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Surrogate Plant Data Base

Volume II Appendix C:

Facilities Planning Baseline Data

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Cambridge MA 02142

May 1983
Final Report

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16. Abstract This four volume report consists of a data base describing "surrogate" automobile and truck manufacturing plants developed as part of a methodology for evaluating capital investment requirements in new manufacturing facilities to build new fleets of automobiles. The report describes the data base, its past uses and potential applications. Separately bound appendices contain the actual data base information. The surrogate plants are typical of automotive manufacturing plants in terms of size, production rates, manufacturing processes, technological sophistication and flexibility. The data for a particular type of surrogate plant, while not representing any specific plant, provides information that, when appropriately aggregated or scaled, will yield accurate industry statistics.			
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PREFACE

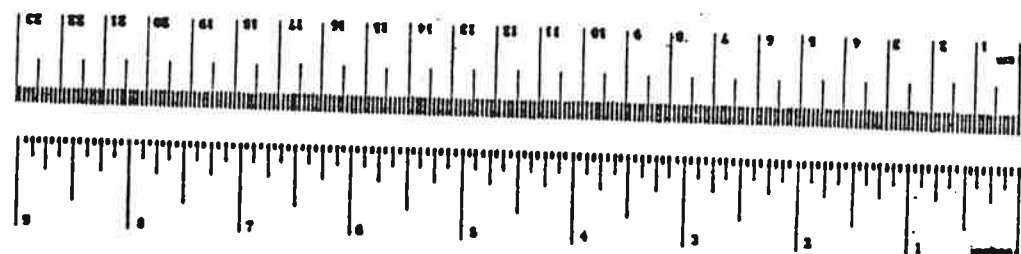
The development of Appendix B--Application of Surrogate Plant Data Base-- was made possible through the efforts of Joseph F. Petrie, who is responsible for this Appendix. The author also wishes to acknowledge the Transportation Consulting Division, a division of Booz, Allen & Hamilton, Inc., and Harbour Associates, Inc., who carried out Contract DOT-TSC-1609 encompassing the acquisition and analysis of information relative to manufacturing equipment required to produce a socially acceptable and efficient motor vehicle. He would also like to thank the staff of Raytheon Service Company for providing support.

METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
LENGTH				
m	inches	2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
AREA				
m ²	square inches	6.5	square centimeters	cm ²
ft ²	square feet	0.09	square meters	m ²
yd ²	square yards	0.8	square meters	m ²
ac	square miles	2.6	square kilometers	km ²
	acres	0.4	hectares	ha
MASS (weight)				
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
VOLUME				
teaspoon	teaspoons	5	milliliters	ml
tablespoon	tablespoons	15	milliliters	ml
fluid ounce	fluid ounces	30	milliliters	ml
cup	cup	0.24	liters	l
pint	pints	0.47	liters	l
quart	quarts	0.94	liters	l
gallon	gallons	3.8	liters	l
cubic foot	cubic feet	0.028	cubic meters	m ³
	cubic yards	0.76	cubic meters	m ³
TEMPERATURE (exact)				
Fahrenheit temperature	8/5 (after subtracting 32)		Celsius temperature	°C

Symbol	When You Know	Multiply by	To Find	Symbol
LENGTH				
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
km	kilometers	1.1	yards	yd
		0.6	miles	mi
AREA				
cm ²	square centimeters	0.16	square inches	in ²
m ²	square meters	1.2	square yards	yd ²
km ²	square kilometers	0.4	square miles	mi ²
ha	hectares (10,000 m ²)	2.5	acres	ac
MASS (weight)				
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	ton
VOLUME				
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	1.1	pints	pt
		1.06	quarts	qt
		0.26	gallons	gal
		36	cubic feet	ft ³
		1.3	cubic yards	yd ³
TEMPERATURE (exact)				
Celsius temperature	9/5 (then add 32)		Fahrenheit temperature	°F



REPORT CONTENT AND ORGANIZATION

This report documents the Surrogate Plant Data Base, covering typical manufacturing plants and facilities representing the major types used to produce motor vehicles. This report is organized into four separate volumes as follows:

o VOLUME I

- INTRODUCTION
- Appendix A describes how the surrogate plant data was developed. It also describes how a manufacturer would plan for a new component or assembly plant including the staffing functions, personnel requirements, leadtime requirements, and cost requirements associated with the planning of a new component, part, or assembly plant.
- Appendix B describes how the surrogate plant data base can be used to develop estimates of the capital cost impacts of developing new facilities or modifying existing facilities. It includes a summary of capital cost impact data on 39 automotive manufacturing plants plus a surrogate plant coding scheme and a method for identifying suppliers to the automotive industry.

o VOLUME II

- Appendix C provides capital cost data for 39 automotive manufacturing plants broken down by major cost element: land, building and equipment, plant facilities, machinery and equipment, and tooling. It also contains a breakdown of the data by major department in the plant, a summary of the plant's size (i.e., square footage) by major department and a diagram depicting the layout of the plant.

o VOLUME III

- Appendix D provides operating manpower, manufacturing plant budgets (i.e., labor, maintenance, utilities, taxes and insurance expenses), and pre-production and launch timing charts and expenses for 10 automotive manufacturing plants. The information presented for the 10 plants is representative of the 39 plants included in Volume II, Appendix C.

o VOLUME IV

- Appendix E discusses the major differences in manufacturing light and heavy duty vehicles in terms of the processes employed and make-up of the plant, and the need to develop surrogate plant data on medium and heavy duty truck assembly and component plants. It includes a list of plants proposed for initial development.

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APPENDIX C
FACILITIES PLANNING BASELINE DATA

This document contains information on the manufacturing processes, capital costs and manpower requirements of 39 major types of plants used in the manufacture of automobiles.

The automobile manufacturers and suppliers in their efforts to produce safe, efficient vehicles are considering the implementation of a broad range of new technologies. The incorporation of each of these new automotive technologies has a major impact on capital investment, employment and productivity. Estimates of the magnitude of each of these impacts on facilities, capital investments, employment and productivity can be assessed by using the manufacturing data contained in this report. The data has been assembled by the Transportation Systems Center (TSC) to help provide answers to a number of important questions concerning the automotive industry such as:

- What are the capital expenditures required by auto manufacturers to retool for the production of fuel efficient vehicles?
- What are the manpower implications of new automotive manufacturing procedures and designs?
- What is the manufacturing cost difference between the old technology vehicle, system or component and the new technology version that is replacing it?

The data on each of the 39 plant types has been presented in the form of "typical" plant descriptions called "surrogate plants." These plant descriptions are based on the hypothesis that over time automotive manufacturing practices have reached a stage of maturity so that there is a reasonably well established industry norm for plant capital expenditures and manpower requirements to manufacture a particular part. The "surrogate plants" are typical in the sense that they have typical:

- Manufacturing process
- Production volume

- Plant size
- Facilities and Equipment
- Manning.

The 39 types of automotive manufacturing facilities included in this document represent the facilities associated with most major automotive components and those components most subject to technological change. When linked together, the surrogate plants describe the bulk of the manufacturing activities in the system required to build automobiles. The data base is unique in the public sector in capturing the detailed automotive manufacturing operations.

Presented below are 1) a detailed description of the data contained in this report and 2) a description of the plants covered.

PLANT DATA

For each plant seven categories of information are provided:

- Basic production and operating assumptions
- Plant capital costs
- Facility planning data
- Process and component summary
- Area required for each department
- Plant layout
- Per unit manufacturing cost.

Presented below are explanations of the information provided under each of these categories.

Basic Production and Operating Assumptions

For each plant all the assumptions used to develop the surrogate plant information--the "typical" characteristics of the plant--are covered under the heading "Basic Production and Operating Assumptions." These are the key assumptions used to determine appropriate plant size, type of machinery and manpower. Key plant characteristics specified in this section include:

- Product manufactured
 - The type of product, detailed as much as necessary to determine the manufacturing processes

- The number of product variations manufactured in the same plant. This determines required plant flexibility and complexity

Production rate

- The number of parts that are manufactured in a year by a typical plant
- The number of shifts used by a typical plant
- The amount of overtime to be expected in a year's production run
- The number of productive days to be expected.

These basic assumptions are important in interpreting the derived plant statistics presented in the later sections. Product complexity and production rate will directly impact manpower and capital requirements.

Plant Capital Costs

For each plant a summary table of plant capital costs is provided. The estimates indicate the costs of building an entirely new plant to manufacture the products. Major elements of the costs include:

- Land
- Site development, which includes clearing the land, road construction, truck and rail areas, lighting, storage, sewers and landscaping
- Building, which includes architectural/engineering work, waste treatment, boilers, scrap facilities, power house, tank farm and paint mixing facilities
- Building support facilities, which includes electrical equipment, cooling equipment, steam, air, water, heating, and telephone equipment
- Manufacturing support facilities, including paint equipment, heat treat equipment, conveyors, cranes, lifts, etc.

- Machinery which includes automatic machinery, welding equipment and related support equipment
- Tooling which includes fixtures for multiwelders, fixtures for automatic body shop, assembly fixtures and guages and checking fixtures.

Facility Planning Data

Data on capital and manpower requirements by plant function are presented under the "Facility Planning" heading. In this section capital and manpower requirements are broken out in detail for each plant function or activity. In some cases manpower and capital requirements for two different production levels are provided. The information by plant function provides data at a level of detail sufficient to identify the capital and manpower requirements by major activity within the plant. The total of all the capital items is the cost of the entire plant.

Process and Component Summary

Plant data under the "Process and Component Summary" heading is the most detailed available. Each major department within the plant is broken out separately to identify department function, capital requirements, manpower requirements and area. Only production facilities and equipment are shown in this section, so total capital costs do not include building and building facilities. In this section labor requirements are broken out by direct labor which includes direct production labor, indirect labor which includes hourly employees associated with overhead activities and salaried labor.

Area Required for Each Department

This section presents the area requirements for the entire plant. This includes manufacturing area, office area and auxiliary area. Manufacturing area is broken down to major departments.

Plant Layout

A layout is shown for each plant. The layout shows typical locations of various departments in a plant, the approximate shape and areas of each department and the separation of plant functions into separate buildings or floors.

Per Unit Manufacturing Cost

For each plant, per unit labor and capital costs are calculated using a set of assumptions for:

- . Employee wage rates
- . Working days per year
- . Depreciation rates
- . Annual production

In addition, estimates are provided for taxes and insurance and other manufacturing costs (maintenance, perishable tools, spoilage, utilities, supplies and other expenses). The data are assembled into a total manufacturing cost per unit. The manufacturing cost includes all costs associated with the operation of the plant. It does not include material costs or costs of ancillary components that may be required to make the product function in an automobile. However, when the typical plants are linked together and adjusted to appropriate production volumes, the costs of input materials and components to one plant are the outputs of another surrogate plant.

PLANTS COVERED

Thirty-nine plants are covered in this document. The major categories are:

PLANT #	TYPE	PLANT #	TYPE
1)	CAR-ASSEMBLY	22)	ENGINE: 8-CYLINDER GAS
2)	LIGHT TRUCK & VAN ASSEMBLY	23)	MANUAL TRANSAXLE
3)	BODY STAMPING	24)	AUTOMATIC TRANSMISSION
4)	HARDWARE	25)	AUTOMATIC TRANSAXLE
5)	ELECTRONIC COMPONENTS	26)	AXLE
6)	PLASTICS MOLDING	27)	C.V. JOINTS AND HALF SHAFTS
7)	TRIM	28)	SUSPENSION
8)	FABRICATED GLASS	29)	BRAKE
9)	HEATER AND AIR CONDITIONER	30)	STEERING COMPONENTS
10)	STEEL FORGING	31)	BUMPER (PLASTIC FASCIA)
11)	GREY IRON FOUNDRY	32)	SEAT BELT
12)	NODULAR IRON FOUNDRY	33)	INSTRUMENTATION
13)	ALUMINUM FOUNDRY	34)	FOAM, PAD AND SUPPORT
14)	ALUMINUM DIE CASTING	35)	SEAT FRAME AND SPRING
15)	ROAD WHEEL	36)	FIBERGLASS REINFORCED
16)	BUMPER (STEEL)		PLASTIC PRODUCTS
17)	ENGINE ELECTRICAL	37)	MANUAL TRANSMISSION
18)	ENGINE: 4-CYLINDER GAS	38)	FRAME
19)	ENGINE: 4-CYLINDER DIESEL	39)	AIR BAG
20)	ENGINE: 6-CYLINDER GAS		
21)	CONDENSER & RADIATOR		

Variations of these plants, such as different vehicle types, engine types and kinds of metal are covered separately.

PLANT NO. 1
PASSENGER CAR ASSEMBLY PLANT

PASSENGER CAR ASSUMPTIONS

PRODUCT

- FWD PASSENGER CAR
- SINGLE CAR LINE
- 2 BODY STYLES (2 DOOR SPORT; 4 DOOR SEDAN)

PRODUCTION RATE

- HOURLY - 75 UNITS
- DAILY - 1200 UNITS
- ANNUAL STRAIGHT TIME - 288,000 @ 240 DAYS (MIN MODEL CHANGE)
- ANNUAL WITH NOMINAL OVERTIME - 300,000 @ 4.2% OVERTIME
- ANNUAL WITH MAXIMUM OVERTIME - 334,000 @ 16% OVERTIME

OPERATING PATTERN

- STRAIGHT TIME - TWO 8 HOUR SHIFTS - 5 DAYS/WEEK - 240 DAYS/YEAR
- MAXIMUM OVERTIME - APPROXIMATELY -9TH HOUR AND EVERY OTHER SATURDAY (8 HOURS)

DAYS/YEAR @ STRAIGHT TIME (AVERAGE)

<u>TYPE OF CHANGE</u>	<u>NUMBER OF PRODUCTION DAYS</u>	<u>EQUIVALENT NUMBER OF LOST DAYS</u>
MINOR CHANGE	240	--
FACE LIFT	235	5
RESKIN	230	10
MAJOR	220	20
RADICAL (RWD TO FWD)	200	40

NEW PASSENGER CAR ASSEMBLY PLANT (NOMINAL ESTIMATE)

<u>LEVEL II</u>		<u>LEVEL I</u> <u>LEVEL II</u>
<u>LAND</u>		
PURCHASE LAND (200 ACRES @ \$10,000/ACRE)	\$ 2,000,000	
SITE DEVELOPMENT	6,000,000	
	<u>SUB TOTAL</u>	<u>\$ 8,000,000</u>
<u>BUILDING & SUPPORT FACILITY</u>		
ENGINEERING	8,000,000	
MANUFACTURING BLDG. (2.2M Sq. Ft. @ \$55/Sq. Ft.)	121,000,000	
POWER HOUSE 3/150,000 # BOILERS	10,000,000	
WASTE TREATMENT	4,000,000	
PAINT MIXING BUILDING	3,000,000	
TANK FARM	2,500,000	
OTHER	<u>2,500,000</u>	
	- USEFUL LIFE-30 YRS - SUBTOTAL	<u>\$151,000,000 (1980 \$)</u>
	+7%	<u>161,570,000 (1981 \$)</u>
<u>BUILDING FACILITIES</u>		
ELECTRICAL	\$ 11,000,000	
RAIL & CARRIER SHIPPING	6,000,000	
UNDERGROUND SERVICES (SEWER, WATER & GAS)	5,000,000	
BUILDING UTILITIES (STEAM, AIR, WATER, GAS)	6,000,000	
HEATING AND VENTILATION	6,000,000	
OTHER	<u>2,000,000</u>	
	- USEFUL LIFE-30 YRS - SUB TOTAL	<u>\$ 36,000,000 (1980 \$)</u>
	+6%	<u>38,160,000 (1981 \$)</u>
<u>PLANT FACILITIES</u>		
PAINT SHOP	\$ 80,000,000	
TOOL ROOM AND MAINTENANCE	5,000,000	
MATERIAL HANDLING EQUIPMENT	3,000,000	
AUTOMATIC SUPPLIER PARTS STORAGE	<u>6,000,000</u>	
	- USEFUL LIFE-12 YRS - SUB TOTAL	<u>\$ 94,000,000 (1980 \$)</u>
	+6%	<u>99,640,000 (1981 \$)</u>
<u>MACHINERY & EQUIPMENT</u>		
PRODUCTION MACHINES & EQUIPMENT	\$ 58,000,000	
TRIM & FINAL CONVEYORS	8,000,000	
MATERIAL HANDLING EQUIPMENT, ETC	22,000,000	
CONTAINERS, RACKS & BINS	4,000,000	
OTHER	<u>1,000,000</u>	
	- USEFUL LIFE-12 YRS - SUBTOTAL	<u>\$ 96,000,000 (1980 \$)</u>
	+6%	<u>101,760,000 (1981 \$)</u>
<u>TOOLING</u>		
NEW VEHICLE 2 BODY STYLE FND	\$ 25,000,000	
	+6%	<u>26,500,000 (1981 \$)</u>
<u>LEVEL I</u>		
TOTAL FACILITIES, EQUIPMENT AND TOOLING	<u>\$410,000,000 (1980 \$)</u>	
	<u>\$435,630,000 (1981 \$)</u>	
<u>PRE-PRODUCTION AND LAUNCH @ APPROXIMATELY 20%</u>		
	\$ 82,000,000	
	+6%	<u>87,126,000 (1981 \$)</u>
	<u>\$492,000,000 (1980 \$)</u>	
	<u>522,756,000 (1981 \$)</u>	
	TOTAL PROGRAM COST	

FACILITIES PLANNING
(NOMINAL ESTIMATE)
(1 of 2)

DATE March 1982

CAPACITY LEVEL I 300,000
CAPACITY LEVEL II

FACILITY TYPE	FACILITY ACTIVITIES		ANNUAL PRODUCTION RATE		MAJOR CAPITAL EXPENDITURES (\$ MILLIONS)		MANPOWER REQUIREMENTS		REMARKS
	FUNCTION	MATERIAL	LEVEL I	LEVEL II	LEVEL I	LEVEL II	LEVEL I	LEVEL II	
PASSENGER CAR ASSEMBLY	o WELDING & ASSEMBLY				o WELDING FIXTURES, WELDERS & AUTOMATION \$65/77 (\$71)		440/520 (480)		
	o PAINTING				o E-COAT PRIME AND AUTOMATIC PAINT SHOP \$70/90 (\$80)		320/380 (350)		
	o TRIM LINE & CHASSIS				o CONVEYORS, FIXTURES & FASTENING EQUIPMENT \$26/30 (\$28)		1145/1325 (1235)		
	o FINAL ASSEMBLY & FINAL OK				o CONVEYORS, FIXTURES, TEST EQUIP. \$20/24 (\$22)		395/475 (435)		
TOTALS									

PRODUCT FWD PASSENGER CAR

FACILITIES PLANNING
(NOMINAL ESTIMATE) (CONT.)
(2 of 2)

DATE March 1982

LEVEL III

CAPACITY LEVEL I 300,000

CAPACITY LEVEL II

FACILITY TYPE	FACILITY ACTIVITIES		ANNUAL PRODUCTION RATE		MAJOR CAPITAL EXPENDITURES (\$ MILLIONS)		MANPOWER REQUIREMENTS		REMARKS
	FUNCTION	MATERIAL	LEVEL I	LEVEL II	LEVEL I	LEVEL II	LEVEL I	LEVEL II	
PASSENGER CAR ASSEMBLY (CONT.)	o PLANT FACILITIES				\$45/55 (\$50)				2,200,000 Sq. Ft. BUILDINGS INCLUDING OFFICE & POWER HOUSE.
	o BUILDING & LAND				\$148/168 (\$158)				
SUBTOTAL							2300/2700 (2500)	D/L	
							1030/1170 (1100)	I/L	
							470/530 (500)	SAL	
TOTALS			288,000 (300,000)		\$374/\$444* (\$410)		3800/4400 (4100)		

PRODUCT FWD PASSENGER CAR

*Major capital expenditures adjusted for 1981 economics \$435,630,000.

**FACILITIES PLANNING
PROCESS AND COMPONENT SUMMARY**

CAPACITY LEVEL I 300,000 DATE March 1982

CAPACITY LEVEL II _____
LEVEL III

MAJOR REQUIREMENTS	DEPARTMENT FUNCTION	MAJOR CAPITAL EXPENDITURES (\$ MILLIONS)			AREA (SQ. FT.)	MANPOWER REQUIREMENTS			REMARKS
		LEVEL I	LEVEL II	TOTAL		LEVEL I	LEVEL II		
							D/L	D/L	
Body Shop	Sub-Assemblies & Body Assembly	\$45			470,000	480			Automated
Paint Shop	Paint Bodies & Small Parts	80			525,000	350			Electro-coat Primer Automatic Spray Paint
Trim Line	Attach Parts to Body Prior to Installing Engine & Drive Train Components	15			225,000	570			
Engine Dress-Up	Adding Parts to Base Engine to Ready for Car Installation	5			25,000	115			
Chassis Line	Car Put on Wheels and Rolls Tested & Driven Off Line	15			180,000	550			
Pre-Final & Final Line	Add Interior Trim & Finish Car	10			108,000	215			
Cushion & Tire Room	"Spring-Up" Seats & Install Tires on Wheels	6			190,000	100			
Car Conditioning & Quality O.K.	Ready Car for Final "Buy Off" & Repair as Required	5			135,000	120			Automated Check-out Process
Other					22,000				
TOTALS		*181			1,880,000	2500			TOTAL DIRECT LABOR
						1100			TOTAL INDIRECT LABOR
						500			TOTAL SALARY LABOR
						4100			TOTAL MANPOWER

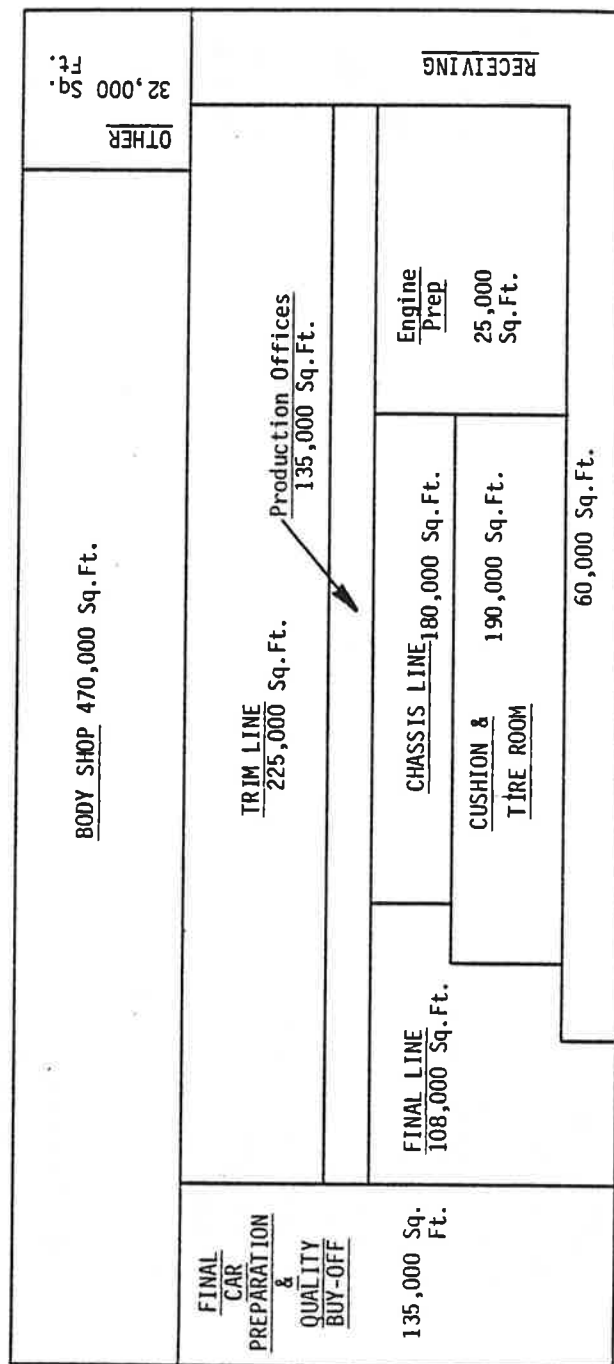
PRODUCT FWD Passenger Car

*Major capital expenditures adjusted for (1981) economies 6% = \$191,860,000

PASSENGER CAR ASSEMBLY PLANT
(SQUARE FEET)

<u>OFFICE BUILDING</u>		<u>AREA</u>
<u>MANUFACTURING BUILDING</u>		<u>70,000</u>
<u>FIRST FLOOR</u>	975' x 1600'	
BODY SHOP		470,000
TRIM LINE		225,000
CHASSIS LINE		180,000
ENGINE DRESS-UP		25,000
PRE-FINAL & FINAL LINE		108,000
CAR CONDITIONING, REPAIR & QUALITY O. K.		135,000
CUSHION ROOM		190,000
PRODUCTION OFFICE & MAINTENANCE		135,000
RECEIVING		60,000
OTHER		32,000
TOTAL		<u>1,560,000</u>
<u>SECOND FLOOR</u>	350' x 1500'	
BODY PAINT SHOP		395,000
SMALL PARTS PAINT		130,000
TOTAL		<u>525,000</u>
<u>GRAND TOTAL MANUFACTURING</u>		2,085,000
<u>AUXILIARY</u>		
		<u>45,000</u>
<u>GRAND TOTAL</u>		2,130,000

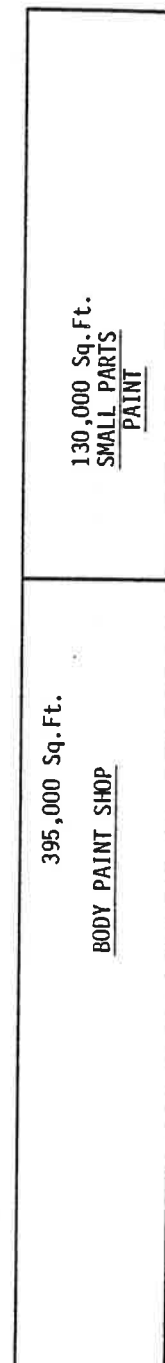
PASSENGER CAR ASSEMBLY PLANT
BUILDING LAYOUT



975'

OFFICE
BUILDING
90x350
2 STORIES

1600'
FIRST FLOOR - 1,560,000 Sq.Ft.



350'

1500'
SECOND FLOOR - 525,000 Sq.Ft.

PASSENGER CAR ASSEMBLY
TOTAL MANUFACTURING COST
(EXCLUDING MATERIAL)

PRODUCTION: 288,000 CARS PER YEAR

MANPOWER:	240 DAYS	EMPLOYEES	ANNUAL HOURS	HRS/UNIT
- DIRECT LABOR	- 1920 -	2,788	5,352,960	18.59
- INDIRECT - HOURLY	- 1920 -	1,130	2,169,600	7.53
- INDIRECT - SALARY	- 2000 -	503	1,006,000	3.49
		<u>4,421</u>	<u>8,528,560</u>	<u>29.61</u>

ANNUAL HOURS ÷ 288,000 UNITS = HOURS PER UNIT = 29.61

WAGE & FRINGE COSTS:

- DIRECT LABOR	\$19.50	X	18.59	=	\$362.51
- INDIRECT - HOURLY	\$21.50	X	7.53	=	\$161.90
- INDIRECT - SALARY	\$23.50	X	3.49	=	\$82.02
					<u>\$606.43</u>
	TOTAL WAGE & FRINGE COSTS				

INVESTMENT: (1981\$)

	FACILITIES COST	DEPRECIATION	COST-PER-UNIT
- BUILDING & SUPPORT FACILITIES USEFUL LIFE - 30 YRS	\$161,570,000	5,385,666	\$18.70
- BUILDING FACILITIES USEFUL LIFE - 30 YRS	\$38,160,000	1,272,000	4.42
- PLANT FACILITIES USEFUL LIFE - 12 YRS	\$99,640,000	8,303,333	28.83
- MACHINERY & EQUIPMENT USEFUL LIFE - 12 YRS	\$101,760,000	8,480,000	29.44
			<u>\$81.39</u>

DEPRECIATION ÷ 288,000 UNITS = TOTAL DEPRECIATION PER UNIT = \$81.39

TAXES & INSURANCE AS PERCENT OF WAGE & FRINGE COST

T & I \$7.5M ÷ \$162.1M = 4.6% \$606.43 X 4.6% = \$27.90

OTHER MANUFACTURING COST AS PERCENT OF WAGE & FRINGE COST

OME \$21.4M ÷ 162.1M = 13.2% \$606.43 X 13.2% = \$80.05

TOTAL WAGE & FRINGE COSTS	\$606.43
TOTAL DEPRECIATION COSTS	\$81.39
TOTAL TAXES & INSURANCE	\$27.90
TOTAL OME	\$80.05
TOTAL	<u>\$795.73</u>

PLANT 2
LIGHT DUTY TRUCK & VAN ASSEMBLY PLANT

ASSUMPTIONS

STANDARD LIGHT DUTY TRUCK ASSEMBLY PLANT

PRODUCT

- CONVENTIONAL R.W.D. PICK-UP TRUCK WITH INTEGRAL BOX.
- TWO BODY STYLES - REGULAR AND CLUB CAB
- 6 FOOT AND 8 FOOT BOXES
- 2x4 AND 4x4 VERSIONS
- POPULAR OPTIONS OFFERED - (POWER STEERING & POWER BRAKES, AIR CONDITIONING, AUTOMATIC TRANSMISSION, AM-FM RADIO, TWO-TONE PAINT WITH SPECIAL TRIM, SPECIAL TIRES, ETC.)
- 6 CYLINDER GAS AND DIESEL ENGINES PLUS V-8 GAS ENGINES OFFERED.

PRODUCTION RATE

- HOURLY 40 UNITS
- DAILY 640 UNITS
- ANNUAL STRAIGHT TIME -- 153,600 (150,000 NOMINAL)
- ANNUAL WITH MAXIMUM PRACTICAL OVERTIME - 178,200 (16% O/T)

OPERATING PATTERN

- STRAIGHT TIME -- TWO 8 HOUR SHIFTS -- 5 DAYS/WEEK -- 240 DAYS/YEAR
- MAXIMUM PRACTICAL OVERTIME -- 9TH HOUR DURING WEEK AND APPROXIMATELY EVERY OTHER SATURDAY (8 HOURS) 16%

MANUFACTURING

- LAND WILL PERMIT EXPANSION
- BUILDING AND PAINT FACILITIES CAPABLE OF HANDLING VANS AND WAGONS

STANDARD LIGHT DUTY TRUCK ASSEMBLY PLANT (NOMINAL ESTIMATE)

<u>LEVEL II</u>		<u>LEVEL I</u>	<u>LEVEL II</u>
<u>LAND</u>			
	PURCHASE LAND (200 ACRES @ \$10,000/ACRE)		\$ 2,000,000
	SITE DEVELOPMENT		4,500,000
	SUB TOTAL		\$ 6,500,000
<u>BUILDING & SUPPORT FACILITY</u>			
	ENGINEERING		\$ 5,500,000
	MANUFACTURING BLDG. (1.45M Sq. Ft. \$ \$55/Sq. Ft.)		80,000,000
	POWER HOUSE - BOILERS AND COMPRESSORS		8,000,000
	WASTE TREATMENT		3,500,000
	PAINT MIXING BUILDING		2,500,000
	TANK FARM		2,000,000
	OTHER (OFFICE BUILDING)		2,000,000
	USEFUL LIFE-30 YRS - SUB TOTAL		\$103,500,000 (1980 \$)
		+7%	110,745,000 (1981 \$)
<u>BUILDING FACILITIES</u>			
	ELECTRICAL		\$ 8,000,000
	RAIL AND CARRIER SHIPPING		5,000,000
	UNDERGROUND SERVICES (SEWER, WATER, GAS)		3,000,000
	BUILDING UTILITIES (STEAM, AIR, WATER, GAS)		4,000,000
	HEATING AND VENTILATION		4,000,000
	OTHER		2,000,000
	USEFUL LIFE-30 YRS - SUB TOTAL		\$ 26,000,000 (1980 \$)
		+6%	27,560,000 (1981 \$)
<u>PLANT FACILITIES</u>			
	PAINT SHOP		\$50,000,000
	TOOL ROOM AND MAINTENANCE		4,000,000
	MATERIAL HANDLING EQUIPMENT		2,500,000
	AUTOMATIC SUPPLIER PARTS STORAGE		6,000,000
	USEFUL LIFE-12 YRS - SUB TOTAL		\$ 62,500,000 (1980 \$)
		+6%	66,250,000 (1981 \$)
<u>MACHINERY & EQUIPMENT</u>			
	PRODUCTION MACHINE AND EQUIPMENT		\$20,000,000
	CHASSIS, TRIM AND FINAL CONVEYORS		4,000,000
	MATERIAL HANDLING TRUCKS AND EQUIPMENT, ETC.		13,000,000
	CONTAINERS, RACK, BINS		3,000,000
	OTHER		1,000,000
	USEFUL LIFE-12 YRS - SUB TOTAL		\$ 43,000,000 (1980 \$)
		+6%	45,580,000 (1981 \$)
<u>TOOLING</u>			
	NEW VEHICLE (2 BODIES, 2 BOXES, (2x4, 4x4)		\$ 12,500,000 (1980 \$)
		+6%	13,250,000 (1981 \$)
<u>LEVEL I</u>			
	TOTAL FACILITIES, EQUIPMENT AND TOOLING		\$254,000,000 (1980 \$)
			269,855,000 (1981 \$)
<u>PRE-PRODUCTION AND LAUNCH @ APPROXIMATELY 20%</u>			
			\$ 50,800,000 (1980 \$)
			53,971,000 (1981 \$)
	TOTAL PROGRAM COST		\$304,800,000 (1980 \$)
			323,826,000 (1981 \$)

FACILITIES PLANNING (NOMINAL ESTIMATE) (1 of 2)

DATE: March 1982

CAPACITY LEVEL I 150,000
CAPACITY LEVEL II

Level III

FACILITY TYPE	FACILITY ACTIVITIES		ANNUAL PRODUCTION RATE		MAJOR CAPITAL EXPENDITURES (\$ MILLIONS)		MANPOWER REQUIREMENTS		REMARKS
	FUNCTION	MATERIAL	LEVEL I	LEVEL II	LEVEL I	LEVEL II	LEVEL I	LEVEL II	
TRUCK ASSEMBLY	WELDING & ASSEMBLY				WELDING FIXTURES, WELDERS, AUTOMATION \$29/\$37 (\$33)		395/455 (425)		
	PAINTING				E-COAT PRIME & AUTOMATIC PAINT SHOP \$45/\$55 (\$50)		135/165 (150)		
	TRIM LINE & CHASSIS				CONVEYORS, FIXTURES, & FASTENING EQUIPMENT \$14/\$16 (\$15)		915/1035 (975)		
	FINAL ASSEMBLY & FINAL OP				CONVEYORS, FIXTURES, TEST EQUIPMENT \$11/\$13 (\$12)		230/270 (250)		
	PLANT FACILITIES				\$30/\$38 (\$34)				
SUB TOTAL	BUILDING & LAND				\$100/\$120 (\$110)				1,450,000 SQ. FT. BUILDING INCLUDING OFFICES & POWER HOUSE
							1675/1925 (1800)	D/L	
							800/900 (850)	I/L	
TOTALS							425/475 (450)	SAL	
			150,000		\$229/\$279 (\$254) *		2900/3300 (3100)		

STANDARD LIGHT
PRODUCT DUTY PICK-UP TRUCK

CAPACITY LEVEL I 150,000/YEAR

DATE March 1982

CAPACITY LEVEL II

Level III

MAJOR REQUIREMENTS	DEPARTMENT FUNCTION	MAJOR CAPITAL EXPENDITURES (\$ MILLIONS)			AREA (SQ. FT.)	MANPOWER REQUIREMENTS			REMARKS
		LEVEL I	LEVEL II	TOTAL		LEVEL I	LEVEL II	D/L	
BODY SHOP	SUB-ASSYS AND BODY & BOX ASSY.	\$19.5			345,000			425	SOME AUTOMATION
PAINT SHOP	PAINT BODIES & SMALL PARTS	50.0			350,000			150	ELECTRO-COAT PRIMER
TRIM LINE	ATTACH PARTS TO BODY PRIOR TO INSTALLING ENGINE & DRIVE COMPONENTS	8.0			193,000			350	AUTOMATIC SPRAY PAINT
ENGINE DRESS-UP	ADDING PARTS TO BARE ENGINE TO READY FOR INSTALLATION	4.0			25,000			80	
CHASSIS & FINAL LINE	PUTTING VEHICLE ON WHEELS AND DRIVE OFF LINE A FINISHED VEHICLE	8.0			158,000			675	WATER TEST & ELECTRONIC CHECK OF ELECTRICAL
CUSHION & TIRE ROOM	SPRING-UP SEATS & INSTALL TIRES ON WHEELS	4.0			60,000			35	
TRUCK CONDITIONING & QUALITY O.K.	READY TRUCK FOR FINAL BUY-OFF & REQUIRED REPAIRS.	4.0			93,000			85	AUTOMATED CHECK-OUT PROCESS
OTHER					8,000				
TOTALS		\$97.5 *			1,232,000			1800	TOTAL DIRECT LABOR
								850	TOTAL INDIRECT LABOR
								450	TOTAL SALARY LABOR
								3100	TOTAL MANPOWER

PRODUCT STANDARD LIGHT DUTY PICK-UP TRUCK

*Major capital expenditures adjusted for 1981 economics \$110,743,000.

STANDARD LIGHT DUTY TRUCK ASSEMBLY PLANT

AREA (SQ. FT.)

OFFICE BUILDING

32,000

MANUFACTURING BUILDING

1st FLOOR

700' x 1500'

BODY SHOP (INCLUDING SUB-ASSEMBLIES)

345,000

TRIM LINE

193,000

CHASSIS LINE & FINAL LINE

158,000

ENGINE DRESS-UP

25,000

TRUCK CONDITIONING REPAIR & QUALITY O.K.

93,000

CUSHION & TIRE ROOM

60,000

PRODUCTION OFFICE, CAFETERIA & MAINTENANCE

68,000

RECEIVING & SHIPPING

100,000

OTHER

8,000

SUB-TOTAL

1,050,000

2nd FLOOR

350' x 1000'

BODY PAINT SHOP

270,000

SMALL PARTS PAINT

72,000

OTHER

8,000

SUB-TOTAL

350,000

GRAND TOTAL MANUFACTURING

1,400,000

AUXILIARY (OUTSIDE MAIN BUILDING)

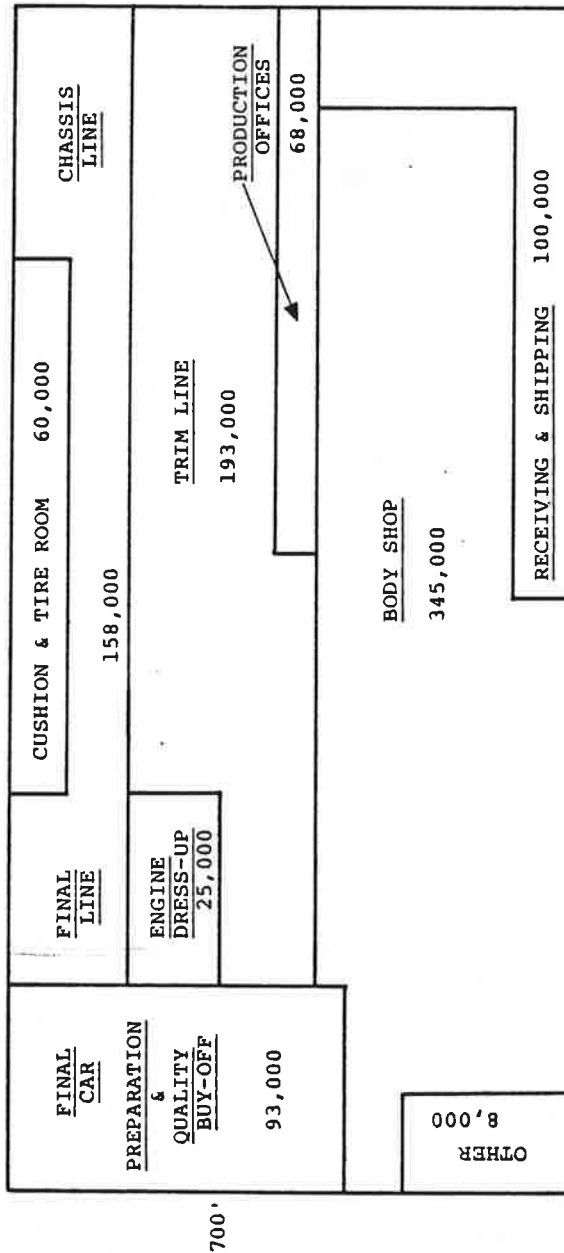
28,000

GRAND TOTAL

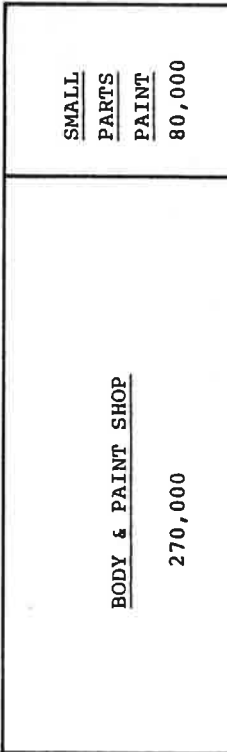
1,460,000

STANDARD LIGHT DUTY TRUCK ASSEMBLY PLANT

BUILDING LAYOUT (AREA IN SQ.FT.)



FIRST FLOOR 1,050,000 SQ. FT.



OFFICE BUILDING

90' x 350'
1 STORY

SECOND FLOOR 350,000 SQ.FT.,
1000'

LIGHT DUTY TRUCK & VAN ASSEMBLY PLANT
TOTAL MANUFACTURING COST
 (EXCLUDING MATERIAL)

PRODUCTION: 150,000 UNITS PER YEAR

<u>MANPOWER:</u>	<u>240 DAYS</u>	<u>EMPLOYEES</u>	<u>ANNUAL HOURS</u>	<u>HRS/UNIT</u>
- DIRECT LABOR	1920	1800	3,456,000	23.04
- INDIRECT - HOURLY	1920	850	1,632,000	10.88
- INDIRECT - SALARY	2000	450	900,000	6.00
		<u>3100</u>	<u>5,988,000</u>	<u>39.92</u>

ANNUAL HOURS ÷ 150,000 UNITS = HOURS PER UNIT = 39.92

WAGE & FRINGE COSTS:

- DIRECT LABOR	\$19.50	x	23.04	=	\$449.28
- INDIRECT - HOURLY	\$21.50	x	10.88	=	\$233.92
- INDIRECT - SALARY	\$23.50	x	6.00	=	\$141.00
	<u>TOTAL WAGES & FRINGE COSTS</u>				
					<u>\$824.20</u>

INVESTMENTS: (1981\$)

	<u>FACILITIES COST</u>	<u>DEPRECIATION</u>	<u>COST-PER-UNIT</u>
- BUILDING & SUPPORT FACILITIES USEFUL LIFE - 30 YRS	\$110,745,000	\$3,691,500	\$24.13
- BUILDING FACILITIES USEFUL LIFE - 30 YRS	\$ 27,560,000	918,666	6.32
- PLANT FACILITIES USEFUL LIFE - 12 YRS	\$ 66,250,000	5,520,833	36.81
- MACHINERY & EQUIPMENT USEFUL LIFE - 12 YRS	\$ 45,580,000	3,798,333	25.32
			<u>\$92.58</u>

DEPRECIATION ÷ 150,000 UNITS = TOTAL DEPRECIATION PER UNIT = \$92.58

TAXES & INSURANCE AS PERCENT OF WAGE & FRINGE COST

T & I ESTIMATE OF 3.9% \$824.20 X 3.9% = \$32.14

OTHER MANUFACTURING COST AS PERCENT OF WAGE & FRINGE COST

OME ESTIMATE OF 13.2% \$824.20 X 13.2% = \$108.79

TOTAL WAGE & FRINGE COSTS \$ 824.20

TOTAL DEPRECIATION COSTS \$ 92.58

TOTAL TAXES & INSURANCE \$ 32.14

TOTAL OME \$ 108.79

TOTAL \$1057.71

PLANT NO. 3
BODY STAMPING PLANT

NEW STAMPING PLANT ASSUMPTIONS

PRODUCT

- o SELECTED SHEET METAL STAMPINGS & STAMPING ASSEMBLIES FOR SUB-COMPACT PASSENGER CAR & PASSENGER CAR DERIVED TRUCK VEHICLES. (MAJOR PANEL INTERCHANGEABILITY-EXHIBIT A)

- o ALL VEHICLES ARE FRONT WHEEL DRIVE

- o MAJOR ASSEMBLY SOURCING (EXHIBIT A)

OPERATING
PATTERN

- o NORMAL OPERATING PATTERN

TWO (8) HOUR SHIFTS PER DAY
245 DAYS PER YEAR

- o OVERTIME

MAJOR PRESS LINES - (SELECTIVE) 20% TOTAL
OTHER - 9TH HOUR (12.5%) & ALTERNATE SATURDAYS (10%)

PRODUCTION

- o BASED ON 30,000 ANNUAL EQUIVALENT CAR SETS PRODUCED (AT STRAIGHT TIME) BY EACH MAJOR PRESS LINE, PLANT IS SIZED FOR AN ANNUAL VEHICLE ASSEMBLY REQUIREMENT OF 900,000 UNITS.

PASSENGER CAR	600,000
TRUCK	300,000
TOTAL	<u>900,000</u>

FACILITIES &
EQUIPMENT

- o MAJOR PRESS LINES RANGE FROM 84" TO 180" IN BED SIZE.

- o CONVENTIONAL (NON AUTOMATED) DIE CHANGE.

- o CURRENT STATE OF ART MECHANICAL HANDLING.

- o ASSEMBLY EQUIPMENT & PROCESSING CONSISTENT WITH CURRENT NORTH AMERICAN ENGINEERING DESIGN LEVELS.

NEW STAMPING PLANT
MAJOR PANEL INTERCHANGEABILITY AND MAJOR ASSEMBLY CHART

MAJOR PANEL	REQ'D. VEH.	TWO DOOR	FOUR DOOR	FOUR DOOR MGN.	TRUCK	PANELS	MAJOR ASSY.	REMARKS
FRONT FENDER	2	C	C	C	C	2		
FRT. FEND.W/HOUSE	2	C	C	C	C	2		
FRONT YOKE	1	C	C	C	C	1		
HOOD - INNER	1	C	C	C	C	1		
- OUTER	1	C	C	C	C	1		
COWL TOP	1	C	C	C	C	1		
COWL - INNER	1	C	C	C	C	1		
ROOF - INNER	1	2	4	4W	T	4		
- OUTER	1	2	4	4W	T	4		
OPERATURE - SIDE	2	2	4	4W	X	6		
FRONT DOOR - INNER	2	2	4	4	T	6		
- OUTER	2	2	4	4	T	6		
REAR DOOR - INNER	2	X	4	4W	X	4		
- OUTER	2	X	4	4W	X	4		
FLOOR PAN - FRONT	1	2	4	4W	T	4		
- REAR	1	2	4	4W	X	3		
DECK LID - INNER	1	X	4	X	X	1		
- OUTER	1	X	4	X	X	1		
LIFT GATE - INNER	1	2	X	X	X	1		
- OUTER	1	2	X	X	X	1		
RR. WHEL. - W/HOUSE	2	C	C	C	X	4		
CAB-REAR	1	X	X	X	T	1		
CARGO BOX - FRONT	1	X	X	X	T	1		
- SIDE	2	X	X	X	T	2		
- FLOOR CTR.	1	X	X	X	T	1		
- FLOOR SIDES	2	X	X	X	T	2		
TAIL GATE - INNER	1	X	X	X	T	1		
- OUTER	1	X	X	X	T	1		
						TOTAL	TOTAL	
						67	18	

NOTES: 'C' USAGE IS COMMON PANEL
'X' APPLICATION NOT APPLICABLE
'4W' 4 DOOR WAGON ONLY
'T' TRUCK ONLY

EXHIBIT 'A'

FACILITIES PLANNING NEW STAMPING PLANT (NOMINAL ESTIMATE)

		LEVEL I	LEVEL II
<u>LEVEL II</u>			
<u>LAND</u>			
	PURCHASE LAND 225 ACRES @ \$10,000/ACRE	\$ 2,250,000	
	SITE DEVELOPMENT	6,700,000	
	SUB TOTAL		\$ 8,950,000
<u>BUILDING & SUPPORT FACILITIES</u>			
	ENGINEERING	\$ 6,000,000	
	MANUFACTURING BLDG (2.4M Sq. Ft. @ \$90/Sq. Ft.)	216,000,000	
	POWER HOUSE - BOILERS & COMPRESSORS	22,000,000	
	SCRAP BAILER	550,000	
	WASTE TREATMENT	9,000,000	
	MISC. OTHER	4,000,000	
	- USEFUL LIFE-30 YRS - SUB TOTAL		\$257,550,000 (1980 \$)
		+7%	275,578,500 (1981 \$)
<u>BUILDING FACILITIES</u>			
	ELECTRICAL	\$ 9,000,000	
	CRANES, CONVEYORS & SCRAP HANDLING	10,000,000	
	UTILITIES (SEWER, WATER & GAS)	10,000,000	
	HEATING & VENTILATING	6,000,000	
	- USEFUL LIFE-30 YRS - SUB TOTAL		\$ 35,000,000 (1980 \$)
		+6%	37,100,000 (1981 \$)
<u>PLANT FACILITIES</u>			
	TOOL & DIE ROOM	\$ 11,200,000	
	MATERIAL HANDLING EQUIPMENT	4,000,000	
	MISC. OTHER (IN-PLANT CONTAINERS, RACKS)	5,000,000	
	- USEFUL LIFE-12 YRS - SUB TOTAL		\$ 20,200,000 (1980 \$)
		+6%	21,200,000 (1981 \$)
<u>MACHINERY & EQUIPMENT</u>			
	BLANKER & AUTOMATIC (25)	\$ 17,500,000	
	MAJOR PRESS LINES (30)	180,000,000	
	FLOOR MOUNTED PRESSES (100)	9,000,000	
	ASSEMBLY LINES	6,800,000	
	- USEFUL LIFE-12 YRS - SUB TOTAL		\$213,300,000 (1980 \$)
		+6%	226,098,000 (1981 \$)
<u>LEVEL I</u>	TOTAL FACILITIES, EQUIPMENT AND TOOLING		\$535,000,000 (1980 \$)
			568,926,500 (1981 \$)
<u>PRE-PRODUCTION AND LAUNCH @ APPROXIMATELY 20%</u>			\$107,000,000 (1980 \$)
			113,420,000 (1981 \$)
	TOTAL PROGRAM COST		\$642,000,000 (1980 \$)
			682,346,500 (1981 \$)

FACILITIES PLANNING (1 of 2)

CAPACITY LEVEL I 900,000 Car Sets
CAPACITY LEVEL II

DATE March 1982

Level III

FACILITY TYPE	FACILITY ACTIVITIES		ANNUAL PRODUCTION RATE		MAJOR CAPITAL EXPENDITURES (\$ MILLIONS)		MANPOWER REQUIREMENTS		REMARKS
	FUNCTION	MATERIAL	LEVEL I	LEVEL II	LEVEL I	LEVEL II	LEVEL I	LEVEL II	
Sheet Metal Stamping & Assy.			900,000						Production Rate Expressed as Equivalent Car Sets.
	Blanker & Automatic				16/18				
	Major Press Lines				160/200		705		Total Manpower For Large Press
	Floor Mounted Presses				8/10		180		
	Assy. Lines				6/8		615		
	Land Building & Equipment				290/344				
SUBTOTAL							1415/1585 (1500)		Direct Labor
							1700/1900 (1800)		Indirect Labor
							475/525 (500)		Salary
TOTALS			900,000		480/580 (535) *		3590/4010 (3800)		

PRODUCT Sheet Metal Stampings & Assys.

*Major capital expenditures adjusted for 1981 economics \$568,926,500.

**FACILITIES PLANNING
PROCESS AND COMPONENT SUMMARY**
(2 of 2)

CAPACITY LEVEL I 900,000 Car Sets

DATE March 1982

CAPACITY LEVEL II

Level III

MAJOR REQUIREMENTS	DEPARTMENT FUNCTION	MAJOR CAPITAL EXPENDITURES (\$ MILLIONS)			AREA (SQ. FT.)	MANPOWER REQUIREMENTS			REMARKS
		LEVEL I	LEVEL II	TOTAL		LEVEL I	LEVEL II	D/L	
Large Press	Decoil, Blank & Automatic Press Forming	17.5		17.5	280,000				Total Manpower for Large Press
Large Press	Press Forming	180.0		180.0	480,000	705			
Floor Mounted Press	Press Forming	9.0		9.0	120,000	180			
Assembly	Hemming/Manual & Automatic Welding	6.8		6.8	420,000	615			
TOTALS		* 213.3		213.3	1,300,000	1500			TOTAL DIRECT LABOR
						1800			TOTAL INDIRECT LABOR
						500			TOTAL SALARY LABOR
						3800			TOTAL MANPOWER

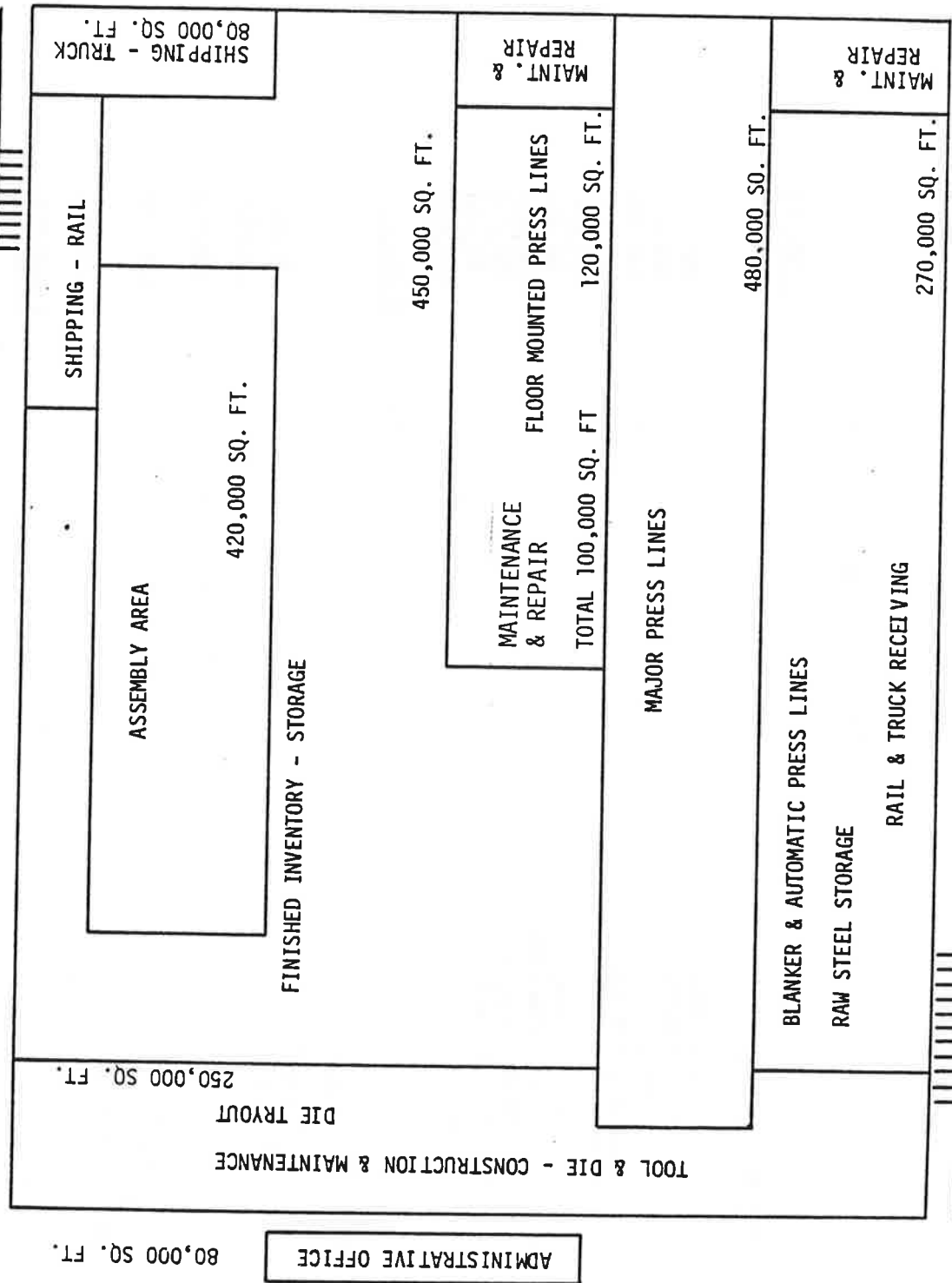
PRODUCT Sheet Metal Stamping & Assys.

*Major capital expenditures adjusted for 1981 economics \$226,098,000.

NEW STAMPING PLANT AREA BREAKDOWN

	<u>SQ. FT.</u>
<u>MANUFACTURING BUILDING</u>	
RAW STEEL STORAGE	160,000
BLANKER & AUTOMATIC PRESS	120,000
MAJOR PRESS	480,000
FLOOR MOUNTED PRESS	120,000
ASSEMBLY	420,000
FINISHED SHIPPING	80,000
TOOL & DIE ROOM (CONSTRUCTION & MAINTENANCE)	250,000
MAINTENANCE & REPAIR	100,000
VENDING, RESTROOMS, LOCKERS	40,000
FINISHED & IN PROCESS INVENTORY STORAGE	<u>450,000</u>
TOTAL MANUFACTURING BUILDING	2,220,000
<u>SUPPORT BUILDINGS</u>	
POWER HOUSE	55,000
SCRAP BAILER	<u>25,000</u>
TOTAL SUPPORT BUILDINGS	80,000
<u>MISC. OTHER</u>	125,000
<u>ADMINISTRATIVE OFFICE</u>	<u>75,000</u>
TOTAL PLANT	<u><u>2,500,000</u></u>

NEW STAMPING PLANT LAYOUT



BODY STAMPING PLANT
TOTAL MANUFACTURING COST
(EXCLUDING MATERIAL)

PRODUCTION: 900,000 CAR SETS PER YEAR

MANPOWER:	245 DAYS	EMPLOYEES	ANNUAL HOURS	HRS/UNIT
- DIRECT LABOR	- 1960 -	1,500	2,940,000	3.27
- INDIRECT - HOURLY	- 1960 -	1,350	2,646,000	2.94
- INDIRECT - SALARY	- 2000 -	500	1,000,000	1.11
		<u>3,350</u>	<u>6,586,000</u>	<u>7.32</u>

ANNUAL HOURS ÷ 900,000 CAR SETS = HOURS PER CAR = 7.32

WAGE & FRINGE COSTS:

- DIRECT LABOR	\$19.50	X	3.27	=	\$63.77
- INDIRECT - HOURLY	\$21.50	X	2.94	=	\$63.21
- INDIRECT - SALARY	\$23.50	X	1.11	=	\$26.08
	TOTAL WAGE & FRINGE COSTS				<u>\$153.06</u>

INVESTMENT: (1981\$)

	FACILITIES COST	DEPRECIATION	COST-PER-UNIT
- BUILDING & SUPPORT FACILITIES USEFUL LIFE - 30 YRS	\$275,578,500	9,185,950	\$10.21
- BUILDING FACILITIES USEFUL LIFE - 30 YEARS	\$ 37,100,000	1,236,666	1.37
- PLANT FACILITIES USEFUL LIFE - 12 HRS	\$ 21,200,000	1,766,666	1.96
- MACHINERY & EQUIPMENT USEFUL LIFE - 12 YRS	\$226,098,000	18,841,500	20.94
			<u>\$34.48</u>

DEPRECIATION ÷ 900,000 UNITS = TOTAL DEPRECIATION PER UNIT = \$34.48

TAXES & INSURANCE AS PERCENT OF WAGE & FRINGE COST

T & I \$4.4M ÷ \$127.2M = 3.5% \$153.06 X 3.5% = \$5.36

OTHER MANUFACTURING COST AS PERCENT OF WAGE & FRINGE COST

OME \$27.48M ÷ \$127.2M = 21.6% \$153.06 X 21.6% = \$33.06

TOTAL WAGE & FRINGE COSTS	\$153.06
TOTAL DEPRECIATION COSTS	34.48
TOTAL TAXES & INSURANCE	\$5.36
TOTAL OME	33.06
TOTAL	<u>\$225.96</u>

PLANT 4

HARDWARE PLANT

(B2-A/B2-B/B2-C/B2-D/B2-E B2-F/B2-G)

NEW BODY HARDWARE PLANT ASSUMPTIONS

PRODUCT

- Decorative Interior & Exterior Body Hardware Parts
- Functional (Operating) Body Hardware Parts
- Separate Parts Listing for Seven Plants

OPERATING
PATTERN

- Normal Operating Pattern - Fabrication & Assembly
245 Days Per Year
Two (8) Hour Shifts Per Day

- Overtime

Saturday Operations as required.

PRODUCTION

- Plant is sized to accommodate an annual vehicle assembly requirement (Level II) of 1,200,000 units. Facilities & equipment expansion (from Level I to Level II) will require minimal re-arrangement expense.

FACILITIES
& EQUIPMENT

- Current state of the art facilities & equipment

NEW BODY HARDWARE PLANT
PLANT B2-A
PRODUCT LISTING

PART DESCRIPTION	MATERIAL
Exterior Finish Hardware - Functional	
Front & Rear Door Handle	Zinc Die Cast
Tail Gate/Lift Gate Handle	Zinc Die Cast
Interior Finish Hardware - Functional	
Front & Rear Door Handle	Zinc Die Cast & Plastic
Front & Rear Door Window Regulator Crank Arm	Plastic & Metal
Tail Gate/Lift Gate Handle	Zinc Die Cast & Plastic
Head Lamp Mounting Hardware	Steel (Coated)

NEW BODY HARDWARE PLANT

PLANT B2-B

PRODUCT LISTING

PART DESCRIPTION	MATERIAL
Front Door Hinges	Steel
Rear Door Hinges	Steel
Deck Lid Hinges	Steel
Hood Hinge	Steel
Hood Latch	Steel
Hood Latch Release (Outside)	Steel
Hood Latch Release (Inside)	Steel
Hood Latch Striker	Steel
Hood Safety Catch	Steel
Front Door Latch	Steel/Plastic
Rear Door Latch	Steel/Plastic
Door Striker	Steel
Front Door Window Regulator	Plastic & Steel
Rear Door Window Regulator	Plastic & Steel
Manual Seat Adjustor	Steel

NEW BODY HARDWARE PLANT
 PLANT B2-C
 PRODUCT LISTING

PART DESCRIPTION	MATERIAL
Exterior Moldings & Finish Parts	
Windshield Moldings	Stainless Steel/Aluminum
Front Door - Side Glass Moldings	Stainless Steel/Aluminum
Rear Door - Side Glass Moldings	Stainless Steel/Aluminum
Rear Window Moldings	Stainless Steel/Aluminum
Body Side Moldings	Stainless Steel/Aluminum
Sill (Rocker Panel) Moldings	Stainless Steel/Aluminum
Fender Opening	Stainless Steel/Aluminum
Hood	Stainless Steel/Aluminum
Miscellaneous Other	Stainless Steel/Aluminum
Deck Lid/Tail Gate	Stainless Steel/Aluminum
Deck Opening	Stainless Steel/Aluminum
Front Grille	Stainless Steel/Aluminum
Center Pillar	Stainless Steel/Aluminum
Roof	Stainless Steel/Aluminum
Interior Moldings & Finish Parts	
Windshield Moldings	Stainless Steel/Aluminum
Front Door	OR
Rear Door	Plastic
Quarter Window	
Rear Window/Tail Gate Opening	
Deck Lid/Tail Gate (Other)	
Wheel Covers/Hub Caps/Trim Rings	Stainless Steel/Aluminum

NEW BODY HARDWARE PLANT
PLANT B2-D
PRODUCT LISTING

PART DESCRIPTION	MATERIAL
Exterior Medallions/Ornaments/Name Plates	
Front Door	Plastic
Rear Door	Plastic
Body Side	Plastic
Fender	Plastic
Hood	Plastic
Miscellaneous Other	Plastic
Deck Lid/Tail Gate	Plastic
Deck Opening	Plastic
Front Grille	Plastic
Center Pillar	Plastic
Roof	Plastic
Interior Medallions/Ornaments/Name Plates	
Front & Rear Door Garnish Molding	Plastic
Front & Rear Door	Plastic
Instrument Panel & Glove Box Door	Plastic
Miscellaneous Other (B Pillar/ C Pillar)	Plastic

NEW BODY HARDWARE PLANT
PLANT B2-E
PRODUCT LISTING

PART DESCRIPTION	MATERIAL
Exhaust Pipe	Steel (Special Coated)
Exhaust Muffler	Steel (Special Coated)
Exhaust Supports	Steel
Fuel Tank Filler Tubes	Steel
License Plate Frames	Steel
License Plate Brackets	Steel
Trailer Hitches	Steel
Tools & Jacks	Steel
Ash Tray -	Steel
Console	Steel
Quarter Arm Rest	Steel
Front Door	Steel
Rear Door	Steel

NEW BODY HARDWARE PLANT
PLANT B2-F
PRODUCT LISTING

PART DESCRIPTION	MATERIAL
Lock Cylinders & Keys	
Front Door	Steel & Die Casting
Ignition Switch	Steel & Die Casting
Glove Box Door	Steel & Die Casting
Spare Tire Compartment	Steel & Die Casting
Floor Console	Steel & Die Casting
Knobs - Adjustment Controls	
Head Lamp	Die Casting/Plastic
Radio	Die Casting/Plastic
Miscellaneous Other (Door Lock/Adjustment)	Die Casting/Plastic
Luggage Racks	
Station Wagon Roof	Steel & Die Casting
Deck Lid	Steel & Die Casting

NEW BODY HARDWARE PLANT
PLANT B2-G
PRODUCT LISTING

PART DESCRIPTION	MATERIAL
Mirrors	
Inside - Rear View	Plastic & Metal
Outside - Side View	Plastic & Metal

BODY HARDWARE PLANT (TOTAL)
(B2-A/B2-B/B2-C/B2-D/B2-E/B2-F/B2-G)
(NOMINAL ESTIMATE)

<u>LEVEL II</u>		<u>LEVEL I</u>	<u>LEVEL II</u>
<u>LAND</u>			
	PURCHASE LAND -(200 ACRES @ \$10,000/ACRE)	\$ 2,000,000	
	* SITE DEVELOPMENT	6,400,000	
	SUB TOTAL		\$ 8,400,000
<u>BUILDING & SUPPORT FACILITY</u>			
	ENGINEERING	\$ 8,000,000	
	MANUFACTURING BLDG. (1.0M Sq. Ft. @ \$55.00/Sq. Ft.)	55,000,000	
	POWER HOUSE	8,000,000	
	WASTE TREATMENT	4,500,000	
	TANK FARM	3,500,000	
	OTHER	2,000,000	
	- USEFUL LIFE-30 YRS - SUBTOTAL		\$ 81,000,000 (1980 \$)
		+7%	86,670,000 (1981 \$)
<u>BUILDING FACILITIES</u>			
	ELECTRICAL	\$ 9,000,000	
	RAIL & CARRIER SHIPPING	4,000,000	
	UNDERGROUND SERVICES (SEWER, WATER & GAS)	3,000,000	
	BUILDING UTILITIES	3,000,000	
	HEATING AND VENTILATION	4,000,000	
	- USEFUL LIFE-30 YRS - SUBTOTAL		\$ 23,000,000 (1980 \$)
		+6%	24,000,000 (1981 \$)
<u>PLANT FACILITIES</u>			
	TOOL ROOM AND MAINTENANCE	\$ 5,000,000	
	MATERIAL HANDLING EQUIPMENT	5,000,000	
	AUTOMATIC SUPPLIER PARTS STORAGE	8,000,000	
	OTHER	2,000,000	
	- USEFUL LIFE-12 YRS - SUBTOTAL		\$ 20,000,000 (1980 \$)
		+6%	21,200,000 (1981 \$)
<u>MACHINERY & EQUIPMENT</u>			
	ROLL FORMING	\$ 600,000	
	METAL STAMPING	16,200,000	
	DIE CASTING/PLATING	9,800,000	
	PLASTIC MOLDING	6,000,000	
	ASSEMBLY	4,600,000	
	MISCELLANEOUS OTHER	6,800,000	
	- USEFUL LIFE-12 YRS SUBTOTAL		\$ 44,000,000 (1980 \$)
		+6%	46,640,000 (1981 \$)
<u>LEVEL I</u>	TOTAL FACILITIES, EQUIPMENT AND TOOLING		\$176,400,000 (1980 \$)
			\$186,910,000 (1981 \$)
<u>PRE-PRODUCTION AND LAUNCH @ APPROXIMATELY 20%</u>			
		\$ 35,280,000 (1980 \$)	
		37,382,000 (1981 \$)	
	TOTAL PROGRAM COST		\$211,680,000 (1980 \$)
			224,292,000 (1981 \$)

FACILITIES PLANNING (MILLIONS OF DOLLARS)

PLANTS

	<u>B2-A</u>	<u>B2-B</u>	<u>B2-C</u>	<u>B2-D</u>	<u>B2-E</u>	<u>B2-F</u>	<u>B2-G</u>
				(600,000 cars)			
• Building Size (sq. ft.)	120,000	120,000	180,000	120,000	144,000	144,000	144,000
• Land & Site Development	\$ 1.2	\$ 1.2	\$ 1.2	\$ 1.2	\$ 1.2	\$ 1.2	\$ 1.2
• Building & Support	10.0	10.0	15.0	10.0	12.0	12.0	12.0
• Plant Facilities & Equipment	5.0	5.0	8.0	5.0	6.0	7.0	7.0
• Machinery & Equipment							
Roll Forming	-	-	0.6	-	-	-	-
Metal Stamping	1.2	2.5	7.0	-	3.5	1.2	0.8
Die Casting/Plating	2.7	-	-	1.2	-	3.4	2.5
Plastic Molding	0.7	0.6	1.2	1.2	-	0.8	1.5
Assembly	0.5	0.3	-	-	1.5	0.8	1.5
Miscellaneous Other	0.5	0.6	0.8	1.0	1.2	1.5	1.2
Total	<u>\$ 5.6</u>	<u>\$ 4.0</u>	<u>\$ 9.6</u>	<u>\$ 3.4</u>	<u>\$ 6.2</u>	<u>\$ 7.7</u>	<u>\$ 7.5</u>
TOTAL	\$21.8	\$20.2	\$33.8	\$19.6	\$25.4	\$27.9	\$27.7
GRAND TOTAL							\$176.4

TOTAL BUILDINGS 972,000 Sq.Ft.

PLANT MANPOWER/HOURS PER CAR
1,200,000 CARS

	PLANTS							
	B2A	B2B	B2C	B2D	B2E	B2F	B2G	TOTAL
Manpower								
Direct Labor	306	375	500	218	438	120	218	2,175
Indirect - Hourly	216	326	438	188	375	66	188	1,797
Indirect - Salary	90	95	102	84	105	60	84	620
Total Manpower	612	796	1,040	490	918	246	490	4,592
Man Hours Per Car	.98	1.27	1.66	.78	1.47	.39	.78	7.33

NEW BODY HARDWARE PLANT
(SQUARE FEET)

	PLANT		
	A/B/D	E/F/G	C
Raw Material - Receiving & Storage	8,000	18,000	22,000
Roll Forming & Metal Stamping	23,000	30,000	34,000
Die Casting & Plating Equipment	12,000	13,000	18,500
Plastic Molding Equipment	12,000	13,000	18,500
Assembly Equipment (All Products)	15,000	12,000	15,000
In Process/Finished Parts Storage and Shipping	15,000	18,000	22,000
Tool Room/Maintenance/Laboratory	12,000	15,000	18,000
Vending/Rest Rooms/Lockers	6,000	6,000	8,000
Administrative & Production Offices	6,000	6,000	8,000
Miscellaneous Other (Air Compressors/ Boilers/Sub Stations/Etc.	11,000	13,000	16,000
TOTAL MANUFACTURING BUILDING	120,000	144,000	180,000

BODY HARDWARE PLANT
TOTAL MANUFACTURING COST
(EXCLUDING MATERIAL)

PRODUCTION: 1,200,000 UNITS PER YEAR

<u>MANPOWER:</u>	<u>245 DAYS</u>	<u>EMPLOYEES</u>	<u>ANNUAL HOURS</u>	<u>HRS/UNIT</u>
- DIRECT LABOR	1960	2175	4,263,000	3.55
- INDIRECT - HOURLY	1960	1797	3,522,120	2.94
- INDIRECT - SALARY	2000	620	1,240,000	1.03
		<u>4592</u>	<u>9,025,120</u>	<u>7.52</u>

ANNUAL HOURS ÷ 1,200,000 UNITS = HOURS PER UNIT = 7.52

WAGE & FRINGE COSTS:

- DIRECT LABOR	\$19.50	x	3.55	=	\$ 69.23
- INDIRECT - HOURLY	\$21.50	x	2.94	=	\$ 63.21
- INDIRECT - SALARY	\$23.50	x	1.03	=	\$ 24.21
	<u>TOTAL WAGES & FRINGE COSTS</u>				
					<u>\$156.65</u>

INVESTMENT: (1981\$)

	<u>FACILITIES COST</u>	<u>DEPRECIATION</u>	<u>COST-PER-UNIT</u>
- BUILDING & SUPPORT FACILITIES USEFUL LIFE - 30 YRS	\$86,670,000	2,889,000	\$2.41
- BUILDING FACILITIES USEFUL LIFE - 30 YRS	\$24,000,000	800,000	.67
- PLANT FACILITIES USEFUL LIFE - 12 YRS	\$21,200,000	1,766,666	1.47
- MACHINERY & EQUIPMENT USEFUL LIFE - 12 YRS	\$46,640,000	3,886,666	3.24
			<u>\$7.79</u>

DEPRECIATION ÷ 1,200,000 UNITS = TOTAL DEPRECIATION PER UNIT \$7.79

TAXES & INSURANCE AS PERCENT OF WAGE & FRINGE COST

T & I ESTIMATE OF 3.9% \$156.65 X 3.9% = \$6.11

OTHER MANUFACTURING COST AS PERCENT OF WAGE & FRINGE COST

OME ESTIMATE OF 28% \$156.65 X 28% = \$43.86

TOTAL WAGE & FRINGE COSTS \$156.65

TOTAL DEPRECIATION COSTS \$ 7.79

TOTAL TAXES & INSURANCE \$ 6.11

TOTAL OME \$ 43.86

TOTAL \$214.41

PLANT NO. 5
ELECTRONIC COMPONENT PLANT

NEW ELECTRONIC & ELECTRO MECHANICAL COMPONENT PLANT

ASSUMPTIONS

<u>PRODUCT</u>	Selected Electronic & Electro Mechanical Components
	o Electronic Digital Clock
	o Electronic (Engine performance) Control Module
	o Fractional Horsepower Motor
	o Power Assist (Antenna/seat/window regulator)
	o Windshield Wiper
	o Radios (AM/FM Monaural/Electronic Tuned AM/FM Stereo/ Electronic Tuned AM/FM Stereo with Cassette Tape)
	o Voltage Regulator
	o Misc. Small Electronic Controls

OPERATING

<u>PATTERN</u>	Normal Operating Pattern
	Two (8) Hour Shifts Per Day
	245 Days per year
	Overtime
	Alternate Saturdays

PRODUCTION

Plant is sized for an annual vehicle assembly requirement (Level II) of 900,000 units, facilities & equipment expansion (from Level I to Level II) will require minimal re-arrangement expense.

NEW ELECTRONIC & ELECTRO MECHANICAL COMPONENT PLANT

(Continued)

PRODUCTION

Installation Rates

o Electronic Digital Clock	40%
o Electronic Control Module	100%
o Fractional Horse Power Motor	
Power Assist (Range)	5/30%
Windshield Wiper	100%
o Radio	90%
o Voltage Regulator	100%
o Misc. Small Controls (Range)	75/100%

FACILITIES &

EQUIPMENT

Electronic Components: Current State of the Art Automatic Insertion, Automatic Assembly, Wave solder, Furnace & Inspection Equipment.
(Some manual assembly operation) Electro Mechanical: Current State of the Art Machining & Coil Winding Equipment. Automated & Manual Assembly Operations.

FACILITIES PLANNING ELECTRONIC COMPONENT PLANT (NOMINAL ESTIMATE)

	LEVEL I	LEVEL II
	900,000 UNITS	450,000 UNITS
<u>LEVEL II</u>		
<u>LAND</u>		
PURCHASE LAND (50 ACRES @ \$10,000/ACRE)	\$ 500,000	\$ 500,000
SITE DEVELOPMENT	1,500,000	1,200,000
SUB TOTAL	\$ 2,000,000	\$ 1,700,000
<u>BUILDING & SUPPORT FACILITIES</u>		
ENGINEERING	\$ 1,200,000	\$ 1,000,000
MANUFACTURING BLDG. (400,000 Sq. Ft. @ \$55/Sq. Ft.)	22,500,000	22,000,000
POWER HOUSE - BOILERS-COMPRESSORS, (PACKAGE BOILER)	1,500,000	1,300,000
WASTE TREATMENT	1,200,000	1,000,000
MISCELLANEOUS OTHER	2,600,000	2,000,000
- USEFUL LIFE-30 YRS - SUB TOTAL	\$29,000,000 (1980 \$)	\$27,300,000
	31,030,000 (1981 \$)	+7% 29,211,000
<u>BUILDING FACILITIES</u>		
ELECTRICAL - HEATING - VENTILATING	\$ 5,500,000	\$ 4,500,000
CRANES - CONVEYORS - SCRAP HANDLING	1,500,000	1,000,000
UTILITIES (SEWER, WATER, GAS)	3,500,000	3,000,000
- USEFUL LIFE-30 YRS - SUB TOTAL	\$10,500,000 (1980 \$)	\$ 8,500,000
	11,130,000 (1981 \$)	+6% 9,010,000
<u>PLANT FACILITIES</u>		
TOOL ROOM - LABORATORY - TEST EQUIPMENT	\$ 3,500,000	\$ 3,000,000
MATERIAL HANDLING EQUIPMENT - RACKS	2,000,000	1,500,000
MISCELLANEOUS OTHER	2,500,000	2,000,000
- USEFUL LIFE-12 YRS - SUB TOTAL	\$ 8,000,000 (1980 \$)	\$ 6,500,000
	8,480,000 (1981 \$)	+6% 6,890,000
<u>MACHINERY & EQUIPMENT</u>		
ELECTRONIC CLOCK	\$ 600,000	\$ 400,000
ELECTRONIC CONTROL MODULE	18,000,000	12,000,000
FRACTIONAL HORSEPOWER MOTOR	16,000,000	10,000,000
RADIO	5,000,000	4,000,000
VOLTAGE REGULATOR	500,000	300,000
MISC. SMALL ELECTRONIC CONTROLS	4,000,000	3,000,000
COMMON & MISC. OTHER MACHINERY & EQUIPMENT	5,900,000	3,300,000
- USEFUL LIFE-12 YRS - SUB TOTAL	\$50,000,000 (1980 \$)	\$33,000,000
	53,000,000 (1981 \$)	+6% 34,980,000
<u>LEVEL I</u>		
TOTAL FACILITIES, EQUIPMENT AND TOOLING	\$99,500,000 (1980 \$)	\$77,000,000
	105,540,000 (1981 \$)	81,791,000
<u>PRE-PRODUCTION AND LAUNCH @ APPROXIMATELY 20%</u>		
	\$19,900,000 (1980 \$)	\$15,400,000
	21,108,000 (1981 \$)	16,358,200
<u>TOTAL PROGRAM COST</u>		
	\$119,400,000 (1980 \$)	\$92,400,000
	120,608,000 (1981 \$)	98,149,200

FACILITY TYPE	FACILITY ACTIVITIES		ANNUAL PRODUCTION RATE		MAJOR CAPITAL EXPENDITURE (\$ MILLIONS)		MANPOWER REQUIREMENTS		REMARKS
	FUNCTION	MATERIAL	LEVEL I	LEVEL II	LEVEL I	LEVEL II	LEVEL I	LEVEL II	
ELECTRO MECHANICAL & ELECTRONIC COMPONENT MANUFACTURE & ASSEMBLY	Assemble & Test Electronic Clock	Purchase Display Module and PC Board	130,000	360,000	\$0.3/0.5 (\$0.4)	\$0.5/0.7 (\$0.6)	12/18 (15)	25/35 (30)	
	Fabricate, Assemble & Test Electronic Control Module	Purchase Hsg. & PC Board	450,000	900,000	\$10.0/14.0 (\$12.0)	\$16.0/20.0 (\$18.0)	70/80 (75)	140/160 (150)	
	Fabricate, Assemble & Test Fractional HP Motor	Purchase Laminations	1,000,000	2,000,000	\$ 8.5/11.5 (\$10.0)	\$14.5/17.5 (\$16.0)	85/95 (90)	170/190 (180)	
	Fabricate, Assemble & Test Radio Equipment	Purchase Metal Stamping & PC Board	405,000	810,000	\$ 3.0/5.0 (\$4.0)	\$4.0/6.0 (\$5.0)	180/220 (200)	360/440 (400)	
	Fabricate & Assemble Voltage Regulator		450,000	900,000	\$ 0.2/0.4 (\$0.3)	\$ 0.4/0.6 (\$0.5)	20/30 (25)	40/60 (50)	
	Fabricate Assemble & Test Misc. Small Electronic Controls		1,500,000	3,000,000	\$ 2.5/3/5 (\$3.0)	\$ 3.5/4.5 (\$4.0)	78/102 (90)	160/200 (180)	5 Components
	Common & Misc. Processing Facilities		Included above	Included above	\$ 3.0/3.6 (\$3.3)	\$ 5.3/6.5 (\$5.9)	Included with major function	Included with major function	Incl. Heat Treat, Varnish ovens & insertion equipment
	Land Building & Other Equipment				\$40.0/48.0 (\$44.0)	\$43.3/55.7 (\$49.5)			
							445/545 (495)	895/1085 (990)	Direct Labor
							330/370 (350)	620/680 (650)	Indirect Labor
TOTALS					\$67.5/86.5 (\$77.0)*	\$87.5/111.5 (\$99.5)*	165/185 (175)	305/335 (320)	Salary
							940/1100 (1020)	1820/2100 (1960)	Total Manpower

*Major capital expenditures adjusted for 1981 economics \$81,791,000 - Level I,

\$105,540,000 - Level II.

PRODUCT

ELECTRO MECHANICAL AND ELECTRONIC COMPONENTS

CAPACITY LEVEL I 450,000 Equivalent Vehicles PROCESS AND COMPONENT SUMMARY

DATE March 1982
Level III

CAPACITY LEVEL II 900,000 Equivalent Vehicles

MAJOR DEPARTMENTS	DEPARTMENT FUNCTION	MAJOR CAPITAL EXPENDITURES (\$ MILLIONS)			AREA (SQ. FT.)	MANPOWER REQMT'S		REMARKS
		LEVEL I	LEVEL II	TOTAL		LEVEL I	LEVEL II	
						D/L	D/L	
ELECTRONIC CLOCK	ASSEMBLE, SOLDER & TEST	0.4	0.2	0.6	10,000	15	30	
ELECTRONIC CONTROL MODULE	INSERTION, ASSEMBLE, SOLDER & TEST	12.0	6.0	18.0	30,000	75	150	
FRACTIONAL HP MOTOR	FABRICATE & MACHINE COIL WINDING ASSEMBLE & TEST	10.0	6.0	16.0	50,000	90	180	
RADIO	INSERTION, ASSEMBLE, SOLDER & TEST	4.0	1.0	5.0	25,000	200	400	
VOLTAGE REGULATOR	INSERTION, ASSEMBLE, SOLDER & TEST	0.3	0.2	0.5	10,000	25	50	
MISC. SMALL ELECTRONIC CONTROLS	INSERTION, ASSEMBLE, SOLDER & TEST	3.0	1.0	4.0	30,000	90	180	
COMMON & MISC. OTHER EQUIPMENT	HEAT TREAT & VARNISH OVENS	3.3	2.6	5.9	INCLUDED WITH MAJOR FUNCTION	INCLUDED WITH MAJOR FUNCTION	INCLUDED WITH MAJOR FUNCTION	
TOTALS		* \$ 33.0	\$17.0	\$50.0	155,000	495	990	TOTAL DIRECT LABOR
						350	650	TOTAL INDIRECT LABOR
						175	320	TOTAL SALARY LABOR
						1020	1960	TOTAL MANPOWER

NEW ELECTRONIC & ELECTRO MECHANICAL COMPONENT PLANT

AREA

	SQUARE FEET
<u>MANUFACTURING BUILDING</u>	
Raw Material - Receiving & Storage	30,000
Electronic Clock (Vacuum Fluorescent Display)	10,000
Electronic Control Module (Engine)	30,000
Fractional Horsepower Motor	50,000
Radio	25,000
Voltage Regulator	10,000
Misc. Small Electronic Controls	30,000
Common Facilities	40,000
In Process/Finished Parts Storage & Shipping	45,000
Tool Room/Laboratory/Test Equipment/Maintenance	56,000
Vending/Rest Rooms/Lockers	10,000
Administrative & Production Offices	30,000
Misc. Other (Air Compressors/Boilers/Sub Stations,Etc.)	34,000
TOTAL MANUFACTURING BUILDING	400,000

NEW ELECTRONIC & ELECTRO MECHANICAL COMPONENT PLANT

(SQUARE FEET)

Electronic Clock 10,000		Electronic Control 30,000		Raw Material Receiving & Storage 30,000	
Electronic Controls 30,000		Common Facilities 40,000		Fractional Horsepower Motor 50,000	
Voltage Regulator 10,000		Radio 25,000			
In-Process/Finished Parts Storage & Shipping 45,000		Vending/ Rest Rooms Lockers 10,000		Tool Room/ Laboratory/Test Equipment/ Maintenance 56,000	
Misc. Other 34,000		Administrative and Production Offices 30,000			

Total Square Feet:
400,000

ELECTRONIC COMPONENT PLANTS
TOTAL MANUFACTURING COST
(EXCLUDING MATERIAL)

PRODUCTION				
MANPOWER:				
	245 DAYS	EMPLOYEES	ANNUAL HOURS	HRS/UNIT
- DIRECT LABOR	- 1960 -	495	970,200	2.16
- INDIRECT LABOR	- 1960 -	350	686,000	1.52
- INDIRECT SALARY	- 2000 -	175	350,000	.78
		<u>1020</u>	<u>2,006,200</u>	<u>4.46</u>
ANNUAL HOURS ÷ 450,000 UNITS = HRS PER UNIT = 4.46				
WAGES & FRINGE COSTS:				
- DIRECT LABOR	\$19.50	X 2.16	=	\$42.12
- INDIRECT HOURLY	\$21.50	X 1.52	=	32.68
- INDIRECT SALARY	\$23.50	X .78	=	18.33
	TOTAL WAGES & FRINGE COSTS			<u>\$93.13</u>
INVESTMENT: (1981\$)				
- BUILDING & SUPPORT FACILITIES USEFUL LIFE - 30 YRS			FACILITIES COST	DEPRECIATION
- BUILDING FACILITIES USEFUL LIFE - 30 YRS			\$29,211,000	973,700
- PLANT FACILITIES USEFUL LIFE - 12 YRS			\$ 9,010,000	300,333
- MACHINERY & EQUIPMENT USEFUL LIFE - 12 YRS			\$ 6,890,000	574,166
			<u>\$34,980,000</u>	<u>2,915,000</u>
				<u>\$10.38</u>
				COST-PER-UNIT
				\$ 1.95
				.67
				1.28
				6.48

DEPRECIATION ÷ 500,000 UNITS = TOTAL DEPRECIATION PER UNIT = \$ 10.38

TAXES & INSURANCE AS PERCENT OF WAGE & FRINGE COST
T & I ESTIMATE OF 3.9% \$93.13 X 3.9% = \$3.63
OTHER MANUFACTURING COST AS PERCENT OF WAGE & FRINGE COST
OME ESTIMATE OF 13.2% \$93.13 X 13.2% = \$12.29
TOTAL WAGE & FRINGE COST \$ 93.13
TOTAL DEPRECIATION COST \$ 10.38
TOTAL TAXES & INSURANCE \$ 3.63
TOTAL OME \$ 12.29
TOTAL \$119.43

PLANT 6
PLASTICS MOLDING PLANT

NEW AUTOMOTIVE PLASTICS MOLDING PLANT ASSUMPTIONS

- | | | | |
|---|---|---|---|
| PRODUCT | <ul style="list-style-type: none"> o SELECTED INJECTION MOLDED PLASTIC DETAIL PARTS AND ASSEMBLIES.
REPRESENTATIVE ITEMS INCLUDE: | | |
| | <table border="0" style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"> <ul style="list-style-type: none"> GARNISH MOLDINGS DOOR TRIM PANELS QUARTER TRIM PANELS CENTER PILLAR TRIM PANELS COWL SIDE LOWER TRIM PANELS FENDER EXTENSIONS SPLASH SHIELDS HEATER/HTR-AC HSGS. </td> <td style="width: 50%; vertical-align: top;"> <ul style="list-style-type: none"> DOOR SILL PLATES BATTERY THERMO GUARD ARM REST ASSEMBLIES INSTRUMENT PANEL ASSEMBLIES TAIL LAMP ASSEMBLIES FRONT GRILLE ASSEMBLIES HEAD LAMP BEZELS HEAD LAMP CLOSURE PANELS </td> </tr> </table> | <ul style="list-style-type: none"> GARNISH MOLDINGS DOOR TRIM PANELS QUARTER TRIM PANELS CENTER PILLAR TRIM PANELS COWL SIDE LOWER TRIM PANELS FENDER EXTENSIONS SPLASH SHIELDS HEATER/HTR-AC HSGS. | <ul style="list-style-type: none"> DOOR SILL PLATES BATTERY THERMO GUARD ARM REST ASSEMBLIES INSTRUMENT PANEL ASSEMBLIES TAIL LAMP ASSEMBLIES FRONT GRILLE ASSEMBLIES HEAD LAMP BEZELS HEAD LAMP CLOSURE PANELS |
| <ul style="list-style-type: none"> GARNISH MOLDINGS DOOR TRIM PANELS QUARTER TRIM PANELS CENTER PILLAR TRIM PANELS COWL SIDE LOWER TRIM PANELS FENDER EXTENSIONS SPLASH SHIELDS HEATER/HTR-AC HSGS. | <ul style="list-style-type: none"> DOOR SILL PLATES BATTERY THERMO GUARD ARM REST ASSEMBLIES INSTRUMENT PANEL ASSEMBLIES TAIL LAMP ASSEMBLIES FRONT GRILLE ASSEMBLIES HEAD LAMP BEZELS HEAD LAMP CLOSURE PANELS | | |
| OPERATING
PATTERN | <ul style="list-style-type: none"> o NORMAL OPERATING PATTERN <li style="padding-left: 40px;">TWO (8) HOUR SHIFTS PER DAY <li style="padding-left: 40px;">235 DAYS PER YEAR o OVERTIME <li style="padding-left: 40px;">SELECTIVE - 9TH HOUR & ALTERNATE SATURDAYS. | | |
| PRODUCTION | <ul style="list-style-type: none"> o AT STRAIGHT TIME, PLANT IS SIZED TO ACCOMODATE AN ANNUAL VEHICLE ASSEMBLY REQUIREMENT OF 400,000 UNITS. | | |
| FACILITIES &
EQUIPMENT | <ul style="list-style-type: none"> o CURRENT STATE OF THE ART FACILITIES AND EQUIPMENT. | | |

CAPACITY LEVEL I 400,000 EQUIVALENT SETS PROCESS AND COMPONENT SUMMARY
 CAPACITY LEVEL II (NOMINAL ESTIMATE) DATE March 1982 Level III

MAJOR DEPARTMENTS		DEPARTMENT FUNCTION	MAJOR CAPITAL EXPENDITURES (\$ MILLIONS)			AREA (SQ. FT.)	MANPOWER REQUIS			REMARKS
			LEVEL I	LEVEL II	TOTAL		LEVEL I	LEVEL II		
							N/L	N/L	N/L	
INJECTION MOLDING	COLOR CODE (INCLUDING BLACK OUT TREATMENTS) & BRITE LAMINATION ARM REST, INSTRUMENT PANEL, TAIL LAMP & FRONT GRILLE BUILD UP ASSEMBLY SUPPORT (GRIND, REGRIND FINISHING, ETC) & ALL OTHER	\$ 28.0		\$ 28.0	160,000	100				
PAINT & HOT STAMP		10.5		10.5	90,000	120				
		4.0		4.0	INCLUDED ABOVE	230				
		9.5		9.5	170,000	150				
TOTALS		\$52.0		\$52.0*	420,000	600			TOTAL DIRECT LABOR	
						650			TOTAL INDIRECT LABOR	
						150			TOTAL SALARY LABOR	
						1400			TOTAL MANPOWER	

*Major capital expenditures adjusted for 1981 economics \$55,120,000

NEW AUTOMOTIVE PLASTICS MOLDING PLANT
AREA BREAKDOWN

MANUFACTURING BUILDING	
RAW MATERIAL-RECEIVING & STORAGE (INCL. REGRIND MAT.)	60,000
MIX & GRIND	70,000
INJECTION MOLD	160,000
PAINT & HOT STAMP (INCL. PAINT STORAGE & MIX)	90,000
FINISHING	40,000
CENTRAL WATER CHILL	20,000
FINISHED & IN PROCESS INVENTORY STORAGE	150,000
TOOL ROOM, MAINTENANCE & REPAIR	50,000
LABORATORY - DEVELOPMENT, TEST & QUALITY CONTROL	20,000
SHIPPING	50,000
ADMINISTRATIVE OFFICE	30,000
ALL OTHER (INCL.VENDING LOCKERS,MATERIAL HDLG.)	60,000
TOTAL MANUFACTURING BUILDING	800,000
SUPPORT BUILDINGS	25,000
TOTAL PLANT	825,000

NEW AUTOMOTIVE PLASTICS MOLDING PLANT
(SQUARE FEET)

LABORATORY 10,000	ADMINISTRATIVE OFFICE 30,000	LABORATORY 10,000	TOOL ROOM MAINTENANCE & REPAIR 50,000
CENTRAL WATER CHILL 20,000	FINISHING 40,000	INJECTION MOLD 160,000	MATERIAL HANDLING, VENDING, LOCKERS & OTHER UTILITY 60,000
MIX & GRIND 70,000			
RAW MATERIAL RECEIVING & STORAGE 60,000	PAINT, HOT STAMP & ASSEMBLY 90,000	FINISHED & IN PROCESS INVENTORY STORAGE 150,000	SHIPPING 50,000

.008

1000'

PLASTIC MOLDING PLANT
TOTAL MANUFACTURING COST
(EXCLUDING MATERIAL)

PRODUCTION: 400,000 UNITS PER YEAR

<u>MANPOWER:</u>	<u>235 DAYS</u>	<u>EMPLOYEES</u>	<u>ANNUAL HOURS</u>	<u>HRS/UNIT</u>
- DIRECT LABOR	1880	600	1,128,000	2.82
- INDIRECT - HOURLY	1880	650	1,222,000	3.06
- INDIRECT - SALARY	2000	150	300,000	.75
		<u>1400</u>	<u>2,650,000</u>	<u>6.63</u>

ANNUAL HOURS ÷ 400,000 UNITS = HOURS PER UNIT = 6.63

WAGE & FRINGE COSTS:

- DIRECT LABOR	\$19.50	x	2.82	=	\$ 54.99
- INDIRECT - HOURLY	\$21.50	x	3.06	=	\$ 65.79
- INDIRECT - SALARY	\$23.50	x	.75	=	\$ 17.63
	TOTAL WAGES & FRINGE COSTS				
					<u>\$138.41</u>

INVESTMENT: (1981\$)

	<u>FACILITIES COST</u>	<u>DEPRECIATION</u>	<u>COST-PER-UNIT</u>
- BUILDING & SUPPORT FACILITIES USEFUL LIFE - 30 YRS	\$71,690,000	2,389,666	\$ 5.97
- BUILDING FACILITIES USEFUL LIFE - 30 YRS	\$20,400,000	680,000	1.70
- PLANT FACILITIES USEFUL LIFE - 12 YRS	\$ 9,540,000	795,000	1.99
- MACHINERY & EQUIPMENT USEFUL LIFE - 12 YRS	\$55,120,000	4,593,333	11.48
			<u>\$21.14</u>

DEPRECIATION ÷ 400,000 UNITS = TOTAL DEPRECIATION PER UNIT = \$21.14

TAXES & INSURANCE AS PERCENT OF WAGE & FRINGE COST

T & I ESTIMATE OF 3.9% \$138.41 X 3.9% = \$5.40

OTHER MANUFACTURING COST AS PERCENT OF WAGE & FRINGE COST

OME ESTIMATE OF 13.2% \$138.41 X 13.2% = \$18.07

TOTAL WAGE & FRINGE COSTS \$138.41

TOTAL DEPRECIATION COSTS \$ 21.14

TOTAL TAXES & INSURANCE \$ 5.40

TOTAL OME \$ 18.07

TOTAL \$183.02

PLANT NO. 7
TRIM PLANT

NEW TRIM PLANT ASSUMPTIONS

GENERAL

- o ALL PRODUCTS RESTRICTED TO ONE PRODUCT LINE OR PASSENGER CAR & PASSENGER CAR DERIVED TRUCK VEHICLES

PRODUCTS

- o SELECTED SOFT TRIM SETS (CUSHION & BACK COVER ASSEMBLIES) FOR CONVENTIONAL "SLIP ON DESIGN" SEAT CONSTRUCTIONS.
 - MAXIMUM OF FOUR (LOW, MEDIUM, HIGH & PREMIUM) TRIM CODES.
 - FALES SEWING CAPABILITY.
 - CLOTH, VINYL OR CLOTH & VINYL TRIM CODE CAPABILITY. NO PROVISION FOR LEATHER TRIM CODES.
- o DIELECTRIC BONDED DOOR & QUARTER TRIM PANELS AND PANEL ASSEMBLIES.
- o SELECTED INJECTION MOLDED INTERIOR TRIM DETAIL COMPONENTS & ASSEMBLIES.
 - LIMITED SMALL PART (300/400 TON RANGE) PRESS CAPACITY.
 - LARGER PRESS SIZED (UP TO 1500 TON) FOR BODY PILLAR, INSTRUMENT PANEL, INSTRUMENT CLUSTER HOOD, QUARTER TRIM PANEL, LOWER DOOR PANEL.
- o COWL LOWER TRIM PANEL & TAIL GATE OPENING PANEL (DETAIL PARTS & SUB ASSEMBLIES).

OPERATING
PATTERN

- o NORMAL OPERATING PATTERN
 - TWO (8) HOUR SHIFTS PER DAY
 - 235 DAYS PER YEAR
- o OVERTIME
 - 9th HOUR - 12.5%
 - ALTERNATE SATURDAYS - 10%

PRODUCTION

- o AT STRAIGHT TIME, PLANT IS SIZED TO ACCOMMODATE AN ANNUAL VEHICLE ASSEMBLY REQUIREMENT OF 400,000 UNITS.

FACILITIES &
EQUIPMENT

- o CURRENT STATE OF THE ART SEWING MACHINE & DI-ELECTRIC BONDING EQUIPMENT. ALL CUTTING EQUIPMENT IS MANUALLY OPERATED.
- o INJECTION MOLDING EQUIPMENT IS EQUAL TO CURRENT INDUSTRY STANDARDS.

FACILITIES PLANNING
NEW TRIM PLANT
(NOMINAL ESTIMATE)

<u>LEVEL II</u>		<u>LEVEL I</u> <u>LEVEL II</u>
<u>LAND</u>		
	PURCHASE LAND (30 ACRES @ \$10,000/ACRE)	\$ 300,000
	SITE DEVELOPMENT	900,000
	<u>SUB TOTAL</u>	<u>\$ 1,200,000</u>
<u>BUILDING & SUPPORT FACILITIES</u>		
	ENGINEERING	\$ 1,500,000
	MANUFACTURING BLDG (250,000 Sq. Ft @ \$55/Sq. Ft.)	14,000,000
	AIR COMPRESSOR & BOILERS	1,000,000
	MISC. OTHER	3,500,000
	<u>- USEFUL LIFE-30 YRS - SUB TOTAL</u>	<u>\$ 20,000,000 (1980 \$)</u>
		21,400,000 (1981 \$)
<u>BUILDING FACILITIES</u>		
	CRANES & CONVEYORS	\$ 600,000
	UTILITIES, PLANT ELECTRICAL, HEATING, VENTILATION & STORAGE SYSTEMS	4,400,000
	<u>- USEFUL LIFE-30 YRS - SUB TOTAL</u>	<u>\$ 5,000,000 (1980 \$)</u>
		5,300,000 (1981 \$)
<u>PLANT FACILITIES</u>		
	TOOL ROOM	\$ 500,000
	MATERIAL HANDLING & RACKS	2,000,000
	MISC. OTHER	1,500,000
	<u>- USEFUL LIFE-12 YRS - SUB TOTAL</u>	<u>\$ 4,000,000 (1980 \$)</u>
		4,240,000 (1981 \$)
<u>MACHINERY & EQUIPMENT</u>		
	SEWING MACHINES	\$ 400,000
	FALES MACHINES	600,000
	DIELECTRIC MACHINES	1,000,000
	INJECTION MOLDING MACHINES	3,500,000
	PAINT EQUIPMENT	5,500,000
	MISC. OTHER EQUIPMENT	3,500,000
	<u>- USEFUL LIFE-12 YRS - SUB TOTAL</u>	<u>\$ 14,500,000 (1980 \$)</u>
		15,370,000
<u>LEVEL I</u>		
	TOOL FACILITIES, EQUIPMENT AND TOOLING	\$ 44,700,000 (1980 \$)
		47,510,000 (1981 \$)
<u>PRE-PRODUCTION AND LAUNCH @ APPROXIMATELY 20%</u>		
		\$ 8,940,000 (1980 \$)
		9,502,000 (1981 \$)
<u>TOTAL PROGRAM COST</u>		<u>\$ 53,640,000 (1980 \$)</u>
		57,012,000 (1981 \$)

FACILITIES PLANNING

DATE March 1982

(NOMINAL ESTIMATE)
(1 of 2)

CAPACITY LEVEL I 400,000
CAPACITY LEVEL II _____

Level III

FACILITY TYPE	FACILITY ACTIVITIES		ANNUAL PRODUCTION RATE		MAJOR CAPITAL EXPENDITURES (\$ MILLIONS)		MANPOWER REQUIREMENTS		REMARKS
	FUNCTION	MATERIAL	LEVEL I	LEVEL II	LEVEL I	LEVEL II	LEVEL I	LEVEL II	
TRIM PLANT	CUT & SEW	BODY CLOTH & INTERIOR VINYL			0.2/0.6 (0.4)		145/175 (160)		CAPACITY EXPRESSED AS EQUIVALENT CAR SETS.
	FALES	BODY CLOTH & INTERIOR VINYL			0.4/0.8 (0.6)		8/12 (10)		
	DIELECTRIC BOND	INTERIOR VINYL			0.7/1.3 (1.0)		12/18 (15)		
	INJECTION MOLDING				3.0/4.0 (3.5)		18/22 (20)		
	PAINT				4.5/6.5 (5.5)		18/22 (20)		
	ASSEMBLY				*		50/70 (60)		
	LAND, BUILDING & EQUIPMENT				29.2/34.8 (31.3)				
SUB-TOTAL							251/319 (285)		DIRECT LABOR
							255/275 (265)		INDIRECT LABOR
							85/95 (90)		SALARY
TOTALS			400,000		\$38/\$48 (\$42.3) *		591/689 (640)		

*Major Capital expenditures adjusted for 1981 economics \$47,510,000.

PRODUCT INTERIOR TRIM

PROCESS AND COMPONENT SUMMARY

CAPACITY LEVEL I 400,000 DATE March 1982
 CAPACITY LEVEL II Level III

(NOMINAL ESTIMATE)
 (2 of 2)

MAJOR REQUIREMENTS	DEPARTMENT FUNCTION	MAJOR CAPITAL EXPENDITURES (\$ MILLIONS)			AREA (SQ. FT.)	MANPOWER REQUIREMENTS			REMARKS
		LEVEL I	LEVEL II	TOTAL		LEVEL I	LEVEL II	D/L	
						D/L	D/L		
SOFT TRIM	CUT & SEW	\$ 0.4			25,000	160			* INCL. WITH MISC. OTHER
	FALES	0.6			INCL. ABOVE	10			
	DIELECTRIC BOND	1.0			18,750	15			
	INJECTION MOLDING	3.5			37,500	20			
	PAINT	5.5			21,875	20			
ALL PARTS	ASSEMBLY	*			28,125	60			MANPOWER INCLUDES COVERS, DOOR TRIM PANEL AND PLASTIC MOLDED PARTS
TOTALS		\$11.0			131,250	285			TOTAL DIRECT LABOR
						265			TOTAL INDIRECT LABOR
						90			TOTAL SALARY LABOR
						640			TOTAL MANPOWER

PRODUCT INTERIOR TRIM

NEW TRIM PLANT AREA BREAKDOWN

MANUFACTURING BUILDING

	<u>SQUARE FEET</u>
RAW MATERIAL STORAGE	30,000
CUT & SEW (INCLUDING FALES)	25,000
DIELECTRIC BOND	18,750
INJECTION MOLDING	37,500
ASSEMBLY	28,125
PAINT	21,875
TOOL ROOM, MAINTENANCE & REPAIR	35,000
VENDING, REST ROOMS & LOCKERS	2,500
FINISHED INVENTORY (STORAGE & SHIPPING)	35,000
ADMINISTRATIVE OFFICE	3,500
MISC. OTHER (INCLUDING AIR COMPRESSOR/BOILERS ETC.)	<u>12,750</u>
TOTAL PLANT	250,000

NEW TRIM PLANT

RAW MATERIAL STORAGE 30,000 SQ.FT.	CUT/SEW/FALES 25,000 SQ.FT.	UTILITY	ADMIN./ VEND./ETC.	FINISHED INVENTORY STORAGE & SHIPPING 35,000 SQ.FT.	
				ASSEMBLY 28,125 SQ.FT.	PAINT 28,875 SQ.FT.
	DIELECTRIC 18,750 SQ.FT.	INJECTION MOLDING 37,500 SQ.FT.			
	TOOL ROOM, MAINTENANCE & REPAIR 35,000 SQ.FT.				

TOTAL PLANT: 250,000 SQ.FT.

TRIM PLANT
TOTAL MANUFACTURING COST
(EXCLUDING MATERIAL)

PRODUCTION: 400,000 UNITS PER YEAR

<u>MANPOWER:</u>	<u>240 DAYS</u>	<u>EMPLOYEES</u>	<u>ANNUAL HOURS</u>	<u>HRS/UNIT</u>
- DIRECT LABOR	- 1960 -	285	558,600	1.40
- INDIRECT - HOURLY	- 1960 -	265	519,400	1.30
- INDIRECT - SALARY	- 2000 -	90	180,000	.45
		<u>640</u>	<u>1,258,000</u>	<u>3.15</u>

ANNUAL HOURS ÷ 400,000 UNITS = HOURS PER UNIT = 3.15

WAGE & FRINGE COSTS:

- DIRECT LABOR	\$19.50	X	1.40	=	\$27.30
- INDIRECT - HOURLY	\$21.50	X	1.30	=	\$27.95
- INDIRECT - SALARY	\$23.50	X	.45	=	\$10.58
	TOTAL WAGE & FRINGE COSTS				
					\$65.83

INVESTMENT: (1981\$)

	<u>FACILITIES COST</u>	<u>DEPRECIATION</u>	<u>COST-PER-UNIT</u>
- BUILDING & SUPPORT FACILITIES USEFUL LIFE - 30 YRS	\$21,400,000	713,333	\$1.78
- BUILDING FACILITIES USEFUL LIFE - 30 YRS	\$ 5,300,000	176,666	.44
- PLANT FACILITIES USEFUL LIFE - 12 YRS	\$ 4,240,000	353,333	.88
- MACHINERY & EQUIPMENT USEFUL LIFE - 12 YRS	\$15,370,000	1,280,833	3.20
			<u>\$6.30</u>

DEPRECIATION ÷ 400,000 UNITS = TOTAL DEPRECIATION PER UNIT = \$6.30

TAXES & INSURANCE AS PERCENT OF WAGE & FRINGE COST

T & I ESTIMATE OF 4.6% 65.83 X 4.6% = 3.03

OTHER MANUFACTURING COST AS PERCENT OF WAGE & FRINGE COST

OME ESTIMATE OF 13.2% 65.83 X 13.2% = \$8.69

TOTAL WAGE & FRINGE COSTS	\$65.83
TOTAL DEPRECIATION COSTS	\$ 6.30
TOTAL TAXES & INSURANCE	\$ 3.03
TOTAL OME	\$ 8.69
TOTAL	\$83.85

PLANT 8
FABRICATED GLASS PLANT

NEW FABRICATED GLASS PLANT ASSUMPTIONS

PRODUCT

- o Windshield Assemblies (Laminated Glass & Rear View Mirror Mounting Bracket)
- o Selected Front Door, Rear Door & Quarter Window Side Glass Parts.
- o Rear Window (Backlite), Lift Gate & Rear Hatch Glass parts. Production capability for non-heated & electrically heated types.
- o Clear & tinted glass capability.

OPERATING
PATTERN

- o Normal operating pattern - 245 days per year
Fabrication: Three (8) hour shifts per day.
Cut/Grind/Drill/Assembly: Sixteen hours per day adjusted as required for operational balance.
- o Overtime
Saturday operations as required.

NEW FABRICATED GLASS PLANT ASSUMPTIONS (CONT.)

PRODUCTION

- o Plant is sized to accomodate an annual vehicle assembly requirement (Level II) of 1,200,000 units. Facilities & Equipment expansion (from Level I to Level II) will require minimal rearrangement expense.

FACILITIES
& EQUIPMENT

o Windshield Fabrication

Automatic cut/seam/wash

Sag form process for bending

Nipper rolls & air autoclave

Silk Screen equipment for black banding peripheral areas.

o Side Glass and Rear Window

Automatic cut/grind/drill/wash

Roller hearth process for bending

Silk screen equipment for electrically heated rear window requirements

Press form equipment for selected parts requiring unique processing methods.

**NEW FABRICATED GLASS PLANT
(NOMINAL ESTIMATE)**

<u>LEVEL II</u>		<u>LEVEL I</u>	<u>LEVEL I</u> <u>LEVEL II</u>
<u>LAND</u>			
	PURCHASE LAND(40 ACRES @\$10,000/ACRE)	\$ 400,000	\$ 400,000
	SITE DEVELOPMENT	1,000,000	1,500,000
	SUB TOTAL	\$ 1,400,000	\$ 1,900,000
<u>BUILDING & SUPPORT FACILITY</u>			
	ENGINEERING	\$ 700,000	\$ 800,000
	MANUFACTURING BLDG. (270,000 Sq. Ft. @ 60/ft ²)	16,200,000	16,200,000
	OTHER	2,000,000	2,500,000
	USEFUL LIFE-30 YRS - SUB TOTAL	\$ 18,900,000	\$ 19,500,000 (1980 \$)
	+7%	20,223,000	20,865,000 (1981 \$)
<u>BUILDING FACILITIES</u>			
	CRANES, CONVEYORS AND SCRAP HANDLING	3,000,000	4,000,000
	ELECTRICAL, HEATING, VENTILATION, COMPRESSORS,	4,500,000	5,500,000
	WASTE TREATMENT	3,000,000	3,500,000
	UTILITIES (SEWER, WATER, GAS)		
	USEFUL LIFE-30 YRS - SUB TOTAL	\$ 15,100,000	\$ 19,400,000 (1980 \$)
	+6%	16,006,000	20,564,000 (1981 \$)
<u>PLANT FACILITIES</u>			
	TOOL ROOM AND LABORATORY-TEST EQUIPMENT	\$ 1,100,000	\$ 1,400,000
	MATERIAL HANDLING EQUIPMENT, RACKS	2,500,000	3,500,000
	OTHER	1,000,000	1,500,000
	USEFUL LIFE-12 YRS - SUB TOTAL	\$ 4,600,000	\$ 6,400,000 (1980 \$)
	+6%	4,876,000	6,784,000 (1981 \$)
<u>MACHINERY & EQUIPMENT</u>			
	WINDSHIELD	\$ 11,300,000	\$ 17,000,000 (1980 \$)
	ROLLER HEARTH	6,800,000	12,800,000 (1980 \$)
	PRESS FORM	2,000,000	4,000,000
	OTHER	1,500,000	2,500,000
	USEFUL LIFE-12 YRS - SUB TOTAL	\$ 21,600,000	\$ 37,000,000 (1980 \$)
	+6%	22,896,000	39,432,000 (1981 \$)
<u>LEVEL I</u>			
	TOTAL FACILITIES, EQUIPMENT AND TOOLING	\$ 57,000,000	\$ 78,000,000 (1980 \$)
		60,525,000	82,761,000 (1981 \$)
<u>PRE-PRODUCTION AND LAUNCH @ APPROXIMATELY 20%</u>			
		\$ 11,400,000	\$ 15,600,000 (1980 \$)
		12,105,000	16,552,200 (1981 \$)
	TOTAL PROGRAM COST	\$ 68,400,000	\$ 93,600,000 (1980 \$)
		72,630,000	99,313,000 (1981 \$)

CAPACITY LEVEL I 600,000 Vehicle Volume

DATE March 1982

PROCESS AND COMPONENT SUMMARY

CAPACITY LEVEL II 1,200,000 Vehicle Volume

Level IV

MAJOR DEPARTMENTS	DEPARTMENT FUNCTION	MAJOR CAPITAL EXPENDITURES (\$ MILLIONS)			AREA (SQ. FT.)	MANPOWER REQMS			REMARKS
		LEVEL I	LEVEL II	TOTAL		LEVEL I	LEVEL II		
Windshield	o Cut/Seam/Wash	\$ 11.3	\$ 6.6	\$ 17.9	60,000	80	160		
	o Bend/Anneal (Sag Form Process)								
	o Laminate								
	o Nipper Roll								
Side Glass/Rear Window/Lift Gate	o Air Autoclave								
	o Silk Screen Black Band								
	o Cut/Grind/Drill/Wash	6.8	6.0	12.8	50,000	70	140		
	o Bend/Anneal (Roller Hearth Process)								
Side Glass/Rear Window/Lift Gate	o Silk Screen (Electrically heated rear window/backlite)								
	o Cut/Grind/Drill/Wash Facilities Common With Roller Hearth Dept.	2.0	2.0	4.0	18,000	17	54		
	o Bend/Anneal (Press Form Process)								
	o Silk Screen (Electrically heated rear window/backlite Facilities common with Roller Hearth Department.	1.5	1.0	2.5					Misc. Other Machinery & Equipment
TOTALS		\$21.6	\$15.6	\$37.2	128,000	177	354		TOTAL DIRECT LABOR
						95	150		TOTAL INDIRECT LABOR
						75	90		TOTAL SALARY LABOR
						347	594		TOTAL MANPOWER

PRODUCT Fabricated Glass

CAPACITY LEVEL I 600,000 Vehicle Volume FACILITIES PLANNING
 CAPACITY LEVEL II 1,200,000 Vehicle Volume (NOMINAL ESTIMATE) DATE March 1982 Level III

FACILITY TYPE	FACILITY ACTIVITIES		ANNUAL PRODUCTION RATE		MAJOR CAPITAL EXPENDITURE (\$ MILLIONS)		MANPOWER REQUIREMENTS		REMARKS
	FUNCTION	MATERIAL	LEVEL I	LEVEL II	LEVEL I	LEVEL II	LEVEL I	LEVEL II	
GLASS FABRICATION	Windshield Assembly Fabrication	Raw Flat Glass (Float Formed or equivalent)	600,000 Plus Service	1,200,000 Plus Service	\$9.0/\$13.5 (\$11.3)	\$14.3/\$21.5 (\$17.9)	70/90 (80)	140/180 (160)	All glass is purchased in the form of flat cut to size 'brackets'.
	Side Glass/Rear Window/Lift Gate Fabrication	Raw Flat Glass (Float Formed or equivalent)	3,500,000	7,000,000	\$5.4/\$8.2 (\$6.8)	\$10.2/\$15.4 (\$12.8)	63/77 (70)	126/154 (140)	Roller Hearth process
	Side Glass/Rear Window	Raw Flat Glass (Float Formed or equivalent)	250,000	500,000	\$1.8/\$2.2 (\$2.0)	\$3.6/\$4.4 (\$4.0)	24/30 (27)	48/60 (54)	Press form process
	Land/Building/Equipment				\$1.2/\$1.8 (\$1.5)	\$2.0/\$3.0 (\$2.5)			
MISC. OTHER MACH. & EQUIP.					\$30.0/\$40.0 (\$35.4)	\$35.0/\$45.0 (\$40.8)			
							157/197 (177)	314/394 (354)	Direct Labor
							85/105 (95)	135/165 (150)	Indirect Labor
TOTALS					\$47.4/\$65.7 (\$57.0)*	\$65.1/\$89.3 (\$78.0)*	70/80 (75)	85/95 (90)	Salary
							312/382 (347)	534/654 (594)	

*Major capital expenditures adjusted for 1981 economics \$60,525,000-Level I, \$82,761,000-Level II. PRODUCT Fabricated Glass

NEW FABRICATED GLASS PLANT AREA BREAKDOWN

	<u>SQUARE FEET</u>
<u>Manufacturing Building</u>	
Receiving/Raw Glass Storage	40,000
Windshield Fabrication	60,000
Roller Hearth	50,000
Press Form	18,000
Finished Parts Storage	30,000
Shipping	10,000
Tool Room/Maintenance/Laboratory	20,000
Vending/Rest Rooms/Lockers	5,000
Cullet Processing	2,000
Administrative & Production Offices	15,000
Misc. Other (Air Compressors/Boilers/Sub Stations, Etc.)	<u>20,000</u>
 TOTAL PLANT:	 270,000

NEW FABRICATED GLASS PLANT

600'

Misc. Other/Cullet Processing 10,000 Sq.Ft.	In-Process/Finished Storage & Shipping 40,000 Sq.Ft.	
Windshield Fabrication 60,000 Sq.Ft.	Side Glass/Rear Window/Lift Gate (Roller Hearth) 50,000 Sq.Ft.	Side Glass/Rear Window/Lift Gate (Press form) 18,000 Sq.Ft.
Receiving/Raw Glass Storage 40,000 Sq.Ft.	Tool Room/Maintenance/ Laboratory 20,000 Sq.Ft.	
	Vending/Rest Rooms 5,000 Sq.Ft.	Admin. Offices & Production 15,000 Sq.Ft.
	Misc. Other 12,000 Sq.Ft.	

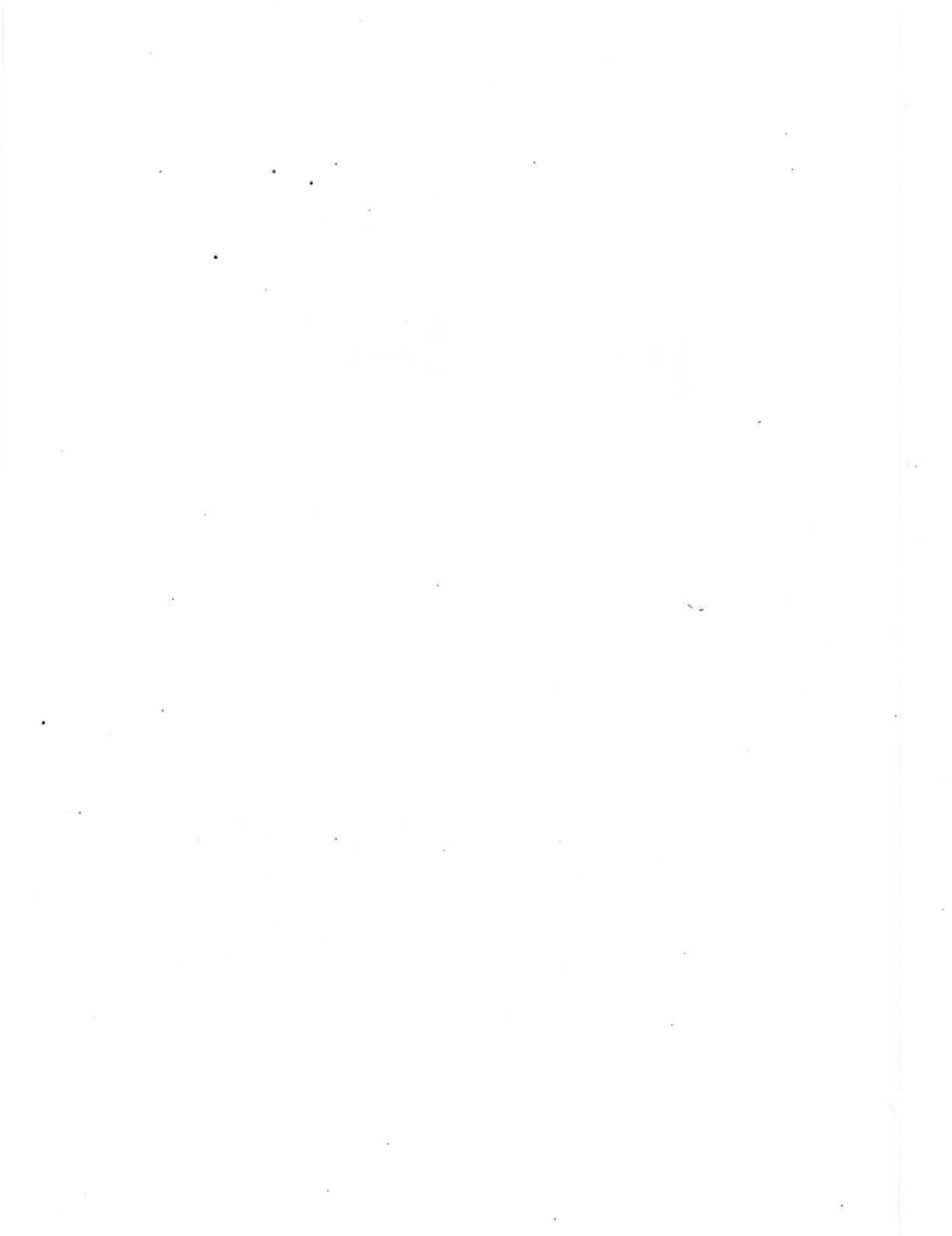
TOTAL PLANT: 270,000 Sq.Ft.

FABRICATED GLASS PLANT
TOTAL MANUFACTURING COST
(EXCLUDING MATERIAL)

PRODUCTION: 600,000 UNITS PER YEAR			
<u>MANPOWER:</u>			
	<u>245 DAYS</u>	<u>EMPLOYEES</u>	<u>ANNUAL HOURS</u>
- DIRECT LABOR	1960	177	346,920
- INDIRECT - HOURLY	1960	95	186,200
- INDIRECT - SALARY	2000	75	150,000
		<u>347</u>	<u>683,120</u>
ANNUAL HOURS ÷ 600,000 UNITS = HOURS PER UNIT = 1.14			
<u>WAGE & FRINGE COSTS:</u>			
- DIRECT - LABOR	\$19.50	x .58	= \$11.31
- INDIRECT - HOURLY	\$21.50	x .31	= \$ 6.67
- INDIRECT - SALARY	\$23.50	x .25	= \$ 6.63
	TOTAL WAGES & FRINGE COSTS		<u>\$24.61</u>
<u>INVESTMENT: (1981\$)</u>			
- BUILDING & SUPPORT FACILITIES USEFUL LIFE - 30 YRS			<u>FACILITIES COST</u>
- BUILDING FACILITIES USEFUL LIFE - 30 YRS			\$20,223,000
- PLANT FACILITIES USEFUL LIFE - 12 YRS			\$16,006,000
- MACHINERY & EQUIPMENT USEFUL LIFE - 12 YRS			\$ 4,876,000
			<u>\$22,896,000</u>
			<u>DEPRECIATION</u>
			674,100
			533,533
			406,333
			<u>1,908,000</u>
			<u>COST-PER-UNIT</u>
			\$1.12
			\$.89
			\$.68
			<u>\$3.18</u>
			<u>\$5.87</u>

DEPRECIATION ÷ 600,000 UNITS = TOTAL DEPRECIATION PER UNIT = \$5.87

TAXES & INSURANCE AS PERCENT OF WAGE & FRINGE COST
T & I ESTIMATE 3.9% \$24.61 X 3.9% = \$.96
OTHER MANUFACTURING COST AS PERCENT OF WAGE & FRINGE COST
OME ESTIMATE 13.2% \$24.61 X 13.2% = \$3.25
TOTAL WAGE & FRINGE COSTS \$24.61
TOTAL DEPRECIATION COSTS \$ 5.87
TOTAL TAXES & INSURANCE \$.96
TOTAL OME \$ 3.25
TOTAL \$34.69



PLANT 9
HEATER AND AIR CONDITIONER PLANT

NEW HEATER AND AIR CONDITIONER PLANT ASSUMPTIONS

PRODUCT

- HEATER ASSEMBLY
- HEATER AIR CONDITIONER ASSEMBLY
- AIR CONDITIONER COMPRESSOR ASSEMBLY
- MISCELLANEOUS HEATER & AIR CONDITIONER SYSTEMS, COMPONENTS

OPERATING PATTERN

NORMAL OPERATING PATTERN - 245 DAYS PER YEAR

ALL OPERATIONS: TWO (8) HOUR SHIFTS PER DAY
OVERTIME

ALL OPERATIONS: ALTERNATE SATURDAYS 10%

THIRD SHIFT STRICTLY FOR MAINTENANCE, EQUIPMENT AND TOOL SET-UP

PRODUCTION RATES

- PLANT SIZED FOR 1,200,000 CAR SETS ANNUALLY (LEVEL II).
FACILITIES & EQUIPMENT EXPANSION (FROM LEVEL I TO LEVEL II).
WILL REQUIRE MINIMAL RE-ARRANGEMENT EXPENSE.
- AIR CONDITIONING REQUIREMENTS PLANNED FOR 70% (INSTALLATION RATE)
OF TOTAL VEHICLES.
(LEVEL II 840,000 UNITS ANNUALLY)
- LEVEL I 600,000 CAR SETS ANNUALLY 2,450/DAY, 153/HOUR
LEVEL II 1,200,000 CAR SETS ANNUALLY 4,900/DAY, 306/HOUR
- AT MAXIMUM PRACTICAL OVERTIME - CAPACITY LEVEL I 660,000/YEAR
- CAPACITY LEVEL II 1,320,000/YEAR
- CAPACITY LEVEL II FOR A/C COMPRESSOR
(924,000/YEAR)

NEW HEATER AND AIR CONDITIONING PLANT ASSUMPTIONS (CONT'D)

TECHNOLOGY LEVEL

- CONVENTIONAL HEATER DESIGN WITH PLASTIC DUCTS AND HOUSINGS
- SWASH PLATE DESIGN A/C COMPRESSOR
- AUTOMATED MACHINING OPERATIONS FOR COMPONENTS SUCH AS SHAFT
& SWASH PLATE, HOUSING, PISTONS, END CAPS, ETC. SOME
AUTOMATED ASSEMBLY.

EQUIPMENT LEVELS CONSISTENT WITH ESTABLISHED OPERATIONS IN THE
UNITED STATES. A FAIR DEGREE OF AUTOMATION BUT STILL SOMEWHAT
LABOR INTENSIVE.

NEW HEATER AND AIR CONDITIONER PLANT (NOMINAL ESTIMATE)

	LEVEL I	LEVEL II	LEVEL I	LEVEL II
<u>LEVEL II</u>				
<u>LAND</u>				
PURCHASE LAND(75 ACRES @ \$10,000/ACRE)	\$ 750,000	\$ 750,000		
SITE DEVELOPMENT	2,250,000	2,750,000		
SUB TOTAL	\$ 3,000,000	\$ 3,500,000		
<u>BUILDING & SUPPORT FACILITY</u>				
ENGINEERING	\$ 1,200,000	1,200,000		
MANUFACTURING BLDG. (0.432M Sq.Ft. @ \$55/Sq.Ft.)	23,760,000	23,760,000		
AIR COMPRESSORS AND FIRE PROTECTION	1,500,000	1,500,000		
WASTE TREATMENT	1,640,000	2,040,000		
TANK FARM	900,000	1,000,000		
OFFICE BUILDING	1,200,000	1,200,000		
OTHER	800,000	1,300,000		
USEFUL LIFE-30 YRS - SUB TOTAL	\$ 31,000,000	\$ 32,000,000 (1980 \$)		
	+7%	33,170,000 +7%		34,240,000 (1981 \$)
<u>BUILDING FACILITIES</u>				
CENTRAL COOLANT SYSTEM	\$ 1,000,000	\$ 1,000,000		
ELECTRICAL	2,500,000	3,000,000		
HEATING AND VENTILATION (PENT-HOUSE HEATERS)	1,500,000	1,500,000		
UNDERGROUND SERVICES	1,000,000	1,000,000		
BUILDING UTILITIES (AIR, WATER, GAS)	1,500,000	1,500,000		
USEFUL LIFE-30 YRS - SUB TOTAL	\$ 7,500,000	\$ 8,000,000 (1980 \$)		
	+6%	7,950,000 +6%		8,480,000 (1981 \$)
<u>PLANT FACILITIES</u>				
TOOL ROOM AND CUTTER GRIND	\$ 3,000,000	\$ 3,000,000		
MATERIAL HANDLING EQUIPMENT	1,000,000	1,500,000		
OTHER	3,500,000	4,500,000		
USEFUL LIFE-12 YRS - SUB TOTAL	\$ 7,500,000	\$ 9,000,000 (1980 \$)		
	+6%	7,950,000 +6%		9,540,000 (1981 \$)
<u>MACHINERY & EQUIPMENT</u>				
A/C COMPRESSOR	\$ 30,000,000	\$ 42,000,000		
HEATER, HEATER A/C ASSEMBLIES	5,000,000	9,000,000		
MISC. SYSTEMS COMPONENTS	2,500,000	3,500,000		
CONTAINERS AND RACKS	1,000,000	1,500,000		
OTHER	1,500,000	2,500,000		
USEFUL LIFE-12 YRS - SUB TOTAL	\$ 40,000,000	\$ 58,500,000 (1980 \$)		
	+6%	42,400,000 +6%		62,010,000 (1981 \$)
<u>LEVEL I</u>				
TOTAL FACILITIES, EQUIPMENT AND TOOLING	\$ 89,000,000	\$111,000,000 (1980 \$)		
		94,470,000		117,770,000 (1981 \$)
<u>PRE-PRODUCTION AND LAUNCH @ APPROXIMATELY 20%</u>				
	\$ 17,800,000	\$ 22,200,000 (1980 \$)		
	18,894,000	23,554,000 (1981 \$)		
TOTAL PROGRAM COST	\$106,800,000	\$133,200,000 (1980 \$)		
	113,364,000	141,324,000 (1981 \$)		

FACILITY TYPE	FACILITY ACTIVITIES		ANNUAL PRODUCTION RATE		MAJOR EXPENDITURE (\$ MILLIONS)		MANPOWER REQUIREMENTS		REMARKS
	FUNCTION	MATERIAL	LEVEL I	LEVEL II	LEVEL I	LEVEL II	LEVEL I	LEVEL II	
o	HEATER AND HEATER A/C HOUSING	TALC FILLED POLYPROPYLENE	600,000	1,200,000	\$1.3/\$1.7 (\$1.5)	\$2.2/\$2.8 (\$2.5)	18/22 (20)	36/44 (40)	
	HEATER ASSEMBLY HEATER A/C ASSY.	ASSEMBLY OF HOUSING HEATER CORE, EVAPORATOR, DOORS, VENTS, LINKAGE, ETC.	600,000	1,200,000	\$3.1/\$3.9 (\$3.5)	\$5.8/\$7.2 (\$6.5)	170/210 (190)	340/420 (380)	
	MISCELLANEOUS SYSTEMS COMPONENTS	PLASTIC DOORS, VENTS DUCTS-STEEL LINKAGE, CONTROL ARMS AND LEVERS	600,000	1,200,000	\$2.2/\$2.8 (\$2.5)	\$3.1/\$3.9 (\$3.5)	18/22 (20)	36/44 (40)	
	AIR CONDITIONER COMPRESSOR	HOUSINGS-ALUMINUM CASTINGS SHAFT - STEEL PISTONS-ALUMINUM	420,000	840,000	\$27.0/\$33.0 (\$30.0)	\$37.9/\$46.1 (\$42.0)	109/131 (120)	218/262 (240)	
	MISCELLANEOUS OTHER				\$5.4/\$6.6 (\$6.0)	\$7.7/\$9.3 (\$8.5)			DIRECT LABOR
o	PLANT FACILITIES				\$10.4/\$12.6 (\$11.5)	\$11.3/\$13.7 (\$12.5)			INDIRECT LABOR
	LAND AND BUILDING				\$30.6/\$37.4 (\$34.0)	\$32.0/\$39.0 (\$35.5)			SALARY
TOTALS					\$80.0/\$98.0 (\$89.0) *	\$100.0/\$122.0 (\$111.0) *	710/870 (790)	1330/1630 (1480)	

*Major capital expenditures adjusted for 1981 economics \$94,470,000-Level I, \$117,770,000-Level II.

CAPACITY LEVEL I 600,000 Vehicles

CAPACITY LEVEL II 1,200,000 Vehicles

PROCESS AND COMPONENT SUMMARY
(NOMINAL ESTIMATE)

DATE March 1982

Level IV

MAJOR DEPARTMENTS		DEPARTMENT FUNCTION	MAJOR CAPITAL EXPENDITURES (\$ MILLIONS)			AREA (SQ. FT.)	MANPOWER REQMT'S			REMARKS
			LEVEL I	LEVEL II			LEVEL I	LEVEL II		
				TOTAL					D/L	
HEATER ASSEMBLY HEATER - A/C ASSEMBLY HEATER - HEATER A/C HOUSING MANUFACTURING AIR CONDITIONER COMPRESSOR		INJECTION MOLDING	\$ 3.5 Included Above 1.5 30.0	\$ 3.0 Included Above 1.0 12.0	\$6.5 2.5 42.0	120,000 Included Above Included Above 100,000	30 160 20 120	60 320 40 240		
MISCELLANEOUS SYSTEMS COMPONENTS MATERIAL HANDLING & OTHER		INJECTION & BLOW MOLDED PARTS. FABRICATED CONTROLS AND DOOR MECHANISMS	2.5 2.5	1.0 1.5	3.5 4.0	10,000	20	40		
TOTALS			\$40.0	\$18.5	\$58.5	230,000	350 320 120 700	700 600 180 1,400	TOTAL DIRECT LABOR TOTAL INDIRECT LABOR TOTAL SALARY LABOR TOTAL MANPOWER	

NEW HEATER AND AIR CONDITIONER PLANT

	<u>Square Feet</u>
Manufacturing Building (600' x 800')	
Raw Material - Receiving & Storage	45,000
Heater-Heater Air Conditioner Fabrication & Assembly	120,000
Air Conditioner Compressor Fabrication & Assembly	100,000
Miscellaneous Systems Components	10,000
In-Process/Finished Parts Storage & Shipping	63,000
Tool Room, Cutter Grind & Laboratory	30,000
Production Office & Maintenance	35,000
Employee Services	19,000
Utilities	10,000
	<u>432,000</u>
TOTAL MANUFACTURING BUILDING	

NEW HEATER AND AIR CONDITIONER PLANT ASSUMPTIONS

		(Square Feet)
<u>In-Process/Finished Parts Storage & Shipping</u> 63,000		<u>Production Office & Maintenance</u> 35,000
<u>Heater</u> <u>Heater - A/C</u> <u>Fabrication & Assembly</u> 120,000	<u>A/C</u> <u>Compressor</u> <u>Machining & Assembly</u> 100,000	<u>Miscellaneous</u> 10,000 <u>Utilities</u> 10,000 <u>Employee Services</u> 19,000
<u>Raw Material Storage & Receiving</u> 45,000		<u>Tool Room & Laboratory</u> 30,000
600'	800'	

HEATER AND AIR CONDITIONER PLANT
TOTAL MANUFACTURING COST
 (EXCLUDING MATERIAL)

PRODUCTION: 600,000 UNITS PER YEAR

<u>MANPOWER:</u>	<u>245 DAYS</u>	<u>EMPLOYEES</u>	<u>ANNUAL HOURS</u>	<u>HRS/UNIT</u>
-DIRECT LABOR	1960	350	686,000	1.14
- INDIRECT - HOURLY	1960	320	627,200	1.05
- INDIRECT - SALARY	2000	120	240,000	.40
		<u>790</u>	<u>1,553,200</u>	<u>2.59</u>

ANNUAL HOURS ÷ 600,000 UNITS = HOURS PER UNIT = 2.59

WAGE & FRINGE COSTS:

- DIRECT LABOR	\$19.50	x	1.14	=	\$22.23
- INDIRECT - HOURLY	\$21.50	x	1.05	=	\$22.58
- INDIRECT - SALARY	\$23.50	x	.40	=	\$ 9.40
					<u>\$54.21</u>

TOTAL WAGES & FRINGE COSTS

INVESTMENT: (1981\$)

	<u>FACILITIES COST</u>	<u>DEPRECIATION</u>	<u>COST-PER-UNIT</u>
- BUILDING & SUPPORT FACILITIES USEFUL LIFE - 30 YRS	\$33,170,000	1,105,666	\$1.84
- BUILDING FACILITIES USEFUL LIFE - 30 YRS	\$ 7,950,000	265,000	\$.44
- PLANT FACILITIES USEFUL LIFE - 12 YRS	\$ 7,950,000	662,500	\$1.10
- MACHINERY & EQUIPMENT USEFUL LIFE - 12 YRS	\$42,400,000	3,533,333	\$5.89
			<u>\$9.27</u>

DEPRECIATION ÷ 600,000 UNITS = TOTAL DEPRECIATION PER UNIT = \$9.27

TAXES & INSURANCE AS PERCENT OF WAGE & FRINGE COST
 T & I ESTIMATE OF 3.9% \$54.21 X 3.9% = \$2.12
 OTHER MANUFACTURING COST AS PERCENT OF WAGE & FRINGE COST
 OME ESTIMATE OF 13.2% \$54.21 X 13.2% = \$7.16
 TOTAL WAGE & FRINGE COSTS \$54.21
 TOTAL DEPRECIATION COSTS \$ 9.27
 TOTAL TAXES & INSURANCE \$ 2.12
 TOTAL OME \$ 7.16
 TOTAL \$72.76

PLANT 10
STEEL FORGING PLANT

FORGE PLANT ASSUMPTIONS

<u>PRODUCT</u> <u>AND</u> <u>PRODUCTION</u> <u>RATES</u>	<u>ENGINE COMPONENTS</u>	<u>PER</u> <u>VEHICLE</u>	<u>ANNUAL</u> <u>VOLUME</u> <u>IN PIECES</u>
-	o Connecting Rod & Cap Forgings	4 Sets	3,200,000
	Four Cylinder Gas Engine	4 Sets	1,600,000
	Four Cylinder Diesel Engine	6 Sets	4,800,000
	V-6 Engine	8 Sets	6,400,000
	V-8 Engine		
	o Crankshaft Forging		
	Four Cylinder Diesel Engine	1	400,000
- <u>TRANSMISSION COMPONENTS</u>			
	o Transaxle Differential		
	- Ring Gear Blank	1	2,000,000
	- Pinion Gear Blank	1	2,000,000
	- Differential Pinion & Side Gear Blanks	1 Set	8,000,000
	o Manual Transaxle		
	- Pinion Shaft Forging	1	1,000,000
	- Main Shaft Forging	1	1,000,000
	- 1st Speed Gear Blank	1	1,000,000
	- 2nd Speed Gear Blank	1	1,000,000
	- 3rd Speed Gear Blank	1	1,000,000
	- 4th Speed Gear Blank	1	1,000,000

FORGE PLANT ASSUMPTIONS (CONT.)

	PER VEHICLE	ANNUAL VOLUME IN PIECES
o Automatic Transaxle		
- Input Shaft Forging	1	1,000,000
- Output Shaft Forging	1	1,000,000
- Transfer Shaft Forging	1	1,000,000
- Transfer Shaft Gear Blank	1	1,000,000
- Output Shaft Gear Blank	1	1,000,000
o Automatic Transmission		
- Input Shaft Forging	1	800,000
- Output Shaft Forging	1	800,000
- DRIVE TRAIN COMPONENTS		
o C-V Joints		
- Bell Housing Forging	2 Sets	4,000,000
- Cage Forging	2 Sets	4,000,000
- Driver Forging	2 Sets	4,000,000
- Tripold Housing Forging	2 Sets	4,000,000
- Tripold Forging	2 Sets	4,000,000
- Drive Shaft Forging	1 Set	2,000,000

FORGE PLANT ASSUMPTIONS (CONT.)

	PER VEHICLE	ANNUAL VOLUME IN PIECES
o Prop Shaft (Truck)		
- Prop Shaft Tube (Roll & Weld)	1	800,000
- Sliding Yoke Forging	1	800,000
- U-Joint		
Shaft End Forging	2	1,600,000
Hub Yoke	1	800,000
Cross Forging	1	800,000
o Rear Axle		
- Axle Shafts Forging	2	1,600,000
- Drive Pinion	1	800,000
- Ring Gear Blank	1	800,000
- Differential Pinion & Side Gear Blanks	1 set	3,200,000
- <u>STEERING</u>		
o Rack & Pinion Steering (Manual & Power)		
- Pinion Shaft Forging	1	2,000,000
o Steering Column		
- Lower U-Joint Forging	2	4,000,000
- Upper U-Joint Forging	2	4,000,000
o Steering Shaft (Truck)	1	800,000
o Strut (Truck)	2	1,600,000
o Tie Rod End Forgings (Passenger Car)	2	4,000,000
o Tie Rod End Forgings (Truck)	4	3,200,000
o Center Link Forging (Truck)	1	800,000
o Idler Arm Forging (Truck)	1	800,000
o Steering Gear Arm Forging (Truck)	1	800,000

FORGE PLANT ASSUMPTIONS (CONT.)

- SUSPENSION

o Knuckle Forgings (Truck)	2	1,600,000
o Knuckle Arm (Truck)	2	1,600,000
o Rear Wheel Spindle Forging	2	4,000,000
o Trailing Arm Body Mounting Forging	2	4,000,000
<u>- BODY COMPONENTS</u>		
o Deck Lid Torsion Bars	2	4,000,000
o Liftgate Torsion Bars	2	400,000
o Hood Torsion Bars (Truck)	2	1,600,000
o Hood Prop Bar (Passenger Car)	1	2,000,000

- The Steel Forging Plant has been planned to match the number of vehicles required to utilize straight time engine capacity for the surrogate plants line-up.
- The latest cold and warm forging techniques have been utilized in developing this plant. Induction heating furnaces have been utilized in most cases where the steel slug or blank requires heating prior to forming. Conventional hammers have been planned for the production of connecting rod forgings only. Gas slot furnaces have been included for this operation.

OPERATING PATTERN

- Straight Time
Two Eight Hour Shifts
- Maximum Practical Overtime
Every Other Saturday (10%)

NUMBER OF

STRAIGHT TIME DAYS - 245 Days per year - Note: In those years when there is a major change to the product, the number of production days per year may be reduced.

STEEL FORGING PLANT (NOMINAL ESTIMATE)

<u>LEVEL II</u>		<u>INVESTMENT</u>	<u>LEVEL I</u> <u>LEVEL II</u>
<u>LAND</u>	PURCHASE LAND (100 ACRES @ \$10,000/ACRE) SITE DEVELOPMENT	\$ 1,000,000 1,500,000	
	SUB TOTAL		\$ 2,500,000
<u>BUILDING & SUPPORT FACILITY</u>	ENGINEERING MANUFACTURING BLDG. (.634M Sq. Ft. @ \$55/Sq. Ft.) SUBSTATION AND ELECTRICAL DISTRIBUTION WASTE TREATMENT BLDG. HEATING SYSTEM & COMPRESSORS OTHER (INCLUDING OFFICE BUILDING)	\$ 2,000,000 34,900,000 1,400,000 4,000,000 1,300,000 2,400,000	
	USEFUL LIFE-30 YRS - SUBTOTAL	+7%	\$46,000,000 (1980 \$) 49,220,000 (1981 \$)
<u>BUILDING FACILITIES</u>	STORES ELECTRICAL HEATING AND VENTILATION UNDERGROUND SERVICES BUILDING UTILITIES (AIR, WATER, GAS)	\$ 1,500,000 3,000,000 2,500,000 2,500,000 2,500,000	
	USEFUL LIFE-30 YRS - SUBTOTAL	+6%	\$12,000,000 (1980 \$) 12,720,000 (1981 \$)
<u>PLANT FACILITIES</u>	TOOL AND DIE ROOM EQUIPMENT REPAIR HEAT TREAT EQUIPMENT MATERIAL HANDLING EQUIPMENT METALLURGICAL LABORATORY OTHER	\$ 2,000,000 1,500,000 4,000,000 2,000,000 1,000,000 1,500,000	
	USEFUL LIFE-12 YRS - SUBTOTAL	+6%	\$12,000,000 (1980 \$) 13,440,000 (1981 \$)
<u>MACHINERY & EQUIPMENT</u>	PRODUCTION EQUIPMENT, DIES AND TOOLING CONTAINERS & RACKS OTHER	\$96,000,000 1,000,000 2,000,000	
	USEFUL LIFE-12 YRS - SUBTOTAL	+6%	\$99,000,000 (1980 \$) 104,949,000 (1981 \$)
<u>LEVEL I</u>	TOTAL FACILITIES, EQUIPMENT AND TOOLING		\$171,500,000 (1980 \$) 182,820,000 (1981 \$)
	PRE-PRODUCTION AND LAUNCH @ APPROXIMATELY 20%		\$ 34,300,000 (1980 \$) 36,564,000 (1981 \$)
	TOTAL PROGRAM COST		\$205,800,000 (1980 \$) 219,384,000 (1981 \$)

MAJOR DEPARTMENTS	DEPARTMENT FUNCTION	MAJOR CAPITAL EXPENDITURES (\$ MILLIONS)			AREA (SQ. FT.)	MANPOWER REQMTS		REMARKS
		LEVEL I	LEVEL II	TOTAL		LEVEL I	LEVEL II	
						D/L	D/L	
o Slug Preparation	-Descaling, Weighing & Cut-off, machining slugs		\$10.0		30,000		72	
o Hammer	-Gas Slot Furnace for heating and drop hammers for forming		20.0		50,000		64	
o Press	-Induction Heating units & forming presses		50.0		120,000		184	
o Bending	-Induction Heating units & Bending and Up-Setting Machines		4.0		20,000		54	
o Finishing	-Trim on presses Debur with snag grinders or tumblers		5.0		30,000		90	
o Assembly Checking & Repair	-Assembly, Dimensional Checking & inspection plus metallurgy check - repair		7.0		25,000		54	
o Heat Treat	-Annealing, Phosphating Induction Hardening		1.5		20,000		46	
o Storage	-Finished Forgings		3.0		60,000		66	
o Other								
TOTALS			\$100.5		355,000		610	TOTAL DIRECT LABOR
							780	TOTAL INDIRECT LABOR
							290	TOTAL SALARY LABOR
							1,700	TOTAL MANPOWER

PRODUCT Steel Forging Plant

FACILITIES PLANNING

CAPACITY LEVEL I _____

DATE March 1982

CAPACITY LEVEL II See Assumptions

Level III

FACILITY TYPE	FACILITY ACTIVITIES		ANNUAL PRODUCTION RATE		MAJOR EXPENDITURE (\$ MILLIONS)	MANPOWER REQUIREMENTS		REMARKS
	FUNCTION	MATERIAL	LEVEL I	LEVEL II		LEVEL I	LEVEL II	
Steel Forgings	o Slug Prep. - Bar Cut-off - Machining				\$9/\$11 (\$10.0)	65/79 (72)		
	o Hammer Operation with gas slot furnaces				\$18/\$22 (\$20.0)	58/70 (64)		
	o Press Operation with electric induction heating				\$45/\$55 (\$50.0)	166/202 (184)		
	o Bender Operation with electric induction heating				\$3.5/\$4.5 (\$4.0)	49/59 (54)		
	o Finishing -Trim Process -Deburring -Snag Grinders				\$4.5/\$5.5 (\$5.0)	81/99 (90)		
	o Assembly, Checking & Repair				\$6.5/\$7.5 (\$7.0)	49/59 (54)		
	o Other				\$2.5/\$3.5 (\$3.0)	102/122 (112)		
	o Plant Facilities				\$21.5/\$26.5 (\$24.0)			
	o Building & Land				\$44/\$53 (\$48.5)			674,000 Sq.Ft.Bldg Including Offices & Auxiliary Buildings
						570/690 (630)		Direct Labor
TOTALS						700/860 (780)		Indirect Labor
						260/320 (290)		Salary
				Annual Forging Weight	\$154.5/\$188.5 (\$171.5) *	1530/1870 (1700)		Total

125,000 Tons/Year

*Major capital expenditures adjusted for 1981 economics \$182,820,000

PRODUCT Steel Forging Plant

STEEL FORGING PLANT AREA BREAKDOWN

(Square Feet)

OFFICE BUILDING

MANUFACTURING BUILDING

Slug Preparation	30,000
Forging Hammers	30,000
Forging Presses	50,000
Benders	120,000
Finishing	20,000
Heat Treat	30,000
Assembly, Checking & Repair	20,000
Finished Forging Storage	25,000
Equipment Maintenance & Repair	60,000
Production & Non-Production Stores	20,000
Tool & Die Room	30,000
Utilities	40,000
Metallurgy Laboratory	10,000
Receiving & Raw Material	15,000
Shipping	40,000
Production Offices, Plant and Production Maintenance	20,000
Other (Rest Rooms & Eating Area, Etc.)	80,000
	24,000

Grand Total Manufacturing 634,000

22 Bays @ 40' = 880' x 12 Bays @ 60' = 720'

AUXILIARY (Outside Main Building)

	10,000
Grand Total	674,000

STEEL FORGING PLANT
(Square Feet)

<u>Receiving & Raw Material Storage</u> 40,000		<u>Slug Preparation</u> 30,000	<u>Forging Hammers</u> 50,000	<u>Equipment Maintenance & Repair</u> 20,000
<u>Other</u> 24,000	<u>Tool & Die Room</u> 40,000	<u>Forging Presses</u> 120,000		<u>Benders</u> 20,000
			<u>Utilities</u> 10,000	<u>Heat Treat</u> 20,000
<u>Production Offices Plant & Production Maintenance</u> 80,000			<u>Finishing Forging Storage</u>	<u>Assembly Checking & Repair</u> 25,000
<u>Metal-lurgy Lab</u> 15,000		<u>Production & Non-Production Stores</u> 30,000	<u>Finished Forging Storage</u> 60,000	<u>Shipping</u> 20,000

720'

880'

Total Area 634,000 Sq.Ft.

PLANT 11
GREY IRON FOUNDRY

GREY IRON FOUNDRY ASSUMPTIONS

PRODUCT - Engine Components

<u>Four Cylinder Engine</u>	<u>V-6 Engine</u>	<u>V-8 Engine</u>
Cylinder Block (Gas & Diesel Versions)	Cylinder Block	Cylinder Block
Main Bearing Caps	Main Bearing Caps	Main Bearing Caps
Camshaft Bearing Caps	Camshaft Bearing Caps	Camshaft Bearing Caps
Flywheel	Flywheel	Flywheel

Brake Components

<u>Disc Brake Hub & Rotor</u>
Small size for 4 Cylinder & V-6 Passenger Car
Large size for V-6 & V-8 Powered Trucks
<u>Rear Brake Drums</u>
Small size for 4 Cylinder & V-6 Passenger Car
Large size for V-6 & V-8 Powered Trucks
<u>Rear Brake Wheel Cylinders</u>
All Rear Brake Drums

PRODUCTION RATES

<u>Maximum Straight time basis</u>	<u>Annual Rate</u>
4 Cylinder Engine Components	
Gas	800,000 Engines
Diesel	400,000 Engines
V-6 Engine Components	800,000 Engines
V-8 Engine Components	800,000 Engines
Manual Transaxle - 4 Cylinder	600,000 Engines

GREY IRON FOUNDRY ASSUMPTIONS (CONT.)

Manual Transaxle or Transmission	V-6	400,000 Engines
Manual Transmission	V-8	400,000 Engines
Disc Brake Components		2,800,000 Vehicles
Rear Brake Drums		2,800,000 Vehicles

- The Grey Iron Foundry has been planned to match the number of vehicles required to utilize total straight time engine capacity for the surrogate plants line-up.
- Straight time melt capacity is planned at 90 tons/hour or 1440 tons/day with a maximum capability of 110 tons/hour for short periods.
- At maximum practical overtime, 10% additional production can be generated.

OPERATING
PATTERN

- Straight Time
Two 8 Hour Shifts
- Maximum Practical Overtime
Every other Saturday

NUMBER OF
STRAIGHT
TIME DAYS

- 245 Days per year - Note: In those years when there is a major change to the product, the number of production days per year may be reduced.

GREY IRON FOUNDRY ASSUMPTIONS (CONT.)

Two Cupolas - 50 tons/hour melt capacity each.
Total melt capacity of 90 tons/hour average - 100 tons/hour maximum.

Requires 3.6 molding lines to run production at
200 molds/hour. Plan 5 lines to achieve best utilization of
manpower and facilities, to permit tryout of new products and
to provide proper line maintenance.

Sizable Core Making Facility for:

4 Cylinder Engine block cores
V-6 Engine block cores
V-8 Engine block cores
Rear Brake Cylinders Cores

GREY IRON FOUNDRY
CAPACITY OF 90 TONS/HOUR OF MOLTEN METAL
(NOMINAL ESTIMATE)

	LEVEL I	LEVEL II
<u>LEVEL II</u>		
<u>LAND</u>		
PURCHASE LAND (150 ACRES @ \$10,000/ACRE)		
SITE DEVELOPMENT	\$ 1,500,000	
	4,500,000	
SUB TOTAL		\$ 6,000,000
<u>BUILDING & SUPPORT FACILITY</u>		
ENGINEERING	\$ 4,000,000	
MANUFACTURING BLDG. (1,116M Sq. Ft. @ \$75/Sq. Ft.)	83,700,000	
POWER HOUSE - BOILER AND COMPRESSOR	10,000,000	
WASTE TREATMENT	8,000,000	
SAND, PIG IRON, SCRAP AND OTHER MATERIAL STORAGE	1,000,000	
OTHER (INC. OFFICE BUILDING)	4,300,000	
USEFUL LIFE-30 YRS - SUB TOTAL		\$111,000,000 (1980 \$)
		+7% 118,770,000 (1981 \$)
<u>BUILDING FACILITIES</u>		
STORES	\$ 2,000,000	
ELECTRICAL	6,000,000	
HEATING AND VENTILATION	4,000,000	
UNDERGROUND SERVICES	4,000,000	
BUILDING UTILITIES (AIR, WATER, GAS)	4,000,000	
USEFUL LIFE-30 YRS - SUB TOTAL		\$ 20,000,000 (1980 \$)
		+6% 21,200,000 (1981 \$)
<u>PLANT FACILITIES</u>		
REPAIR, PATTERNS, CORE BOXES AND FLASKS	\$ 2,000,000	
MATERIAL HANDLING EQUIPMENT	2,000,000	
METALLURGICAL LAB	2,000,000	
POLLUTION CONTROLS	19,000,000	
OTHER	3,000,000	
USEFUL LIFE-12 YRS - SUB TOTAL		\$ 28,000,000 (1980 \$)
		+6% 29,680,000 (1981 \$)
<u>MACHINERY & EQUIPMENT</u>		
PRODUCTION EQUIPMENT, PATTERNS AND PERMANENT TOOLING	\$160,000,000	
CONTAINERS AND RACKS	3,000,000	
OTHER	2,000,000	
USEFUL LIFE-12 YRS - SUB TOTAL		\$165,000,000 (1980 \$)
		+6% 174,900,000 (1981 \$)
<u>LEVEL I</u>		
TOTAL FACILITIES, EQUIPMENT AND TOOLING	\$330,000,000 (1980 \$)	
	350,550,000 (1981 \$)	
PRE-PRODUCTION AND LAUNCH @ APPROXIMATELY 20%	66,000,000 (1980 \$)	
	70,110,000 (1981 \$)	
TOTAL PROGRAM COST	\$396,000,000 (1980 \$)	
	420,660,000 (1981 \$)	

CAPACITY LEVEL 1

CAPACITY LEVEL II See Assumptions

FACILITIES PLANNING
(NOMINAL ESTIMATE)

DATE March 1982

Level III

FACILITY TYPE	FACILITY ACTIVITIES		ANNUAL PRODUCTION RATE		MAJOR EXPENDITURE (\$ MILLIONS)		MANPOWER REQUIREMENTS		REMARKS
	FUNCTION	MATERIAL	LEVEL I	LEVEL II	LEVEL I	LEVEL II	LEVEL I	LEVEL II	
GREY IRON FOUNDRY	o Melting & Pouring Metal	Grey Iron (Scrap, Pig, Coke Alloys, Flux, etc.)				\$ 24/\$28 (\$26)		55/65 (60)	2 Cupolas @ appr. 90-100 tons/hour 350,000-400,000 tons/year.
	o Molding Lines & Sand System	Lake Sand and Cores				\$ 50/\$60 (\$55)		190/230 (210)	5 Molding lines with Hydraulic- Squeeze Machines, Continuous con- veyor lines & core setters.
	o Core Making	Core Sand and Resin				\$ 23/\$27 (\$25)		265/315 (290)	Core Blowers, Iso-Cure Core Making Machines & Core Dryers.
	o Cooling & Cleaning					\$30/\$40 (\$35)		165/195 (180)	Cooling Conveyor & Tunnel, Shakers and Shotblast Equipment.
	o Inspection & Repair					\$17/\$21 (\$19)		90/110 (100)	Welders, Impreg- nators and in- spection equip- ment.
	o Other					\$ 4/\$6 (\$5)		35/45 (40)	
	o Plant Facilities					\$44/\$52 (\$48)			
	o Building and Land					\$108/\$126 (\$117)			1,188,500 Sq.Ft. buildings includ- ing offices & power house.
TOTALS									

[illegible]

*Major capital expenditures adjusted for 1981 economics \$350,550,000.

CAPACITY LEVEL I _____ PROCESSING AND COMPONENT SUMMARY
 CAPACITY LEVEL II See Assumptions (PRODUCTION FACILITIES & EQUIPMENT ONLY)
 DATE March 1982 (NOMINAL ESTIMATE)

MAJOR DEPARTMENTS		DEPARTMENT FUNCTION	MAJOR CAPITAL EXPENDITURES (\$ MILLIONS)		AREA (SQ. FT.)	MANPOWER REQUIREMENTS			REMARKS
			LEVEL I	LEVEL II		LEVEL I	LEVEL II		
						TOTAL	D/L	D/L	
o Melting	- Melting & Raw Material Charging System		\$ 21.0		170,000		24	2 - 100 Ton Cupolas	
o Pouring	- Metal Holding and Pouring System		5.0		30,000		36		
o Sand System	- Sand Mix and Delivery System		9.0		40,000		40		
o Molding	- Flask Delivery and Molding Conveyor System		16.0		50,000		20	5 Molding Lines Average 200 molds/ hour.	
o Molding	- Molding Line, Core Delivery & Setting		30.0		140,000		150		
o Core Making	- Core Machines and Dryers		25.0		120,000		290		
o Cooling	- Cooling Conveyor Tunnel & Cooling System		25.0		130,000		180		
o Cleaning	- Shakers, Shot Blast & Air Guns, Etc.		10.0						
o Inspection & Repair	- Welding, Impregnating Equipment and Inspection Equipment		19.0		50,000		100		
o Other			5.0				40	Containers, Racks, Misc. Conveyors Etc.	
o Storage	- Finished Casting Storage				80,000				
TOTALS			\$165.0		810,000		880	TOTAL DIRECT LABOR	
							820	TOTAL INDIRECT LABOR	
							350	TOTAL SALARY LABOR	
							2,050	TOTAL MANPOWER	

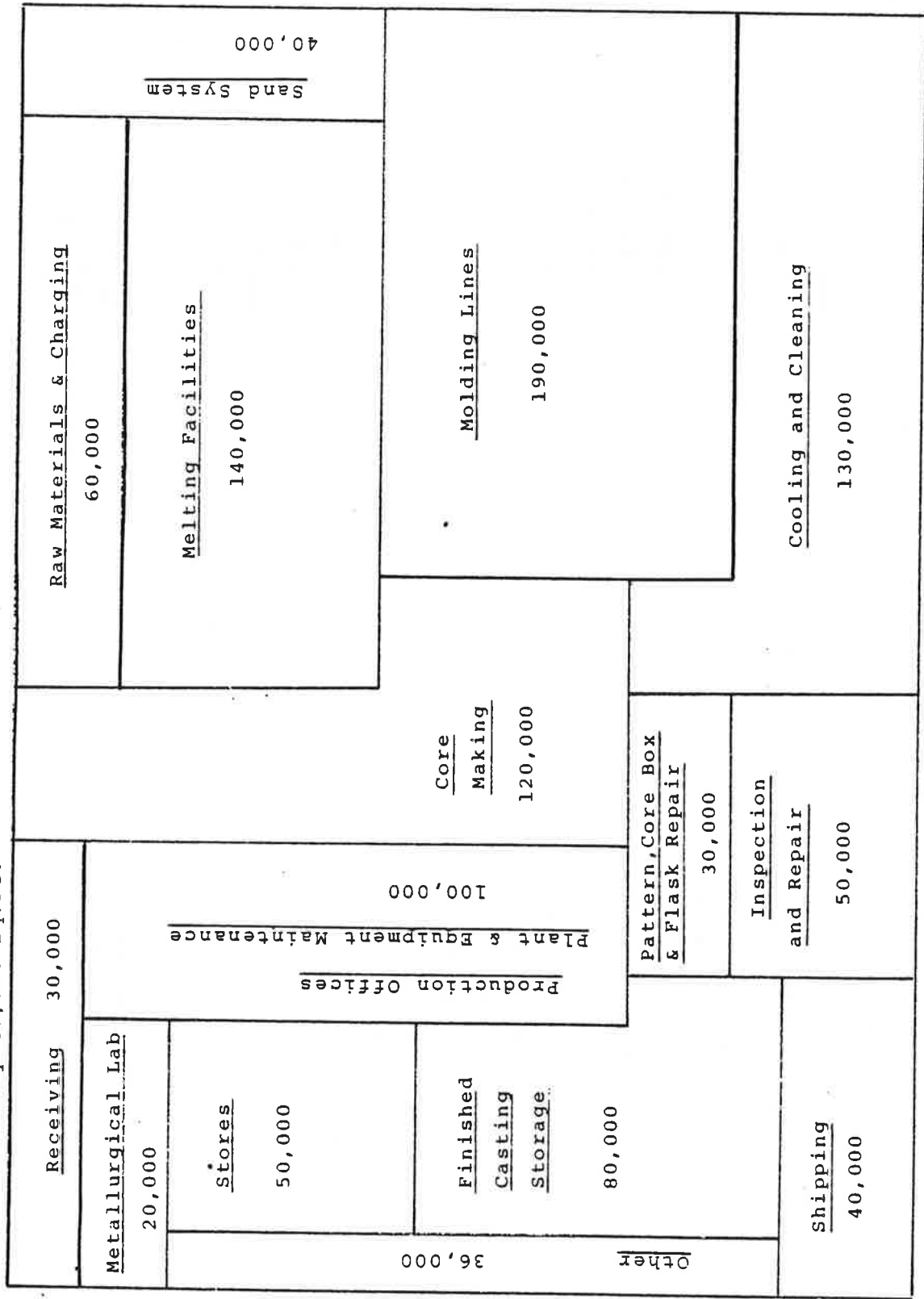
GREY IRON FOUNDRY AREA BREAKDOWN
(SQUARE FEET)

	<u>AREA</u>
<u>Office Building</u> 90' x 450'	40,500
<u>Manufacturing Building</u>	
Raw Material and Charging	60,000
Melting Facilities	140,000
Molding Lines and Sand System	230,000
Core Room	120,000
Cooling and Cleaning	130,000
Inspection and Repair	50,000
Finished Casting Storage	80,000
Pattern, Core Box and Flask Repair	30,000
Shipping and Receiving	70,000
Stores	50,000
Metallurgical Laboratory	20,000
Production Offices, Plant and Equipment Maintenance	100,000
Other (Rest Rooms, Eating Areas, Etc.)	36,000
Grand Total Manufacturing	1,116,000
22.5 Bays @ 40' = 900 x 15.5 Bays @ 80' = 1240'	
<u>Auxiliary</u> (Outside Main Building)	32,000
Grand Total	1,188,500

GREY IRON FOUNDRY BUILDING LAYOUT
(SQUARE FEET)

Office Building

90' x 450' One Story 40,500 Sq.Ft.



PLANT 12
NODULAR IRON FOUNDRY

MODULAR IRON FOUNDRY ASSUMPTIONS

PRODUCT -

ENGINE COMPONENTS

4 CYLINDER ENGINE	V-6 ENGINE	V-8 ENGINE
Crankshaft (Gas)	Crankshaft	Crankshaft
Camshaft (Gas & Diesel)	Camshafts	Camshafts
Intermediate Shaft		
Exhaust Manifold	Exhaust Manifolds	Exhaust Manifolds

BRAKE COMPONENTS

Disc Brake Calipers & Adapters

Small for 4 Cylinder & V-6 Engine powered vehicles

Large for V-8 Engine powered trucks

REAR AXLE COMPONENTS

Rear Axle Case

Small for V-6 Engine powered trucks

Large for V-8 Engine powered trucks

Rear Axle Carrier

Small for V-6 Engine powered trucks

Large for V-8 Engine powered trucks

STEERING & SUSPENSION COMPONENTS

Front Wheel Bearing Support for all front wheel drive vehicles

Steering Gear Housing

Manual conventional steering gear for trucks (RWD)

Automatic conventional steering gear for trucks (RWD)

NODULAR IRON FOUNDRY ASSUMPTIONS (CONT.)

PRODUCTION RATES

- Maximum Straight Time Basis	
4 Cylinder Engine (Gas)	800,000 Engines
4 Cylinder Engine (Diesel)	400,000 Engines
V-6 Engine	800,000 Engines
V-8 Engine	800,000 Engines
Disc Brake Components	2,800,000 Vehicles
Rear Axles	1,000,000 Trucks
Front Bearing Support	1,800,000 Vehicles
Steering Gear Manual	300,000 Trucks
Automatic	700,000 Trucks

- The Nodular Iron Foundry has been planned to match the number of vehicles required to utilize total straight time engine capacity for the surrogate plant line-up.
- Straight Time melt capacity is planned at 100 tons/hour or 1,600 tons/day with a maximum capability of 120 tons/hour for short periods.
- At maximum practical overtime, 10% additional production can be generated.

OPERATING PATTERN

- Straight Time
2 - 8 Hour Shifts
- Maximum practical overtime
Every other Saturday

NUMBER OF STRAIGHT TIME DAYS

- 245 Days Per Year - Note: In those years when there is a major change to the product, the number of production days per year may be reduced.

NODULAR IRON FOUNDRY

- o 2 Cupolas - 50 tons/hour melt capacity each
- 3 Induction furnaces - 10 tons/hour melt capacity each for a total melt capacity of 120 tons/hour. (130 tons/hour maximum)
Inoculation for special iron and steel castings accomplished in the induction furnaces.
- o Requires 2.5 molding lines to run production at 200 molds/hour.
Plan 4 lines to achieve best utilization of manpower, facilities, permit tryout of new products and to permit proper line maintenance.

Moderate Core Making Facility

Cores for exhaust manifolds
Disc Brake calipers
Rear Axle case
Rear Axle Carrier
Steering Gear Housing

CRANKSHAFT AND CAMSHAFT PRODUCTION

Provisions provided to center crankshafts and camshaft castings.
Also equipment to flame harden camshaft castings.

**NODULAR IRON FOUNDRY
CAPACITY OF 120 TONS/HOUR OF MOLTEN METAL
(NOMINAL ESTIMATE)**

<u>LEVEL</u>		<u>INVESTMENT</u>	
<u>LAND</u>	PURCHASE LAND (150 ACRES @ \$10,000/ACRE) SITE DEVELOPMENT	\$ 1,500,000 4,500,000	
	SUB TOTAL	\$ 6,000,000	
<u>BUILDING & SUPPORT FACILITY</u>	ENGINEERING MANUFACTURING BLDG. (1.042M Sq. Ft. @ \$75/Sq. Ft.) POWER HOUSE - BOILER AND COMPRESSOR WASTE TREATMENT SAND, PIG IRON, SCRAP AND OTHER MATERIAL STORAGE OTHER (INC. OFFICE BUILDING)	\$ 4,000,000 78,200,000 10,000,000 8,000,000 1,000,000 4,300,000	
	USEFUL LIFE-30 YRS - SUB TOTAL	\$105,500,000 (1980 \$) +7% 112,885,000 (1981 \$)	
<u>BUILDING FACILITIES</u>	STORES ELECTRICAL HEATING AND VENTILATION UNDERGROUND SERVICES BUILDING UTILITIES (AIR, WATER, GAS)	\$ 2,000,000 6,000,000 4,000,000 4,000,000 4,000,000	
	USEFUL LIFE-30 YRS - SUB TOTAL	\$ 49,500,000 (1980 \$) +6% 52,470,000 (1981 \$)	
<u>PLANT FACILITIES</u>	REPAIR, PATTERNS, CORE BOXES AND FLASKS MATERIAL HANDLING EQUIPMENT METALLURGICAL LABORATORY POLLUTION CONTROLS OTHER	\$ 2,000,000 2,000,000 2,000,000 20,500,000 3,000,000	
	USEFUL LIFE-12 YRS - SUB TOTAL	\$ 29,500,000 (1980 \$) +6% 31,270,000 (1981 \$)	
<u>MACHINERY & EQUIPMENT</u>	PRODUCTION EQUIPMENT AND PERMANENT TOOLING CONTAINERS AND RACKS OTHER	\$156,000,000 3,000,000 2,000,000	
	USEFUL LIFE-12 YRS - SUB TOTAL	\$161,000,000 (1980 \$) +6% 170,660,000 (1981 \$)	
<u>LEVEL I</u>	TOTAL FACILITIES, EQUIPMENT AND TOOLING	\$322,000,000 (1980 \$) 373,285,000 (1981 \$)	
	PRE-PRODUCTION AND LAUNCH @ APPROXIMATELY 20%	\$ 64,400,000 (1980 \$) 74,657,000 (1981 \$)	
	TOTAL PROGRAM COST	\$386,400,000 (1980 \$) 447,942,000 (1981 \$)	

FACILITIES PLANNING (NOMINAL ESTIMATE)

CAPACITY LEVEL I

CAPACITY LEVEL II See Assumptions

DATE March 1982

Level IV

FACILITY TYPE	FACILITY ACTIVITIES		ANNUAL PRODUCTION RATE		MAJOR EXPENDITURE (\$ MILLIONS)		MANPOWER REQUIREMENTS		REMARKS
	FUNCTION	MATERIAL	LEVEL I	LEVEL II	LEVEL I	LEVEL II	LEVEL I	LEVEL II	
NODULAR IRON FOUNDRY	o Melting & Pouring Metal	Modular, Ductile Iron (Scrap, Pig, Coke, Alloys, Flux, etc)			\$28/\$34 (\$31.0)		76/92 (84)		
	o Molding Lines & Sand System	Lake Sand and Cores			\$42/\$52 (\$47.0)		160/192 (176)		
	o Core Making	Core Sand and Resin			\$18/\$22 (\$20.0)		215/265 (240)		
	o Cooling & Cleaning				\$33/\$41 (\$37.0)		180/220 (200)		
	o Inspection and Repair				\$19/\$23 (\$21.0)		90/110 (100)		
	o Other				\$ 4/\$6 (\$5.0)		44/56 (50)		
	o Plant Facilities				\$43/\$56 (\$49.5)				
	o Building and Land				\$103/\$120 (\$111.5)				1,114,500 Sq. Ft. Building incl. Offices & Power House
							765/935 (850)		Direct Labor
							715/855 (785)		Indirect Labor
							320/380 (350)		Salary
TOTALS				Annual Casting Weight		\$290/\$354 * (\$322.0)	1800/2170 (1985)		

380,000 Tons/Year

*Main capital expenditures

PROCESS AND COMPONENT SUMMARY
(PRODUCTION FACILITIES AND EQUIPMENT)
(NOMINAL ESTIMATE)

DATE March 1982
Level III

MAJOR DEPARTMENTS	DEPARTMENT FUNCTION	MAJOR CAPITAL EXPENDITURES (\$ MILLIONS)			AREA (SQ. FT.)	MANPOWER REQUIREMENTS		REMARKS
		LEVEL I	LEVEL II	TOTAL		LEVEL I	LEVEL II	
						D/L	D/L	
o Melting	- 2 Cupolas & Raw Material Charging System		\$ 25.0		190,000		36	
o Pouring	- 3 Induction Furnaces		6.0		40,000		48	
o Sand System	- Metal Holding and Pouring System		8.0		36,000		36	
o Molding	- Sand Mix and Delivery System		14.0		40,000		20	
o Molding	- Flask Delivery and Molding Conveyor system		25.0		120,000		120	
o Core Making	- Molding Line, Core Delivery & Setting		20.0		80,000		240	
o Cooling	- Core Machines and Dryers		25.0		90,000		200	
o Cleaning	- Cooling Conveyor Tunnel & Cooling System		12.0					
o Inspection	- Shakers, Shot Blast & Air Guns, Etc.		21.0		50,000		100	
	- Flame Hardening equipment		5.0				50	
	- Welding, impregnating & inspection equipment							
	- crankshaft & camshaft centering machines							
	- Other: Containers, Racks, Misc. conveyors Etc.							
	- Finished Casting Storage				80,000			
TOTALS			161.0		726,000		850	TOTAL DIRECT LABOR
							765	TOTAL INDIRECT LABOR
							350	TOTAL SALARY LABOR
							1,985	TOTAL MANPOWER

PRODUCT MODULAR IRON FOUNDRY

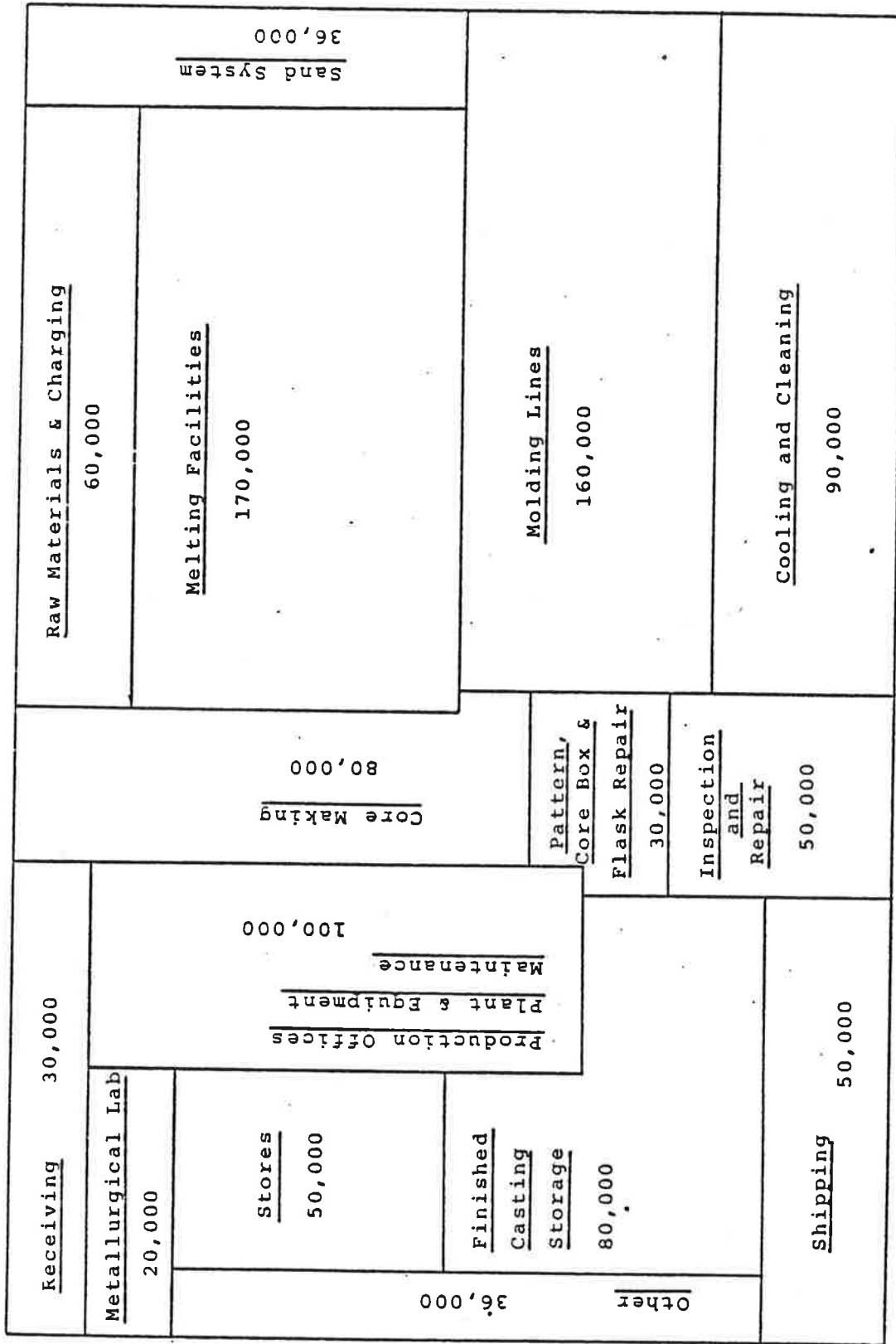
NODULAR IRON FOUNDRY AREA BREAKDOWN
(SQUARE FEET)

	<u>AREA</u>
<u>Office Building</u> 90' x 450'	40,500
<u>Manufacturing Building</u>	
Raw Material and Charging	60,000
Melting Facilities	170,000
Molding Lines and Sand System	196,000
Core Room	80,000
Cooling and Cleaning	90,000
Inspection and Repair	50,000
Finished Casting Storage	80,000
Pattern, Core Box and Flask Repair	30,000
Shipping and Receiving	80,000
Stores	50,000
Metallurgical Laboratory	20,000
Production Offices, Plant and Equipment Maintenance	100,000
Other (Rest Rooms, Eating Areas, Etc.)	36,000
Grand Total Manufacturing	1,042,000
21 Bays @ 40' = 840' x 15.5 Bays @ 80' = 1240'	
<u>Auxiliary</u> (Outside of Main Building)	32,000
GRAND TOTAL	1,114,500

NODULAR IRON FOUNDRY BUILDING LAYOUT

Office Building

90' x 450' 1 Story 40,500 Sq.Ft.



840'

1240'

Total Area 1,042,000

PLANT 13
ALUMINUM FOUNDRY

ALUMINUM FOUNDRY (GREEN SAND)

PRODUCTS

Engine Components

4 Cylinder	V-6	V-8
Cylinder Head (Gas)	Cylinder Head	Cylinder Head
Intake Manifold (Gas)	Intake Manifold	Intake Manifold

Other

Brake Master Cylinder
Road Wheels

Production Rates

	Annual Rate
Maximum Straight Time Basis	
4 Cylinder Engine Cylinder Heads	800,000 Engines
4 Cylinder Engine Intake Manifolds	800,000 Engines
V-6 Cylinder Heads	800,000 Engines
V-6 Intake Manifold	800,000 Engines
V-8 Cylinder Heads	800,000 Engines
V-8 Intake Manifold	800,000 Engines
Brake Master Cylinder (All)	2,800,000 Vehicles
Road Wheels	250,000 Vehicles

- The Aluminum Foundry has been planned to match the number of vehicles required to utilize total straight time engine capacity for the surrogate plant line-up.

ALUMINUM FOUNDRY (GREEN SAND) (CONT.)

- At maximum practical overtime, 10% additional production can be generated.

Operating Pattern

- Straight Time
Two 8 Hour Shifts
- Maximum Practical overtime
Every other Saturday

Number of Straight Time Days

- 245 Days per year - Note: In those years when there is a major change to the product, the number of production days per year may be reduced.

ALUMINUM FOUNDRY (GREEN SAND)

EQUIPMENT ASSUMPTIONS

- Melting furnaces required are 3 reverb furnaces. While they will provide more than adequate melt capacity, they are planned so that one can be down for rebuild or maintenance while one is being re-charged and the other is providing production requirements. Approximately 40 tons/hour of molten metal is needed at maximum capacity.
- 10-10 Ton induction holding furnaces required to adequately supply molding lines in an efficient manner.
- 5 large disamatic flaskless molding machines required along with 3 medium disamatics.
- Approximately 121,000 tons of castings produced annually at straight time capacity.

CAPACITY LEVEL II See Assumptions

Level III

FACILITY TYPE	FACILITY ACTIVITIES		ANNUAL PRODUCTION RATE		MAJOR EXPENDITURE (\$ MILLIONS)		MANPOWER REQUIREMENTS		REMARKS
	FUNCTION	MATERIAL	LEVEL I	LEVEL II	LEVEL I	LEVEL II	LEVEL I	LEVEL II	
ALUMINUM FOUNDRY	o Melting and Pouring Metal				\$ 14/\$18 (\$16)		45/55 (50)		
	o Molding Machines & Sand System				\$ 31/\$37 (\$34)		36/44 (40)		
	o Core Molding				\$ 9/\$11 (\$10)		90/110 (100)		
	o Cooling & Cleaning				\$ 9/\$11 (\$10)		155/185 (170)		
	o Inspection & Repair				\$ 7/\$9 (\$8)		26/34 (30)		
	o Other				\$ 4/\$6 (\$5)		18/22 (20)		
	o Plant Facilities				\$ 20/\$24 (\$22)		—		
	o Building & Land				\$ 31/\$37 (\$34)		—		
							370/450 (410)		Direct Labor
TOTALS							425/515 (470)		Indirect Labor
							150/180 (165)		Salary
					\$125/\$153 (\$139) *		945/1145 (1045)		Total

TOTALS

ANNUAL CASTING WEIGHT

121,000 Tons/Year

*Major capital expenditures adjusted for 1981 economics \$147,540,000.

PRODUCTION Aluminum Foundry (Sand)

(NOMINAL ESTIMATE)

C-130

PROCESSING COMPONENT SUMMARY
(PRODUCTION FACILITIES & EQUIPMENT ONLY)
(NOMINAL ESTIMATE)

DATE March 1982

CAPACITY LEVEL I See Assumptions
CAPACITY LEVEL II See Assumptions

Level IV

CAPACITY LEVEL		II	See Assumptions	MAJOR CAPITAL EXPENDITURES (\$ MILLIONS)		AREA (SQ. FT.)	MANPOWER REQMS		REMARKS
MAJOR DEPARTMENTS	DEPARTMENT FUNCTION	LEVEL I	LEVEL II	TOTAL			LEVEL I	LEVEL II	
							D/L	D/L	
o Melting	-Melting of Metal and Charging System		\$ 6.0			50,000		10	3-50 Ton Revere Furnaces
o Delivery	-Holding and delivery of molten metal		10.0					40	10-10 Ton induction holding furnaces
o Sand System	-Sand mix and delivery System.		4.0			20,000		20	
o Molding	-Molding Machines		30.0			10,000		20	5 large disamatics
	-Core Delivery								3 medium disamatics
o Core Making	-Core Machines and Dryers		10.0			70,000		80	
o Cooling	-Cooling and casting Pick-off		5.0			50,000		20	
o Cleaning	-Knock-off, cleaning, cut-off and grinding		5.0			55,000		170	
o Inspection & Repair	-Impregnating and inspection equipment		8.0					30	
o Heat Treat	-Solution and aging furnaces		2.2			40,000		20	
o Other	-Containers & Racks Misc. Conveyors and try out line		5.0			--		--	
o Storage	-Finished Casting storage		--			55,000			
TOTALS			\$85.2			350,000		410	TOTAL DIRECT LABOR
								470	TOTAL INDIRECT LABOR
								165	TOTAL SALARY LABOR
								1,045	TOTAL MANPOWER

PRODUCT ALUMINUM FOUNDRY

ALUMINUM FOUNDRY (SAND) AREA BREAKDOWN
(SQUARE FEET)

<u>Office Building</u>	<u>AREA</u>
	30,000
<u>Manufacturing Building</u>	
Raw Material and Charging	25,000
Sand System and Delivery (Molding & Core)	20,000
Melt and Holding Furnaces	25,000
Disamatic Machines	10,000
Cooling Lines & Casting Pick-off	50,000
Core Making	70,000
Casting Cleaning, Cut-off, Grinding & Inspection	55,000
Heat Treat	40,000
Finished Casting Storage	55,000
Pattern and Core Box Repair Area	10,000
Shipping and Receiving	40,000
Stores	15,000
Metallurgical Laboratory	10,000
Production Office, Plant and Maintenance Equipment	50,000
Utilities	10,000
Other (Rest Rooms, Eating Areas, Etc.)	19,000
10 Bays @ 60' - 600' x 21 Bays @ 40' - 840'	504,000
<u>Auxiliary</u>	<u>10,000</u>
Grand Total	544,000

ALUMINUM FOUNDRY (SAND) BUILDING LAYOUT (SQUARE FEET)

Office Building 80' x 375' one story 30,000 Sq. Ft.

Shipping 30,000		Sand System 20,000		Raw & Material and Charging 25,000		Receiving 10,000
Finished Casting Storage 55,000		Production Offices & Maintenance 50,000		Melt and Holding Furnaces 25,000		Sand System 20,000
Heat Treat 40,000		Utilities 10,000		Disamatic 10,000		Core Making 70,000
Other 19,000		Stores 15,000		Cooling & Casting Pickoffs 50,000		Cooling & Casting Pickoffs
Metal. Lab. 10,000		Cleaning and Inspection 55,000				

840'

Total Area: 504,000 Sq. Ft.

PLANT 14
ALUMINUM DIE CASTING PLANT

ALUMINUM DIE CASTING PLANT

PRODUCT

Engine Components

<u>Four Cylinder</u>	<u>V-6</u>	<u>V-8</u>
o Water Pump Housing	o Water Pump Housing	o Water Pump Housing
o Carburetor Housing	o Carburetor Housing	o Carburetor Housing
o Air Pump Housing	o Air Pump Housing	o Air Pump Housing
o Air Pump Inlet End	o Air Pump Inlet End	o Air Pump Inlet End

Permanent Mold - Unique Alloy

o Pistons o Pistons o Pistons

Transmission and Transaxle Components

<u>Automatic</u>	<u>Manual</u>
o Transaxle Case	o Transaxle Case
o Transaxle Extension	o Differential Housing
o Transmission Case	o -----
o Transmission Extension	o -----
o Transaxle Valve Body	o -----
o Transmission Valve Body	o -----
o -----	o Clutch Housing

ALUMINUM DIE CASTING PLANT (CONT.)

Steering

<u>Passenger Car</u>	<u>Truck</u>
o Rack and Pinion Steering Power	o -----
o Rack and Pinion Steering Manual	o -----
o Upper Steering Column Housing	o Upper Steering Column Housing
o -----	o Power Steering Housing

Electrical

<u>Small</u>	<u>Large</u>
o Alternator Frame	o Alternator Frame
o Alternator End Shield	o Alternator End Shield

Other

o Compressor Housing and Pistons - Air Conditioning

ALUMINUM DIE CASTING PLANT (CONT.)

<u>PRODUCTION RATES</u>	<u>Maximum Straight Time Basis</u>	<u>Annual Rate</u>
4 Cylinder Engines (Gas & Diesel) Components		1,200,000
V-6 Engine Components		800,000
V-8 Engine Components		800,000
Air Pump		1,000,000
Transaxle - Automatic		1,000,000
Transaxle - Manual		800,000
Transmission - Automatic		800,000
Steering Components		
Passenger Car - Power		1,200,000
Passenger Car - Manual		600,000
Truck - Power		600,000
Truck - Manual		400,000
Electrical Components Small		2,000,000
Electrical Components Large		800,000
Air Conditioning		1,500,000

- The Aluminum Die Casting Plant has been planned to match the number of vehicles required to utilize total straight time engine capacity for the surrogate plants line-up.
- Straight time melt capacity is planned at tons/hour or tons/day with a maximum capability of tons/ hour for short periods.
- At maximum practical overtime, 10% additional production can be generated.

ALUMINUM DIE CASTING PLANT (CONT.)

OPERATING PATTERN

- Straight Time
Three 8 Hour Shifts (23 Effective Hours)
- Maximum Practical Overtime
Every other Saturday

NUMBER OF STRAIGHT TIME DAYS

- 245 days per year - Note: In those years when there is a major change to the product, the number of production days per year may be reduced.

ALUMINUM DIE CASTING PLANT (NOMINAL ESTIMATE)

<u>LEVEL II</u>		<u>INVESTMENT</u>	<u>LEVEL I</u> <u>LEVEL II</u>
<u>LAND</u>			
	PURCHASE LAND (100 ACRES @ \$10,000/ACRE)	\$ 1,000,000	
	SITE DEVELOPMENT	1,500,000	
	SUB TOTAL		\$ 2,500,000
<u>BUILDING & SUPPORT FACILITY</u>			
	ENGINEERING	\$ 1,800,000	
	MANUFACTURING BLDG. (.65M Sq. Ft. @ \$55/Sq. Ft.)	35,900,000	
	ELECTRICAL SUBSTATION, HEATERS AND COMPRESSOR	4,000,000	
	WASTE TREATMENT	1,700,000	
	INGOT, SCRAP & OTHER MATERIAL STORAGE	500,000	
	OFFICE BUILDING	1,200,000	
	OTHER	900,000	
	USEFUL LIFE-30 YRS - SUB TOTAL		\$46,000,000 (1980 \$)
		+7%	49,220,000 (1981 \$)
<u>BUILDING FACILITIES</u>			
	STORES	\$ 700,000	
	ELECTRICAL	5,000,000	
	HEATING AND VENTILATION	2,500,000	
	UNDERGROUND SERVICES	2,500,000	
	BUILDING UTILITIES (AIR, GAS, WATER)	2,500,000	
	USEFUL LIFE-30 YRS - SUB TOTAL		\$13,200,000 (1980 \$)
		+6%	13,992,000 (1981 \$)
<u>PLANT FACILITIES</u>			
	REPAIR DIES, MOLDS, FURNACES	\$ 3,300,000	
	MACHINE REBUILD	2,500,000	
	MATERIAL HANDLING EQUIPMENT	1,000,000	
	METALLURGICAL LAB	1,000,000	
	OTHER	1,500,000	
	USEFUL LIFE-12 YRS - SUB TOTAL		\$ 9,300,000 (1980 \$)
		+6%	9,858,000 (1981 \$)
<u>MACHINERY & EQUIPMENT</u>			
	PROD. EQUIP., PATTERNS, MOLDS AND OTHER TOOLING	\$110,000,000	
	CONTAINERS AND RACKS	2,400,000	
	OTHER	2,600,000	
	USEFUL LIFE-12 YRS - SUB TOTAL		\$115,000,000 (1980 \$)
		+6%	121,900,000 (1981 \$)
<u>LEVEL I</u>	TOTAL FACILITIES, EQUIPMENT AND TOOLING		\$186,000,000 (1980 \$)
			197,470,000 (1981 \$)
<u>PRE-PRODUCTION AND LAUNCH @ APPROXIMATELY 20%</u>			
			\$ 37,200,000 (1980 \$)
			39,494,000 (1981 \$)
	TOTAL PROGRAM COST		\$262,694,000 (1980 \$)
			236,964,000 (1981 \$)

CAPACITY LEVEL I _____
CAPACITY LEVEL II See Assumption

PROCESS AND COMPONENT SUMMARY
(PRODUCTION FACILITIES & EQUIPMENT)
(NOMINAL ESTIMATE)

DATE March 1982
Level IV

MAJOR DEPARTMENTS	DEPARTMENT FUNCTION	MAJOR CAPITAL EXPENDITURES (\$ MILLIONS)		AREA (SQ. FT.)	MANPOWER REQUIS		REMARKS
		LEVEL I	LEVEL II		LEVEL I	LEVEL II	
					O/L	O/L	
o Melting	Melting of Metal and Prime Holding of Delivered Molten Metal		\$ 15.0	103,000		30	3-50 Ton Reverb Furnaces
o Molten Metal Delivery	Deliver Molten Metal to Die Cast Machines		3.0	--		--	9-10 Ton Reverb Holding Furnaces Charging Facilities
o Die Cast Molding	Molding Machines & Holding Furnaces		70.0	210,000		315	Conveyor Lines & Pouring Ladles
o Piston Molding	Automatic Molding & Pouring of Pistons		10.8	12,000		24	140-Diecast Machines 600T to 2000T Capacity
o Casting Cleaning	Trimming, Shot Blast & Air Cleaning		3.0	18,000		90	18-Piston Centers
o Assembly, Inspection & Repair	Welding, Impregnating & Inspection		5.0	25,000		45	
o Machining	Rough Turning & Milling of Castings		3.2	10,000		30	
o Other			5.0	--		60	Containers, Racks, Misc. Conveyor, Etc.
o Storage	Finish Castings		--	50,000		--	
TOTALS			115.0	428,000		594	TOTAL DIRECT LABOR
						806	TOTAL INDIRECT LABOR
						250	TOTAL SALARY LABOR
						1,650	TOTAL MANPOWER

PRODUCT ALUMINUM DIE CASTING PLANT

CAPACITY LEVEL I

FACILITIES PLANNING
(NOMINAL ESTIMATE)

DATE March 1982

CAPACITY LEVEL II See Assumptions

Level III

FACILITY TYPE	FACILITY ACTIVITIES		ANNUAL PRODUCTION RATE		MAJOR CAPITAL EXPENDITURE (\$ MILLIONS)		MANPOWER REQUIREMENTS		REMARKS
	FUNCTION	MATERIAL	LEVEL I	LEVEL II	LEVEL I	LEVEL II	LEVEL I	LEVEL II	
ALUMINUM DIE CASTING PLANT	o Melting & Pouring Metal				\$16.2/\$19.8 (\$18.0)		27/33 (30)		
	o Molding Machines & Holding Furnaces				\$72.8/\$88.8 (\$80.8)		305/373 (339)		
	o Casting				\$ 5.6/\$6.8 (\$6.2)		108/132 (120)		
	o Cleaning & Machining								
	o Assembly, Inspection & Repair				\$ 4.5/\$5.5 (\$5.0)		94/116 (105)		
	o Other				\$ 4.5/\$5.5 (\$5.0)				
	o Plant Facilities				\$20.5/\$24.5 (\$22.5)				Direct Labor
	o Building & Land				\$43.9/\$53.1 (\$48.5)				Indirect Labor
									Salary
TOTALS				Annual Casting Weight		\$168/\$204 (\$186)*	1485/1815 (1650)	Total	

100,00 Tons/Year

PRODUCT ALUMINUM DIE CASTING PLANT

*Major capital expenditures adjusted for 1981 economics \$197,470,000.

ALUMINUM DIE CASTING PLANT AREA BREAKDOWN
(SQUARE FEET)

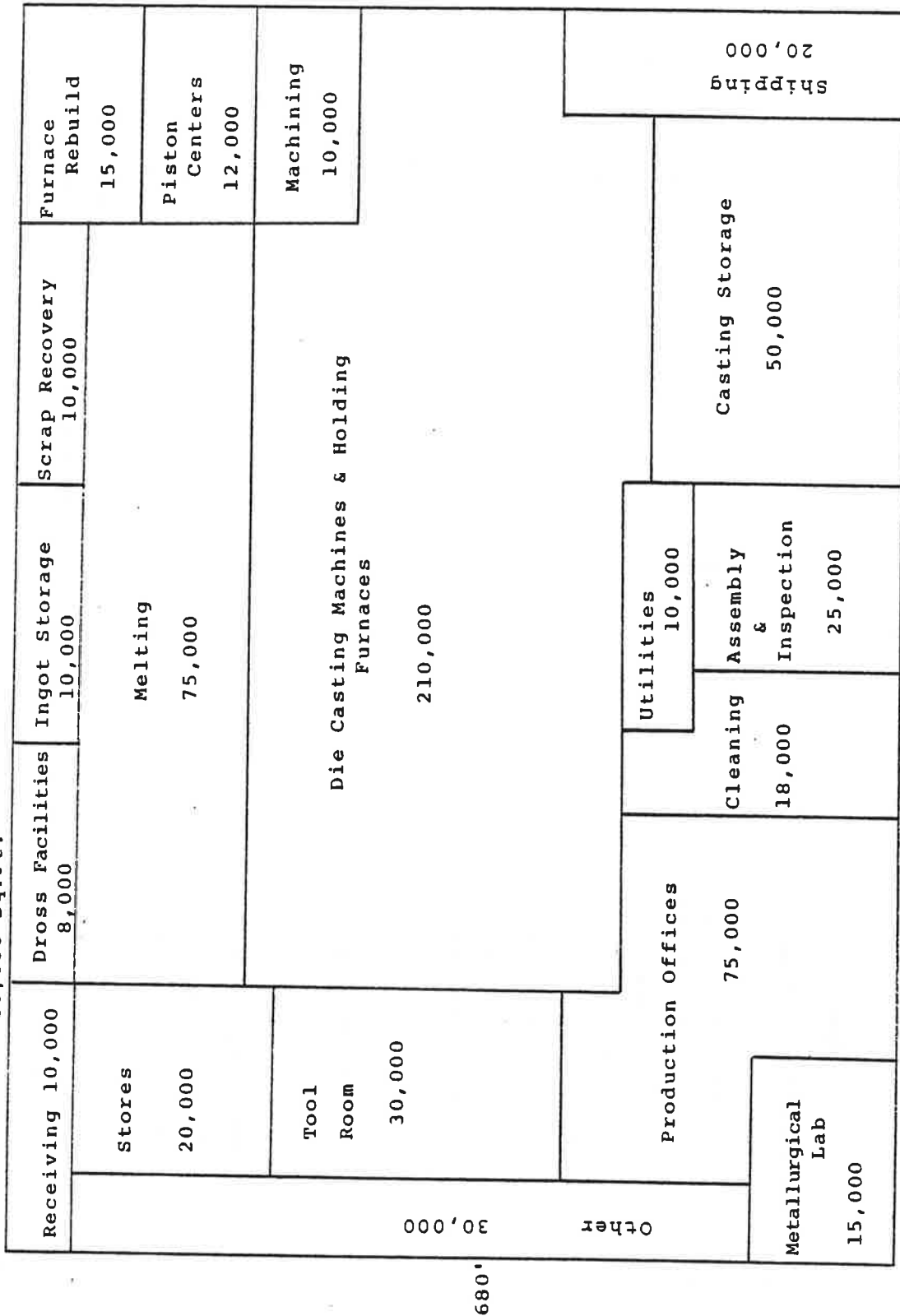
OFFICE BUILDING

MANUFACTURING BUILDING

Aluminum Ingot, Scrap Storage and Furnace Charging	30,000
Melting and Prime Holding Furnaces	10,000
Die Casting Machines and Holding Furnaces	75,000
Piston Centers	210,000
Cleaning	12,000
Machining	18,000
Scrap and Turning Recovery	10,000
Assembly, Inspection and Repair	10,000
Finished Casting Storage	25,000
Dross Facilities	50,000
Stores	8,000
Tool Room, Die Repair & Rebuild	20,000
Furnace Rebuild	30,000
Utilities	15,000
Shipping and Receiving	10,000
Metalurgical Lab	30,000
Production Offices, Plant and Equipment Maintenance	15,000
Other (Rest Rooms, Eating Areas, Etc.)	75,000
	<u>30,000</u>
Grand Total Manufacturing	653,000
17 Bays @ 40' = 680' x 12 Bays @ 60' = 720'	
<u>AUXILIARY (Outside of Main Building)</u>	20,000
Grand Total	<u>703,000</u>

ALUMINUM DIE CASTING PLANT BUILDING LAYOUT
(SQUARE FEET)

OFFICE BUILDING - 30,000 Sq.Ft.



Total Area: 653,000 Sq.Ft.

PLANT NO. 15
ROAD WHEEL PLANT

NEW ROAD WHEEL PLANT ASSUMPTIONS

PRODUCT

- o SELECTED (PASSENGER CAR TYPE) STEEL ROAD WHEELS.
- o TWO DIAMETER (13" & 14") CAPABILITY
- o VARIOUS RIM SIZES RANGING FROM 4.5" TO 5.5".
- o FINISHED WHEEL ASSEMBLIES EITHER ELECTRO COAT BLACK OR COLOR PAINTED.
- o NORMAL OPERATING PATTERN

OPERATING
PATTERN

TWO (7) HOUR SHIFTS PER DAY

240 DAYS PER YEAR

- o SELECTED OVERTIME

FIRST OVERTIME HOUR - 14.3%

ALTERNATE SATURDAYS 10.0%

PRODUCTION
FACILITIES &
EQUIPMENT

- o PLANT FACILITIES WILL PRODUCE 2,000,000 WHEEL ASSEMBLIES PER YEAR.
- o METAL FORMING, ASSEMBLY, PAINT & TESTING EQUIPMENT EQUIVALENT TO CURRENT NORTH AMERICAN STATE OF THE ART.

**FACILITIES PLANNING
ROAD WHEEL PLANT
(NOMINAL ESTIMATE)**

LEVEL I
LEVEL II

<u>LEVEL II</u>				
<u>LAND</u>				
	PURCHASE LAND (25 ACRES @ \$10,000 ACRE) SITE DEVELOPMENT	\$ 250,000 750,000		
	SUB TOTAL			\$ 1,000,000
<u>BUILDING & SUPPORT FACILITIES</u>				
	ENGINEERING	\$ 900,000		
	MANUFACTURING BLDG. (140,000 Sq. Ft. @ \$60/ft)	8,400,000		
	POWER HOUSE - BOILERS & COMPRESSORS	550,000		
	MISC. OTHER	800,000		
	- USEFUL LIFE-30 YRS - SUB TOTAL		+7%	\$10,650,000 (1980 \$) 11,395,500 (1981 \$)
<u>BUILDING FACILITIES</u>				
	CRANES, CONVEYORS, SCRAP HANDLING UTILITIES, PLANT ELECTRICAL, HEATING, VENTILATION & STORAGE SYSTEMS	\$ 3,000,000 3,800,000		
	- USEFUL LIFE-30 YRS - SUB TOTAL		+6%	\$ 6,800,000 (1980 \$) 7,208,000 (1981 \$)
<u>PLANT FACILITIES</u>				
	TOOL & DIE ROOM EQUIPMENT	\$ 800,000		
	MATERIAL HANDLING & RACKS	1,400,000		
	MISC. OTHER	1,500,000		
	- USEFUL LIFE-12 YRS - SUB TOTAL		+6%	\$ 3,700,000 (1980 \$) 3,922,000 (1981 \$)
<u>MACHINERY & EQUIPMENT</u>				
	DECOILER/LEVELER/TRIM/BLANKER/STACKER	\$ 900,000		
	DESTACKER/BLANK PREP-ROLL FORM	5,200,000		
	AUTOMATIC PRESS	2,400,000		
	ASSEMBLY EQUIPMENT	3,600,000		
	PAINT FACILITY	8,800,000		
	INSPECTION & TESTING	700,000		
	TOOLING	750,000		
	- USEFUL LIFE-12 YRS - SUB TOTAL		+6%	\$22,350,000 (1980 \$) 23,691,000 (1981 \$)
<u>LEVEL I</u>				
	TOTAL FACILITIES, EQUIPMENT AND TOOLING			\$44,500,000 (1980 \$) 47,216,500 (1981 \$)
<u>PRE-PRODUCTION AND LAUNCH @ APPROXIMATELY 20%</u>				\$ 8,900,000 (1980 \$) 9,443,200 (1981 \$)
	TOTAL PROGRAM COST			\$53,400,000 (1980 \$) 56,659,700 (1981 \$)

FACILITIES PLANNING

CAPACITY LEVEL I 2,000,000

DATE March 1982

CAPACITY LEVEL II _____

Level III

FACILITY TYPE	FACILITY ACTIVITIES		ANNUAL PRODUCTION RATE		MAJOR CAPITAL EXPENDITURES (\$ MILLIONS)		MANPOWER REQUIREMENTS		REMARKS
	FUNCTION	MATERIAL	LEVEL I	LEVEL II	LEVEL I	LEVEL II	LEVEL I	LEVEL II	
Steel Road Wheel Fabrication and Assembly			2,000,000		\$45				Manpower is Direct Labor Only
	Fabrication				(\$44.5 Nominal)				
	Assembly				\$7.5/9.5 (8.5)		50/60 54		
	Paint				\$3/4 (3.5)		16/20 18		
	Test & Tooling				\$7.5/9.5 (8.5)		16/20 18		
	Land & Building				\$1/2 (1.5)		Indirect		
					\$21/25 (22.5)				Spider, Fatigue, Drop, Run Out & Weld Quality Testing
					\$19-20.5 Avg.		82/100 (90)		Direct Labor
							85/105 (95)		
							75/110 (93)		
TOTALS					\$40/50 * (45)		242/315 (278)		Salary

PRODUCT Steel Road Wheels

*Major capital expenditures adjusted for 1981 economics \$47,216,500.

PROCESS AND COMPONENT SUMMARY

CAPACITY LEVEL I 2,000,000
CAPACITY LEVEL II

DATE March 1982
Level IV

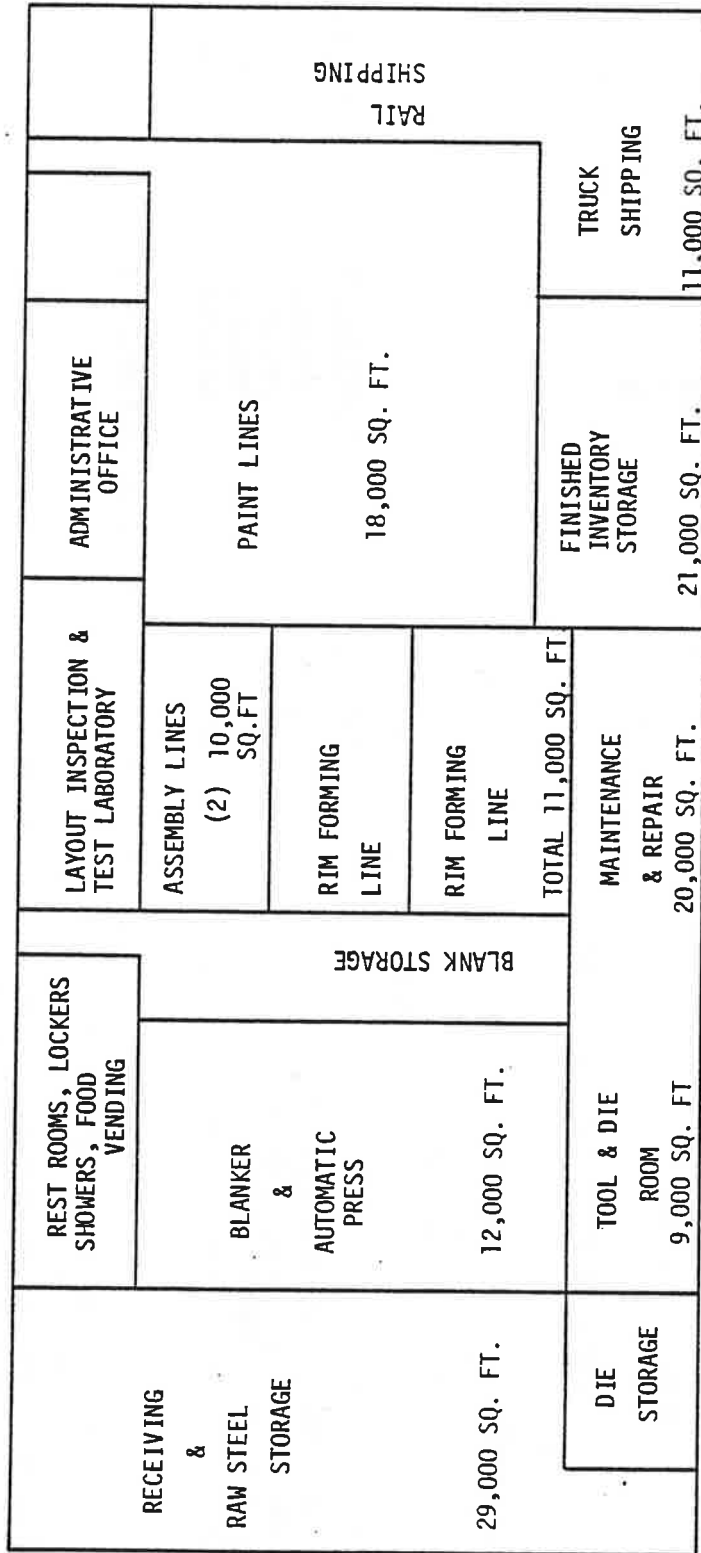
MAJOR REQUIREMENTS	DEPARTMENT FUNCTION	MAJOR CAPITAL EXPENDITURES (\$ MILLIONS)			AREA (SQ. FT.)	MANPOWER REQUIREMENTS			REMARKS
		LEVEL I	LEVEL II	TOTAL		LEVEL I	LEVEL II	D/L	
Decoil, Blank, Automatic Press, and Rim Forming Assembly Paint Misc. Other	Form Spider				12,000	36			Round Form Butt Weld & Section Form. Assys. Mfg. to 'Circumpress' Standards
	Roll Form Wheel Rims	\$8.5			11,000	18			
	Pierce Valve Hole Arcweld Rim & Spider	3.6			10,000	18			
	Wash, Phosphate, Electrocoat Black or Spray Color.	8.8			18,000	18			
		1.5							
TOTALS		22.4			51,000	90			TOTAL DIRECT LABOR
						95			TOTAL INDIRECT LABOR
						110			TOTAL SALARY LABOR
						295			TOTAL MANPOWER

PRODUCT Steel Road Wheels

NEW ROAD WHEEL PLANT AREA BREAKDOWN

<u>MANUFACTURING BUILDING</u>	<u>SQUARE FEET</u>
RAW STEEL STORAGE	24,000
BLANKER & AUTOMATIC PRESS	12,000
ROLL FORMING	11,000
ASSEMBLY	10,000
PAINT	18,000
FINISHED PARTS SHIPPING	11,000
TOOL & DIE ROOM	9,000
MAINTENANCE & REPAIR	20,000
VENDING, REST ROOMS, LOCKERS	1,000
FINISHED INVENTORY (STORAGE)	21,000
ADMINISTRATIVE OFFICE	2,000
MISC. OTHER	<u>1,000</u>
TOTAL PLANT	140,000

NEW ROAD WHEEL PLANT LAYOUT



TOTAL SQ. FT. : 140,000

SCALE: 1" = 46'

ROAD WHEEL PLANT
TOTAL MANUFACTURING COST
(EXCLUDING MATERIAL)

PRODUCTION: 2,000,000 UNITS PER YEAR

<u>MANPOWER:</u>	<u>245 DAYS</u>	<u>EMPLOYEES</u>	<u>ANNUAL HOURS</u>	<u>HRS/UNIT</u>
- DIRECT LABOR	- 1960 -	90	176,400	.09
- INDIRECT - HOURLY	- 1960 -	95	186,200	.09
- INDIRECT - SALARY	- 2000 -	110	220,000	.11
		<u>295</u>	<u>582,600</u>	<u>.29</u>

ANNUAL HOURS ÷ 2,000,000 UNITS = HOURS PER UNIT = .29

WAGE & FRINGE COSTS:

- DIRECT LABOR	\$19.50	X	.09	=	\$1.76
- INDIRECT - HOURLY	\$21.50	X	.09	=	\$1.94
- INDIRECT - SALARY	\$23.50	X	.11	=	\$2.59
	<u>TOTAL WAGES & FRINGE COSTS</u>				<u>\$6.29</u>

INVESTMENT: (1981\$)

- BUILDING & SUPPORT FACILITIES USEFUL LIFE - 30 YRS	<u>FACILITIES COST</u>	<u>DEPRECIATION</u>	<u>COST-PER-UNIT</u>
- BUILDING FACILITIES USEFUL LIFE - 30 YRS	\$11,395,500	379,850	\$.19
- PLANT FACILITIES USEFUL LIFE - 12 YRS	\$ 7,208,000	240,266	.12
- MACHINERY & EQUIPMENT USEFUL LIFE - 12 YRS	\$ 3,922,000	326,833	.16
	<u>\$23,691,000</u>	<u>1,974,250</u>	<u>.99</u>
			<u>\$1.46</u>

DEPRECIATION ÷ 2,000,000 UNITS = TOTAL DEPRECIATION PER UNIT = \$1.46

TAXES & INSURANCE AS PERCENT OF WAGE & FRINGE COST
T & I ESTIMATE OF 3.9% \$6.29 X 3.9% = \$.25
OTHER MANUFACTURING COST AS PERCENT OF WAGE & FRINGE COST
OME ESTIMATE OF 13.2% \$6.29 X 13.2% = \$.83
TOTAL WAGE & FRINGE COST \$6.29
TOTAL DEPRECIATION COST \$1.46
TOTAL TAXES & INSURANCE \$.25
TOTAL OME \$.83
TOTAL \$8.83

PLANT NO. 16
BUMPER PLANT (STEEL)

NEW BUMPER PLANT

ASSUMPTIONS

PRODUCT	o NICKLE CHROME PLATED FRONT & REAR BUMPERS FOR PASSENGER CAR OR PASSENGER CAR DERIVED TRUCK VEHICLES.
	o HIGH-STRENGTH, LOW-ALLOY (HSLA) STEEL FABRICATION CAPABILITY.
OPERATING PATTERN	o NORMAL OPERATING PATTERN
	MAJOR PRESS - TWO (8) HOUR SHIFTS/245 DAYS PER YEAR
	POLISH & PLATING - THREE (8) HOUR SHIFTS/235 DAYS PER YEAR
	o OVERTIME
	ALTERNATE SATURDAYS
PRODUCTION	o PLANT IS SIZED TO PRODUCE 800,000 FINISHED BUMPERS ANNUALLY ON A STRAIGHT TIME BASIS.
FACILITIES & EQUIPMENT	o CONVENTIONAL (NON-AUTOMATED) PRESS LINE. NO PROVISION FOR STRESS RELIEF (USING HEAT) DURING FORM OPERATIONS.
	o POLISHING, PLATING & TEST EQUIPMENT EQUIVALENT TO CURRENT NORTH AMERICA STATE OF THE ART.

BUMPER (STEEL) PLANT **(NOMINAL ESTIMATE)**

<u>LEVEL II</u>		<u>LEVEL I</u>	<u>LEVEL II</u>
<u>LAND</u>			
	PURCHASE LAND (25 ACRES @ \$10,000/ACRE)	\$ 250,000	
	SITE DEVELOPMENT	750,000	
	SUB TOTAL		\$ 1,000,000
<u>BUILDING & SUPPORT FACILITY</u>			
	ENGINEERING	\$ 500,000	
	MANUFACTURING BLDG. (90,000 Sq. Ft. @ \$60/Sq. Ft.)	5,400,000	
	AIR HANDLING (SCRUBBERS)	4,000,000	
	SCRAP HANDLING	400,000	
	WASTE TREATMENT	2,500,000	
	ALL OTHER	3,200,000	
	- USEFUL LIFE-30 YRS - SUBTOTAL		\$ 16,000,000 (1980 \$) 17,120,000 (1981 \$)
<u>BUILDING FACILITIES</u>			
	ELECTRICAL		
	CRANES, CONVEYORS & SCRAP HANDLING	\$ 2,000,000	
	HEATING & VENTILATION	2,500,000	
	UTILITY (SEWER, WATER, GAS & AIR)	2,000,000	
	HEATING & VENTILATION	1,500,000	
	- USEFUL LIFE 30 YRS - SUBTOTAL		\$ 8,000,000 (1980 \$) 8,480,000 (1981 \$)
<u>PLANT FACILITIES</u>			
	TOOL & DIE ROOM	\$ 1,000,000	
	MATERIAL HANDLING & RACKS	1,500,000	
	ALL OTHER	2,500,000	
	- USEFUL LIFE 12 YEARS - SUBTOTAL		\$ 5,000,000 (1980 \$) 5,300,000 (1981 \$)
<u>MACHINERY & EQUIPMENT</u>			
	MAJOR PRESS EQUIPMENT	\$ 6,000,000	
	POLISHING EQUIPMENT	6,500,000	
	PLATING EQUIPMENT	12,000,000	
	INSPECTION & TEST EQUIPMENT	1,500,000	
	MISC. OTHER	3,000,000	
	- USEFUL LIFE 12 YRS - SUBTOTAL		\$ 29,000,000 (1980 \$) 30,740,000 (1981 \$)
<u>LEVEL I</u>			
	TOTAL FACILITIES, EQUIPMENT AND TOOLING		\$ 59,000,000 (1980 \$) 62,640,000 (1981 \$)
	PRE-PRODUCTION AND LAUNCH @ APPROXIMATELY 20%		\$ 11,800,000 (1980 \$) 12,528,000 (1981 \$)
	TOTAL PROGRAM COST		\$ 70,800,000 (1980 \$) 75,168,000 (1981 \$)

CAPACITY LEVEL I 800,000

FACILITIES PLANNING
(NOMINAL ESTIMATE)

CAPACITY LEVEL II

DATE March 1982

FACILITY TYPE	FACILITY ACTIVITIES		ANNUAL PRODUCTION RATE		MAJOR CAPITAL EXPENDITURE (\$ MILLIONS)		MANPOWER REQUIREMENTS		REMARKS
	FUNCTION	MATERIAL	LEVEL I	LEVEL II	LEVEL I	LEVEL II	LEVEL I	LEVEL II	
BUMPER PLANT	FLAT POLISH	HSLA STEEL	800,000		\$2.5/\$3.5 (\$3.0)		20/40 (30)		
	MAJOR PRESS				5.0/7.0 (6.0)		15/25 (20)		
	PLATING	NICKLE/CHROME			10.0/14.0 (12.0)		15/25 (20)		
	FINAL POLISH				3.0/4.0 (3.5)		20/50 (35)		
	INSPECTION & TEST				1.0/2.0 (1.5)		10/20 (15)		o PLATING TESTS o HSLA MATERIAL CERTIFICATION
	LAND, BLDG. & OTHER EQUIP.				28.5/37.5 (33.0)				
TOTALS			800,000		\$50.0/68.0 (\$59.0)		80/160 (120)		DIRECT LABOR
							120/180 (150)		INDIRECT LABOR
							60/90 (75)		SALARY
							260/430 (345)		TOTAL

**FACILITIES PLANNING
PROCESS AND COMPONENT SUMMARY
(NOMINAL ESTIMATE)**

800,000

CAPACITY LEVEL I

DATE March 1982
Level III

CAPACITY LEVEL II

MAJOR DEPARTMENTS	DEPARTMENT FUNCTION	MAJOR CAPITAL EXPENDITURES (\$ MILLIONS)			AREA (SQ. FT.)	MANPOWER REQUIREMENTS		REMARKS
		LEVEL I	LEVEL II	TOTAL		LEVEL I	LEVEL II	
						O/L	O/L	
FLAT POLISH	POLISH FLAT STEEL	\$ 3.0		\$ 3.0	10,000	30		PURCHASE FLAT STEEL CUT TO SIZE. ADDITIONAL 7,000 SQ.FT. ON SECOND FLOOR
MAJOR PRESS	METAL FORM	6.0		6.0	18,000	20		
PLATING	NICKLE/CHROME PLATE	12.0		12.0	8,000	20		
FINAL POLISH	POLISH PLATED BUMPER	3.5		3.5	10,000	35		
INSPECTION & TEST		1.5		1.5	INCLUDED WITH ABOVE MAJOR DEPARTMENT AREAS	15		
MISC. OTHER		3.0		3.0				
TOTALS		\$ 29.0		\$ 29.0*	46,000	120		TOTAL DIRECT LABOR
						150		TOTAL INDIRECT LABOR
						75		TOTAL SALARY LABOR
						345		TOTAL MANPOWER

*Major capital expenditures adjusted for 1981 economics \$30,740,000.

PRODUCT NICKLE, CHROME PLATED FRONT & REAR BUMPERS

NEW BUMPER PLANT
AREA BREAKDOWN

MANUFACTURING BUILDING	SQUARE FEET
RAW STEEL-RECEIVING & STORAGE	8,000
POLISHING-FLAT	10,000
MAJOR PRESS	18,000
PLATING (ADDITIONAL 7,000 SQ.FT. ON SECOND FLOOR)	8,000
POLISHING - FINAL	10,000
FINISHED PARTS SHIPPING	8,000
TOOL & DIE / MAINTNEANCE & REPAIR	6,000
VENDING, REST ROOM & LOCKERS	3,000
FINISHED & IN PROCESS STORAGE	8,000
ADMINISTRATIVE OFFICES	5,000
ALL OTHER (INCLUDING UTILITY)	6,000
TOTAL MANUFACTURING BUILDING	90,000

NEW BUMPER PLANT

(SQUARE FEET)					
<u>RAW STEEL RECEIVING AND STORAGE</u> 8,000	<u>MAJOR PRESS</u> 18,000	<u>PLATING</u> 8,000 <u>MAIN FLOOR</u>	<u>TOOL & DIE</u> <u>MAINT. & REPAIR</u> 6,000	<u>ALL OTHER</u> 6,000 <u>VENDING, REST ROOMS LOCKERS</u> 3,000	<u>ADMIN. OFFICE</u> 5,000
			<u>ALL OTHER</u>		
<u>FLAT POLISHING</u> 10,000 .	<u>FINAL POLISHING</u> 10,000	<u>FINISHED AND IN PROCESS INVENTORY STORAGE</u> 8,000	<u>FINISHED PARTS SHIPPING</u> 8,000		

225'

400'

TOTAL SQ. FT. 90,000

BUMPER (STEEL) PLANT
TOTAL MANUFACTURING COST
 (EXCLUDING MATERIAL)

<u>PRODUCTION: 800,000 UNITS PER YEAR</u>			
<u>MANPOWER:</u>		<u>245 DAYS</u>	<u>EMPLOYEES</u>
- DIRECT LABOR	- 1960	-	120
- INDIRECT - HOURLY	- 1960	-	150
- INDIRECT - SALARY	- 2000	-	75
			<u>345</u>
		<u>ANNUAL HOURS</u>	<u>HRS/UNIT</u>
		235,200	.29
		294,000	.37
		150,000	.19
		<u>679,000</u>	<u>.85</u>

ANNUAL HOURS ÷ 800,000 UNITS = HOURS PER UNIT = .85

WAGE & FRINGE COSTS:

- DIRECT LABOR	\$19.50	X	.29	=	\$5.66
- INDIRECT - HOURLY	\$21.50	X	.37	=	\$7.96
- INDIRECT - SALARY	\$23.50	X	.19	=	\$4.47
	<u>TOTAL WAGES & FRINGE COSTS</u>				<u>\$18.09</u>

INVESTMENT: (1981\$)

	<u>FACILITIES COST</u>	<u>DEPRECIATION</u>	<u>COST-PER-UNIT</u>
- BUILDING & SUPPORT FACILITIES USEFUL LIFE - 30 YRS	\$17,120,000	570,666	\$.71
- BUILDING FACILITIES USEFUL LIFE - 30 YRS	\$ 8,480,000	282,666	.35
- PLANT FACILITIES USEFUL LIFE - 12 YRS	\$ 5,300,000	441,666	.55
- MACHINERY & EQUIPMENT USEFUL LIFE - 12 YRS	\$30,740,000	2,561,666	3.20
			<u>\$4.81</u>

DEPRECIATION ÷ 800,000 UNITS = TOTAL DEPRECIATION PER UNIT = \$4.81

TAXES & INSURANCE AS PERCENT OF WAGE & FRINGE COST

T & I ESTIMATE OF 3.9% \$18.09 X 3.9% = \$.71

OTHER MANUFACTURING COST AS PERCENT OF WAGE & FRINGE COST

OME ESTIMATE OF 13.2% \$18.09 X 13.2% = \$2.39

TOTAL WAGE & FRINGE COST	\$18.09
TOTAL DEPRECIATION COST	\$ 4.81
TOTAL TAXES & INSURANCE	\$.71
TOTAL OME	\$ 2.39
	<u>\$26.00</u>

PLANT NO. 17
ENGINE ELECTRICAL PLANT

ENGINE ELECTRICAL PLANT ASSUMPTIONS

PRODUCT VARIOUS ELECTRO MECHANICAL & ELECTRONIC COMPONENTS FOR ENGINE ELECTRICAL OPERATION
& CONTROL FUNCTIONS

- o ALTERNATOR
- o COIL
- o DISTRIBUTOR
- o STARTER
- o ELECTRONIC CONTROL COMPONENTS
- o IGNITION CONTROL
- o VOLTAGE REGULATOR
- o FRACTIONAL HORSEPOWER MOTOR

PRODUCTION RATE

PLANT IS SIZED & EQUIPMENT PROVIDED FOR PRODUCTION OF 1,000,000 (EQUIVALENT) COMPLETE
CAR SETS ANNUALLY.

- o 4082 SETS PER DAY
- o 225 SETS PER HOUR

OPERATING PATTERN

STRAIGHT TIME

- o 245 DAYS PER YEAR
- o TWO 8 HOUR SHIFTS PER DAY

OVERTIME

- o ALTERNATE SATURDAYS & NINTH HOUR.

FACILITIES PLANNING ENGINE ELECTRICAL PLANT (NOMINAL ESTIMATE)

<u>LEVEL I</u>		<u>LEVEL I</u>	<u>LEVEL II</u>
<u>LAND</u>			
	PURCHASE LAND (55 ACRES @ \$10,000/ACRE)	\$ 550,000	
	SITE DEVELOPMENT	<u>1,650,000</u>	
	SUB TOTAL		\$ 2,200,000
<u>BUILDING & SUPPORT FACILITIES</u>			
	ENGINEERING	\$ 1,500,000	
	MANUFACTURING BLDG (504,000 Sq. Ft.)	<u>30,000,000</u>	
	POWER HOUSE (PACKAGE BOILER)	1,500,000	
	WASTE TREATMENT	<u>1,200,000</u>	
	MISC. OTHER	<u>3,000,000</u>	
	- USEFUL LIFE-30 YRS - SUB TOTAL		\$ 37,200,000 (1980 \$)
		+7%	<u>39,804,000 (1981 \$)</u>
<u>BUILDING FACILITIES</u>			
	ELECTRICAL	\$ 3,000,000	
	CRANES, CONVEYORS & SCRAP HANDLING	<u>1,000,000</u>	
	UTILITIES (SEWER, WATER, GAS)	3,000,000	
	HEATING & VENTILATING	<u>2,500,000</u>	
	- USEFUL LIFE-30 YRS - SUB TOTAL		\$ 9,500,000 (1980 \$)
		+6%	<u>10,070,000 (1981 \$)</u>
<u>PLANT FACILITIES</u>			
	TOOL ROOM & CUTTER GRIND	\$ 3,000,000	
	MATERIAL HANDLING	<u>2,000,000</u>	
	MISC. OTHER	<u>2,100,000</u>	
	- USEFUL LIFE-12 YRS - SUB TOTAL		\$ 7,100,000 (1980 \$)
		+6%	<u>7,526,000 (1981 \$)</u>
<u>MACHINERY & EQUIPMENT</u>			
	FABRICATION & MACHINING	\$ 20,000,000	
	TRANSFER LINES	<u>24,000,000</u>	
	COIL WINDING	21,000,000	
	ASSEMBLY & TEST	<u>15,000,000</u>	
	INSERTION	10,000,000	
	HEAT TREAT & VARNISH OVENS	<u>5,000,000</u>	
	OTHER ELECTRONIC EQUIPMENT	<u>5,000,000</u>	
	- USEFUL LIFE-12 YRS - SUB TOTAL		\$100,000,000 (1980 \$)
		+6%	<u>106,000,000 (1981 \$)</u>
<u>LEVEL I</u>			
	TOTAL FACILITIES, EQUIPMENT AND TOOLING	\$156,000,000 (1980 \$)	
		<u>165,600,000 (1981 \$)</u>	
<u>PRE-PRODUCTION AND LAUNCH @ APPROXIMATELY 20%</u>			
		\$ 31,200,000 (1980 \$)	
		<u>33,072,000 (1981 \$)</u>	
	TOTAL PROGRAM COST	\$187,200,000 (1980 \$)	
		<u>198,672,000 (1981 \$)</u>	

FACILITIES PLANNING (NOMINAL ESTIMATE)

CAPACITY LEVEL I 1,000,000

CAPACITY LEVEL II _____

DATE March 1982

Level III

FACILITY TYPE	FACILITY ACTIVITIES		ANNUAL PRODUCTION RATE		MAJOR CAPITAL EXPENDITURES (\$ MILLIONS)		MANPOWER REQUIREMENTS		REMARKS
	FUNCTION	MATERIAL	LEVEL I	LEVEL II	LEVEL I	LEVEL II	LEVEL I	LEVEL II	
ENGINE ELECTRICAL PLANT	ALTERNATOR		1,000,000		\$ 24/\$30 (\$27)		155/195 (175)		
	COIL				\$ 4/\$6 (\$5)		25/35 (30)		
	DISTRIBUTOR				\$ 9/\$13 (\$11)		125/155 (140)		
	STARTER				\$ 24/\$30 (\$27)		235/295 (265)		
	ELECTRONIC CONTROL COMPONENTS				\$ 15/\$19 (\$17)		40/60 (50)		
	FRACTIONAL HORSEPOWER MOTOR				\$ 7/\$9 (\$8)		105/135 (120)		
SUBTOTAL	HEAT TREAT				\$ 4/\$6 (\$5)		*		DIRECT LABOR INCLUDED WITH MAJOR FUNCTION
	LAND, BLDG. & PLANT FACILITIES				\$ 50/\$62 (\$56)		685/875 (780)		DIRECT LABOR
							350/450 (400)		INDIRECT LABOR
							210/250 (230)		SALARY
TOTALS			1,000,000		\$137/\$175 (\$156)*		1245/1575 (1410)		

PRODUCT ENGINE ELECTRICAL PARTS

*Major capital expenditures adjusted for 1981 economics \$165,600,000.

PROCESS AND COMPONENT SUMMARY
(NOMINAL ESTIMATE)

DATE March 1982

CAPACITY LEVEL I 1,000,000

CAPACITY LEVEL II _____

Level III

MAJOR REQUIREMENTS	DEPARTMENT FUNCTION	MAJOR CAPITAL EXPENDITURES (\$ MILLIONS)			AREA (SQ. FT.)	MANPOWER REQUIREMENTS		REMARKS	
		LEVEL I	LEVEL II	TOTAL		LEVEL I	LEVEL II		
						D/L	D/L		
ALTERNATOR	MACHINING	\$ 4.0							*DIRECT LABOR INCLUDED WITH MAJOR DEPT. *DISCRETE COMPONENTS.
	TRANSFER LINE	12.0							
	COIL WINDING	8.0							
COIL	ASSY. & TEST	3.0			50,000	175			
	SUB TOTAL	\$ 27.0							
	WINDING	\$ 3.0							
DISTRIBUTOR	ASSY. & TEST	2.0			20,000	30			
	SUB TOTAL	\$ 5.0							
	MACHINING	4.0							
STARTER	TRANSFER LINE	4.0			35,000	140			
	TEST	3.0							
	SUB TOTAL	\$ 11.0							
FRACTIONAL HORSEPOWER MOTOR	MACHINING	10.0							
	TRANSFER LINE	8.0							
	COIL WINDING	6.0			70,000	265			
ELECTRONIC CONTROL COMPONENTS	ASSY. & TEST	3.0							
	SUB TOTAL	\$ 27.0							
	MACHINING	2.0							
	COIL WINDING	4.0			30,000	120			
	ASSY. & TEST	2.0			25,000	*			
	SUB TOTAL	\$ 8.0			40,000	50			
TOTALS	HEAT TREAT	\$ 5.0							
	INSERTION *	\$ 10.0							
	ASSY. & TEST	2.0							
	MISC. OTHER	5.0							
	SUB TOTAL	\$ 17.0							
		\$100.0			270,000	780		TOTAL DIRECT LABOR	
						400		TOTAL INDIRECT LABOR	
						230		TOTAL SALARY LABOR	
						1410		TOTAL MANPOWER	

PRODUCT ENGINE ELECTRICAL PARTS

ENGINE ELECTRICAL PLANT
SQUARE FEET

RECEIVING & RAW MATERIAL INVENTORY	AREA
ALTERNATOR	35,000
COIL	50,000
DISTRIBUTOR	20,000
STARTER	35,000
ELECTRONIC CONTROL COMPONENTS	70,000
FRACTIONAL HORSEPOWER MOTOR	40,000
HEAT TREAT & VARNISH OVENS	30,000
FINISHED & IN PROCESS INVENTORY STORAGE	25,000
TOOL & DIE ROOM	69,000
MAINTENANCE & REPAIR	25,000
LABORATORY & TEST	20,000
UTILITY	15,000
FINISHED PARTS SHIPPING	15,000
ADMINISTRATIVE OFFICE	20,000
MISC. OTHER (INCL. VENDING, LOCKERS, RESTROOMS, MTL. HANDLING, ETC.)	15,000
	20,000
TOTAL PLANT	504,000

ENGINE ELECTRICAL PLANT LAYOUT

RECEIVING & RAW MATERIAL INVENTORY 35,000		TOOL & DIE ROOM 25,000		DISTRIBUTOR 35,000		ELECTRONIC CONTROL COMPONENTS 40,000		COIL 20,000		MAINTENANCE & REPAIR 20,000		MISC. OTHER 20,000		UTILITY 15,000	
ALTERNATOR 50,000		FINISHED & IN PROCESS INVENTORY STORAGE 25,000		HEAT TREAT & VARNISH OVENS 25,000		LABORATORY & TEST 15,000		ADMINISTRATIVE OFFICE 15,000		FINISHED PARTS 20,000		FINISHED & IN PROCESS INVENTORY STORAGE 69,000			
FRACTIONAL HORSEPOWER MOTOR 30,000		STARTER 70,000													

TOTAL SQUARE FEET: 504,000

ENGINE ELECTRICAL PLANT
TOTAL MANUFACTURING COST
(EXCLUDING MATERIAL)

<u>PRODUCTION: 1,000,000 UNITS PER YEAR</u>			
<u>MANPOWER:</u>		<u>245 DAYS</u>	<u>EMPLOYEES</u>
- DIRECT LABOR	- 1960 -		780
- INDIRECT - HOURLY	- 1960 -		400
- INDIRECT - SALARY	- 2000 -		230
			<u>1410</u>
		<u>ANNUAL HOURS</u>	<u>HRS/UNIT</u>
		1,528,800	1.53
		784,000	.78
		460,000	.46
		<u>2,772,800</u>	<u>2.77</u>

ANNUAL HOURS ÷ 1,000,000 UNITS = HOURS PER UNIT = 2.77

WAGE & FRINGE COSTS:

- DIRECT LABOR	\$19.50	X	1.53	=	\$29.84
- INDIRECT - HOURLY	\$21.50	X	.78	=	\$16.77
- INDIRECT - SALARY	\$23.50	X	.46	=	\$10.81
	<u>TOTAL WAGE & FRINGE COSTS</u>				
					<u>\$57.42</u>

INVESTMENT: (1981\$)

- BUILDING & SUPPORT FACILITIES USEFUL LIFE - 30 YRS	<u>FACILITIES COST</u>	<u>DEPRECIATION</u>	<u>COST-PER-UNIT</u>
- BUILDING FACILITIES USEFUL LIFE - 30 YRS	\$ 39,804,000	1,326,800	\$1.33
- PLANT FACILITIES USEFUL LIFE - 12 YRS	\$ 10,070,000	335,666	.34
- MACHINERY & EQUIPMENT USEFUL LIFE - 12 YRS	\$ 7,526,000	627,166	.63
	<u>\$106,000,000</u>	<u>8,833,333</u>	<u>8.33</u>
			<u>\$10.63</u>

DEPRECIATION ÷ 1,000,000 UNITS = TOTAL DEPRECIATION PER UNIT = \$10.63

TAXES & INSURANCE AS PERCENT OF WAGE & FRINGE COST
T & I ESTIMATE OF 3.9% \$57.42 X 3.9% = \$2.24
OTHER MANUFACTURING COST AS PERCENT OF WAGE & FRINGE COST
OME ESTIMATE OF 13.2% \$57.42 X 13.2% = \$7.58
TOTAL WAGE & FRINGE COST \$57.42
TOTAL DEPRECIATION COST \$10.63
TOTAL TAXES & INSURANCE \$ 2.24
TOTAL OME \$ 7.58
TOTAL <u>\$77.87</u>

PLANT NO. 18

ENGINE: 4-CYLINDER GAS PLANT

ENGINE PLANT ASSUMPTIONS

PRODUCT - IN-LINE 4 CYLINDER ENGINE WITH OVERHEAD CAMSHAFT
- TWO DISPLACEMENTS FOR ONE FAMILY OF ENGINES

*DIFFERENT CYLINDER BORES & STROKE

*DIFFERENT THROWS ON THE CRANKSHAFT

*COMMON CONNECTING RODS

PRODUCTION RATES

- PLANT SIZED FOR 800,000 ENGINES ANNUALLY - STRAIGHT TIME BASIS.
- AT 400,000 ENGINES ANNUALLY - STRAIGHT TIME BASIS - ONLY ONE ENGINE DISPLACEMENT OF ENGINE.
- EACH DEPARTMENT IS ARRANGED TO PROVIDE EQUIPMENT FOR 800,000 ENGINES ANNUALLY. LITTLE OR NO REARRANGEMENT REQUIRED TO EXPAND FROM CAPACITY LEVEL 1 400,000 TO CAPACITY LEVEL II 800,000 ENGINES ANNUALLY.
- 1633 ENGINES PER DAY.
- 102 ENGINE ASSEMBLIES/HOUR ON TWO SHIFT BASIS.
- 80-100 EQUIVALENT ENGINE COMPONENTS MACHINED PER HOUR ON THREE SHIFT BASIS.
- AT MAXIMUM PRACTICAL OVERTIME - CAPACITY LEVEL I OF 440,000/YEAR (10% OVERTIME)
 - CAPACITY LEVEL II OF 880,000/YEAR

OPERATING PATTERN

- STRAIGHT TIME

ASSEMBLY OPERATIONS - TWO 8 HOUR SHIFTS/DAY

MACHINING OPERATIONS - THREE 8 HOUR SHIFTS/DAY

- OVERTIME

EVERY OTHER SATURDAY (8 HOURS PER SHIFT)

NUMBER OF DAYS AT STRAIGHT TIME

- 245 DAYS PER YEAR - NOTE: IN THOSE YEARS WHEN THERE IS A MAJOR CHANGE TO THE ENGINE, THE NUMBER OF PRODUCTION DAYS PER YEAR MAY BE REDUCED SIGNIFICANTLY.

FACILITIES PLANNING **NEW 4 CYLINDER OHC ENGINE PLANT** **(NOMINAL ESTIMATES)**

	CAPACITY LEVEL I 400,000 UNITS/YEAR CAPACITY LEVEL II 800,000 UNITS/YEAR TWO DISPLACEMENTS - ONE ENGINE FAMILY			LEVEL I LEVEL II
LEVEL II		400,000 UNITS	800,000 UNITS	
<u>LAND</u>				
	PURCHASE LAND (150 ACRES @ \$10,000/ACRE)	\$ 1,500,000	\$ 1,500,000	
	SITE DEVELOPMENT	4,500,000	5,500,000	
	SUB TOTAL	\$ 6,000,000	\$ 7,000,000	
<u>BUILDING & SUPPORT FACILITIES</u>				
	ENGINEERING	\$ 4,000,000	\$ 4,000,000	
	MANUFACTURING BLDG (1.5M Sq. Ft. @ \$55/Sq. Ft.)	82,000,000	82,000,000	
	POWER HOUSE-BOILERS & COMPRESSORS	10,000,000	12,000,000	
	WASTE TREATMENT	8,000,000	8,000,000	
	TANK FARM	2,000,000	2,000,000	
	OTHER	3,000,000	4,000,000	
	- USEFUL LIFE-30 YRS - SUB TOTAL	\$109,000,000	\$112,000,000 (1980 \$)	
	+7%	116,630,000	119,840,000 (1981 \$)	
<u>BUILDING FACILITIES</u>				
	ELECTRICAL	\$ 6,000,000	8,000,000	
	CENTRAL COLLANT SYSTEM	4,000,000	5,000,000	
	UNDERGROUND SERVICES (SEWER, WATER, GAS)	4,000,000	4,000,000	
	BUILDING UTILITIES (STEAM, AIR, WATER, GAS)	4,000,000	4,000,000	
	HEATING AND VENTILATION	4,000,000	5,000,000	
	- USEFUL LIFE-30 YRS - SUB TOTAL	\$ 22,000,000	\$ 26,000,000 (1980 \$)	
	+6%	23,320,000	27,560,000 (1981 \$)	
<u>PLANT FACILITIES</u>				
	TOOL ROOM & CUTTER GRIND	\$ 5,000,000	7,000,000	
	AUTOMATIC STORAGE SYSTEM	7,000,000	11,000,000	
	MATERIAL HANDLING EQUIPMENT	2,000,000	3,000,000	
	WASHERS	4,000,000	5,000,000	
	OTHERS	4,000,000	5,000,000	
	- USEFUL LIFE-12 YRS - SUB TOTAL	\$ 22,000,000	\$ 31,000,000 (1980 \$)	
	+6%	23,320,000	32,860,000 (1981 \$)	
<u>MACHINERY & EQUIPMENT</u>				
	PRODUCTION EQUIPMENT & PERMANENT TOOLS	\$123,000,000	\$232,000,000	
	ENGINE ASSEMBLY & TESTING EQUIPMENT	20,000,000	33,000,000	
	CONTAINERS & RACKS	3,000,000	4,000,000	
	OTHER	2,000,000	3,000,000	
	- USEFUL LIFE-12 YRS - SUB TOTAL	\$148,000,000	\$272,000,000 (1980 \$)	
	+6%	156,880,000	288,320,000 (1981 \$)	
<u>LEVEL I</u>				
	TOTAL FACILITIES, EQUIPMENT AND TOOLING	\$307,000,000	\$448,000,000 (1980 \$)	
		326,150,000	475,580,000 (1981 \$)	
<u>PRE-PRODUCTION AND LAUNCH @ APPROXIMATELY 20%</u>				
		\$ 61,400,000	\$ 89,600,000 (1980 \$)	
		65,230,000	95,116,000 (1981 \$)	
	TOTAL PROGRAM COST	\$368,400,000	\$537,600,000 (1980 \$)	
		391,380,000	570,696,000 (1981 \$)	

FACILITIES PLANNING (1 of 3)

CAPACITY LEVEL I 400,000
CAPACITY LEVEL II 800,000

DATE: March 1982

FACILITY TYPE	FACILITY ACTIVITIES		ANNUAL PRODUCTION RATE		MAJOR CAPITAL EXPENDITURES (\$ MILLIONS)		MANPOWER REQUIREMENTS		REMARKS
	FUNCTION	MATERIAL	LEVEL I	LEVEL II	LEVEL I	LEVEL II	LEVEL I	LEVEL II	
IN LINE 4 CYLINDER O. H. V. ENGINE	o MACHINING		400,000	800,000					PROCESSING AND EQUIPMENT UTILIZE THE MOST CURRENT TECHNOLOGY INCLUDING THE DEGREE OF AUTOMATION READILY AVAILABLE FROM THE TOOL MACHINE BUILDING INDUSTRY
	-BLOCKS -HEADS -MANIFOLD -CRANKSHAFTS -CAMSHAFTS -PISTONS -CONNECTING RODS	CAST IRON ALUMINUM CAST IRON/ ALUM. DUCTILE IRON ALLOY IRON ALUMINUM FORGED STEEL			\$113/133 (\$123)	\$210/252 (\$232)	600/720 (660)	1140/1316 (1228)	
SUB TOTAL	o ENGINE ASSEMBLY AND TESTING				\$17/23 (20)	\$29/37 (33)	400/480 (440)	810/934 (872)	1,480,000 SQ. FT. OF BUILDING AT BOTH CAPACITY LEVELS I & II
	o PLANT FACILITIES o BUILDING & LAND				\$45/53 (49) 107/123 (115)	\$59/69 (64) 110/128 (119)	1000/1200 (1100) 740/860 (800) 360/440 (400)	1950/2250 (2100) 1350/1550 (1450) 600/700 (650)	
TOTAL			400,000	800,000	\$282/\$332 (\$307)*	\$408/\$486 (\$447)*	2100/2500 (2300)	3900/4500 (4200)	

PRODUCT 4 CYLINDER O. H. C. ENGINE

*Major capital expenditures adjusted for 1981 economics \$326,150,000 Level I, \$475,580,000 Level II.

FACILITIES PLANNING PROCESS AND COMPONENT SUMMARY

CAPACITY LEVEL I 400,000

CAPACITY LEVEL II 800,000

DATE March 1982

Level IV

MAJOR REQUIREMENTS	DEPARTMENT FUNCTION	MAJOR CAPITAL EXPENDITURES (\$ MILLIONS)			AREA (SQ. FT.)	MANPOWER REQUIREMENTS			REMARKS
		LEVEL I		LEVEL II		LEVEL I		LEVEL II	
				TOTAL		D/L	D/L		
Cylinder Block & Assy.	Machining (Cast Iron)	\$30.0	\$30.0	\$60.0	200,000	110	205	Automated Transfer Line	
Crankshaft	Machining (Cast Iron)	25.0	20.0	45.0	130,00	117	207	Two Different Cranks	
Conn. Rods & Assembly	Machining (Forging)	12.0	6.0	18.0	75,000	70	120	Automated Line	
Pistons	Machining (Aluminum)	5.0	4.0	9.0	25,000	27	52	Automated Line-2 Different Pistons	
Camshaft	Machining (Cast Alloy Iron)	14.0	14.0	28.0	42,000	44	88	Camshaft Variations	
Accessory Shaft	Machining (Cast Iron)	3.5	3.5	7.0	18,000	48	96		
Cylinder Head & Assy.	Machining (Cast Aluminum)	20.0	20.0	40.0	125,000	80	150	Automated Transfer Line	
Intake Manifold	Machining (Cast Aluminum)	3.0	3.0	6.0	13,000	33	66	Automated Transfer Line	
Exhaust Manifold	Machining (Cast Iron)	3.0	3.0	6.0	12,000	12	24	Variations to Fit Specified Vehicle	
Oil Pump	Machining (Cast Iron)	2.0	2.0	4.0	10,000	45	85		
TOTALS								TOTAL DIRECT LABOR	
								TOTAL INDIRECT LABOR	
								TOTAL SALARY LABOR	
								TOTAL MANPOWER	

PRODUCT 4 CYLINDER OHC ENGINE

FACILITIES PLANNING
 PROCESS AND COMPONENT SUMMARY
 (3 of 3)

CAPACITY LEVEL I 400,000
 CAPACITY LEVEL II 800,000

DATE March 1982
 Level IV

MAJOR REQUIREMENTS	DEPARTMENT FUNCTION	MAJOR CAPITAL EXPENDITURES (\$ MILLIONS)				AREA (SQ. FT.)	MANPOWER REQUIREMENTS			REMARKS
		LEVEL I	LEVEL II	TOTAL	LEVEL I		LEVEL II	D/L		
									D/L	
Water Pump	Machining (Die Cast Alum.)	0.5	0.5	1.0	10,000	25	45		Combination-Automation & Manual Operations Automated Testing and Diagnostic Functions	
Engine Assembly	Assembly	12.0	6.0	18.0	90,000	395	780			
Engine Testing	Testing, Repair, Final O.K.	8.0	7.0	15.0	45,000	45	90			
Misc.	Various Other Components	5.0	3.0	8.0	25,000	49	92			
Material Handling & Other	Containers Racks	5.0	2.0	7.0						
Storage of Parts for Assembly					50,000					
Storage of Finished Parts					70,000					
TOTALS		\$148.0	\$124.0	\$272.0	940,000	1100	2100		TOTAL DIRECT LABOR	
						800	1450		TOTAL INDIRECT LABOR	
						400	650		TOTAL SALARY LABOR	
						2300	4200		TOTAL MANPOWER	

PRODUCT 4 Cylinder OHC Engine

*Major capital expenditures adjusted for 1981 economics \$156,880,000 - Level I, \$288,320,000 - Total.

ENGINE PLANT AREA BREAKDOWN
(SQ. FT.)

<u>OFFICE BUILDING</u>	<u>AREA</u>
	60,000
<u>MANUFACTURING BUILDING</u>	
MACHINES & EQUIPMENT (INCLUDING AISLE ALLOWANCE)	940,000
IN PROCESS STORAGE BANKS	120,000
SHIPPING & RECEIVING	100,000
TOOL ROOM & CUTTER GRIND	40,000
PRODUCTION OFFICES & MAINTENANCE	100,000
LABS (QUALITY, ENGINEERING & REPAIR)	20,000
OTHER (REST ROOMS, EATING AREAS, ETC.)	<u>40,000</u>
GRAND TOTAL MANUFACTURING	1,360,000
15 BAYS @ 60' - 900' x 39 BAYS @ 40' - 1560'	
<u>AUXILIARY (OUTSIDE MAIN BUILDING)</u>	<u>60,000</u>
GRAND TOTAL	1,480,000

4 CYLINDER OHC ENGINE PLANT

800,000 UNITS/YEAR
3200 UNITS/DAY

IN PROCESS STORAGE 120,000 SQ.FT.		40,000 RAIL DOCK RECEIVING		CYLINDER BLOCK MACHINING (2 TRANSFER LINES) 200,000		MISC. SUB-ASSEMBLY 25,000	
				CYLINDER HEAD MACHINING (2 TRANSFER LINES) 125,000		PISTON & CONN. ROD SUB-ASSEMBLY	
				CRANKSHAFT MACHINING 130,000		CYL. HEAD SUB-ASSEMBLY	
				CAMSHAFT 42,000		STORAGE OF PARTS FOR ASSEMBLY	
				SERVICE AREA 180,000 MAINTENANCE DEPT., CUTTER GRIND, PROD. OFFICES, CAFETERIA			
				CONNECTING ROD MACHINING 75,000			
				MISC. PARTS 63,000 OIL & WATER PUMP, INTAKE & EXHAUST Manifold aux. shaft			
				PISTON MACHINING 25,000			
TRUCK DOCK RECEIVING 10,000						45,000	
						90,000 ENGINE ASSEMBLY LINE	
						LABS 20,000	
						70,000 FINISHED ENGINE STORAGE	
						1560'	

4-CYLINDER ENGINE
TOTAL MANUFACTURING COST
 (EXCLUDING MATERIAL)

PRODUCTION: 400,000 UNITS PER YEAR			
<u>MANPOWER:</u>			
	<u>245 DAYS</u>	<u>EMPLOYEES</u>	<u>ANNUAL HOURS</u>
- DIRECT LABOR	- 1960 -	670	1,313,200
- INDIRECT - HOURLY	- 1960 -	440	862,400
- INDIRECT - SALARY	- 2000 -	285	570,000
		<u>1,395</u>	<u>2,745,600</u>

ANNUAL HOURS ÷ 400,000 UNITS = HOURS PER UNIT = 6.87

WAGE & FRINGE COSTS:

- DIRECT LABOR	\$19.50	X	3.28	=	\$63.96
- INDIRECT - HOURLY	\$21.50	X	2.16	=	\$46.44
- DIRECT - SALARY	\$23.50	X	1.43	=	\$33.61
	TOTAL WAGE & FRINGE COSTS \$144.01				

INVESTMENT:

	<u>FACILITIES COST</u>	<u>DEPRECIATION</u>	<u>COST-PER-UNIT</u>
- BUILDING & SUPPORT FACILITIES USEFUL LIFE - 30 YRS	\$116,630,000	3,887,666	\$9.72
- BUILDING FACILITIES USEFUL LIFE - 30 YRS	\$ 23,320,000	777,333	1.94
- PLANT FACILITIES USEFUL LIFE - 12 YRS	\$ 23,320,000	1,943,333	4.86
- MACHINERY & EQUIPMENT USEFUL LIFE - 12 YRS	\$156,880,000	13,073,333	32.68
			<u>\$49.20</u>

DEPRECIATION ÷ 4000,000 UNITS = TOTAL DEPRECIATION PER UNIT = \$49.20

TAXES & INSURANCE AS PERCENT OF WAGE & FRINGE COST

T & I \$2.1M ÷ \$53.9M = 3.9% \$144.01 X 3.9% = \$5.62

OTHER MANUFACTURING COST AS PERCENT OF WAGE & FRINGE COST

OME \$15.02M ÷ \$53.9M = 27.9% \$144.01 X 27.9% = \$40.18

TOTAL WAGE & FRINGE COSTS	\$144.01
TOTAL DEPRECIATION COSTS	\$ 49.20
TOTAL TAXES & INSURANCE	\$ 5.62
TOTAL OME	\$ 40.18
TOTAL	<u>\$239.01</u>

PLANT NO. 19

ENGINE: 4-CYLINDER DIESEL PLANT

DIESEL ENGINE PLANT ASSUMPTIONS

PRODUCT - IN-LINE 4 CYLINDER DIESEL

- ONE DISPLACEMENT

- TWO VERSIONS

- o NATURALLY ASPIRATED
- o TURBOCHARGED

PRODUCTION RATES

- PLANT SIZED FOR 400,000 ENGINES ANNUALLY - STRAIGHT TIME BASIS

- o 200,000 NATURALLY ASPIRATED
- o 200,000 TURBOCHARGED

- 1633 ENGINES PER DAY

- 102 ENGINE ASSEMBLIES PER HOUR - TWO SHIFT BASIS

- AT MAXIMUM PRACTICAL OVERTIME - CAPACITY 440,000 PER YEAR.
(10% OVERTIME)

OPERATING PATTERN

- STRAIGHT TIME

- o ASSEMBLY OPERATIONS - TWO 8 HOUR SHIFTS PER DAY
- o MACHINING OPERATIONS - THREE 8 HOUR SHIFTS PER DAY

- OVERTIME

- o APPROXIMATELY EVERY OTHER SATURDAY (8 HOURS PER SHIFT)

NUMBER OF DAYS AT STRAIGHT TIME

- 245 DAYS PER YEAR - NOTE: IN THOSE YEARS WHEN THERE IS A MAJOR CHANGE TO THE ENGINE, THE NUMBER OF PRODUCTION DAYS PER YEAR MAY BE REDUCED SIGNIFICANTLY.

NEW 4 CYLINDER DIESEL ENGINE PLANT **(NOMINAL ESTIMATES)**

		ONE DISPLACEMENT-NATURALLY ASPIRATED & TURBOCHARGED	
LEVEL II	LEVEL I	LEVEL II	LEVEL I
		400,000 UNITS	
		\$ 1,500,000	
		4,500,000	
		\$ 6,000,000	
		\$ 2,400,000	
		46,500,000	
		8,000,000	
		5,000,000	
		1,500,000	
		3,000,000	
		2,600,000	
		\$ 69,000,000 (1980 \$)	
		+7% 73,830,000 (1981 \$)	
		\$ 5,500,000	
		4,000,000	
		2,500,000	
		2,500,000	
		2,000,000	
		\$ 16,500,000 (1980 \$)	
		+6% 17,490,000 (1981 \$)	
		\$ 5,000,000	
		7,000,000	
		1,500,000	
		4,000,000	
		3,000,000	
		2,000,000	
		\$ 22,500,000 (1980 \$)	
		+6% 23,850,000 (1981 \$)	
		\$133,000,000	
		23,000,000	
		3,000,000	
		2,000,000	
		\$161,000,000 (1980 \$)	
		+6% 170,660,000 (1981 \$)	
		\$275,000,000 (1980 \$)	
		291,000,000 (1981 \$)	
		\$ 55,000,000 (1980 \$)	
		58,200,000 (1981 \$)	
		\$330,000,000 (1980 \$)	
		349,200,000 (1981 \$)	

FACILITIES PLANNING (NOMINAL ESTIMATE)

CAPACITY LEVEL I 400,000 DATE March 1982

CAPACITY LEVEL II _____ Level III

FACILITY TYPE	FACILITY ACTIVITIES		ANNUAL PRODUCTION RATE		MAJOR CAPITAL EXPENDITURES (\$ MILLIONS)		MANPOWER REQUIREMENTS		REMARKS
	FUNCTION	MATERIAL	LEVEL I	LEVEL II	LEVEL I	LEVEL II	LEVEL I	LEVEL II	
4 CYLINDER DIESEL - NATURALLY ASPIRATED AND TURBO-CHARGED VERSIONS	o MACHINING				\$123/\$143 (\$133)		650/770 (710)		PROCESSING AND EQUIPMENT UTILIZE THE MOST CURRENT TECHNOLOGY INCLUDING AUTOMATION WHERE JUSTIFIED FROM A COST & QUALITY STAND POINT.
	- BLOCKS	CAST IRON							
	- HEADS	ALUMINUM							
	- MANIFOLDS	CAST IRON/ALUM.							
	- CRANKSHAFTS	FORGED STEEL							
SUBTOTAL	- CAMSHAFTS	ALLOY IRON							AUTOMATIC TEST STANDARDS.
	- PISTONS	ALUMINUM							
	- CONNECTING RODS	FORGED STEEL							
	o ENGINE ASSY. & TESTING				\$20/\$26 (\$23)		430/510 (470)		
	o PLANT FACILITIES				\$39/\$49 (\$44)				
TOTALS	o BUILDING & LAND				\$68/\$82 (\$75)				935,000 SQ.-FT. MANUFACTURING, OFFICE BUILDINGS & POWER HOUSE
			400,000		\$250/\$300 (\$275)		1080/1280 (1180)	D/L	
							790/890 (840)	I/L	
							390/430 (410)	SAL	
							2260/2600 (2430)		

*Major capital expenditures adjusted for 1981\$ \$291,000,000

PRODUCT 4 CYLINDER DIESEL ENGINE

PROCESS AND COMPONENT SUMMARY

CAPACITY LEVEL I 400,000 DATE March 1982

(PRODUCTION FACILITIES & EQUIPMENT ONLY)

(NOMINAL ESTIMATE)

CAPACITY LEVEL II

(1 of 2)

LEVEL IV

MAJOR REQUIREMENTS	DEPARTMENT FUNCTION	MAJOR CAPITAL EXPENDITURES (\$ MILLIONS)			AREA (SQ. FT.)	MANPOWER REQUIREMENTS			REMARKS
		LEVEL I	LEVEL II	TOTAL		LEVEL I	LEVEL II	D/L	
CYLINDER BLOCK & ASSY.	MACHINING (CAST IRON)	\$30.0			100,000	110			AUTOMATED TRANSFER LINE
CRANKSHAFT	MACHINING (FORGING)	27.0			70,000	122			
CONN. RODS & ASSEMBLY	MACHINING (FORGING)	10.0			45,000	70			
PISTONS	MACHINING (ALUMINUM)	6.0			20,000	35			
CAMSHAFT	MACHINING (CAST ALLOY IRON)	15.0			25,000	50			CAMSHAFT VARIATIONS
ACCESSORIES SHAFT	MACHINING (CAST IRON)	3.5			10,000	48			
CYLINDER HEAD & ASSY.	MACHINING (CAST ALUMINUM)	23.0			70,000	95			AUTOMATED TRANSFER LINE
INTAKE MANIFOLD	MACHINING (CAST ALUMINUM)	4.0			10,000	35			AUTOMATED TRANSFER LINE
EXHAUST MANIFOLD	MACHINING (CAST IRON)	4.0			10,000	15			COMBINATION AUTOMATION & MANUAL OPERATIONS
OIL PUMP	MACHINING (CAST IRON)	2.0			5,000	45			
WATER PUMP	MACHINING (DIE CAST ALUM.)	0.5			5,000	25			
ENGINE ASSEMBLY	ASSEMBLY	13.0			60,000	425			
TOTALS									TOTAL DIRECT LABOR
									TOTAL INDIRECT LABOR
									TOTAL SALARY LABOR
									TOTAL MANPOWER

PRODUCT 4 CYLINDER DIESEL ENGINE

FACILITIES PLANNING PROCESS AND COMPONENT SUMMARY

CAPACITY LEVEL I 400,000 DATE March 1982
 CAPACITY LEVEL II _____
 (PRODUCTION FACILITIES & EQUIPMENT ONLY)
 (NOMINAL ESTIMATE)
 (2 of 2)

Level IV

MAJOR REQUIREMENTS	DEPARTMENT FUNCTION	MAJOR CAPITAL EXPENDITURES (\$ MILLIONS)			AREA (SQ. FT.)	MANPOWER REQUIREMENTS		REMARKS
		LEVEL I	LEVEL II	TOTAL		LEVEL I	LEVEL II	
						D/L	D/L	
TURBO CHARGER	PURCHASED				SEE MISC.			AUTOMATED TESTING AND DIAGNOSTIC FUNCTIONS
ENGINE TESTING	TESTING, REPAIR & FINAL O.K.	\$ 10.0			25,000	50		
MISC. SUB ASSEMBLIES	VARIOUS OTHER COMPONENTS	7.0			15,000	55		
MATERIAL HANDLING & OTHER	CONTAINERS, RACKS, MISC. PARTS	6.0						
STORAGE OF PARTS FOR ASSY.					30,000			
STORAGE OF FINISHED ENGINES					40,000			
TOTALS		\$161.0*			540,000	1180		TOTAL DIRECT LABOR
						840		TOTAL INDIRECT LABOR
						410		TOTAL SALARY LABOR
						2430		TOTAL MANPOWER

PRODUCT 4 CYLINDER DIESEL ENGINE

*Major capital expenditures adjusted for 1981 economics \$170,666,000.

4 CYLINDER DIESEL ENGINE PLANT AREA BREAKDOWN
(SQ.FT.)

<u>OFFICE BUILDING</u>	<u>AREA</u>
	45,000
<u>MANUFACTURING BUILDING</u>	
MACHINES & EQUIPMENT (INCLUDING AISLE ALLOWANCE)	540,000
IN PROCESS STORAGE BANKS	60,000
SHIPPING & RECEIVING	80,000
TOOL ROOM & CUTTER GRIND	35,000
PRODUCTION OFFICES & MAINTENANCE	80,000
LABS (QUALITY, ENGINEERING & REPAIR)	20,000
OTHER (REST ROOMS, EATING AREAS, ETC.)	<u>30,000</u>
GRAND TOTAL MANUFACTURING	845,000
11 BAYS @ 60' - 660' x 32 BAYS @ 40' - 1280'	
<u>AUXILIARY</u> (OUTSIDE MAIN BUILDING)	<u>45,000</u>
GRAND TOTAL	935,000

4 CYLINDER DIESEL ENGINE PLANT

400,000 UNITS/YEAR

1,633 UNITS/DAY

IN PROCESS STORAGE 60,000 SQ.FT.

<u>30,000</u> <u>RAIL DOCK RECEIVING</u>		<u>CYLINDER BLOCK MACHINING</u> <u>TRANSFER LINE</u> 100,000		<u>MISC.</u> <u>SUB-ASSEMBLY</u> 15,000	
		<u>CYLINDER HEAD MACHINING</u> <u>TRANSFER LINE</u> 70,000		<u>PISTON & CONN.</u> <u>ROD SUB-ASSEMBLY</u>	
		<u>CRANKSHAFT MACHINING</u> 70,000		<u>CYL. HEAD</u> <u>SUB-ASSEMBLY</u>	
		<u>CAMSHAFT</u> 25,000		<u>60,000</u> <u>ENGINE ASSEMBLY LINE</u>	
145,000		<u>SERVICE AREA</u> MAINTENANCE DEPT., CUTTER GRIND, PROD. OFFICES, CAFETERIA			
		<u>CONNECTING ROD MACHINING</u> 45,000		<u>25,000</u> <u>STORAGE OF PARTS FOR ASSEMBLY</u>	
		<u>MISC. PARTS</u> 40,000 OIL & WATER PUMP, INTAKE & EXHAUST MAIFOLD AUX. SHAFT			
		<u>PISTON MACHINING</u> 20,000		<u>25,000</u> <u>FINAL TEST & INSPECTION</u>	
<u>TRUCK DOCK</u> <u>RECEIVING</u> 10,000					
				<u>40,000</u> <u>RAIL SHIPPING</u>	
				<u>40,000</u> <u>FINISHED ENGINE STORAGE</u>	

660'

4-CYLINDER DIESEL ENGINE PLANT
TOTAL MANUFACTURING COST
(EXCLUDING MATERIAL)

PRODUCTION: 400,000 UNITS PER YEAR			
MANPOWER:		240 DAYS	
- DIRECT LABOR	-	1960	-
- INDIRECT - HOURLY	-	1960	-
- INDIRECT - SALARY	-	2000	-
		EMPLOYEES	ANNUAL HOURS
		1180	2,312,800
		840	1,646,400
		410	820,000
		2430	4,779,200
			HRS/UNIT
			5.78
			4.12
			2.05
			11.95
ANNUAL HOURS ÷ 400,000 UNITS = HOURS PER UNIT = 11.95			
WAGE & FRINGE COSTS:			
- DIRECT LABOR	\$19.50	X	5.78 =
- INDIRECT - HOURLY	\$21.50	X	4.12 =
- INDIRECT - SALARY	\$23.50	X	2.05 =
		TOTAL WAGES & FRINGE COSTS	
			\$249.47
INVESTMENT: (1981\$)			
- BUILDING & SUPPORT FACILITIES USEFUL LIFE - 30 YRS			
- BUILDING FACILITIES USEFUL LIFE - 30 YRS			
- PLANT FACILITIES USEFUL LIFE - 12 YRS			
- MACHINERY & EQUIPMENT USEFUL LIFE - 12 YRS			
		FACILITIES COST	DEPRECIATION
		\$ 73,830,000	2,461,000
		\$ 17,490,000	583,000
		\$ 23,850,000	1,987,500
		\$170,660,000	14,221,666
			COST-PER-UNIT
			\$ 6.15
			1.46
			4.97
			35.55
			\$48.13

DEPRECIATION ÷ 400,000 UNITS = TOTAL DEPRECIATION PER UNIT = \$48.13

TAXES & INSURANCE AS PERCENT OF WAGE & FRINGE COST	
T & I ESTIMATE OF 3.9% \$249.47 X 3.9% = \$9.73	
OTHER MANUFACTURING COST AS PERCENT OF WAGE & FRINGE COST	
OME ESTIMATE OF 13.2% \$249.47 X 13.2% = \$32.93	
TOTAL WAGE & FRINGE COSTS	\$249.47
TOTAL DEPRECIATION COSTS	\$ 48.13
TOTAL TAXES & INSURANCE	\$ 9.73
TOTAL OME	\$ 32.93
TOTAL	\$340.26

PLANT NO. 20
ENGINE: 6-CYLINDER GAS

V-6 ENGINE PLANT ASSUMPTIONS

PRODUCT - SMALL V-6 ENGINE WITH CONVENTIONAL PUSH-ROD-CAM CONFIGURATION.

- 2 BARREL CARBURETION ONLY

- TWO DISPLACEMENTS FOR ONE FAMILY OF ENGINES

- * DIFFERENT CYLINDER BORES & STROKE
- * DIFFERENT THROWS ON THE CRANKSHAFT
- * COMMON CONNECTING RODS

PRODUCTION RATES

- PLANT SIZED FOR 800,000 ENGINES ANNUALLY - STRAIGHT TIME BASIS.

- AT 400,000 ENGINES ANNUALLY - STRAIGHT TIME BASIS - ONLY ONE DISPLACEMENT OF ENGINE.

- EACH DEPARTMENT IS ARRANGED TO PROVIDE EQUIPMENT FOR 800,000 ENGINES ANNUALLY. LITTLE OR NO REARRANGEMENT REQUIRED TO EXPAND FROM CAPACITY LEVEL I 400,000 TO CAPACITY LEVEL II 800,000 ENGINES ANNUALLY.

- 1633 ENGINES PER DAY AT CAPACITY LEVEL I.

- 102 ENGINE ASSEMBLIES/HOUR ON TWO SHIFT BASIS AT CAPACITY LEVEL I

- 80-100 EQUIVALENT ENGINE COMPONENTS MACHINED PER HOUR ON THREE SHIFT BASIS.

- AT MAXIMUM PRACTICAL OVERTIME - CAPACITY LEVEL I OF 440,000/YEAR
(10% OVERTIME) - CAPACITY LEVEL II OF 880,000/YEAR

OPERATING PATTERN

- STRAIGHT TIME: ASSEMBLY OPERATIONS - TWO 8 HOUR SHIFTS/DAY
MACHINING OPERATIONS - THREE 8 HOUR SHIFTS/DAY

- OVERTIME: EVERY OTHER SATURDAY (8 HOURS PER SHIFT)

NUMBER OF DAYS AT STRAIGHT TIME

- 245 DAYS PER YEAR - NOTE: IN THOSE YEARS WHEN THERE IS A MAJOR CHANGE TO THE ENGINE, THE NUMBER OF PRODUCTION DAYS PER YEAR MAY BE REDUCED SIGNIFICANTLY.

FACILITIES PLANNING **NEW SMALL V-6 ENGINE PLANT** **(NOMINAL ESTIMATE)**

CAPACITY LEVEL I 400,000 UNITS/YEAR
CAPACITY LEVEL II 800,000 UNITS/YEAR
TWO DISPLACEMENTS - ONE ENGINE FAMILY

		400,000 UNITS	800,000 UNITS	LEVEL I	LEVEL II
<u>LEVEL II</u>					
<u>LAND</u>					
	PURCHASE LAND (150 ACRES @ \$10,000/ACRE)	\$ 1,500,000	\$ 1,500,000		
	SITE DEVELOPMENT	4,500,000	5,500,000		
	SUB TOTAL	\$ 6,000,000	\$ 7,000,000		
<u>BUILDING & SUPPORT FACILITIES</u>					
	ENGINEERING	\$ 4,500,000	\$ 4,500,000		
	MANUFACTURING BLDG (1.536M Sq. Ft. @ \$55/Sq. Ft.)	84,500,000	84,500,000		
	POWER HOUSE - BOILERS & COMPRESSORS	11,000,000	13,000,000		
	WASTE TREATMENT	8,000,000	8,000,000		
	TANK FARM	2,000,000	2,000,000		
	OFFICE BUILDING	3,000,000	3,000,000		
	OTHER	3,000,000	4,000,000		
	- USEFUL LIFE-30 YRS - SUB TOTAL	\$116,000,000	\$119,000,000 (1980 \$)		
	+7%	124,120,000	127,330,000 (1981 \$)		
<u>BUILDING FACILITIES</u>					
	ELECTRICAL	\$ 6,000,000	\$ 8,000,000		
	CENTRAL COLLANT SYSTEM	4,000,000	5,000,000		
	UNDERGROUND SERVICES (SEWER, WATER, GAS)	4,000,000	4,000,000		
	BUILDING UTILITIES (STEAM, AIR, WATER, GAS)	4,000,000	4,000,000		
	HEATING AND VENTILATION	4,000,000	5,000,000		
	- USEFUL LIFE-30 YRS - SUB TOTAL	\$ 22,000,000	\$ 26,000,000 (1980 \$)		
	+6%	23,320,000	27,560,000 (1981 \$)		
<u>PLANT FACILITIES</u>					
	TOOL ROOM & CUTTER GRIND	\$ 5,000,000	\$ 7,000,000		
	AUTOMATIC STORAGE SYSTEM	7,000,000	11,000,000		
	MATERIAL HANDLING EQUIPMENT	2,500,000	3,500,000		
	WASHERS	4,500,000	5,500,000		
	OTHER	4,000,000	5,000,000		
	- USEFUL LIFE-12 YRS - SUB TOTAL	\$ 23,000,000	\$ 32,000,000 (1980 \$)		
	+6%	24,380,000	33,920,000 (1981 \$)		
<u>MACHINERY & EQUIPMENT</u>					
	PRODUCTION EQUIPMENT & PERMANENT TOOLS	\$168,000,000	\$311,500,000		
	ENGINE ASSEMBLY & TESTING EQUIPMENT	24,000,000	39,500,000		
	CONTAINERS & RACKS	3,000,000	4,000,000		
	OTHER	2,000,000	3,000,000		
	- USEFUL LIFE-12 YRS - SUB TOTAL	\$197,000,000	\$358,000,000 (1980 \$)		
	+6%	208,820,000	\$379,480,000 (1981 \$)		
<u>LEVEL I</u>					
	TOTAL FACILITIES, EQUIPMENT AND TOOLING	\$364,000,000	\$542,000,000 (1980 \$)		
		386,640,000	575,290,000 (1981 \$)		
<u>PRE-PRODUCTION AND LAUNCH @ APPROXIMATELY 20%</u>					
		\$ 72,800,000	\$108,400,000 (1980 \$)		
		77,328,000	115,058,000 (1981 \$)		
	TOTAL PROGRAM COST	\$436,800,000	\$650,400,000 (1980 \$)		
		463,968,000	690,348,000 (1981 \$)		

CAPACITY LEVEL I 400,000
CAPACITY LEVEL II 800,000

FACILITIES PLANNING
(1 of 3)

DATE March 1982

Level III

FACILITY TYPE	FACILITY ACTIVITIES		ANNUAL PRODUCTION RATE		MAJOR CAPITAL EXPENDITURES (\$ MILLIONS)		MANPOWER REQUIREMENTS		REMARKS
	FUNCTION	MATERIAL	LEVEL I	LEVEL II	LEVEL I	LEVEL II	LEVEL I	LEVEL II	
SHALL V-6 ENGINE	o MACHINING	CAST IRON ALUMINUM CAST IRON/ALUM. DUCTILE IRON ALLOY STEEL ALUMINUM FORGED STEEL			\$154/\$182 (\$168)	\$285/\$339 (\$312)	725/885 (805)	1270/1550 (1410)	PROCESSING AND EQUIPMENT UTILIZE THE MOST CURRENT TECHNOLOGY INCLUDING THE DEGREE OF AUTOMATION READILY AVAILABLE FROM THE TOOL MACHINE BUILDING INDUSTRY.
	-BLOCKS -HEADS -MANIFOLDS -CRANKSHAFTS -CAMSHAFTS -PISTONS -CONNECTING RODS								
SUBTOTAL	o ENGINE ASSEMBLY AND TESTING		\$ 21/\$27 (\$24)		\$ 35/\$43 (\$39)		445/515 (480)	895/945 (920)	AUTOMATED AND MANUAL ASSEMBLY WITH AUTOMATED TEST & DIAGNOSTIC TEST STANDS.
	o PLANT FACILITIES		\$ 45/\$55 (\$50)		\$ 57/\$73 (\$65)				
TOTALS	o BUILDING & LAND		\$114/\$130 (\$122)		\$117/\$135 (\$126)				1,656,000 SQ. FT. OF BUILDING AT BOTH CAPACITY LEVELS I & II
							1170/1400 (1285) 860/1000 (930) 410/500 (455)	2165/2495 (2330) 1490/1730 (1610) 745/835 (790)	
			400,000	800,000	\$334/\$394 (\$364) *	\$494/\$590 (\$542) *	2440/2900 (2670)	4400/5060 (4730)	

PRODUCT SMALL V-6 ENGINE

*Major capital expenditures adjusted for 1981 economics \$386,640,000 - Level I, \$575,290,000 - Level II.

PROCESS AND COMPONENT SUMMARY
(PRODUCTION FACILITIES & EQUIPMENT ONLY)
(NOMINAL ESTIMATE)

DATE March 1982

CAPACITY LEVEL I 400,000

CAPACITY LEVEL II 800,000

(2 of 3)

Level IV

MAJOR REQUIREMENTS	DEPARTMENT FUNCTION	MAJOR CAPITAL EXPENDITURES (\$ MILLIONS)			AREA (SQ. FT.)	MANPOWER REQUIREMENTS		REMARKS
		LEVEL I	LEVEL II	TOTAL		LEVEL I	LEVEL II	
CYLINDER BLOCK & ASSY. CRANKSHAFT	MACHINING (CAST IRON)	\$ 35.0	\$ 35.0	\$ 70.0	200,000	125	240	AUTOMATED TRANSFER LINE
	MACHINING (CAST IRON)	34.0	27.5	61.5	140,000	140	240	TWO DIFFERENT CRANKS
CONN. RODS & ASSEMBLY PISTONS	MACHINING (FORGING)	18.0	9.0	27.0	100,000	100	150	AUTOMATED LINE
	MACHINING (ALUMINUM)	8.0	6.0	14.0	35,000	45	80	AUTOMATED LINE-TWO DIFFERENT PISTONS
CAMSHAFT	MACHINING (CAST ALLOY IRON)	15.0	15.0	30.0	45,000	50	100	CAMSHAFT VARIATIONS
	MACHINING (CAST ALUMINUM)	36.0	33.0	69.0	180,000	130	220	AUTOMATED TRANSFER LINE
CYLINDER HEAD & ASSY. INTAKE MANIFOLD	MACHINING (CAST ALUMINUM)	6.0	6.0	12.0	25,000	50	100	AUTOMATED TRANSFER LINE
	MACHINING (CAST IRON)	6.0	6.0	12.0	19,000	20	40	VARIATIONS TO FIT SPECIFIED VEHICLE
EXHAUST MANIFOLD OIL PUMP	MACHINING (CAST IRON)	3.0	2.0	5.0	12,000	50	85	
	MACHINING ASSEMBLY	1.0	0.5	1.5	10,000	35	50	COMBINATION-AUTOMATION & MANUAL OPERATIONS
WATER PUMP ENGINE ASSEMBLY	TESTING, REPAIR, FINAL O.K.	15.0	7.0	22.0	100,000	430	820	
	VARIOUS OTHER	9.0	8.0	17.0	50,000	50	100	AUTOMATED TESTING AND DIAGNOSTIC FUNCTIONS
ENGINE TESTING MISC.		6.0	4.0	10.0	30,000	60	105	
TOTALS								TOTAL DIRECT LABOR
								TOTAL INDIRECT LABOR
								TOTAL SALARY LABOR
								TOTAL MANPOWER

PRODUCT SMALL V-6 ENGINE

PROCESS AND COMPONENT SUMMARY
(NOMINAL ESTIMATE)

CAPACITY LEVEL I 400,000

CAPACITY LEVEL II 800,000

DATE March 1982

(3 of 3)

Level IV

MAJOR REQUIREMENTS	DEPARTMENT FUNCTION	MAJOR CAPITAL EXPENDITURES (\$ MILLIONS)			AREA (SQ. FT.)	MANPOWER REQUIREMENTS			REMARKS
		LEVEL I	LEVEL II	TOTAL		LEVEL I	LEVEL II	D/L	
MATERIAL HANDLING & OTHER	CONTAINERS RACKS	\$ 5.0	\$ 2.0	\$ 7.0					
STORAGE OF PARTS FOR ASSEMBLY					70,000				
FINISHED ENGINE STORAGE					80,000				
TOTALS		\$197.0*	\$161.0	\$358.0*	1,096,000	1285	2330		TOTAL DIRECT LABOR
						930	1610		TOTAL INDIRECT LABOR
						455	790		TOTAL SALARY LABOR
						2670	4730		TOTAL MANPOWER

PRODUCT SMALL V-6 ENGINE

*Major capital expenditures adjusted for 1981 economics \$208,820,000 - Level I, \$379,480,000 - Total

SMALL V-6 ENGINE PLANT AREA BREAKDOWN
(SQ.FT.)

	AREA
OFFICE BUILDING	60,000
MANUFACTURING BUILDING	
MACHINES & EQUIPMENT (INCLUDING AISLE ALLOWANCE)	1,096,000
IN PROCESS STORAGE BANKS	140,000
SHIPPING & RECEIVING	100,000
TOOL ROOM & CUTTER GRIND	40,000
PRODUCTION OFFICES & MAINTENANCE	100,000
LABS (QUALITY, ENGINEERING & REPAIR)	20,000
OTHER (REST ROOMS, EATING AREAS, ETC.)	<u>40,000</u>
GRAND TOTAL MANUFACTURING	1,536,000
16 BAYS @ 60' - 960' x 40 BAYS @ 40' - 1600'	
AUXILIARY (OUTSIDE MAIN BUILDING)	<u>60,000</u>
GRAND TOTAL	1,656,000

SMALL V-6 ENGINE PLANT

800,000 UNITS/YEAR
3265 UNITS/DAY

IN PROCESS STORAGE 140,000 SQ. FT.

(SQUARE FEET)									
40,000 RAIL DOCK RECEIVING	<u>CYLINDER BLOCK MACHINING</u> (2 TRANSFER LINES) 200,000		<u>PISTON & CONN.</u> ROD SUB-ASSEMBLY		<u>MISC</u> SUB-ASSEMBLY 30,000		<u>LABS</u> 20,000		80,000 <u>FINISHED ENGINE STORAGE</u>
	<u>CYLINDER HEAD MACHINING</u> (2 TRANSFER LINES) 180,000		<u>CYL. HEAD</u> SUB-ASSEMBLY		<u>ENGINE ASSEMBLY LINE</u> 100,000				
<u>CRANKSHAFT MACHINING</u> 140,000		70,000 <u>STORAGE OF PARTS FOR ASSEMBLY</u>		50,000 <u>FINAL TEST & INSPECTION</u>		50,000 <u>RAIL SHIPPING</u>		80,000 <u>FINISHED ENGINE STORAGE</u>	
<u>CAMSHAFT</u> 45,000									
<u>SERVICE AREA</u> <u>MAINTENANCE DEPT., CUTTER GRIND, PROD.</u> OFFICES, CAFETERIA 180,000		50,000 <u>FINAL TEST & INSPECTION</u>		50,000 <u>RAIL SHIPPING</u>		80,000 <u>FINISHED ENGINE STORAGE</u>			
<u>CONNECTING ROD MACHINING</u> 100,000									
<u>MISC. PARTS</u> OIL & WATER PUMP, INTAKE & EXHAUST MANIFOLD AUX. SHAFT 96,000		50,000 <u>FINAL TEST & INSPECTION</u>		50,000 <u>RAIL SHIPPING</u>		80,000 <u>FINISHED ENGINE STORAGE</u>			
<u>PISTON MACHINING</u> 35,000									
<u>TRUCK DOCK</u> <u>RECEIVING</u> 10,000									

960'

V-6 ENGINE PLANT
TOTAL MANUFACTURING COST
(EXCLUDING MATERIAL)

PRODUCTION: 400,000 UNITS PER YEAR			
MANPOWER:	240 DAYS	EMPLOYEES	ANNUAL HOURS
- DIRECT LABOR	- 1960 -	1285	2,518,600
- INDIRECT - HOURLY	- 1960 -	930	1,822,800
- INDIRECT - SALARY	- 2000 -	455	910,000
		<u>2670</u>	<u>5,251,400</u>
			<u>13.14</u>
ANNUAL HOURS ÷ 400,000 UNITS = HOURS PER UNIT = 13.14			
WAGE & FRINGE COSTS:			
- DIRECT LABOR	\$19.50	X 6.30	= \$122.85
- INDIRECT - HOURLY	\$21.50	X 4.56	= \$ 98.04
- INDIRECT - SALARY	\$23.50	X 2.28	= \$ 53.58
			<u>\$274.47</u>
INVESTMENT: (1981\$)			
- BUILDING & SUPPORT FACILITIES USEFUL LIFE - 30 YRS			\$124,120,000
- BUILDING FACILITIES USEFUL LIFE - 30 YRS			\$ 23,320,000
- PLANT FACILITIES USEFUL LIFE - 12 YRS			\$ 24,380,000
- MACHINERY & EQUIPMENT USEFUL LIFE - 12 YRS			\$208,820,000
			<u>4,137,333</u>
			<u>777,333</u>
			<u>2,031,666</u>
			<u>17,401,666</u>
			<u>\$10.34</u>
			<u>1.94</u>
			<u>5.08</u>
			<u>43.50</u>
			<u>\$60.86</u>

DEPRECIATION ÷ 400,000 UNITS = TOTAL DEPRECIATION PER UNIT = \$60.86

TAXES & INSURANCE AS PERCENT OF WAGE & FRINGE COST
T & I ESTIMATE OF 3.9% \$274.47 X 3.9% = \$10.70
OTHER MANUFACTURING COST AS PERCENT OF WAGE & FRINGE COST
OME ESTIMATE OF 13.2% \$274.47 X 13.2% = \$32.67
TOTAL WAGE & FRINGE COSTS \$274.47
TOTAL DEPRECIATION COSTS \$ 60.86
TOTAL TAXES & INSURANCE \$ 10.70
TOTAL OME \$ 32.67
TOTAL \$378.70

PLANT 21
CONDENSER & RADIATOR PLANT

NEW CONDENSER & RADIATOR PLANT ASSUMPTIONS

PRODUCT

- HEATER CORE
- A/C CONDENSER
- EVAPORATOR COIL
- OIL COOLER
- RADIATOR

OPERATING PATTERN

- NORMAL OPERATING PATTERN - 245 DAYS PER YEAR
ALL OPERATIONS: TWO (8) HOUR SHIFTS PER DAY
- OVERTIME
- ALL OPERATIONS: ALTERNATE SATURDAYS 10%
- THIRD SHIFT STRICTLY FOR MAINTENANCE, EQUIPMENT & TOOL SET-UP.

PRODUCTION RATES

- PLANT SIZED FOR 1,200,000 CAR SETS ANNUALLY (LEVEL II). FACILITIES & EQUIPMENT EXPANSION (FROM LEVEL I TO LEVEL II) WILL REQUIRE MINIMAL RE-ARRANGEMENT EXPENSE.
- AIR CONDITIONING REQUIREMENTS PLANNED FOR 70% (INSTALLATION RATE) OF TOTAL VEHICLES. (LEVEL II 840,000 UNITS ANNUALLY)
- LEVEL I 600,000 CAR SETS ANNUALLY 2450/DAY, 153/HOUR
- LEVEL II 1,200,000 CAR SETS ANNUALLY 4900/DAY, 306/HOUR
- AT MAXIMUM PRACTICAL OVERTIME
 - CAPACITY LEVEL I 660,000/YEAR
 - CAPACITY LEVEL II 1,320,000/YEAR
 - CAPACITY LEVEL II FOR A/C COMPONENTS

NEW CONDENSER & RADIATOR PLANT ASSUMPTIONS (CONT.)

TECHNOLOGY
LEVEL

- HEATER CORE - TUBE & FIN DESIGN
- A/C CONDENSER - ALUMINUM SKYVED FIN
- EVAPORATOR COIL - TUBE & FIN DESIGN
- OIL COOLER - TUBE & FIN DESIGN
- RADIATOR - CROSS FLOW - TUBE & FIN DESIGN

EQUIPMENT LEVELS CONSISTENT WITH ESTABLISHED OPERATIONS IN THE UNITED STATES. A FAIR DEGREE OF AUTOMATION BUT STILL SOMEWHAT LABOR INTENSIVE.

NEW CONDENSER & RADIATOR PLANT (NOMINAL ESTIMATE)

<u>LEVEL II</u>			<u>LEVEL I</u>
<u>LAND</u>			<u>LEVEL II</u>
	PURCHASE LAND (75 ACRES @ \$10,000/ACRE)	\$ 750,000	\$ 750,000
	SITE DEVELOPMENT	2,250,000	2,750,000
	SUB TOTAL	\$ 3,000,000	\$ 3,500,000
<u>BUILDING & SUPPORT FACILITY</u>			
	ENGINEERING	\$ 1,400,000	\$ 1,400,000
	MANUFACTURING BLDG. (0.512M Sq. Ft. @ \$55/Sq. Ft.)	28,160,000	28,160,000
	AIR COMPRESSOR AND FIRE PROTECTION	1,500,000	1,500,000
	WASTE TREATMENT	1,500,000	1,900,000
	TANK FARM	400,000	500,000
	OFFICE BUILDING	1,200,000	1,200,000
	OTHER	1,840,000	2,340,000
	USEFUL LIFE-30 YRS - SUB TOTAL	\$36,000,000	\$37,000,000 (1980 \$)
		+7%	39,590,000 (1981 \$)
<u>BUILDING FACILITIES</u>			
	ELECTRICAL	\$ 2,500,000	\$ 3,000,000
	HEATING AND VENTILATION (PENTHOUSE HEATERS)	1,500,000	1,500,000
	UNDERGROUND SERVICES	1,000,000	1,000,000
	BUILDING UTILITIES (AIR, WATER, GAS)	1,500,000	1,500,000
	USEFUL LIFE-30 YRS - SUB TOTAL	\$ 6,500,000	\$ 7,000,000 (1980 \$)
			7,420,000 (1981 \$)
<u>PLANT FACILITIES</u>			
	ELECTRICAL	\$ 3,000,000	\$ 3,000,000
	MATERIAL HANDLING EQUIPMENT	1,000,000	1,500,000
	OTHER	3,500,000	5,000,000
	USEFUL LIFE-12 YRS - SUB TOTAL	\$ 7,500,000	\$ 9,500,000 (1980 \$)
		+6%	10,070,000 (1981 \$)
<u>MACHINERY & EQUIPMENT</u>			
	HEATER CORE, EVAPORATOR COIL AND OIL COOLER	\$ 3,500,000	\$ 6,500,000
	A/C CONDENSER (SKYVED FIN)	1,000,000	1,500,000
	RADIATOR	6,000,000	11,500,000
	CONTAINERS AND RACKS	1,500,000	2,500,000
	OTHER (INCLUDES PERMANENT TOOLS & GAGES)	1,000,000	2,000,000
	USEFUL LIFE-12 YRS - SUBTOTAL	\$13,000,000	\$24,000,000 (1980 \$)
		+6%	25,440,000 (1981 \$)
<u>LEVEL I</u>	TOTAL FACILITIES, EQUIPMENT AND TOOLING	\$66,000,000	\$81,000,000 (1980 \$)
		70,140,000	86,020,000 (1981 \$)
<u>PRE-PRODUCTION AND LAUNCH @ APPROXIMATELY 20%</u>			
		\$13,200,000	\$16,200,000 (1980 \$)
		14,028,000	17,204,000 (1981 \$)
	TOTAL PROGRAM COST	\$79,200,000	\$ 97,200,000 (1980 \$)
		84,168,000	103,224,000 (1981 \$)

FACILITY TYPE	FACILITY ACTIVITIES		ANNUAL PRODUCTION RATE		MAJOR CAPITAL EXPENDITURE (\$ MILLIONS)		MANPOWER REQUIREMENTS		REMARKS
	FUNCTION	MATERIAL	LEVEL I	LEVEL II	LEVEL I	LEVEL II	LEVEL I	LEVEL II	
C-203	• HEATER CORE - FABRICATE & ASSEMBLE	COPPER	600,000	1,200,000	\$3.1/\$3.9 (\$3.5)	\$5.9/\$7.1 (\$6.5)	82/102 (92)	166/202 (184)	
	• A/C EVAPORATOR - FABRICATE & ASSEMBLE (INCLUDES OIL COOLER)	ALUMINUM	420,000	840,000	--	--	74/90 (82)	148/180 (164)	
	• A/C CONDENSER SKYVE, FORM & ASSEMBLE	ALUMINUM EXTRUSION	420,000	840,000	\$0.9/\$1.1 (\$1.0)	\$1.3/\$1.7 (\$1.5)	60/72 (66)	118/146 (132)	
	• RADIATOR	COPPER & STEEL	600,000	1,200,000	\$5.4/\$6.6 (\$6.0)	\$10.3/\$12.7 (\$11.5)	170/210 (190)	342/418 (380)	
	• MISC. OTHER				\$5.4/\$6.6 (\$6.0)	\$8.5/\$10.5 (\$9.5)			
	• PLANT FACILITIES				\$9.5/\$11.5 (\$10.5)	\$10.3/\$12.7 (\$11.5)			
	• LAND AND BUILDINGS				\$34.7/\$43.3 (\$39.0)	\$36.7/\$44.3 (\$40.5)			
							386/474 (430)	774/946 (860)	DIRECT LABOR
							274/326 (300)	486/594 (540)	INDIRECT LABOR
							150/190 (170)	270/330 (300)	SALARY
TOTALS					\$59.0/\$73.0 (\$66.0)*	\$73.0/\$89.0 (\$81.0)*	810/990 (900)	1530/1870 (1700)	

*Major capital expenditures adjusted for 1981 economics \$70,140,000-Level I, \$86,020,000-Level II.

CAPACITY LEVEL I 600,000 VEHICLES

CAPACITY LEVEL II 1,200,000 VEHICLES

PROCESS AND COMPONENT SUMMARY
(NOMINAL ESTIMATE)

DATE March 1982

Level IV

MAJOR DEPARTMENTS	DEPARTMENT FUNCTION	MAJOR CAPITAL EXPENDITURES (\$ MILLIONS)				AREA (SQ. FT.)	MANPOWER REQMTS			REMARKS
		LEVEL I	LEVEL II	TOTAL	LEVEL I		LEVEL II			
							D/L	D/L		
HEATER CORE	AUTOMATIC ROLL FORM RIBBON, ROLL FORM FIN, FOLD CELL UNIT & COLLECT	\$ 3.5	\$ 3.0	\$ 6.5	40,000	92	184			
	ROLL FORM EVAPORATOR FIN COURSE. AUTOMATIC ASSEMBLY OF FIN & TUBE CORE STACK.	INCLUDED ABOVE	INCLUDED ABOVE		60,000	82	164			
	SAME AS EVAPORATOR COIL	INCLUDED ABOVE	INCLUDED ABOVE							
	A/C CONDENSER	FABRICATE (STAMP) FRAME COMPONENTS, SKYVE(KNIFE SHAVE) COOLING FINS. BEND & CUT AS REQUIRED. ASSEMBLE CORE UNIT FRAME & FITTINGS	1.0	0.5	1.5	55,000	66	132		
RADIATOR ASSEMBLY (ENGINE COOLING)	FABRICATE (STAMP) RADIATOR TANKS & FRAME COMPONENTS. ROLL FORM FIN COURSE. AUTOMATIC CORE ASSEMBLY. RAM PRESS HEADER ASSEMBLY. AUTOMATIC FINAL (SOLDER TANK ENDS & FITTINGS) ASSEMBLY.	6.0	5.5	11.5	130,000	190	380			
	MATERIAL HANDLING & OTHER	2.5	2.0	4.5						
TOTALS		\$13.0	\$11.0	\$24.0	285,000	430	860		TOTAL DIRECT LABOR	
						300	540		TOTAL INDIRECT LABOR	
						170	300		TOTAL SALARY LABOR	

NEW CONDENSER & RADIATOR PLANT
(SQUARE FEET)

MANUFACTURING BUILDING

RAW MATERIAL - RECEIVING/STORAGE	50,000
HEATER CORE,OIL COOLER & AIR CONDITIONER	
EVAPORATOR FABRICATION & ASSEMBLY	100,000
AIR CONDITIONER CONDENSER FABRICATION & ASSEMBLY	55,000
RADIATOR FABRICATION & ASSEMBLY	130,000
MISCELLANEOUS COMPONENTS	10,000
IN PROCESS/FINISHED PARTS STORAGE & SHIPPING	72,000
TOOL ROOM, CUTTER GRIND & LABORATORY	30,000
PRODUCTION OFFICES & MAINTENANCE	35,000
EMPLOYEE SERVICES	20,000
UTILITIES	10,000

TOTAL MANUFACTURING BUILDING

512,000

NEW CONDENSER & RADIATOR PLANT (CONT.)
(SQUARE FEET)

IN-PROCESS/FINISHED PARTS STORAGE & SHIPPING 72,000			PRODUCTION OFFICES & MAINTENANCE 35,000
RADIATOR FABRICATION & ASSEMBLY	HEATER CORE OIL COOLER & A/C EVAPORATOR FABRICATION & ASSEMBLY	AIR CONDITIONER CONDENSER FABRICATION & ASSEMBLY	MISCELLANEOUS 10,000
			UTILITIES 10,000
			EMPLOYEE SERVICES 20,000
130,000	100,000	55,000	TOOL ROOM, CUTTER GRIND & LABORATORY 30,000
RAW MATERIAL - RECEIVING/STORAGE 50,000			

640

CONDENSER & RADIATOR PLANT
TOTAL MANUFACTURING COST
 (EXCLUDING MATERIAL)

<u>PRODUCTION: 600,000 UNITS PER YEAR</u>			
<u>MANPOWER:</u>	<u>245 DAYS</u>	<u>EMPLOYEES</u>	<u>ANNUAL HOURS</u>
- DIRECT LABOR	1960	430	842,800
- INDIRECT - HOURLY	1960	300	588,000
- INDIRECT - SALARY	2000	170	340,000
		900	1,770,800
			<u>2.95</u>
<u>ANNUAL HOURS ÷ 600,000 UNITS = HOURS PER UNIT = 2.95</u>			
<u>WAGE & FRINGE COSTS:</u>			
- DIRECT LABOR	\$19.50	x 1.40	= \$27.30
- INDIRECT - HOURLY	\$21.50	x .98	= \$21.07
- INDIRECT - SALARY	\$23.50	x .57	= \$13.40
	<u>TOTAL WAGES & FRINGE COSTS</u>		<u>\$61.77</u>
<u>INTESTMENT: (1981\$)</u>			
- BUILDING & SUPPORT FACILITIES USEFUL LIFE - 30 YRS			<u>FACILITIES COST</u>
- BUILDING FACILITIES USEFUL LIFE - 30 YRS			<u>DEPRECIATION</u>
- PLANT FACILITIES USEFUL LIFE - 12 YRS			
- MACHINERY & EQUIPMENT USEFUL LIFE - 12 YRS			
			<u>COST-PER-UNIT</u>
			\$2.14
			\$.38
			\$1.10
			\$1.91
			<u>\$5.53</u>

DEPRECIATION ÷ 600,000 UNITS = TOTAL DEPRECIATION PER UNIT = \$5.53

TAXES & INSURANCE AS PERCENT OF WAGE & FRINGE COST
 T & I ESTIMATE OF 3.9% \$61.77 X 3.9% = \$2.41
 OTHER MANUFACTURING COST AS PERCENT OF WAGE & FRINGE COST
 OME ESTIMATE OF 13.2% \$61.77 X 13.2% = \$8.15
 TOTAL WAGE & FRINGE COSTS \$61.77
 TOTAL DEPRECIATION COSTS \$ 5.53
 TOTAL TAXES & INSURANCE \$ 2.41
 TOTAL OME \$ 8.15
 TOTAL \$77.85

PLANT NO. 22
ENGINE: 8-CYLINDER GAS

ENGINE PLANT ASSUMPTIONS

PRODUCT - V-8 ENGINE WITH CONVENTIONAL PUSH ROD-CAM CONFIGURATION
- 2 & 4 BARREL CARBURETORS
- TWO DISPLACEMENTS FOR ONE FAMILY OF ENGINES

- * DIFFERENT CYLINDER BORES & STROKE
- * DIFFERENT THROWS ON THE CRANKSHAFT
- * COMMON CONNECTING RODS

PRODUCTION RATES

- PLANT SIZED FOR 800,000 ENGINES ANNUALLY - STRAIGHT TIME BASIS.
- AT 400,000 ENGINES ANNUALLY - STRAIGHT TIME BASIS - ONLY ONE DISPLACEMENT OF ENGINE.
- EACH DEPARTMENT IS ARRANGED TO PROVIDE EQUIPMENT FOR 800,000 ENGINES ANNUALLY. LITTLE OR NO REARRANGEMENT REQUIRED TO EXPAND FROM CAPACITY LEVEL I 400,000 TO CAPACITY LEVEL II 800,000 ENGINES ANNUALLY.
- 1633 ENGINES PER DAY. CAPACITY LEVEL I
- 102 ENGINE ASSEMBLIES/HOUR ON TWO SHIFT BASIS. CAPACITY LEVEL II
- 80-100 EQUIVALENT ENGINE COMPONENTS MACHINED PER HOUR ON THREE SHIFT BASIS.
- AT MAXIMUM PRACTICAL OVERTIME - CAPACITY LEVEL I OF 440,000/YEAR
(10% OVERTIME) - CAPACITY LEVEL II OF 880,000/YEAR

OPERATING PATTERN

- STRAIGHT TIME
ASSEMBLY OPERATIONS - TWO 8 HOUR SHIFTS/DAY
MACHINING OPERATIONS - THREE 8 HOUR SHIFTS/DAY

- OVERTIME
EVERY OTHER SATURDAY (8 HOURS PER SHIFT)

Number OF DAYS AT STRAIGHT TIME

- 245 DAYS PER YEAR - NOTE: IN THOSE YEARS WHEN THERE IS A MAJOR CHANGE TO THE ENGINE, THE NUMBER OF PRODUCTION DAYS PER YEAR MAY BE REDUCED SIGNIFICANTLY.

CAPACITY FOR 400,000 UNITS/YEAR
CAPACITY FOR 800,000 UNITS/YEAR
TWO DISPLACEMENTS - ONE ENGINE PER

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FACILITIES PLANNING
(NOMINAL ESTIMATE)
(1 of 2)

DATE March 1982

CAPACITY LEVEL I 400,000
CAPACITY LEVEL II 800,000

Level III

FACILITY TYPE	FACILITY ACTIVITIES		ANNUAL PRODUCTION RATE		MAJOR CAPITAL EXPENDITURES (\$ MILLIONS)		MANPOWER REQUIREMENTS		REMARKS
	FUNCTION	MATERIAL	LEVEL I	LEVEL II	LEVEL I	LEVEL II	LEVEL I	LEVEL II	
V-8 ENGINE	MACHINING				\$167/\$197 (\$182)	\$310/\$366 (\$338)	785/955 (870)	1405/1615 (1510)	PROCESSING & EQUIPMENT UTILIZE THE MOST CURRENT TECHNOLOGY INCLUDING THE DEGREE OF AUTOMATION READILY AVAILABLE FROM THE TOOL MACHINE BUILDING INDUSTRY.
	-BLOCKS	CAST IRON							
	-HEADS	ALUMINUM							
	-MANIFOLD	CAST IRON/ ALUM.							
	-CRANKSHAFTS	DUCTILE IRON							1,752,000 SQ. FT. OF BUILDINGS AT BOTH CAPACITY LEVELS I & II
	-CAMSHAFTS	ALLOY IRON							
	-PISTONS	ALUMINUM							
	-CONNECTING RODS	FORGED STEEL							
	ENGINE ASSEMBLY AND TESTING				\$22/\$30 (\$26)	\$38/\$46 (\$42)	450/530 (490)	870/1010 (940)	
	PLANT FACILITIES				\$ 46/\$56 (\$51)	\$ 59/\$75 (\$67)			
	BUILDING AND LAND				\$119/\$137 (\$128)	\$123/\$141 (\$132)			
TOTALS									

PRODUCT V-8 ENGINE

FACILITY TYPE	FACILITY ACTIVITIES		ANNUAL PRODUCTION RATE		MAJOR CAPITAL EXPENDITURES (\$ MILLIONS)		MANPOWER REQUIREMENTS		REMARKS
	FUNCTION	MATERIAL	LEVEL I	LEVEL II	LEVEL I	LEVEL II	LEVEL I	LEVEL II	
V-8 ENGINE									
SUBTOTAL							1235/1483 (1360)	2275/2625 (2450)	DIRECT LABOR
							895/1045 (970)	1560/1800 (1680)	INDIRECT LABOR
							430/530 (480)	780/880 (830)	SALARY
TOTALS			400,000	800,000	\$354/\$420 (\$387)	\$530/\$628* (\$579)	2560/3060 (2810)	4615/5305 (4960)	

*Major capital expenditures adjusted for 1981 economics \$411,080,000 - Level I, \$614,040,000 - Level II.
 PRODUCT V-8 ENGINE

PROCESS AND COMPONENT SUMMARY

(PRODUCTION FACILITIES & EQUIPMENT ONLY) (NOMINAL ESTIMATE)
(1 of 2)

DATE March 1982

CAPACITY LEVEL I 400,000

CAPACITY LEVEL II 800,000

Level IV

MAJOR REQUIREMENTS	DEPARTMENT FUNCTION	MAJOR CAPITAL EXPENDITURES (\$ MILLIONS)			AREA (SQ. FT.)	MANPOWER REQUIREMENTS		REMARKS
		LEVEL I	LEVEL II	TOTAL		LEVEL I	LEVEL II	
		\$ 38.0	\$ 38.0	\$ 76.0		D/L	D/L	
CYLINDER BLOCK & ASSY.	MACHINING (CAST IRON)				225,000	130	250	AUTOMATED TRANSFER LINE
CRANKSHAFT	MACHINING (CAST IRON)	35.0	28.5	63.5	150,000	145	250	TWO DIFFERENT CRANKS
CONN. RODS & ASSEMBLY	MACHINING (FORGING)	20.0	10.0	30.0	110,000	120	170	AUTOMATED LINE
PISTONS	MACHINING (ALUMINUM)	10.0	8.0	18.0	45,000	50	90	AUTOMATED LINE-TWO DIFFERENT PISTONS
CAMSHAFT	MACHINING (CAST ALLOY IRON)	16.0	16.0	32.0	50,000	55	110	CAMSHAFT VARIATIONS
CYLINDER HEAD & ASSY.	MACHINING (CAST ALUMINUM)	38.0	35.0	73.0	200,000	140	240	AUTOMATED TRANSFER LINE
INTAKE MANIFOLD	MACHINING (CAST ALUMINUM)	7.0	7.0	14.0	30,000	55	110	AUTOMATED TRANSFER LINE
EXHAUST MANIFOLD	MACHINING (CAST IRON)	7.0	7.0	14.0	20,000	25	50	VARIATION TO FIT SPECIFIED VEHICLE
OIL PUMP	MACHINING (CAST IRON)	3.0	2.0	5.0	12,000	50	90	
WATER PUMP	MACHINING (DIE CAST ALUMINUM)	1.0	0.5	1.5	10,000	35	40	
ENGINE ASSEMBLY	ASSEMBLY	16.0	7.0	23.0	110,000	440	840	COMBINATION-AUTOMATION & MANUAL OPERATIONS
ENGINE TESTING	TESTING, REPAIR, FINAL O.K.	10.0	9.0	19.0	55,000	50	100	AUTOMATED TESTING AND DIAGNOSTIC FUNCTIONS
TOTALS								TOTAL DIRECT LABOR
								TOTAL INDIRECT LABOR
								TOTAL SALARY LABOR
								TOTAL MANPOWER

DD FORM 11-0 UNCLASSIFIED

**FACILITIES PLANNING
PROCESS AND COMPONENT SUMMARY
(NOMINAL ESTIMATE)
(2 of 2)**

CAPACITY LEVEL I 400,000 DATE March 1982
CAPACITY LEVEL II 800,000 Level IV

MAJOR REQUIREMENTS	DEPARTMENT FUNCTION	MAJOR CAPITAL EXPENDITURES (\$ MILLIONS)			AREA (SQ. FT.)	MANPOWER REQUIREMENTS		REMARKS
		LEVEL I	LEVEL II	TOTAL		LEVEL I	LEVEL II	
						D/L	D/L	
MISC. SUB-ASSY	VARIOUS OTHER COMPONENTS	7.0	4.0	11.0	30,000	65	110	
MATERIAL HANDLING & OTHER	CONTAINERS RACKS	5.0	2.0	7.0				
STORAGE OF PARTS FOR ASSY.					55,000			
STORAGE OF FINISHED ENGINES					80,000			
TOTALS		\$ 213.0*	\$ 174.0	\$ 387.0*	1,182,000	1360	2450	TOTAL DIRECT LABOR
						970	1680	TOTAL INDIRECT LABOR
						480	830	TOTAL SALARY LABOR
						2810	4960	TOTAL MANPOWER

PRODUCT V-8 ENGINE

*Major capital expenditures adjusted for 1981 economics \$225,780,000 - Level I, \$410,220,000 - Level II

V-8 ENGINE PLANT AREA BREAKDOWN
(SQ. FT.)

OFFICE BUILDING	<u>AREA</u> 60,000
MANUFACTURING BUILDING	
MACHINES & EQUIPMENT (INCLUDING AISLE ALLOWANCE)	1,182,000
IN PROCESS STORAGE BANKS	150,000
SHIPPING & RECEIVING	100,000
TOOL ROOM & CUTTER GRIND	40,000
PRODUCTION OFFICES & MAINTENANCE	100,000
LABS (QUALITY, ENGINEERING & REPAIR)	20,000
OTHER (REST ROOMS, EATING AREAS, ETC.)	40,000
GRAND TOTAL MANUFACTURING	<u>1,632,000</u>
17 BAYS @ 60' = 1020' x 40 BAYS @ 40' = 1600'	
AUXILIARY (OUTSIDE MAIN BUILDING)	60,000
GRAND TOTAL	<u>1,752,000</u>

V-8 ENGINE PLANT
800,000 UNIT/YEAR
3200 UNITS/DAY

IN PROCESS STORAGE 150,000 SQ. FT.		(SQUARE FEET)	
RAIL DOCK RECEIVING 40,000			
CYLINDER BLOCK MACHINING (2 TRANSFER LINES) 225,000		MISC. SUB-ASSEMBLY 30,000	
CYLINDER HEAD MACHINING (2 TRANSFER LINES) 200,000		PISTON & CONN. ROD SUB-ASSEMBLY	
CRANKSHAFT MACHINING 150,000		CYL. HEAD SUB-ASSEMBLY	
CAMSHAFT 50,000		55,000 STORAGE OF PARTS FOR ASSEMBLY	
SERVICE AREA MAINTENANCE DEPT., CUTTER GRIND, PROD. OFFICE, CAFETERIA 180,000			
CONNECTING ROD MACHINING 110,000		55,000 FINAL TEST & INSPECTION	
MISC. PARTS 72,000 OIL & WATER PUMP, INTAKE & EXHAUST MANIFOLD			
PISTON MACHINING 45,000		50,000 RAIL SHIPPING	
TRUCK DOCK RECEIVING 10,000			
		80,000 FINISHED ENGINE STORAGE	

900'

1560'
TOTAL AREA 1,404,000 SQ. FT.

V-8 ENGINE PLANT
TOTAL MANUFACTURING COST
(EXCLUDING MATERIAL)

PRODUCTION: 400,000 UNITS PER YEAR

MANPOWER:	245 DAYS	EMPLOYEES	ANNUAL HOURS	HRS/UNIT
- DIRECT LABOR	- 1960 -	1,360	2,665,600	6.64
- INDIRECT - HOURLY	- 1960 -	970	1,901,200	4.75
- INDIRECT - SALARY	- 2000 -	480	960,000	2.40
		<u>2,810</u>	<u>5,526,800</u>	<u>13.79</u>

ANNUAL HOURS ÷ 400,000 UNITS - HOURS PER UNIT = 13.79

WAGE & FRINGE COSTS:

- DIRECT LABOR	\$19.50	X	6.64	=	\$129.48
- INDIRECT - HOURLY	\$21.50	X	4.75	=	\$102.13
- INDIRECT - SALARY	\$23.50	X	2.40	=	\$ 56.40
					<u>\$288.01</u>

TOTAL WAGE & FRINGE COSTS

INVESTMENT: (1981\$)

- BUILDING & SUPPORT FACILITIES USEFUL LIFE - 30 YRS	
- BUILDING FACILITIES USEFUL LIFE - 30 YRS	
- PLANT FACILITIES USEFUL LIFE - 12 YRS	
- PLANT & EQUIPMENT USEFUL LIFE - 12 YRS	

FACILITIES COST	DEPRECIATION	COST-PER-UNIT
\$130,540,000	4,351,333	\$10.88
\$ 24,380,000	812,666	2.03
\$ 24,380,000	2,031,666	5.08
\$225,780,000	<u>18,816,666</u>	<u>47.04</u>
		<u>\$65.03</u>

DEPRECIATION ÷ 400,000 UNITS = TOTAL DEPRECIATION PER UNIT = \$65.03

TAXES & INSURANCE AS PERCENT OF WAGE & FRINGE COST

T & I ESTIMATE OF 3.9% \$288.01 X 3.9% = \$11.23

OTHER MANUFACTURING COST AS PERCENT OF WAGE & FRINGE COST

OME ESTIMATE OF 13.2% \$288.01 X 13.2% = \$38.02

TOTAL WAGE & FRINGE COSTS	\$288.01
TOTAL DEPRECIATION COSTS	\$ 65.03
TOTAL TAXES & INSURANCE	\$ 11.23
TOTAL OME	\$ 38.02
TOTAL	<u>\$402.29</u>

PLANT NO. 23
MANUAL: TRANSAXLE PLANT

4 SPEED MANUAL TRANSAXLE PLANT ASSUMPTIONS

PRODUCT

- FOUR-SPEED MANUAL TRANSAXLE WITH TWO DIFFERENTIAL GEAR RATIOS.
- TWO BACK OF BLOCK CONFIGURATIONS.
- FIVE-SPEED VERSION.

FACILITIES

- INCLUDES PRODUCTION OF DIFFERENTIAL (CLUTCH AND FLYWHEEL PURCHASED AND SUPPLIED TO VEHICLE ASSEMBLY PLANT).

**PRODUCTION
RATES**

- PLANT SIZED FOR 1,000,000 TRANSAXLES ANNUALLY ON A STRAIGHT TIME BASIS.
- EACH DEPARTMENT IS ARRANGED TO PROVIDE EQUIPMENT SPACE FOR 1,000,000 TRANSAXLES ANNUALLY. LITTLE REARRANGEMENT REQUIRED TO EXPAND FROM CAPACITY LEVEL I, 500,000 TO CAPACITY LEVEL II, 1,000,000 TRANSAXLES ANNUALLY.
- 2,040 TRANSAXLES PER DAY CAPACITY LEVEL I.
- 128 TRANSAXLE ASSEMBLIES PER HOUR ON TWO SHIFT BASIS.
- 100-140 EQUIVALENT TRANSAXLE MACHINED COMPONENTS/HOUR ON THREE SHIFT BASIS.
- 4,080 TRANSAXLES PER DAY CAPACITY LEVEL II.
- 256 TRANSAXLES PER HOUR ON TWO SHIFT BASIS.
- 200-280 EQUIVALENT TRANSAXLE MACHINED COMPONENTS/HOUR ON THREE SHIFT BASIS.
- AT MAXIMUM PRACTICAL OVERTIME - CAPACITY LEVEL I 550,000/YEAR
(10% OVERTIME) - CAPACITY LEVEL II 1,100,000/YEAR.

NUMBER OF DAYS AT STRAIGHT TIME

- 245 DAYS/YEAR - NOTE: IN THOSE YEARS WHEN THERE IS A MAJOR CHANGE TO THE TRANSAXLE, THE NUMBER OF PRODUCTION DAYS PER YEAR MAY BE REDUCED SIGNIFICANTLY.

FACILITIES PLANNING

		(NOMINAL ESTIMATE)		LEVEL I	LEVEL II
		500,000 UNITS	1,000,000 UNITS		
<u>LAND</u>	PURCHASE LAND (150 ACRES @ \$10,000/ACRE)	\$ 1,500,000	\$ 1,500,000		
	SITE DEVELOPMENT	4,500,000	5,500,000		
	SUB TOTAL	\$ 6,000,000	\$ 7,000,000		
<u>BUILDING & SUPPORT FACILITIES</u>	ENGINEERING	\$ 4,000,000	\$ 4,000,000		
	MANUFACTURING BLDG. (1,306 Sq. Ft @ \$55/Sq. Ft.)	72,000,000	72,000,000		
	POWER HOUSE - BOILERS & COMPRESSORS	10,000,000	12,000,000		
	WASTE TREATMENT	8,000,000	8,000,000		
	TANK FARM	2,000,000	2,000,000		
	OTHER (OFFICE BUILDING)	4,000,000	5,000,000		
	- USEFUL LIFE-30 YRS - SUB TOTAL	\$100,000,000	\$103,000,000 (1980 \$)		
	+7%	107,000,000	110,210,000 (1981 \$)		
<u>BUILDING FACILITIES</u>	ELECTRICAL	\$ 6,000,000	\$ 8,000,000		
	CENTRAL COOLANT SYSTEM	4,000,000	5,000,000		
	UNDERGROUND SERVICES (SEWER, WATER & GAS)	4,000,000	4,000,000		
	BUILDING UTILITIES (STEAM, AIR, WATER, GAS)	3,000,000	3,000,000		
	HEATING AND VENTILATION	4,000,000	5,000,000		
	- USEFUL LIFE-30 YRS - SUB TOTAL	\$ 21,000,000	\$ 25,000,000 (1980 \$)		
	+6%	22,260,000	26,500,000 (1981 \$)		
<u>PLANT FACILITIES</u>	TOOL ROOM & CUTTER GRIND	\$ 6,000,000	\$ 8,000,000		
	AUTOMATIC STORAGE-SYSTEM	7,000,000	11,000,000		
	MATERIAL HANDLING EQUIPMENT	3,000,000	4,000,000		
	HEAT TREAT EQUIPMENT	8,000,000	11,000,000		
	WASHERS	4,000,000	5,000,000		
	OTHER	3,000,000	4,000,000		
	- USEFUL LIFE-12 YRS - SUB TOTAL	\$ 31,000,000	\$ 43,000,000 (1980 \$)		
	+6%	32,860,000	45,580,000 (1981 \$)		
<u>MACHINERY & EQUIPMENT</u>	PRODUCTION EQUIPMENT & PERMANENT TOOLS	\$ 81,000,000	\$148,000,000		
	TRANSMISSION (INCLUDES AUTO HANDLING)	15,000,000	28,000,000		
	DIFFERENTIAL	8,000,000	12,000,000		
	TRANSAXLE ASSEMBLY & TEST	3,000,000	4,000,000		
	CONTAINERS & RACKS	2,000,000	3,000,000		
	OTHER				
	- USEFUL LIFE-12 YRS - SUB TOTAL	\$109,000,000	\$195,000,000 (1980 \$)		
	+6%	115,540,000	206,700,000 (1981 \$)		
<u>LEVEL I</u>	TOTAL FACILITIES, EQUIPMENT AND TOOLING	\$267,000,000	\$373,000,000 (1980 \$)		
		283,660,000	395,990,000 (1981 \$)		
<u>PRE-PRODUCTION AND LAUNCH @ APPROXIMATELY 20%</u>		\$ 53,400,000	\$ 74,600,000 (1980 \$)		
		56,732,000	79,198,000 (1981 \$)		
	TOTAL PROGRAM COST	\$320,400,000	\$447,600,000 (1980 \$)		
		340,392,000	475,188,000 (1981 \$)		

FACILITY TYPE	FACILITY ACTIVITIES		ANNUAL PRODUCTION RATE		MAJOR EXPENDITURE (\$ MILLIONS)	MANPOWER REQUIREMENTS		REMARKS		
	FUNCTION	MATERIAL	LEVEL I	LEVEL II		LEVEL I	LEVEL II			
FOUR SPEED MANUAL TRANSAXLE	o Machining Cases Housings. Shafts Gears Hubs	-Aluminum -Aluminum -Steel -Cast Iron -Cast Iron			\$ 71/\$87 (\$79)	\$130/\$160 (\$145)	362/442 (402)	716/872 (794)	Processing and equipment utilize current technology including the degree of automation readily available from tool machine building industry.	
	o Stamping Clutch Plates Shift Forks Brackets	-Sheet Steel			\$2/\$2 (\$2)	\$3/\$3 (\$3)	9/11 (10)	18/22 (20)		
	o Heat Treat Gears & Shafts				\$7/\$9 (\$8)	\$10/\$12 (\$11)	36/44 (40)	63/77 (70)		
	o Component Machining & Assembly - Differential				\$14/\$16 (\$15)	\$25/\$31 (\$28)	125/155 (140)	244/296 (270)		
o Final Assembly & Test of Complete Transaxles					\$7/\$9 (\$8)	\$11/\$13 (\$12)	216/260 (238)	424/508 (466)		
o Plant Facilities o Building & Land				\$45/\$53 (\$49)	\$59/\$69 (\$64)	27/33 (30)	55/65 (60)			
				\$96/\$116 (\$106)	\$100/\$120 (\$110)			1,446,000 Sq.Ft. Buildings at both Capacity Levels I and II.		
TOTALS										

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FACILITY TYPE	FACILITY ACTIVITIES		ANNUAL PRODUCTION RATE		MAJOR CAPITAL EXPENDITURE (\$ MILLIONS)		MANPOWER REQUIREMENTS		REMARKS
	FUNCTION	MATERIAL	LEVEL I	LEVEL II	LEVEL I	LEVEL II	LEVEL I	LEVEL II	
TOTALS			500,000	1,000,000	\$242/\$292 (\$267) *	\$338/\$408 (\$373) *	775/945 (860) 455/555 (505) 300/360 (330)	1520/1840 (1680) 850/1040 (945) 445/535 (490)	Direct Labor Indirect Labor Salary

*Major capital expenditures adjusted for 1981 economics \$283,660,000 - Level I,
\$395,990,000 - Level II.

PRODUCT 4 SPEED MANUAL TRANSAXLE

CAPACITY LEVEL I 500,000
CAPACITY LEVEL II 1,000,000

FACILITIES PLANNING

DATE

March 1982
Level III

MAJOR DEPARTMENTS	DEPARTMENT FUNCTION	MAJOR CAPITAL EXPENDITURES (\$ MILLIONS)			AREA (SQ. FT.)	MANPOWER REQMT'S			REMARKS
		LEVEL I	LEVEL II	TOTAL		LEVEL I	LEVEL II	D/L	
Cases	Machining (Alum. Die Casting)	\$18	\$18	\$36	130,000	68	130		
Housings	Machining (Alum. Die Casting)	10	10	20	50,000	34	68		
Extensions	Machining (Alum. Die Casting)	4	4	8	20,000	10	20		
Shafts	Machining (Steel)	8	6	14	50,000	30	60		
Gears	Machining (Cast Iron & Steel)	25	20	45	220,000	190	380		
Synchronizers	Machining (Cast Iron & Steel)	8	5	13	50,000	30	60		
Miscellaneous	Machining (Alum., Cast Iron & Steel)	6	3	9	50,000	40	76		
Heat Treat	Anneal, Carburizing & Induction Hardening	8	3	11	100,000	40	70		
Shift Mechanisms	Stamping & Machining (Steel)	2	1	3	10,000	10	20		
Differential	Machining & Assembly	15	13	28	100,000	140	270		
Transaxle Assembly	Assembly & Testing	8	4	12	130,000	238	466		
Material Handling & Other		11	4	15		30	60		
TOTALS		\$123	\$91	\$214	910,000	860	1680		TOTAL DIRECT LABOR
						505	945		TOTAL INDIRECT LABO?
						330	490		TOTAL SALARY LABOR
						1695	3115		TOTAL MANPOWER

NEW FOUR SPEED MANUAL TRANSAXLE PLANT
(SQ.FT.)

MANUFACTURING BUILDING

MACHINES & EQUIPMENT (INCLUDING AISLE ALLOWANCE)

TRANSAXLE - MACHINING	580,000
ASSEMBLY	130,000
DIFFERENTIAL	100,000
HEAT TREAT	100,000
SHIPPING & RECEIVING	140,000
TOOL ROOM & CUTTER GRIND	50,000
PRODUCTION OFFICES AND MAINTENANCE	110,000
LABS (QUALITY, ENGINEERING, REPAIR & ENDURANCE TESTING)	40,000
OTHER (REST ROOMS, EATING AREAS, ETC.)	56,000
TOTAL	1,306,000

BUILDING SIZE 17 BAYS @ 60' = 1,020' x 32 BAYS @ 40' = 1,280'

OFFICE

60,000

AUXILIARY

80,000

GRAND TOTAL

1,446,000

FOUR SPEED MANUAL TRANSAXLE PLANT

1,000,000 UNITS/YEAR

4,080 UNITS/DAY
(SQ.FT.)

SHIPPING & RECEIVING 90,000	GEARS 220,000	HEAT TREAT 100,000	DIFFERENTIAL ASSEMBLY 100,000
			SHAFTS & SHIFT MECHANISM 60,000
PRODUCTION OFFICES & MAINTENANCE TOOL ROOM & CUTTER GRIND 160,000			
TRANSFER LINES CASES, HOUSINGS, EXTENSIONS 200,000	TRANSAXLE ASSEMBLY & TEST 130,000		
SYNCHRONIZERS 50,000	MISC. 50,000		
LABS 40,000	OTHER 56,000	SHIPPING 50,000	

1,020'

1,280'

TOTAL AREA 1,306,000

FOUR SPEED MANUAL TRANSAXLE PLANT
TOTAL MANUFACTURING COST
(EXCLUDING MATERIAL)

PRODUCTION: 500,000 UNITS PER YEAR

<u>MANPOWER:</u>	<u>245 DAYS</u>	<u>EMPLOYEES</u>	<u>ANNUAL HOURS</u>	<u>HRS/UNIT</u>
- DIRECT LABOR	- 1960 -	860	1,685,600	3.37
- INDIRECT LABOR	- 1960 -	505	989,800	1.98
- INDIRECT SALARY	- 2000 -	330	660,000	1.32
		<u>1,695</u>	<u>3,335,400</u>	<u>6.67</u>

ANNUAL HOURS ÷ 500,000 UNITS = HRS PER UNIT = 6.67

WAGES & FRINGE COSTS:

- DIRECT LABOR	\$19.50	X	3.37	=	\$ 65.72
- INDIRECT HOURLY	\$21.50	X	1.98	=	42.57
- INDIRECT SALARY	\$23.50	X	1.32	=	31.02
	TOTAL WAGES & FRINGE COSTS				
					<u>\$139.31</u>

INVESTMENT: (1981\$)

- BUILDING & SUPPORT FACILITIES USEFUL LIFE - 30 YRS	<u>FACILITIES COST</u>	<u>DEPRECIATION</u>	<u>COST-PER-UNIT</u>
- BUILDING FACILITIES USEFUL LIFE - 30 YRS	\$107,000,000	3,566,666	\$ 7.13
- PLANT FACILITIES USEFUL LIFE - 12 YRS	\$ 22,260,000	742,000	1.48
- MACHINERY & EQUIPMENT USEFUL LIFE - 12 YRS	\$ 32,860,000	2,738,333	5.48
	\$115,540,000	9,628,333	19.26
			<u>\$33.35</u>

DEPRECIATION ÷ 500,000 UNITS = TOTAL DEPRECIATION PER UNIT = \$33.35

TAXES & INSURANCE AS PERCENT OF WAGE & FRINGE COST

T & I ESTIMATE OF 3.9% \$139.31 X 3.9% = \$5.43

OTHER MANUFACTURING COST AS PERCENT OF WAGE & FRINGE COST

OME ESTIMATE OF 13.2% \$139.31 X 13.2% = \$18.39

TOTAL WAGE & FRINGE COST	\$139.31
TOTAL DEPRECIATION COST	\$ 33.35
TOTAL TAXES & INSURANCE	\$ 5.43
TOTAL OME	\$ 18.39
TOTAL	<u>\$196.48</u>

PLANT NO. 24
AUTOMATIC TRANSMISSION PLANT

RWD AUTOMATIC TRANSMISSION PLANT ASSUMPTIONS

- PRODUCT
 - 3 SPEED AUTOMATIC TRANSMISSION FOR REAR WHEEL DRIVE VEHICLES.
 - WIDE-RATIO GEAR TRAIN WITH LOCK-UP TORQUE CONVERTER FEATURE.
 - FOUR BACK OF BLOCK CONFIGURATIONS
 - TWO EXTENSIONS UTILIZED
 - USED ON PASSENGER CARS & LIGHT DUTY TRUCKS
- PRODUCTION RATE
 - PLANT SIZED FOR 800,000 TRANSMISSIONS ANNUALLY ON A STRAIGHT TIME BASIS
 - AT 400,000 TRANSMISSIONS ANNUALLY, TWO BACK OF BLOCK CONFIGURATIONS AND ONLY ONE EXTENSION.
 - EACH DEPARTMENT IS ARRANGED TO PROVIDE EQUIPMENT FOR 800,000 TRANSMISSIONS ANNUALLY. MINIMAL REARRANGEMENT REQUIRED TO EXPAND FROM CAPACITY LEVEL I OF 400,000 ANNUALLY TO CAPACITY LEVEL II OF 800,000 ANNUALLY.
 - 1633 TRANSMISSIONS PER DAY - 102 ASSEMBLIES PER HOUR ON A TWO SHIFT BASIS AT CAPACITY LEVEL I.
 - AT MAXIMUM PRACTICAL OVERTIME - CAPACITY LEVEL I OF 440,000/YEAR
 - CAPACITY LEVEL II OF 880,000/YEAR
- OPERATING PATTERN
 - STRAIGHT TIME
 - o ASSEMBLY OPERATIONS-TWO 8 HOUR SHIFTS/DAY
 - o MACHINING OPERATIONS-THREE 8 HOUR SHIFTS/DAY
 - OVERTIME
 - o EVERY OTHER SATURDAY (8 HOURS PER SHIFT)
- NUMBER OF DAYS STRAIGHT TIME
 - 245 DAYS PER YEAR - NOTE: IN THOSE YEARS WHEN THERE IS A MAJOR CHANGE TO THE TRANSMISSION, THE NUMBER OF PRODUCTION DAYS PER YEAR MAY BE REDUCED SIGNIFICANTLY.

FACILITIES PLANNING **RWD 3-SPEED AUTOMATIC TRANSMISSION PLANT** **(NOMINAL ESTIMATE)**

<u>LEVEL I</u>		<u>400,000 UNITS</u>	<u>800,000 UNITS</u>	<u>LEVEL I</u>	<u>LEVEL II</u>
<u>LAND</u>					
	PURCHASE OF LAND (200 ACRES @ \$10,000/ACRE)	\$ 2,000,000	\$ 2,000,000		\$ 2,000,000
	SITE DEVELOPMENT	4,000,000	5,000,000		5,000,000
	SUB TOTAL	\$ 6,000,000	\$ 7,000,000		
<u>BUILDING & SUPPORT FACILITIES</u>					
	ENGINEERING	\$ 4,500,000	\$ 4,500,000		\$ 4,500,000
	MANUFACTURING BLDG. (1.55M Sq. Ft. @ \$55/Sq. Ft.)	85,000,000	85,000,000		85,000,000
	POWER HOUSE - BOILERS & COMPRESSORS	11,000,000	13,500,000		13,500,000
	WASTE TREATMENT	7,000,000	7,000,000		7,000,000
	TANK FARM	2,000,000	2,000,000		2,000,000
	OFFICE BUILDING	2,500,000	2,500,000		2,500,000
	OTHER	2,500,000	3,000,000		3,000,000
	- USEFUL LIFE-30 YRS - SUB TOTAL	\$115,000,000	\$118,000,000		\$118,000,000 (1980 \$)
		+7%	123,050,000		126,260,000 (1981 \$)
<u>BUILDING FACILITIES</u>					
	ELECTRICAL	\$ 5,000,000	\$ 7,000,000		\$ 7,000,000
	CENTRAL COOLANT SYSTEM	3,500,000	4,000,000		4,000,000
	UNDERGROUND SERVICES (SEWER, WATER, GAS)	3,500,000	3,500,000		3,500,000
	BUILDING UTILITIES (STEAM, AIR, WATER, GAS)	2,500,000	2,500,000		2,500,000
	HEATING AND VENTILATION	3,500,000	4,000,000		4,000,000
	- USEFUL LIFE-30 YRS - SUB TOTAL	\$ 18,000,000	\$ 21,000,000		\$ 21,000,000 (1980 \$)
		+6%	19,080,000		22,260,000 (1981 \$)
<u>PLANT FACILITIES</u>					
	TOOL ROOM & CUTTER GRIND	\$ 6,000,000	\$ 9,000,000		\$ 9,000,000
	AUTOMATIC STORAGE SYSTEM	6,000,000	10,000,000		10,000,000
	MATERIAL HANDLING EQUIPMENT	3,000,000	4,000,000		4,000,000
	HEAT TREATMENT EQUIPMENT	7,000,000	9,000,000		9,000,000
	WASHERS	5,000,000	7,000,000		7,000,000
	OTHER	3,000,000	4,000,000		4,000,000
	- USEFUL LIFE-12 YRS - SUB TOTAL	\$ 30,000,000	\$ 43,000,000		\$ 43,000,000 (1980 \$)
		+6%	31,800,000		45,580,000 (1981 \$)
<u>MACHINERY & EQUIPMENT</u>					
	PRODUCTION EQUIPMENT & PERMANENT TOOLING				
	TRANSMISSION	\$119,000,000	\$226,000,000		\$226,000,000
	TRANSMISSION ASSEMBLY & TEST	12,000,000	18,000,000		18,000,000
	TORQUE CONVERTER	30,000,000	45,000,000		45,000,000
	CONTAINERS & RACKS	3,000,000	4,000,000		4,000,000
	OTHER	3,000,000	4,000,000		4,000,000
	- USEFUL LIFE-12 YRS - SUB TOTAL	\$167,000,000	\$297,000,000		\$297,000,000 (1980 \$)
		+6%	177,020,000		314,820,000 (1981 \$)
<u>LEVEL I</u>	TOTAL FACILITIES, EQUIPMENT AND TOOLING	\$334,000,000	\$486,000,000		\$486,000,000 (1980 \$)
		356,950,000	515,920,000		515,920,000 (1981 \$)
<u>PRE-PRODUCTION AND LAUNCH @ APPROXIMATELY 20%</u>					
		\$ 66,800,000	\$ 97,200,000		\$ 97,200,000 (1980 \$)
		71,390,000	103,184,000		103,184,000 (1981 \$)
	TOTAL PROGRAM COST	\$400,800,000	\$583,200,000		\$583,200,000 (1980 \$)
		428,340,000	619,104,000		619,104,000 (1981 \$)

FACILITIES PLANNING

DATE: March 1982
Level III

(NOMINAL ESTIMATE)
(1 of 2)

CAPACITY LEVEL I 400,000
CAPACITY LEVEL II 800,000

FACILITY Type	FACILITY ACTIVITIES		ANNUAL PRODUCTION RATE		MAJOR CAPITAL EXPENDITURE (\$ MILLIONS)		MANPOWER REQUIREMENTS		REMARKS
	FUNCTION	MATERIAL	LEVEL I	LEVEL II	LEVEL I	LEVEL II	LEVEL I	LEVEL II	
3 SPEED AUTOMATIC TRANSMISSION	o MACHINING CASES HOUSINGS EXTENSIONS SHAFTS GEARS VALVES PUMPS	o --- ALUMINUM CAST IRON ALUMINUM STEEL CAST IRON STEEL ALUMINUM & CAST IRON			o TRANSFER LINES AUTOMATIC MACHINING HIGHLY ACCURATE GEAR SHAPERS & HOBBERS \$110/\$128 \$208/\$244 (\$119) (\$226)		1050/ 1290 (1170)		PROCESSING AND EQUIPMENT UTILIZE TODAY'S TECHNOLOGY AND THE DEGREE OF AUTOMA- TION IS CONSISTENT WITH GOOD INDUSTRY PRACTICES
	o HEAT TREAT GEARS & SHAFTS				o CARBURIZE, DRAW, HARDENING, FURNACES \$ 6/\$8 \$ 8/\$10 30/40 (\$7) (\$9) (15) 55/75 (65)				
	o TORQUE CONVERTER COMPONENTS & ASSEMBLY	o STEEL			o TRANSFER PRESS, BRAZING FURNACES & PRESSES \$ 27/\$33 \$42/\$48 (\$30) (\$45) 110/130 220/260 (120) (240)				
	o FINAL ASSY. AND TESTING OF COMPLETE TRANSMISSION				o ASSEMBLY LINE AUTOMATION & TEST EQUIPMENT \$ 10/\$14 \$ 15/\$21 (\$12) (\$18) 365/415 710/810 (390) (760)				
	o PLANT FACILITIES				o BUILDING FACILITIES & MATERIAL HANDLING \$40/\$50 \$58/\$68 (\$45) (\$63)				
	o BUILDINGS & LAND				o MANUFACTURING OFFICE & POWER HOUSE \$111/\$131 \$115/\$135 (\$121) (\$125)				
TOTALS									1,670,000 SQ.FT.OF BLDGS. FOR BOTH CAPACITY LEVEL I & II

PRODUCT RWD 3 SPEED AUTOMATIC TRANSMISSION

FACILITIES PLANNING

(2 of 2)

DATE March 1982

CAPACITY LEVEL I 400,000
CAPACITY LEVEL II 800,000

FACILITY TYPE	FACILITY ACTIVITIES		ANNUAL PRODUCTION RATE		MAJOR CAPITAL EXPENDITURE (\$ MILLIONS)		MANPOWER REQUIREMENTS		REMARKS
	FUNCTION	MATERIAL*	LEVEL I	LEVEL II	LEVEL I	LEVEL II	LEVEL I	LEVEL II	
3 SPEED AUTOMATIC TRANSMISSION (CONTINUED)									
Subtotal							1035/ 1235 (1135)	2035/ 2435 (2235)	DIRECT/LABOR
							715/ 835 (775)	1405/ 1545 (1475)	INDIRECT/LABOR
							440/ 500 (470)	600/ 700 (650)	SALARY
Totals			400,000*	800,000 *	\$304/\$364 (\$334)	\$446/\$526 (\$486)	2190/ 2570 (2380)	4040/ 4680 (4360)	

PRODUCT RWD 3 SPEED AUTOMATIC TRANSMISSION

*Major capital expenditures adjusted for 1981 economics \$356,950,000 - Level I, \$515,920,000 - Level II.

PROCESS AND COMPONENT SUMMARY

CAPACITY LEVEL I 400,000 (NOMINAL ESTIMATE) DATE March 1982
CAPACITY LEVEL II 800,000

0007,000

CAPACITY LEVEL II

Level IV

MAJOR DEPARTMENTS	DEPARTMENT FUNCTION	MAJOR CAPITAL EXPENDITURES (\$ MILLIONS)			AREA (Sq. Ft.)	MANPOWER REQUIREMENTS		REMARKS
		LEVEL I	LEVEL II	Total		LEVEL I	LEVEL II	
						D/L	D/L	
CASES	MACHINING (ALUM. DIE CASTING)	\$ 25	\$ 25	\$ 50	150,000	80	150	
HOUSINGS	MACHINING (CAST IRON)	10	10	20	85,000	45	85	
EXTENSIONS	MACHINING (ALUM. DIE CASTING)	6	6	12	50,000	40	80	
SHAFTS	MACHINING (STEEL)	14	11	25	55,000	35	75	
GEARS	MACHINING (CAST IRON-STEEL)	18	14	32	165,000	130	260	
VALVES & PUMPS	MACHINING (ALUMINUM-STEEL)	18	18	36	70,000	50	100	
MISC.	MACHINING & ASSEMBLY (ALUMINUM-STEEL-CAST IRON)	12	10	22	80,000	70	140	
HEAT TREAT	CARBURIZING, DRAW, HARDENING, CARBO-NITRIDE	7	2	9	80,000	35	65	
CLUTCHES	STAMPING & ASSEMBLY	6	5	11	80,000	50	100	
PLANETARY GEAR SETS	STAMPING, ASSEMBLY & WELDING	10	8	18	60,000	40	80	
TORQUE CONVERTER	STAMPING, MACHINING & ASSEMBLY	30	15	45	130,000	120	240	
TRANSMISSION ASSEMBLY	ASSEMBLY & TEST	12	6	18	175,000	390	760	
MATERIAL HANDLING & OTHER		12	4	16		50	100	
TOTALS		\$180	\$134	\$314	1,180,000	1135	2235	TOTAL DIRECT LABOR
						775	1475	TOTAL INDIRECT LABOR
						470	650	TOTAL SALARY LABOR
						2380	4360	TOTAL MANPOWER

RWD 3 SPEED AUTOMATIC TRANSMISSION
(SQ.FT.)

MANUFACTURING BUILDING

MACHINES & EQUIPMENT (INCL.AISLE & STORAGE ALLOWANCE)

AREA	
TRANSMISSION - MACHINING	795,000
ASSEMBLY & TEST	175,000
TORQUE CONVERTER	130,000
HEAT TREAT	80,000
SHIPPING AND RECEIVING	130,000
TOOL ROOM & CUTTER GRIND	50,000
PRODUCTION OFFICES & MAINTENANCE	105,000
LABS (QUALITY, ENGINEERING, REPAIR & ENDURANCE TESTING)	40,000
OTHER (REST ROOMS, EATING AREAS, ETC)	50,000
TOTAL	1,555,000

BUILDING SIZE 18 BAYS @ 60' = 1080' x 36 BAYS @ 40' = 1440'

OFFICE

50,000

AUXILIARY

65,000

1,670,000

GRAND TOTAL

CAPACITY LEVEL II 800,000 UNITS/YEAR
3,265 UNITS/DAY

(-TJ-QS)

SHIPPING & RECEIVING 130,000		CLUTCHES 80,000		TORQUE CONVERTER 130,000	
GEARS 165,000		MISC. MACHINING 40,000		SALES \$1,000	
		PLANETARY GEAR SETS 60,000			
PRODUCTION OFFICES & MAINTENANCE 105,000					
TOOL ROOM & CUTTER GRIND 50,000					
HOUSINGS 85,000		EXTENSIONS 50,000		TRANSMISSION CASE (2 TRANSFER LINES) 150,000	
VALVES & PUMPS 70,000		MISC. ASSEMBLY 40,000		TRANSMISSION ASSEMBLY & TEST 175,000	
LABS 40,000		OTHER 50,000		SHIPPING	

1440:

TOTAL AREA 1,555,000

RMD 3-SPEED AUTOMATIC TRANSMISSION PLANT
TOTAL MANUFACTURING COST
 (EXCLUDING MATERIAL)

PRODUCTION: 400,000 UNITS PER YEAR

<u>MANPOWER:</u>	<u>245 DAYS</u>	<u>EMPLOYEE</u>	<u>ANNUAL HOURS</u>	<u>HRS/UNIT</u>
- DIRECT LABOR	- 1960 -	1,135	2,224,600	5.56
- INDIRECT - HOURLY	- 1960 -	775	1,519,000	3.80
- INDIRECT - SALARY	- 2000 -	470	940,000	2.35
		<u>2,380</u>	<u>4,683,600</u>	<u>11.71</u>

ANNUAL HOURS ÷ 400,000 UNITS = HOURS PER UNIT = 11.71

WAGE & FRINGE COSTS:

- DIRECT LABOR	\$19.50	X	5.56	=	\$108.42
- INDIRECT - HOURLY	\$21.50	X	3.80	=	\$ 81.70
- INDIRECT - SALARY	\$23.50	X	2.35	=	\$ 55.23
	<u>TOTAL WAGES & FRINGE COSTS</u>				
					<u>\$245.35</u>

INVESTMENT: (1981\$)

- BUILDING & SUPPORT FACILITIES USEFUL LIFE - 30 YRS	<u>FACILITIES COST</u>	<u>DEPRECIATION</u>	<u>COST-PER-UNIT</u>
- BUILDING FACILITIES USEFUL LIFE - 30 YRS	\$123,050,000	4,101,666	\$10.25
- PLANT FACILITIES USEFUL LIFE - 12 YRS	\$ 19,080,000	636,000	1.95
- MACHINERY & EQUIPMENT USEFUL LIFE - 12 YRS	\$ 31,800,000	2,650,000	6.63
	<u>\$177,020,000</u>	<u>14,751,666</u>	<u>36.88</u>
			<u>\$55.71</u>

DEPRECIATION ÷ 400,000 UNITS = TOTAL DEPRECIATION PER UNIT = \$55.71

TAXES & INSURANCE AS PERCENT OF WAGE & FRINGE COST

T & I ESTIMATE OF 3.9% \$245.35 X 3.9% = \$9.57

OTHER MANUFACTURING COST AS PERCENT OF WAGE & FRINGE COST

OME ESTIMATE OF 13.2% \$245.35 X 13.2% = \$32.39

TOTAL WAGE & FRINGE COSTS	\$245.35
TOTAL DEPRECIATION COSTS	\$ 55.71
TOTAL TAXES & INSURANCE	\$ 9.57
TOTAL OME	\$ 32.39
<u>TOTAL</u>	<u>\$343.02</u>

PLANT NO. 25
AUTOMATIC TRANSAXLE PLANT

3 SPEED AUTOMATIC TRANSAXLE PLANT ASSUMPTIONS

<u>PRODUCT</u>	- THREE-SPEED AUTOMATIC TRANSAXLE WITH TWO DIFFERENTIAL GEAR RATIOS
	- TWO BACK-OF-BLOCK CONFIGURATIONS
	- LOCK-UP TORQUE CONVERTER FEATURE
	- INCLUDES PRODUCTION OF DIFFERENTIAL AND LOCK-UP TORQUE CONVERTER
<u>FACILITIES</u>	
<u>PRODUCTION RATES</u>	- PLANT SIZED FOR 1,000,000 TRANSAXLES ANNUALLY - STRAIGHT TIME BASIS
	- EACH DEPARTMENT IS ARRANGED TO PROVIDE EQUIPMENT SPACE FOR 1,000,000 TRANSAXLES ANNUALLY. LITTLE REARRANGEMENT REQUIRED TO EXPAND FROM CAPACITY LEVEL I, 500,000 TO CAPACITY LEVEL II, 1,000,000 TRANSAXLES ANNUALLY
	- 2040 TRANSAXLES PER DAY CAPACITY LEVEL I.
	- 128 TRANSAXLES ASSEMBLIES PER HOUR ON TWO SHIFTS.
	- 100 - 140 EQUIVALENT TRANSAXLE MACHINED COMPONENTS/HOUR ON THREE SHIFT BASIS.
	- AT MAXIMUM PRACTICAL OVERTIME - CAPACITY LEVEL I, 550,000/YEAR (10% OVERTIME) CAPACITY LEVEL II, 1,100,000/YEAR
<u>NUMBER OF DAYS AT STRAIGHT TIME</u>	
	- 245 DAYS/YEAR - NOTE IN THOSE YEARS WHEN THERE IS A MAJOR CHANGE TO THE TRANSAXLE, THE NUMBER OF PRODUCTION DAYS PER YEAR MAY BE REDUCED SIGNIFICANTLY.

FACILITIES PLANNING **NEW 3-SPEED AUTOMATIC TRANSAXLE PLANT** **(NOMINAL ESTIMATE)**

<u>LEVEL II</u>	<u>500,000 UNITS</u>	<u>LEVEL I</u>	<u>1,000,000 UNITS</u>
<u>LAND</u>		<u>LEVEL II</u>	
PURCHASE OF LAND (200 ACRES @ \$10,000)	\$ 2,000,000		\$ 2,000,000
SITE DEVELOPMENT	<u>4,500,000</u>		<u>5,500,000</u>
SUB TOTAL	\$ 6,500,000		\$ 7,500,000
<u>BUILDING & SUPPORT FACILITIES</u>			
ENGINEERING	\$ 4,000,000		\$ 4,000,000
MANUFACTURING BLDG. (1.8 M Sq. Ft. @ \$55/Sq. Ft.)	99,000,000		99,000,000
POWER HOUSE - BOILERS & COMPRESSORS	11,000,000		13,500,000
WASTE TREATMENT	8,000,000		8,000,000
TANK FARM	2,000,000		2,000,000
OTHER (OFFICE BUILDING)	<u>4,500,000</u>		<u>5,000,000</u>
- USEFUL LIFE-30 YRS - SUB TOTAL	\$128,500,000		\$131,500,000 (1980 \$)
+7%	137,495,000		140,705,000 (1981 \$)
<u>BUILDING FACILITIES</u>			
ELECTRICAL	\$ 6,000,000		\$ 8,000,000
CENTRAL COOLANT SYSTEM	4,000,000		5,000,000
UNDERGROUND SERVICES (SEWER, WATER, GAS)	4,000,000		4,000,000
BUILDING UTILITIES (STEAM, AIR, WATER, GAS)	3,000,000		3,000,000
HEATING AND VENTILATION	<u>4,000,000</u>		<u>5,000,000</u>
- USEFUL LIFE-30 YRS - SUB TOTAL	\$ 21,000,000		\$ 25,000,000 (1980 \$)
+6%	22,260,000		26,500,000 (1981 \$)
<u>PLANT FACILITIES</u>			
TOOL TOOM & CUTTER GRIND	\$ 7,000,000		\$ 9,000,000
AUTOMATIC STORAGE SYSTEM	7,000,000		11,000,000
MATERIAL HANDLING EQUIPMENT	3,000,000		4,000,000
HEAT TREAT EQUIPMENT	8,000,000		11,000,000
WASHERS	5,000,000		7,000,000
OTHER	<u>4,000,000</u>		<u>5,000,000</u>
- USEFUL LIFE-12 YRS - SUB TOTAL	\$ 34,000,000		\$ 47,000,000 (1980 \$)
+6%	36,040,000		49,820,000 (1981 \$)
<u>MACHINERY & EQUIPMENT</u>			
PRODUCTION EQUIPMENT & PERMANENT TOOLS	\$126,000,000		\$241,000,000
TRANSMISSION (INCLUDES AUTO HANDLING)	15,000,000		28,000,000
DIFFERENTIAL	14,000,000		22,000,000
TRANSMISSION ASSEMBLY & TEST	34,000,000		52,000,000
TORQUE CONVERTER	3,000,000		4,000,000
CONTAINERS & RACKS	3,000,000		4,000,000
OTHER	<u>3,000,000</u>		<u>4,000,000</u>
- USEFUL LIFE-12 YRS - SUB TOTAL	\$195,000,000		\$351,000,000 (1980 \$)
+6%	206,700,000		372,060,000 (1981 \$)
<u>LEVEL I</u>			
TOTAL FACILITIES, EQUIPMENT AND TOOLING	\$385,000,000		\$562,000,000 (1980 \$)
	408,995,000		596,585,000 (1981 \$)
<u>PRO-PRODUCTION AND LAUNCH @ APPROXIMATELY 20%</u>			
	\$ 77,000,000		\$112,400,000 (1980 \$)
	<u>81,799,000</u>		<u>119,317,000 (1981 \$)</u>
TOTAL PROGRAM COST	\$462,000,000		\$674,400,000 (1980 \$)
	490,794,000		715,902,000 (1981 \$)

FACILITIES PLANNING

(NOMINAL ESTIMATE)

(1 of 2)

DATE March 1982

Level III

CAPACITY LEVEL I 500,000

CAPACITY LEVEL II 1,000,000

FACILITY TYPE	FACILITY ACTIVITIES		ANNUAL PRODUCTION RATE		MAJOR CAPITAL EXPENDITURES (\$ MILLIONS)		MANPOWER REQUIREMENTS		REMARKS
	FUNCTION	MATERIAL	LEVEL I	LEVEL II	LEVEL I	LEVEL II	LEVEL I	LEVEL II	
3 SPEED AUTOMATIC TRANSAXLE	o MACHINING CASES, HOUSINGS, SHAFTS, GEARS, VALVES, PUMPS	o ALUMINUM CAST IRON STEEL CAST IRON STEEL ALUMINUM & CAST IRON	\$116/\$136 (\$126)		\$223/\$259 (\$241)		462/558 (510)	915/1105 (1010)	PROCESSING AND EQUIPMENT UTILIZE THE MOST CURRENT TECHNOLOGY INCLUDING THE DEGREE OF AUTOMATION READILY AVAILABLE FROM THE TOOL MACHINE BUILDING INDUSTRY. REQUIRED: LARGE TRANSNAT 2,000,000 SQ.FT. BLDGS. AT BOTH CAPT. LEVEL I & II
	o HEAT TREAT GEARS & SHAFTS		\$7/\$9 (\$8)		\$9/\$13 (\$11)		37/43 (40)	65/75 (70)	
	o COMPONENTS & ASSEMBLY -DIFFERENTIAL		\$14/\$16 (\$15)		\$25/\$31 (\$28)		128/152 (140)	258/302 (280)	
	-TORQUE CONVERTER		\$32/\$36 (\$34)		\$49/\$55 (\$52)		136/164 (150)	274/326 (300)	
	o FINAL ASSY. & TEST OF COMPLETE TRANSAXLES.		\$13/\$15 (\$15)		\$20/\$24 (\$22)		317/382 (350)	628/752 (690)	
	o PLANT FACILITIES		\$48/\$58 (\$53)		\$62/\$76 (\$69)		-	-	
	o BUILDINGS & LAND		\$125/\$145 (\$135)		\$129/\$149 (\$139)		-	-	
TOTALS									

PRODUCT 3 SPEED AUTOMATIC TRANSAXLE

FACILITIES PLANNING
(NOMINAL ESTIMATE)
(2 of 2)

DATE March 1982
Level III

CAPACITY LEVEL I 500,000
CAPACITY LEVEL II 1,000,000

FACILITY TYPE	FACILITY ACTIVITIES		ANNUAL PRODUCTION RATE		MAJOR CAPITAL EXPENDITURES (\$ MILLIONS)		MANPOWER REQUIREMENTS		REMARKS
	FUNCTION	MATERIAL	LEVEL I	LEVEL II	LEVEL I	LEVEL II	LEVEL I	LEVEL II	
SUBTOTAL							1080/1300 (1190) 740/860 (800) 460/540 (500)	2140/2560 (2350) 1410/1590 (1500) 650/750 (700)	D/L I/L SAL
TOTALS			500,000	1,000,000	\$355/\$415 (\$365)*	\$517/\$607 (\$562)*	2280/2700 (2490)	4200/4900 (4550)	

PRODUCT 3 SPEED AUTOMATIC TRANSAXLE

*Major capital expenditures adjusted for 1981 \$ economics \$408,995,000 - Level I, \$596,585,000 - Level II.

PROCESS AND COMPONENT SUMMARY

CAPACITY LEVEL I 500,000 DATE March 1982

CAPACITY LEVEL II 1,000,000 Level IV

(NOMINAL ESTIMATE)

MAJOR REQUIREMENTS	DEPARTMENT FUNCTION	MAJOR CAPITAL EXPENDITURES (\$ MILLIONS)			AREA (SQ. FT.)	MANPOWER REQUIREMENTS		REMARKS
		LEVEL I	LEVEL II	TOTAL		LEVEL I	LEVEL II	
						D/L	D/L	
CASES	MACHINING (ALUM. DIE CASTING)	\$25	\$25	\$50	150,000	80	150	
HOUSINGS	MACHINING (CAST IRON)	12	12	24	80,000	40	80	
SHAFTS	MACHINING (STEEL)	15	12	27	65,000	40	80	
GEARS	MACHINING (CAST IRON-STEEL)	20	16	36	200,000	130	260	
VALVES & PUMPS	MACHINING (ALUMINUM-STEEL)	20	20	40	90,000	55	110	
MISC.	MACHINING (ALUMINUM-STEEL-CAST IRON)	17	17	34	100,000	55	110	
HEAT TREAT	CARBURIZING, DRAW, HARDENING, CARBO-NITRIDE	8	3	11	100,000	40	70	
CLUTCHES	STAMPING & ASSEMBLY	7	5	12	75,000	50	100	
PLANETARY GEAR SETS	STAMPING, ASSEMBLY & WELDING	10	8	18	60,000	30	60	
DIFFERENTIAL	MACHINING, ASSEMBLY & TEST	15	13	28	100,000	140	280	
TORQUE CONVERTER	STAMPING, MACHINING & ASSEMBLY	34	18	52	160,000	150	300	
TRANSAXLE ASSEMBLY	ASSEMBLY & TEST	14	8	22	200,000	350	690	
MATERIAL HANDLING & OTHER		13	4	17	---	30	60	
TOTALS		\$210	\$161	\$371	1,380,000	1190	2350	TOTAL DIRECT LABOR
						800	1500	TOTAL INDIRECT LABOR
						500	700	TOTAL SALARY LABOR
						2490	4550	TOTAL MANPOWER

PRODUCT 3 SPEED AUTOMATIC TRANSAXLE

NEW 3 SPEED AUTOMATIC TRANSAXLE PLANT
(SQ.FT.)

MANUFACTURING BUILDING

MACHINES & EQUIPMENT (INCL. AISLE ALLOWANCE)

TRANSAXLE - MACHINING	820,000
ASSEMBLY	200,000
DIFFERENTIAL	100,000
TORQUE CONVERTER	160,000
HEAT TREAT	100,000
SHIPPING & RECEIVING	150,000
TOOL ROOM & CUTTER GRIND	60,000
PRODUCTION OFFICES AND MAINTENANCE	124,000
LABS (QUALITY, ENGINEERING, REPAIR & ENDURANCE TESTING)	50,000
OTHER (REST ROOMS, EATING AREAS, ETC.)	60,000
TOTAL	1,824,000

BUILDING SIZE 20 BAYS @ 60' = 1200' x 38 BAYS @ 40' = 1520'

OFFICE

60,000

AUXILIARY

80,000

GRAND TOTAL

1,964,000

3 SPEED AUTOMATIC TRANSAXLE

1,000,000 UNITS/YEAR
4,080 UNITS/DAY
(SQ.FT.)

1520'

<u>SHIPPING & RECEIVING</u> 150,000		<u>DIFFERENTIAL ASSY.</u> 100,000		<u>TORQUE CONVERTER</u> 160,000	
<u>GEARS</u> 200,000		<u>HEAT TREAT</u> 100,000		<u>PLANET GEAR SETS</u> 60,000	
		<u>SHAFTS</u> 65,000		<u>MISC.</u> 50,000	
<u>PRODUCTION OFFICES & MAINTENANCE</u> 124,000					
<u>TOOL ROOM & CUTTER GRIND</u> 60,000					
<u>VALVES & PUMPS</u> 90,000		<u>HOUSINGS</u> 80,000			
		<u>TRANSAXLE CASE</u> (2 TRANSFER LINES) 150,000			
<u>CLUTCHES</u> 75,000		<u>MISC.</u> 50,000		<u>TRANSAXLE ASSEMBLY & TEST</u> 200,000	
<u>LABS</u> 50,000		<u>OTHER</u> 60,000		<u>SHIPPING</u>	

1520'

TOTAL AREA 1,824,000

1200'

C-247/C-248

MANPOWER:

-	DIRECT LABOR	- 1960
-	INDIRECT - HOURLY	- 1960
-	INDIRECT SALARY	- 2000

- DIRECT LABOR

- INDIRECT - HOURLY

- INDIRECT SALARY - 2000 -

WAGE & FRINGE COSTS:

- DIRECT LABOR

- INDIRECT - HOURLY

- INDIRECT - SALARY \$23.50

TOTAL WAGES & FRINGE COSTS \$205.38

FACILITIES COST

- BUILDING & SUPPORT FACILITIES USEFUL LIFE - 30 YRS

- BUILDING FACILITIES USEFUL LIFE - 30 YRS

- PLANT FACILITIES USEFUL LIFE - 12 YRS

- MACHINERY & EQUIPMENT USEFUL LIFE - 12 YRS

DEPRECIATION

4,583,166

742,000

3,003,333

$$\begin{array}{r} 34.45 \\ \hline \$51.11 \end{array}$$
$$\text{DEPRECIATION} \div 500,000 \text{ UNITS} = \text{TOTAL DEPRECIATION PER UNIT} = \$51.11$$

TAXES & INSURANCE AS PERCENT OF WAGES & FRINGE COST

T & I ESTIMATE OF 3.9% $\$205.38 \times 3.9\% = \8.01

OTHER MANUFACTURING COST AS PERCENT OF WAGE & FRINGE COST

OME ESTIMATE OF 13.2% $\$205.38 \times 13.2\% = \27.11

TOTAL WAGE & FRINGE COSTS \$205.38

TOTAL DEPRECIATION COSTS \$ 51.11

TOTAL TAXES & INSURANCE

TOTAL OME

TOTAL \$294.61

PLANT NO. 26
AXLE PLANT

NEW REAR AXLE PLANT
ASSUMPTIONS

- PRODUCT
- o REAR AXLE AND DRUM BRAKE ASSEMBLY COMPLETE
 - o SALISBURY DESIGN
 - o TWO AXLE SIZE CAPABILITY AT LEVEL II
 - o DRUM BRAKE ASSEMBLY PURCHASED COMPLETE
(OUTSIDE SUPPLIER OR CORPORATE SOURCE)

PRODUCTION RATE

- o PLANT IS SIZED TO PRODUCE 880,000 AXLE ASSEMBLIES ANNUALLY ON A STRAIGHT TIME BASIS.
EXPANSION FROM LEVEL I (440,000 UNITS) TO LEVEL II (880,000 UNITS) ACCOMPLISHED WITH
MINIMAL REARRANGEMENT.

- o STRAIGHT TIME DAILY RATES

	<u>LEVEL I</u>	<u>LEVEL II</u>
ASSEMBLIES PER DAY	1,796	3,592
ASSEMBLIES PER HOUR	112	224

OPERATING PATTERN

- o STRAIGHT TIME

<u>ASSEMBLY</u>	<u>MACHINING</u>
TWO SHIFTS	THREE SHIFTS
16 HOURS/DAY	20 HOURS/DAY
5 DAYS/WEEK	5 DAYS/YEAR
245 DAYS/YEAR	245 DAYS/YEAR
- o OVERTIME - 10%

ALTERNATE SATURDAYS	ALTERNATE SATURDAYS
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FACILITIES PLANNING **REAR-WHEEL DRIVE AXLE PLANT** **(NOMINAL ESTIMATE)**

LEVEL I	LEVEL I		LEVEL II
	440,000 UNITS	880,000 UNITS	
<u>LAND</u>			
PURCHASE LAND (60 ACRES @ \$10,000/ACRE)	\$ 600,000	\$ 600,000	
SITE DEVELOPMENT	1,800,000	1,800,000	
SUB TOTAL	\$ 2,400,000	\$ 2,400,000	
<u>BUILDING & SUPPORT FACILITIES</u>			
ENGINEERING	\$ 2,500,000	\$ 2,500,000	
MANUFACTURING BLDG (575,000 Sq. Ft. @ \$60/Sq. Ft.)	34,500,000	34,500,000	
POWER HOUSE - BOILERS & COMPRESSORS	9,000,000	9,000,000	
WASTE TREATMENT	6,000,000	9,000,000	
TANK FARM	1,500,000	2,000,000	
MISC. OTHER	4,000,000	6,000,000	
- USEFUL LIFE-30 YRS - SUB TOTAL	\$ 54,500,000	\$ 63,000,000 (1980 \$)	
+7%	58,315,000	67,410,000 (1981 \$)	
<u>BUILDING FACILITIES</u>			
ELECTRICAL	\$ 4,000,000	\$ 6,000,000	
UTILITIES (SEWER, WATER, & GAS)	5,000,000	6,000,000	
CRANES & CONVEYORS	2,500,000	4,000,000	
HEATING & VENTILATING	3,000,000	4,000,000	
- USEFUL LIFE-30 YRS - SUB TOTAL	\$ 14,500,000	\$ 20,000,000 (1980 \$)	
+6%	15,370,000	21,200,000 (1981 \$)	
<u>PLANT FACILITIES</u>			
TOOL ROOM & CUTTER GRIND	\$ 4,000,000	\$ 6,000,000	
MATERIAL HANDLING EQUIPMENT	1,500,000	2,500,000	
MISC. OTHER	3,100,000	5,500,000	
- USEFUL LIFE-12 YRS - SUB TOTAL	\$ 8,600,000	\$ 14,000,000 (1980 \$)	
+6%	9,116,000	14,840,000 (1981 \$)	
<u>MACHINERY & EQUIPMENT</u>			
TUBE MILL	\$ 5,000,000	\$ 5,000,000	
TRANSFER LINES	21,000,000	42,000,000	
AUTOMATIC GEAR MACHINES	10,000,000	20,000,000	
HEAT TREATMENT FURNACE	5,000,000	7,500,000	
TRANSFER LINES/ASSEMBLY	14,000,000	28,000,000	
OTHER ASSEMBLY/TEST & MATL. HDLG.	13,000,000	15,000,000	
- USEFUL LIFE-12 YRS - SUB TOTAL	\$ 68,000,000	\$117,000,000 (1980 \$)	
+6%	72,080,000	124,020,000 (1981 \$)	
<u>LEVEL I</u>			
TOTAL FACILITIES, EQUIPMENT & TOOLING	\$148,000,000	\$216,900,000 (1980 \$)	
	157,281,000	229,870,000 (1981 \$)	
<u>PRE-PRODUCTION AND LAUNCH @ APPROXIMATELY 20%</u>			
	\$ 29,600,000	\$ 43,380,000 (1980 \$)	
	31,456,200	45,974,000 (1981 \$)	
TOTAL PROGRAM COST	\$177,600,000	\$260,280,000 (1980 \$)	
	188,737,000	275,844,000 (1981 \$)	

FACILITIES PLANNING
(NOMINAL ESTIMATE)
(1 of 2)

DATE March 1982

Level III

CAPACITY LEVEL I 440,000

CAPACITY LEVEL II 880,000

FACILITY TYPE	FACILITY ACTIVITIES		ANNUAL PRODUCTION RATE		MAJOR CAPITAL EXPENDITURES (\$ MILLIONS)		MANPOWER REQUIREMENTS		REMARKS
	FUNCTION	MATERIAL	LEVEL I	LEVEL II	LEVEL I	LEVEL II	LEVEL I	LEVEL II	
	TUBE MILL	STEEL	440,000	880,000	\$ 4/6 (5)	\$ 4/6 (5)	12/18 (15)	20/30 (25)	
	TRANSFER LINES o MACHINE CASE	CASTING			7/9 (8)	14/18 (16)	55/65 (60)	110/130 (120)	
	o MACHINE CARRIER	CASTING			7/9 (8)	14/18 (16)	55/65 (60)	110/130 (120)	
	o MACHINE AXLE	FORGING			4/6 (5)	8/12 (10)	25/35 (30)	50/70 (60)	
	AUTOMATIC GEAR MACHINES	FORGING			8/12 (10)	16/24 (20)	135/165 (150)	270/330 (300)	
	HEAT TREAT FURNACE				4/6 (5)	6/9 (7.5)	18/22 (20)	26/34 (30)	SIDE GEARS
	TRANSFER LINES FOR ASSY. OF CASE, CARRIER & PINION GEARS				12/16 (14)	24/32 (28)	70/80 (75)	115/135 (125)	
	AUTOMATED ASSY. LINE- WELD TUBES ON HOUSING				2.5/4.5 (3.5)	4/6 (5)	22/28 (25)	44/56 (50)	
TOTALS									

PRODUCT REAR AXLE ASSEMBLY
(SALISBURY)

CAPACITY LEVEL I 440,000
CAPACITY LEVEL II 880,000

FACILITIES PLANNING
(NOMINAL ESTIMATE)
(2 of 2)

DATE March 1982

Level III

FACILITY TYPE	FACILITY ACTIVITIES		ANNUAL PRODUCTION RATE		MAJOR CAPITAL EXPENDITURES (\$ MILLIONS)		MANPOWER REQUIREMENTS		REMARKS
	FUNCTION	MATERIAL	LEVEL I	LEVEL II	LEVEL I	LEVEL II	LEVEL I	LEVEL II	
SUBTOTAL	ASSEMBLE SHAFTS INTO TUBES				\$ 1/2 (1.5)	1.5/2.5 (2)	22/28 (25)	44/56 (50)	
	MOUNT BRAKE ASSEMBLIES				6/10 (8)	6/10 (8)	125/165 (150)	250/290 (270)	
	FINAL TEST & MATERIAL				70/90 (80)	85/115 (99.4)			
	LAND, BLDG. & EQUIPMENT						549/671 (610) 300/380 (340) 225/275 (250)	1039/1261 (1150) 400/500 (450) 360/440 (400)	DIRECT LABOR INDIRECT LABOR SALARY
TOTALS					\$125.5/* 170.5 (148)	\$182.5/* 252.5 (216.9)	1074/ 1326 (1200)	1799/ 2201 (2000)	

PRODUCT REAR AXLE ASSEMBLY
(SALISBURY)

*Major capital expenditures adjusted for 1981 economics \$157,281,000 - Level I, \$229,870,000 - Level II.

PROCESS AND COMPONENT SUMMARY
(NOMINAL ESTIMATE)

CAPACITY LEVEL I 440,000 DATE March 1982

CAPACITY LEVEL II 880,000 Level IV

MAJOR REQUIREMENTS	DEPARTMENT FUNCTION	MAJOR CAPITAL EXPENDITURES (\$ MILLIONS)			AREA (SQ. FT.)	MANPOWER REQUIREMENTS		REMARKS
		LEVEL I	LEVEL II	TOTAL		LEVEL I	LEVEL II	
TUBE MILL MACHINING	FORM & WELD AXLE TUBES	\$ 5.0	-0-	\$ 5.0	25,000	15	25	TOTAL MACHINING AREA
	MACHINE CASE	8.0	8.0	16.0		60	120	
	MACHINE CARRIER	8.0	8.0	16.0		60	120	
	MACHINE AXLE	5.0	5.0	10.0		30	60	
	MACHINE GEARS	10.0	10.0	20.0	160,000	150	300	
HEAT TREAT	HEAT TREAT GEARS & SHAFTS	5.0	2.5	7.5	27,000	20	30	TOTAL FINAL ASSEMBLY
	CASE & CARRIER	14.0	14.0	28.0		75	125	
ASSEMBLY	WELD TUBES ON HOUSING	3.5	1.5	5.0		25	50	
	SHAFTS INTO TUBES	1.5	0.5	2.0		25	50	
	BRAKES TO SHAFTS	8.0	-0-	8.0	30,000	150	270	
TOTALS		\$68.0	\$49.5	\$117.5	242,000	610	1150	TOTAL DIRECT LABOR
						340	450	TOTAL INDIRECT LABOR
						250	400	TOTAL SALARY LABOR
						1200	2000	TOTAL MANPOWER

PRODUCT REAR AXLE ASSEMBLY
(SALISBURY)

NEW REAR AXLE PLANT
(SQ. FEET)

MANUFACTURING BUILDING	AREA
RAW INVENTORY (RECEIVING & STORAGE)	50,000
FORMING & WELDING	25,000
MACHINING	160,000
HEAT TREAT	27,000
ASSEMBLY - FINAL	30,000
FINISHED & IN PROCESS INVENTORY BANKS	90,000
SHIPPING - RAIL & TRUCK	45,000
TOOL ROOM & CUTTER GRIND	20,000
MAINTENANCE & REPAIR	45,000
LABORATORY (TEST & DEVELOPMENT) & QUALITY CONTROL	15,000
ADMINISTRATIVE OFFICES	25,000
REPAIR (PRODUCT)	15,000
MISC. OTHER	23,000
TOTAL MANUFACTURING BUILDING	570,000
SUPPORT BUILDINGS	30,000
TOTAL PLANT	600,000

REAR AXLE ASSEMBLY PLANT - BUILDING LAYOUT

(SQ. FEET)

FORMING & WELDING 25,000	ADMINISTRATIVE OFFICES 25,000	MAINTENANCE & REPAIR 25,000	TOOL ROOM/ CUTTER GRIND 20,000		RAW INVENTORY (RECEIVING & STORAGE) 50,000
			160,000 GEAR MACHINING SHAFT MACHINING CARRIER MACHINING CASH MACHINING		
IN-PROCESS INVENTORY BANK 45,000			HEAT TREAT 27,000		FINISHED INVENTORY BANK 45,000
			LABORATORY 15,000		
			VENDING, LOCKERS RESTROOMS & MISC. 23,000		PRODUCT REPAIR 15,000
			MAINTENANCE & REPAIR 20,000		
			FINAL ASSEMBLY 30,000		SHIPPING - RAIL & TRUCK 45,000
			TOOL ROOM MISC. OTHER		

MANUFACTURING BUILDING 570,000 SQ. FT.

REAR-WHEEL DRIVE AXLE PLANT
TOTAL MANUFACTURING COST
(EXCLUDING MATERIAL)

PRODUCTION: 440,000 UNITS PER YEAR

MANPOWER:	245 DAYS	EMPLOYEES	ANNUAL HOURS	HRS/UNIT
- DIRECT LABOR	- 1960 -	610	1,195,600	2.72
- INDIRECT - HOURLY	- 1960 -	340	666,400	1.51
- INDIRECT - SALARY	- 2000 -	250	500,000	1.14
		1200	2,362,000	5.37

ANNUAL HOURS ÷ 440,000 UNITS = HOURS PER UNIT = 5.37

WAGE & FRINGE COSTS:

- DIRECT LABOR	\$19.50	X	2.72	=	\$53.04
- INDIRECT - HOURLY	\$21.50	X	1.51	=	\$32.47
- INDIRECT - SALARY	\$23.50	X	1.14	=	\$26.79
	TOTAL WAGES & FRINGE COSTS				
					\$112.30

INVESTMENT: (1981\$)

	FACILITIES COST	DEPRECIATION	COST-PER-UNIT
- BUILDING & SUPPORT FACILITIES USEFUL LIFE - 30 YRS	\$58,315,000	1,943,833	\$4.42
- BUILDING FACILITIES USEFUL LIFE - 30 YRS	\$15,370,000	512,333	1.16
- PLANT FACILITIES USEFUL LIFE - 12 YRS	\$ 9,116,000	759,666	1.73
- MACHINERY & EQUIPMENT USEFUL LIFE - 12 YRS	\$72,080,000	6,006,666	13.65
			\$20.96

DEPRECIATION ÷ 440,000 UNITS = TOTAL DEPRECIATION PER UNIT = \$20.96

TAXES & INSURANCE AS PERCENT OF WAGE & FRINGE COST

T & I ESTIMATE OF 3.9% \$112.30 X 3.9% = \$4.38

OTHER MANUFACTURING COST AS PERCENT OF WAGE & FRINGE COST

OME ESTIMATE OF 13.2% \$112.30 X 13.2% = \$14.82

TOTAL WAGE & FRINGE COST	\$112.30
TOTAL DEPRECIATION COST	\$ 20.96
TOTAL TAXES & INSURANCE	\$ 4.38
TOTAL OME	\$ 14.82
	\$152.46

PLANT NO. 27
C.V. JOINTS AND HALF SHAFTS

HALF SHAFTS (C.V. JOINTS) PLANT ASSUMPTIONS

- PRODUCT
- DRIVE SHAFTS AND CONSTANT VELOCITY JOINTS FOR A FRONT WHEEL DRIVE VEHICLE.
- OPERATING PATTERN
- TWO 8 HOUR SHIFTS FOR COMPONENT MACHINING AND ASSEMBLY.
 - THIRD SHIFT STRICTLY FOR MAINTENANCE, EQUIPMENT AND TOOL SET-UP.
- PRODUCTION LEVEL
- PLANT SIZED FOR 1,000,000 CAR SETS/YEAR. STRAIGHT TIME BASIS OF 245 DAYS
 - EACH DEPARTMENT IS ARRANGED TO PROVIDE EQUIPMENT SPACE FOR 1,000,000 CAR SETS ANNUALLY. LITTLE REARRANGEMENT REQUIRED TO EXPAND FROM CAPACITY LEVEL I 500,000 TO CAPACITY LEVEL II 1,000,000 CAR SETS ANNUALLY. 2040 CAR SETS PER DAY - 128 PER HOUR AT CAPACITY LEVEL I.
 - AT MAXIMUM PRACTICAL OVERTIME - CAPACITY LEVEL I OF 550,000/YEAR
 - CAPACITY LEVEL II OF 1,100,000/YEAR

- TECHNOLOGY LEVEL
- C.V. JOINTS ARE HIGH PRECISION ASSEMBLIES REQUIRING A GREAT DEAL OF CARE AND TECHNOLOGY TO PRODUCE A TROUBLE-FREE PRODUCT THAT WILL HAVE A SATISFACTORY LIFE CYCLE. WITH A HIGHLY SKILLED WORK FORCE IT IS POSSIBLE TO MINIMIZE INVESTMENT. HOWEVER, THIS STUDY IS PREDICATED ON THE BASIS OF A WORK FORCE CONSISTING OF A LIMITED NUMBER OF HIGHLY SKILLED PEOPLE WITH THE BALANCE OF "AVERAGE" SKILLS. AS A RESULT, A HIGH LEVEL OF TOOLING AND EQUIPMENT HAS BEEN UTILIZED. THIS IS PARTICULARLY TRUE IN THE AREA OF CHECKING, GAGING AND TESTING THE PRODUCT AS IT PROGRESSES THROUGH THE MANUFACTURING PROCESS.

FACILITIES PLANNING FRONT-WHEEL DRIVE AXLE PLANT

		50,000 CAR SETS	LEVEL I LEVEL II 1,000,000 CAR SETS
<u>LEVEL II</u>			
<u>LAND</u>			
	PURCHASE LAND (75 ACRES @ \$10,000/ACRE)	\$ 750,000	\$ 750,000
	SITE DEVELOPMENT	1,250,000	1,250,000
	SUB TOTAL	\$ 2,000,000	\$ 2,000,000
<u>BUILDING & SUPPORT FACILITIES</u>			
	ENGINEERING	\$ 1,100,000	\$ 1,100,000
	MANUFACTURING BLDG. (389,000 Sq. Ft. @ \$55/Sq. Ft.)	21,400,000	21,400,000
	POWER HOUSE - AIR COMPRESSORS & FIRE PROTECTION	1,500,000	1,500,000
	WASTE TREATMENT	1,500,000	1,900,000
	TANK FARM	300,000	400,000
	OFFICE BUILDING	1,200,000	1,200,000
	OTHER	1,000,000	1,500,000
	- USEFUL LIFE-30 YRS - SUB TOTAL	\$ 28,000,000	\$ 29,000,000 (1980 \$)
	+7%	29,960,000	31,030,000 (1981 \$)
<u>BUILDING FACILITIES</u>			
	ELECTRICAL	\$ 2,500,000	\$ 2,500,000
	CENTRAL COOLANT SYSTEM	1,500,000	1,500,000
	UNDERGROUND SERVICES (SEWER, WATER, GAS)	1,000,000	1,000,000
	BUILDING UTILITIES (AIR, WATER, GAS)	800,000	800,000
	HEATING AND VENTILATION (PENT HOUSE HEATERS)	1,500,000	1,500,000
	- USEFUL LIFE-30 YRS - SUB TOTAL	\$ 7,300,000	\$ 7,300,000 (1980 \$)
	+6%	7,738,000	7,738,000 (1981 \$)
<u>PLANT FACILITIES</u>			
	TOOL ROOM & CUTTER GRIND	\$ 3,000,000	\$ 3,000,000
	MATERIAL HANDLING EQUIPMENT	700,000	1,200,000
	HEAT TREAT EQUIPMENT (INDUCTION HARDENING EQUIPMENT INCLUDED IN MACHINERY & EQUIPMENT)	4,000,000	4,000,000
	OTHER	2,000,000	3,000,000
	- USEFUL LIFE-12 YRS - SUB TOTAL	\$ 9,700,000	\$ 11,200,000 (1980 \$)
	+6%	10,282,000	11,872,000 (1981 \$)
<u>MACHINERY & EQUIPMENT</u>			
	C-V JOINTS	\$ 44,400,000	\$ 81,200,000
	SHAFTS	10,700,000	15,400,000
	ASSEMBLY & TESTING	1,000,000	2,000,000
	CONTAINERS & RACKS	600,000	1,000,000
	OTHER (INCLUDING PERMANENT TOOLS & GAGES)	1,300,000	1,900,000
	- USEFUL LIFE-12 YRS - SUB TOTAL	\$ 58,000,000	\$101,500,000 (1980 \$)
	+6%	61,480,000	107,590,000 (1981 \$)
<u>LEVEL I</u>			
	TOTAL FACILITIES, EQUIPMENT AND TOOLING	\$105,000,000	\$151,000,000 (1980 \$)
		111,460,000	160,230,000 (1981 \$)
	PRE-PRODUCTION AND LAUNCH @ APPROXIMATELY 20%	\$ 21,000,000	\$ 30,200,000 (1980 \$)
		22,292,000	32,046,000 (1981 \$)
	TOTAL PROGRAM COST	\$126,000,000	\$181,200,000 (1980 \$)
		133,752,000	192,276,000 (1981 \$)

FACILITIES PLANNING

(NOMINAL ESTIMATE)

(1 of 2)

CAPACITY LEVEL I 500,000 CAR SETS

CAPACITY LEVEL II 1,000,000 CAR SETS

DATE March 1982

Level III

FACILITY TYPE	FACILITY ACTIVITIES		ANNUAL PRODUCTION RATE		MAJOR CAPITAL EXPENDITURES (\$ MILLIONS)		MANPOWER REQUIREMENTS		REMARKS
	FUNCTION	MATERIAL	LEVEL I	LEVEL II	LEVEL I	LEVEL II	LEVEL I	LEVEL II	
HALF SHAFTS (C-V JOINTS)	o MACHINING				\$50.1/\$60.1 (\$55.1)	\$87.2/\$106.0 (\$96.6)	178/206 (192)	340/404 (372)	PROCESSING AND EQUIPMENT UTILIZE THE MOST CURRENT TECHNOLOGY FOR MACHINING, GAGING AND TESTING.
	-BELL HOUSING	STEEL FORGING							o TRANSFER MACHINE (HOUSINGS)
	-CAGE DRIVER	STEEL FORGING							o SINGLE PURPOSE EQUIPMENT.
	-TRIPOID HOUSING	STEEL FORGING							HIGHLY SOPHISTICATED CHECKING FIXTURES & GAGES
	o HEAT TREAT -SHAFTS	STEEL BAR							o INDUCTION HARDENING PROCESS INTEGRAL WITH MACHINING LINE.
	o ASSEMBLY & TEST OF COMPLETE UNITS	CARBURIZING & ANNEALING			\$ 3.5/\$4.5 (\$4.0)	\$ 3.5/\$4.5 (\$4.0)	14/18 (16)	20/24 (22)	
	o PLANT FACILITIES				\$ 0.9/\$1.1 (\$1.0)	\$ 1.8/\$2.2 (\$2.0)	32/40 (36)	60/72 (66)	o DYNAMOMETER (TEST STANDS)
	o BUILDING & LAND				\$13.5/\$16.3 (\$14.9)	\$15.5/\$19.3 (\$17.4)			
TOTALS					\$27.0/\$33.0 (\$30.0)	\$28.0/\$34.0 (\$31.0)			430,000 SQ. FT. BUILDINGS AT BOTH CAPACITY LEVEL I & II

PRODUCT HALF SHAFTS (C-V JOINTS)

FACILITIES PLANNING
(NOMINAL ESTIMATE)
(2 of 2)

DATE March 1982
Level III

CAPACITY LEVEL I 500,000 CAR SETS (CONT.)
CAPACITY LEVEL II 1,000,000 CAR SETS

FACILITY TYPE	FACILITY ACTIVITIES		ANNUAL PRODUCTION RATE		MAJOR CAPITAL EXPENDITURES (\$ MILLIONS)		MANPOWER REQUIREMENTS		REMARKS
	FUNCTION	MATERIAL	LEVEL I	LEVEL II	LEVEL I	LEVEL II	LEVEL I	LEVEL II	
SUBTOTAL							224/264 (244)	420/500 (460)	DIRECT LABOR
							190/230 (210)	360/440 (400)	INDIRECT LABOR
							95/105 (100)	150/170 (160)	SALARY
TOTALS			500,000	1,000,000	\$95/\$115 * (\$105)	\$136/\$166 (\$151)	509/599 (554)	930/1110 (1020)	

PRODUCT HALF SHAFTS (C-V JOINTS)

*Major capital expenditures adjusted for 1981 economics \$111,460,000 - Level I, \$160,230,000 - Level II.

PROCESS AND COMPONENT SUMMARY
(PRODUCTION FACILITIES, TOOLS & EQUIPMENT ONLY)
(NOMINAL ESTIMATE)

CAPACITY LEVEL I 500,000 CAR SETS

CAPACITY LEVEL II 1,000,000 CAR SETS

DATE March 1982

Level IV

Level IV

MAJOR REQUIREMENTS	DEPARTMENT FUNCTION	MAJOR CAPITAL EXPENDITURES (\$ MILLIONS)			AREA (SQ. FT.)	MANPOWER REQUIREMENTS		REMARKS
		LEVEL I	LEVEL II	TOTAL		LEVEL I	LEVEL II	
D/L	D/L							
OUTER JOINT		\$ 14.5	\$ 13.5	\$ 28.0	50,000	40	78	
BELL HOUSING	MACHINING (STEEL FORGING)							
CAGE	MACHINING (STEEL FORGING)	6.2	4.2	10.4	12,000	17	32	
DRIVER	MACHINING (STEEL FORGING)	7.0	6.5	13.5	20,000	23	44	
INNER JOINT								
TRIPOID	MACHINING (STEEL FORGING)	3.7	3.0	6.7	14,000	18	35	
TRIPOID	MACHINING (STEEL FORGING)	4.0	3.5	7.5	22,000	30	57	
TRIPOID	ASSEMBLY & TEST	9.0	6.1	15.1	20,000	24	46	
HOUSING ASSY.								
SHAFTS								
TUBING	CUTOFF (STEEL TUBING)	0.5	0.1	0.6		5	10	
SOLID	MACHINING (STEEL BAR)	4.0	1.6	5.6		10	17	
STUB	MACHINING (STEEL BAR OR FORGING)	0.5	0.2	0.7		10	17	
ASSEMBLY	FRICITION WELDING	5.7	2.8	8.5	32,000	15	30	
HEAT TREAT	CARBURIZING & ANNEALING	4.0		4.0	14,000	16	22	
ASSEMBLY	SHAFTS, C-V JOINTS & BOOTS + DYNAMOMETER TEST	1.0	1.0	2.0	30,000	36	72	
PURCHASED PARTS & STORAGE					35,000			
FINISHED ASSY. STORAGE					20,000			
TOTALS		\$ 60.1	\$ 42.5	\$102.6	269,000	244	460	TOTAL DIRECT LABOR
						210	400	TOTAL INDIRECT LABOR
						100	160	TOTAL SALARY LABOR

HALF SHAFTS (C-V JOINTS) PLANT AREA BREAKDOWN

(SQ. FT.)

	AREA
OFFICE BUILDING	<u>30,000</u>
MANUFACTURING BUILDING	
MACHINES & EQUIPMENT (INCLUDING AISLE ALLOWANCE)	269,000
SHIPPING & RECEIVING	25,000
TOOL ROOM & CUTTER GRIND	20,000
PRODUCTION OFFICES & MAINTENANCE	35,000
LABS (QUALITY & ENGINEERING)	10,000
UTILITIZE ROOM (AIR COMPRESSOR, GAS & ELECTRICAL)	10,000
OTHER (REST ROOMS, EATING AREAS, ETC.)	20,000
9 BAYS @ 60 = 540' x 18 BAYS @ 40 = 720'	<u>389,000</u>
AUXILIARY	<u>11,000</u>
GRAND TOTAL	<u>430,000</u>

HALF SHAFTS (C-V JOINTS) PLANT

1,000,000 CAR SETS/YEAR

4080 CAR SET/DAY

(SQUARE FEET)

15,000 RECEIVING										
32,000 SHAFT MACHINING & ASSEMBLY			20,000 DRIVER	12,000 CAGE	50,000 BELL HOUSING					
20,000 OTHER			14,000 HEAT TREAT							
			20,000 TOOL ROOM & CUTTER GRIND		10,000 UTILITIZED			35,000 PURCHASED PARTS STORAGE		
			35,000 PRODUCTION OFFICE & MAINTENANCE		10,000 LABS			20,000 FINISHED ASSY. STORAGE		
14,000 TRIPOID	22,000 TRIPOID HOUSING	20,000 TRIPOID ASSEMBLY	30,000 C-V JOINT & HALF SHAFT ASSEMBLY					10,000 SHIPPING		

540'

720'

TOTAL AREA 389,000 SQ. FT.

FRONT-WHEEL DRIVE AXLE PLANT
TOTAL MANUFACTURING COST
 (EXCLUDING MATERIAL)

PRODUCTION: 500,000 UNITS PER YEAR

<u>MANPOWER:</u>	<u>245 DAYS</u>	<u>EMPLOYEES</u>	<u>ANNUAL HOURS</u>	<u>HRS/UNIT</u>
- DIRECT LABOR	- 1960 -	244	478,240	.96
- INDIRECT - LABOR	- 1960 -	210	411,600	.82
- INDIRECT - SALARY	- 2000 -	100	200,000	.40
		<u>554</u>	<u>1,089,840</u>	<u>2.18</u>

ANNUAL HOURS ÷ 500,000 UNITS = HOURS PER UNIT = 2.18

WAGE & FRINGE COSTS:

- DIRECT LABOR	\$19.50	X	.96	=	\$18.72
- INDIRECT - LABOR	\$21.50	X	.82	=	\$17.63
- INDIRECT - SALARY	\$23.50	X	.40	=	\$ 9.40
	TOTAL WAGE & FRINGE COSTS				
					<u>\$45.75</u>

INVESTMENT: (1981\$)

- BUILDING & SUPPORT FACILITIES USEFUL LIFE - 30 YRS					
- BUILDING FACILITIES USEFUL LIFE - 30 YRS					
- PLANT FACILITIES USEFUL LIFE - 12 YRS					
- MACHINERY & EQUIPMENT USEFUL LIFE - 12 YRS					
			<u>FACILITIES COST</u>	<u>DEPRECIATION</u>	<u>COST-PER-UNIT</u>
			\$29,960,000	998,666	\$ 2.00
			\$ 7,738,000	257,933	.52
			\$10,282,000	856,833	1.71
			\$61,480,000	5,123,333	<u>10.25</u>
					<u>\$14.48</u>

DEPRECIATION ÷ 500,000 UNITS = TOTAL DEPRECIATION PER UNIT = \$14.48

TAXES & INSURANCE AS PERCENT OF WAGE & FRINGE COST

T & I ESTIMATE OF 3.9% \$45.75 X 3.9% = \$1.78

OTHER MANUFACTURING COST AS PERCENT OF WAGE & FRINGE COST

OME ESTIMATE OF 13.2% \$45.75 X 13.2% = \$6.04

TOTAL WAGE & FRINGE COST	\$45.75
TOTAL DEPRECIATION COST	\$14.48
TOTAL TAXES & INSURANCE	\$ 1.78
TOTAL OME	\$ 6.04
TOTAL	<u>\$68.05</u>

PLANT NO. 28
SUSPENSION PLANT

SUSPENSION COMPONENTS PLANT

PRODUCT

The following component assemblies and their details, would be produced in this plant at the daily rates shown. Capacity Level I has been set at 500,000 Car Sets per year and Capacity Level II 1,000,000 Car Sets per year.

	DAILY RATE	
	Level I	Level II
o Ball Joints	4,080	8,160
o Bearing Support & Knuckle	4,080	8,160
o Front Wheel Hub	4,080	8,160
o Rear Wheel Spindle	4,080	8,160
o Front Control Arms	4,080	8,160
o Rear Control Arms	4,080	8,160
o McPherson Strut	4,080	8,160
- Spring Support		
- Spring Seat		
- Spring Insulator		
- Shock Absorber and Insulator Assy.		
o Shock Absorber Assembly	8,160	16,320
- Body		
- Strut		
o Bumper Energy Absorber Unit	8,160	16,320
- Body		
- Strut		
Purchase Parts		
Rubber Bumpers		
Rubber Bushings		
Coil Springs		

FACILITIES

- Are provided to produce the products listed and their details. Purchase parts are from another corporate plant or purchased from an outside supplier. Two Capacity Levels are shown for Facility Planning purposes. Capacity Level I 500,000 Car Sets Per Year, Capacity Level II 1,000,000 Car Sets Per Year.

PRODUCTION
RATES

- Are Shown for the Daily Rates of individual products at Capacity Level I & II, considering the usage per car on a straight time basis. Two shift operation for assembly and three shifts for detail operations is assumed.
- At maximum practical overtime - Capacity Level I 550,000 Car Sets
(10% Overtime) Per Year
Capacity Level II 1,100,000 Car Sets
Per Year

NUMBER OF STRAIGHT TIME DAYS

- 245 Days per year - Note: In those years when there is a major change to the product, the number of production days per year may be reduced depending on the extent of the change.

FACILITIES PLANNING SUSPENSION COMPONENT'S PLANT (NOMINAL ESTIMATE)

LEVEL II	LEVEL I	LEVEL II	500,000 UNITS		1,000,000 UNITS	
			500,000 UNITS	1,000,000 UNITS	500,000 UNITS	1,000,000 UNITS
<u>LAND</u>	PURCHASE LAND (75 ACRES @ \$10,000/ACRE)		\$ 750,000	\$ 750,000	\$ 750,000	\$ 750,000
			1,250,000	1,250,000	1,250,000	1,250,000
	SUB TOTAL		\$ 2,000,000	\$ 2,000,000	\$ 2,000,000	\$ 2,000,000
<u>BUILDING & SUPPORT FACILITIES</u>	ENGINEERING		\$ 1,300,000	\$ 1,300,000	\$ 1,300,000	\$ 1,300,000
	MANUFACTURING BLDG. (0.480M Sq. Ft. @ \$55/Sq. Ft.)		26,400,000	26,400,000	26,400,000	26,400,000
	POWER HOUSE - AIR COMPRESSORS & FIRE-PROTECTION		1,500,000	1,500,000	1,500,000	1,500,000
	WASTE TREATMENT		1,500,000	1,500,000	1,500,000	1,500,000
	TANK FARM		300,000	300,000	300,000	300,000
	OFFICE - BUILDING		1,200,000	1,200,000	1,200,000	1,200,000
	OTHER		1,200,000	1,200,000	1,200,000	1,200,000
	- USEFUL LIFE-30 YRS - SUB TOTAL	+7%	\$33,400,000	\$33,400,000 (1980 \$)	\$34,000,000 (1980 \$)	\$34,000,000 (1980 \$)
			35,738,000	36,380,000 (1981 \$)	36,380,000 (1981 \$)	36,380,000 (1981 \$)
<u>BUILDING FACILITIES</u>	ELECTRICAL		\$ 2,200,000	\$ 2,200,000	\$ 2,200,000	\$ 2,200,000
	CRANES, CONVEYORS & SCRAP HANDLING		1,300,000	1,300,000	1,800,000	1,800,000
	BUILDING UTILITIES (SEWER, WATER & GAS)		800,000	800,000	800,000	800,000
	HEATING AND VENTILATION (PENTHOUSE HEATERS)		1,500,000	1,500,000	1,500,000	1,500,000
	- USEFUL LIFE-30 YRS - SUB TOTAL	+6%	\$ 5,800,000	\$ 5,800,000 (1980 \$)	\$ 6,300,000 (1980 \$)	\$ 6,300,000 (1980 \$)
			6,148,000	6,678,000 (1981 \$)	6,678,000 (1981 \$)	6,678,000 (1981 \$)
<u>PLANT FACILITIES</u>	TOOL ROOM & CUTTER GRIND		\$ 3,000,000	\$ 3,000,000	\$ 3,000,000	\$ 3,000,000
	MATERIAL HANDLING EQUIPMENT		700,000	700,000	1,200,000	1,200,000
	WASHERS		600,000	600,000	1,000,000	1,000,000
	OTHER		1,900,000	1,900,000	2,500,000	2,500,000
	- USEFUL LIFE-12 YRS - SUB TOTAL	+6%	\$ 6,200,000	\$ 6,200,000 (1980 \$)	\$ 7,700,000 (1980 \$)	\$ 7,700,000 (1980 \$)
			6,572,000	8,162,000 (1981 \$)	8,162,000 (1981 \$)	8,162,000 (1981 \$)
<u>MACHINERY & EQUIPMENT</u>	BALL JOINTS		\$ 1,600,000	\$ 1,600,000	\$ 2,000,000	\$ 2,000,000
	BEARING SUPPORT & KNUCKLES		14,000,000	15,700,000	15,700,000	15,700,000
	FRONT WHEEL HUB		1,600,000	2,100,000	2,100,000	2,100,000
	REAR WHEEL SPINDLE		3,500,000	4,500,000	4,500,000	4,500,000
	CONTROL ARMS		4,000,000	4,400,000	4,400,000	4,400,000
	McPHERSON STRUT		5,100,000	7,300,000	7,300,000	7,300,000
	SHOCK ABSORBER		2,000,000	3,100,000	3,100,000	3,100,000
	BUMPER ENERGY ABSORBERS		1,900,000	2,700,000	2,700,000	2,700,000
	CONTAINERS & TRACKS		600,000	1,000,000	1,000,000	1,000,000
	OTHER		1,700,000	2,200,000	2,200,000	2,200,000
	- USEFUL LIFE-12 YRS - SUB TOTAL	+6%	\$36,000,000	\$45,000,000 (1980 \$)	\$45,000,000 (1980 \$)	\$45,000,000 (1980 \$)
			38,160,000	47,700,000 (1981 \$)	47,700,000 (1981 \$)	47,700,000 (1981 \$)
<u>LEVEL I</u>	TOTAL FACILITIES, EQUIPMENT AND TOOLING		\$83,400,000	\$95,000,000 (1980 \$)	\$95,000,000 (1980 \$)	\$95,000,000 (1980 \$)
			88,618,000	100,920,000 (1981 \$)	100,920,000 (1981 \$)	100,920,000 (1981 \$)
PRE-PRODUCTION AND LAUNCH @ APPROXIMATELY 20%			16,680,000	\$19,000,000 (1980 \$)	\$19,000,000 (1980 \$)	\$19,000,000 (1980 \$)
			17,723,600	20,184,000 (1981 \$)	20,184,000 (1981 \$)	20,184,000 (1981 \$)
TOTAL PROGRAM COST			\$100,000,000	\$115,000,000 (1980 \$)	\$115,000,000 (1980 \$)	\$115,000,000 (1980 \$)

FACILITY TYPE	FACILITY ACTIVITIES		ANNUAL PRODUCTION RATE		MAJOR CAPITAL EXPENDITURE (\$ MILLIONS)		MANPOWER REQUIREMENTS		REMARKS
	FUNCTION	MATERIAL	LEVEL I	LEVEL II	LEVEL I	LEVEL II	LEVEL I	LEVEL II	
BALL JOINTS	o Machining -Ball Ends -Cups	Steel - Bar Steel - Bar	1,000,000	2,000,000	\$1.5/\$1.7 (\$1.6)	\$1.8/2.2 (\$2.0)	18/22 (20)	36/44 (40)	
BEARING SUPPORT & KNUCKLE	o Machining -Support	Nodular Iron Casting	1,000,000	2,000,000	12.6/15.4 (14.0)	14.0/17.4 (15.7)	67/83 (75)	126/154 (140)	Transfer Line
FRONT WHEEL HUB	o Machining - Hub	Forging-Steel	1,000,000	2,000,000	1.4/1.8 (1.6)	1.9/2.3 (2.1)	40/50 (45)	72/88 (80)	
REAR WHEEL SPINDLE	o Machining -Spindle	Forging-Steel	1,000,000	2,000,000	3.1/3.9 (3.5)	4.1/4.9 (4.5)	50/60 (55)	90/110 (100)	
CONTROL ARMS	o Stamping -Control Arms o Assembly	Steel-Sheet	2,000,000	4,000,000	3.6/4.4 (4.0)	4.0/4.8 (4.4)	32/38 (35)	54/66 (60)	Transmat Press
MCPHERSON STRUT	o Stamping -Insulator -Seat -Support o Assembly	Steel - Sheet " "	1,000,000	2,000,000	4.6/5.6 (5.1)	6.6/8.0 (7.3)	85/105 (95)	162/198 (180)	
TOTALS									

PRODUCT Suspension Components

CAPACITY LEVEL I 500,000 Car Sets/Year

CAPACITY LEVEL II 1,000,000 Car Sets/Year

FACILITIES PLANNING
(NOMINAL ESTIMATE)DATE March 1982
Level III

FACILITY TYPE	FACILITY ACTIVITIES		ANNUAL PRODUCTION RATE		MAJOR EXPENDITURE (\$ MILLIONS)		MANPOWER REQUIREMENTS		REMARKS
	FUNCTION	MATERIAL	LEVEL I	LEVEL II	LEVEL I	LEVEL II	LEVEL I	LEVEL II	
SHOCK ABSORBER	o Stamping -Body	Steel-Tubing	2,000,000	4,000,000	\$1.8/2.2 (\$2.0)	\$2.8/3.4 (\$3.1)	59/71 (65)	108/132 (120)	
	o Machining -Strut	Steel-Tubing							
	o Bar Assembly	Misc.							
	o Assembly		2,000,000	4,000,000	1.7/2.1 (1.9)	2.4/3.0 (2.7)	49/61 (55)	90/110 (100)	
BUMPER ENERGY ABSORBERS	o Stamping -Body	Steel-Tubing			2.1/2.5 (2.3)	2.9/3.5 (3.2)			
	o Machining -Strut	Steel-Rod			10.8/13.2 (12.0)	12.6/15.4 (14.0)			
	o Assembly				31.8/39.0 (35.4)	32.4/39.6 (36.0)			
	o Other								
	o Plant Facilities								
	o Building & Land								
							400/490 (445)	738/902 (820)	Direct Labor
							245/295 (270)	450/550 (500)	Indirect Labor
TOTALS					\$75.0/\$91.8 (\$83.4)±	\$85.5/104.5 (\$95.0)±	755/925 (840)	1395/1705 (1550)	Salary

CAPACITY LEVEL I 500,000 Car Sets/Year

PROCESS AND COMPONENT SUMMARY
(PRODUCTION FACILITIES, TOOLS & EQUIPMENT ONLY)DATE March 1982
Level III

CAPACITY LEVEL II 1,000,000 Car Sets/Year

(NOMINAL ESTIMATE)

MAJOR DEPARTMENTS	DEPARTMENT FUNCTION	MAJOR CAPITAL EXPENDITURES (\$ MILLIONS)			AREA (SQ. FT.)	MANPOWER REQUIS			REMARKS	
		LEVEL I	LEVEL II	TOTAL		LEVEL I	LEVEL II	D/L		
										D/L
BALL JOINTS oBall Ends oCups	Machining (Steel Bar) Machining (Steel Bar)	\$ 1.6	\$ 0.4	\$ 2.0	40,000	20		40		
BEARING SUPPORT & KNUCKLE	Machining (Nodular Iron Casting)	14.0	1.7	15.7	60,000	75		140		
FRONT WHEEL HUB	Machining (Steel Forging)	1.6	0.5	2.1		45		80		
REAR WHEEL SPINDLE	Machining (Steel Forging)	3.5	1.0	4.5	30,000	55		100		
CONTROL ARMS	Stamping (Steel Sheet)	4.0	0.4	4.4	20,000	35		60		
MC PHERSON STRUT oInsulator oSeat oSupport	Stamping (Steel-Sheet) (Steel-Sheet) (Steel-Tube)	5.1	2.2	7.3	60,000	95		180		
SHOCK ABSORBERS oBody oStrut oBar Assy..	Stamping (Steel Tube) Machining(Steel Rod) Misc.	2.0	1.1	3.1	100,000	65		120		
BUMPER ENERGY ABSORBER oBody oStrut	Stamping (Steel-Tube) Machining (Steel-Rod)	1.9	0.8	2.7		55		100		
	o Purchased Parts Storage o Finished Assy. Storage				23,000 25,000					
TOTALS						\$33.7	\$8.1	\$41.8		TOTAL DIRECT LABOR
								820		TOTAL INDIRECT LABOR
								500		TOTAL SALARY LABOR
								230		TOTAL MANPOWER
								840	1550	

PRODUCT SUSPENSION COMPONENTS

SUSPENSION COMPONENTS PLANT
(SQUARE FEET)

		AREA
MANUFACTURING BUILDING		
Machinery & Equipment (Including Aisle Allowance)		358,000
Shipping & Receiving		45,000
Tool Room & Cutter Grind		20,000
Production Offices & Maintenance		35,000
Labs (Quality & Engineering)		10,000
Utilitize Room (Air Compressor, Gas & Electrical)		15,000
Other (Rest Rooms, Eating Areas, Etc.)		20,000
Operations Offices		25,000
11 Bays @ 60' = 660' x 20 Bays @ 40' = 800'		Total
		528,000
AUXILIARY		
		12,000
Grand Total		540,000

SUSPENSION COMPONENTS PLANT

1,000,000 Car Sets/Year

4,000 Car Sets/Day

(Square Feet)

<u>Operations Office</u> 25,000		<u>Ball Joints</u> 40,000		<u>Front Wheel Hub & Rear Wheel Spindle</u> 30,000		<u>Control Arms</u> 20,000		<u>Purchased Parts Storage</u> 23,000	<u>Shipping</u> 25,000	<u>Receiving</u> 20,000
<u>Bearing Support & Knuckle</u> 60,000		<u>Production Office & Maintenance</u> 35,000		<u>Utilititze Room</u> 15,000		<u>McPherson Strut</u> 60,000				
<u>Labs</u> 10,000		<u>Tool Room & Cutter Grind</u> 20,000		<u>Other</u> 20,000		<u>Bumper Energy Absorbers</u> 100,000		<u>Finished Parts Storage</u> 25,000		
						<u>Shock Absorbers</u> &				

660'

800'

Total Area 528,000

SUSPENSION COMPONENTS PLANT
TOTAL MANUFACTURING COST
 (EXCLUDING MATERIAL)

<u>PRODUCTION</u>		<u>245 DAYS</u>	<u>EMPLOYEES</u>	<u>ANNUAL HOURS</u>	<u>HRS/UNIT</u>
<u>MANPOWER:</u>					
-	DIRECT LABOR	- 1960 -	445	872,200	1.74
-	INDIRECT - HOURLY	- 1960 -	270	529,200	1.06
-	INDIRECT - SALARY	- 2000 -	125	250,000	.50
			<u>840</u>	<u>1,651,400</u>	<u>3.30</u>

ANNUAL HOURS ÷ 500,000 UNITS = HRS PER UNIT = 3.30

WAGE & FRINGE COSTS

-	DIRECT LABOR		X	\$1.74	=	\$33.93
-	INDIRECT - HOURLY		X	1.06	=	\$22.79
-	INDIRECT - SALARY		X	.50	=	\$11.75
						<u>\$68.47</u>
	TOTAL WAGES & FRINGE COSTS					

INVESTMENT: (1981\$)

-	BUILDING & SUPPORT FACILITIES USEFUL LIFE - 30 YRS	<u>FACILITIES COST</u>	<u>DEPRECIATION</u>	<u>COST-PER-UNIT</u>
-	BUILDING FACILITIES USEFUL LIFE - 30 YRS	\$35,738,000	1,191,266	\$ 2.38
-	PLANT FACILITIES USEFUL LIFE - 12 YRS	6,148,000	204,933	.41
-	MACHINERY & EQUIPMENT USEFUL LIFE - 12 YRS	6,572,000	547,666	1.10
		38,160,000	3,180,000	6.36
				<u>\$10.25</u>

DEPRECIATION ÷ 500,000 UNITS = TOTAL DEPRECIATION PER UNIT = \$10.25

TAXES & INSURANCE AS PERCENT OF WAGE & FRINGE COST

T & I ESTIMATE OF 3.9% \$68.47 X 3.9% = \$2.67

OTHER MANUFACTURING COST AS PERCENT OF WAGE & FRINGE COST

OME ESTIMATE OF 13.2% \$68.47 X 13.2% = \$9.04

TOTAL WAGE & FRINGE COST	\$68.47
TOTAL DEPRECIATION COST	\$10.25
TOTAL TAXES & INSURANCE	\$ 2.67
TOTAL OME	\$ 9.04
TOTAL	<u>\$90.43</u>

PLANT NO. 29
BRAKE PLANT

BRAKE COMPONENTS PLANT

PRODUCT

The following component assemblies and their details, would be produced in this plant at the daily rates shown. Capacity Level I has been set at 500,000 car sets/year and Capacity Level II 1,000,000 car sets/year.

	<u>DAILY RATE</u>	
	<u>LEVEL I</u>	<u>LEVEL II</u>
o Disc Brakes	4,080	8,160
- Calipers		
- Piston		
- Brake Pads		
- Brake Pad Support Plate		
- Disc (Rotor)		
- Dust Cover		
o Drum Brakes	4,080	8,160
- Brake Support		
- Brake Shoes		
- Levers		
- Adjusters		
- Drum		
- Dust Cover		
o Brake Cylinders	8,160	16,320
- Body		
- Valves & Valve Assys		
o Dual Master Brake Cylinder	2,040	4,080
- Cylinder		
- Valves & Valve Assys		
o Brake Pedal & Bracket	2,040	4,080
o Brake Booster	2,040	4,080
- Booster Housing		
- Piston		
- Booster Cover		
- Rod		

BRAKE COMPONENTS PLANT

Purchased Parts

Brake Linings
Brake Tubes
Drum Castings
Disc Castings

Caliper Castings
Reservoir Set
Brake & Master Cylinder Castings
Brake Pedal Pad

FACILITIES-Are Provided to produce the products listed. Purchase parts are from another corporate plant or purchased from an outside supplier. Two capacity levels are shown for facility planning purposes. Capacity Level I 500,000 car sets per year, Capacity Level II, 1,000,000 car sets per year.

PRODUCTION

RATES

-Are shown for the Daily rates of individual products at Capacity Level I & II, considering the usage per car on a straight time basis. A 2 shift operation for assembly and 3 shifts for detail operations is assumed.

-At maximum practical overtime - Capacity Level I 550,000 Car sets/Year
(10% Overtime) Capacity Level II 1,100,000 Car sets/Year

NUMBER OF STRAIGHT TIME DAYS

-245 Days/Year - Note: In those years when there is a major change to the product, the number of production days per year may be reduced depending on the extent of the change.

**FACILITIES PLANNING
BRAKE COMPONENTS PLANT
(NOMINAL ESTIMATE)**

	LEVEL I LEVEL II 1,000,000 UNITS	500,000 UNITS		LEVEL I LEVEL II 1,000,000 UNITS
<u>LAND</u>		\$ 750,000 1,250,000		750,000 1,250,000
PURCHASE OF LAND (75 ACRES @ \$10,000/ACRE)				
		\$ 2,000,000		\$ 2,000,000
SUB TOTAL				
<u>BUILDING & SUPPORT FACILITIES</u>		\$ 1,500,000 31,700,000 1,800,000 1,500,000 300,000 1,200,000		\$ 1,500,000 31,700,000 1,800,000 2,000,000 400,000 1,600,000
ENGINEERING				
MANUFACTURING BLDG. (0.580M Sq. Ft. @ \$55/Sq. Ft.)				
AIR COMPRESSORS & FIRE PROTECTION				
WASTE TREATMENT				
TANK FARM				
OTHER				
- USEFUL LIFE 30 YRS - SUB TOTAL		\$ 38,000,000 +7% 40,600,000		\$ 39,000,000 (1980 \$) 41,730,000
<u>BUILDING FACILITIES</u>		\$ 2,500,000 1,500,000 1,500,000 800,000		\$ 2,500,000 2,000,000 1,500,000 800,000
ELECTRICAL				
CRANES, CONVEYORS & SCRAP HANDLING				
HEATING & VENTILATION (PENTHOUSE HEATERS)				
UTILITIES (SEWER, WATER, GAS & AIR)				
- USEFUL LIFE 30 YEARS - SUB TOTAL		\$ 6,300,000 +6% 6,678,000		\$ 6,800,000 (1980 \$) 7,208,000 (1981 \$)
<u>PLANT FACILITIES</u>		\$ 3,000,000 700,000 1,000,000 2,000,000		\$ 3,000,000 1,200,000 1,500,000 2,500,000
TOOL ROOM & CUTTER GRIND				
MATERIAL HANDLING EQUIPMENT				
WASHERS				
OTHER				
- USEFUL LIFE 12 YRS - SUB TOTAL		\$ 6,700,000 +6% 7,102,000		\$ 8,200,000 (1980 \$) 8,692,000 (1981 \$)
<u>MACHINERY & EQUIPMENT</u>		\$ 11,000,000 9,500,000 2,000,000 2,800,000 1,400,000 2,800,000 700,000 1,800,000		\$ 20,000,000 15,400,000 3,100,000 4,300,000 1,600,000 3,800,000 1,300,000 2,500,000
DISC BRAKES				
DRUM BRAKES				
BRAKE CYLINDERS				
DUAL MASTER CYLINDER				
BRAKE PEDAL & BRACKET				
BRAKE BOOSTER				
CONTAINERS & RACKS				
OTHER				
- USEFUL LIFE 12 YRS - SUBTOTAL		\$ 32,000,000 +6% 33,920,000		\$ 52,000,000 (1980 \$) 55,120,000 (1981 \$)
<u>LEVEL I</u>		\$ 85,000,000 90,360,000		\$108,000,000 (1980 \$) 114,750,000 (1981 \$)
TOTAL FACILITIES, EQUIPMENT AND TOOLING				
<u>PRE-PRODUCTION AND LAUNCH @ APPROXIMATELY 20%</u>		\$ 17,000,000 18,072,000		\$ 21,600,000 (1980 \$) 22,950,000 (1981 \$)
TOTAL PROGRAM COST		\$102,000,000 108,432,000		\$129,600,000 (1980 \$) 137,700,000 (1981 \$)

CAPACITY LEVEL I 500,000 Car Sets

CAPACITY LEVEL II 1,000,000 Car Sets

FACILITIES PLANNING
(Nominal Estimate)

DATE March 1982

Level III

FACILITY TYPE	FACILITY ACTIVITIES		ANNUAL PRODUCTION RATE		MAJOR EXPENDITURE (\$ MILLIONS)		MANPOWER REQUIREMENTS		REMARKS
	FUNCTION	MATERIAL	LEVEL I	LEVEL II	LEVEL I	LEVEL II	LEVEL I	LEVEL II	
<u>Disc Brakes</u>	oMachining -Caliper -Disc (Rotor) oGrinding -Piston oGrinding & Drilling -Brake Pad oForming -Brake Pad Support oStamping -Dust Cover oAssembly	Nodular Iron Casting Grey Iron Casting Plastic Grey Iron Casting Steel Steel Riveting, Welding & Bonding	1,000,000	2,000,000	\$10.0/\$12.0 (\$11.0)	\$18.0/\$22.0 (\$20.0)	72/88 (80)	136/164 (150)	
			1,000,000	2,000,000	8.4/10.6 (\$9.5)	13.9/16.9 (\$15.4)	68/82 (75)	127/153 (140)	
<u>Drum Brakes</u>	oMachining -Adjusters -Drum oStamping -Brake Support -Levers -Brake Shoe -Dust Cover oAssembly	Steel Grey Iron Casting Steel Steel Steel Steel Riveting, Welding, & Bonding	2,000,000	4,000,000	1.8/2.2 (\$2.0)	2.8/3.4 (\$3.1)	54/66 (60)	104/126 (115)	
			500,000	1,000,000	2.5/3.1 (\$2.8)	3.9/4.7 (\$4.3)			
<u>Brake Cylinders</u>	oMachining -Body -Valves -Assembly	Aluminum Casting Steel Rod							
	oMachining -Cylinder -Valves -Assembly	Aluminum Casting Steel Rod							
TOTALS									

PRODUCT Brake Components

CAPACITY LEVEL I 500,000 Car Sets
CAPACITY LEVEL II 1,000,000 Car Sets

FACILITIES PLANNING
(Nominal Estimate)

DATE March 1982

Level III

FACILITY TYPE	FACILITY ACTIVITIES		ANNUAL PRODUCTION RATE		MAJOR CAPITAL EXPENDITURE (\$ MILLIONS)		MANPOWER REQUIREMENTS		REMARKS
	FUNCTION	MATERIAL	LEVEL I	LEVEL II	LEVEL I	LEVEL II	LEVEL I	LEVEL II	
<u>Brake Pedal & Bracket</u>	oStamping oAssembly	Steel Attach Brake Pad	500,000	1,000,000	1.3/1.5 (\$1.4)	1.5/1.7 (\$1.6)	9/11 (10)	18/22 (20)	
<u>Brake Booster</u>	oMachining -Piston oStamping -Housing & Cover -Misc. Parts oAssembly	Aluminum Steel Steel	500,000	1,000,000	2.4/3.2 (\$2.8)	3.4/4.2 (\$3.8)	32/38 (35)	55/65 (60)	
<u>All Brake Components</u>	oContainers & Racks oOther				0.6/0.8 (\$0.7) 1.3/2.3 (\$1.8)	1.2/1.4 (\$1.3) 2.2/2.8 (\$2.5)			
	oPlant Facilities oBuilding & Land				11.7/14.3 (\$13.0) 36.0/44.0 (\$40.0)	13.1/16.9 (\$15.0) 37.0/45.0 (\$41.0)			576,000 Sq.Ft. Building
TOTALS					\$76/\$94* (\$85.0)	\$97/\$119* (\$108.0)	235/285 (260)	440/530 (485)	Direct Labor
TOTALS							135/165 (150)	250/310 (280)	Indirect Labor
TOTALS							90/110 (100)	145/175 (160)	Salary
TOTALS					\$76/\$94* (\$85.0)	\$97/\$119* (\$108.0)	460/560 (510)	835/1015 (925)	

*Major capital expenditures adjusted for 1981 economics \$00 360 000 - Level I

CAPACITY LEVEL I 500,000 Car Sets
 CAPACITY LEVEL II 1,000,000 Car Sets
 PROCESS AND COMPONENT SUMMARY
 (Production Facilities, Tools & Equipment Only)
 (Nominal Estimate)

DATE March 1982
 Level III

Level III									
MAJOR DEPARTMENTS	DEPARTMENT FUNCTION	MAJOR CAPITAL EXPENDITURES (\$ MILLIONS)			AREA (SQ. FT.)	MANPOWER REQMT'S		REMARKS	
		LEVEL I	LEVEL II	TOTAL		LEVEL I	LEVEL II		
									D/L
<u>Disc Brakes</u> -Caliper -Piston -Brake Pad -Brake Pad Support Plate -Disc (Rotor) -Dust Cover	Machining (Modular Iron Casting) Grinding (Plastic) Grinding & Drilling (Iron) Forming (Steel) Machining (Iron) Stamping (Steel)	\$ 11.0	\$ 9.0	\$ 20.0	120,000	80	150		
<u>Drum Brakes</u> -Brake Support -Levers -Adjusters -Drum -Dust Cover -Brake Shoes	Stamping (Steel) Stamping (Steel) Machining (Steel) Machining (Iron) Stamping (Steel) Stamping (Steel)	9.5	5.9	15.4	120,000	75	140		
<u>Brake Cylinder</u> -Body -Valves	Machining (Aluminum) Machining (Steel)	2.0	1.1	3.1	60,000 Includes dual Master Cylinder	60 Includes dual Master Cylinder	115		
TOTALS								TOTAL DIRECT LABOR TOTAL INDIRECT LABOR TOTAL SALARY LABOR TOTAL MANPOWER	

PRODUCT Brake Components

PROCESS AID COMPONENT SUMMARY
(Production Facilities, Tools & Equipment Only)
(Nominal Estimate)

DATE March 1982

CAPACITY LEVEL I 500,000 Car Sets

CAPACITY LEVEL II 1,000,000 Car Sets

MAJOR DEPARTMENTS	DEPARTMENT FUNCTION	MAJOR CAPITAL EXPENDITURES (\$ MILLIONS)			AREA (SQ. FT.)	MANPOWER REQMT'S			REMARKS
		LEVEL I	LEVEL II	TOTAL		LEVEL I	LEVEL II	D/L	
<u>Dual Master Cylinder</u> -Cylinder -Valves <u>Brake Pedal & Bracket</u> <u>Brake Booster</u> -Housing & Cover -Piston <u>Purchased Parts Storage</u> <u>Finished Assembly Storage</u>	Machining (Aluminum) Machining (Steel) Stamping (Steel) Stamping (Steel) Machining (Aluminum)	2.8	1.5	4.3					
		1.4	0.2	1.6	18,000	10	20		
		2.8	1.0	3.8	45,000	35	60		
					25,000				
					30,000				
TOTALS		\$29.5	\$18.7	\$48.2	418,000	260	485		TOTAL DIRECT LABOR
						150	280		TOTAL INDIRECT LABOR
						100	160		TOTAL SALARY LABOR
						510	925		TOTAL MANPOWER

BRAKE COMPONENTS PLANT

(SQ. FT.)

	AREA
<u>Manufacturing Building</u>	
Machinery & Equipment (Incl. Aisle Allowance)	418,000
Shipping & Receiving	40,000
Tool Room & Cutter Grind	20,000
Production Offices & Maintenance	35,000
Labs (Quality & Engineering)	5,000
Utilitize Room (Air Compressor, Gas & Electrical)	15,000
Other (Rest Rooms, Eating Areas, Etc.)	22,000
Operations Offices	25,000
	580,000
<u>Auxiliary</u>	
11 Bays @ 60' = 660' x 22 Bays @ 40' = 880'	
	10,000
Grand Total	590,000

BRAKE COMPONENTS PLANT
 1,000,000 CAR SETS/YEAR
 4,080 CAR SETS/DAY

660'		(Square Feet)	
OPERATIONS OFFICES		25,000	
DISC BRAKES 120,000		DRUM BRAKES 120,000	
OTHER 22,000		TOOL ROOM & CUTTER GRIND 20,000	
PRODUCTION OFFICES & MAINT.		35,000	
BRAKE & MASTER CYLINDER 60,000		UTILITIES 15,000	
FINISHED PARTS 30,000		PURCHASED PARTS STORAGE 25,000	
RECEIVING 20,000			
BRAKE PEDAL 18,000		LAB 5,000	
BRAKE BOOSTER 45,000		SHIPPING 20,000	
880'			

TOTAL AREA 580,000

BRAKE PLANT
TOTAL MANUFACTURING COST
(EXCLUDING MATERIAL)

PRODUCTION: 500,000 UNITS PER YEAR

MANPOWER:

	245 DAYS	EMPLOYEES	ANNUAL HOURS	HRS/UNIT
- DIRECT LABOR	- 1960 -	260	509,600	1.02
- INDIRECT - HOURLY	- 1960 -	150	294,000	.59
- INDIRECT - SALARY	- 2000 -	100	200,000	.40
		<u>510</u>	<u>1,003,600</u>	<u>2.01</u>

ANNUAL HOURS ÷ 500,000 UNITS = HRS PER UNIT = 2.01

WAGE & FRINGE COSTS:

- DIRECT LABOR	\$19.50	X	1.02	=	\$19.89
- INDIRECT - HOURLY	\$21.50	X	.59	=	\$12.69
- INDIRECT - SALARY	\$23.50	X	.40	=	\$ 9.40
					<u>\$41.98</u>

INVESTMENT: (1981\$)

	FACILITIES COST	DEPRECIATION	COST-PER-UNIT
- BUILDING & SUPPORT FACILITIES USEFUL LIFE - 30 YRS	\$40,600,000	1,353,333	\$2.71
- BUILDING FACILITIES USEFUL LIFE - 30 YRS	\$ 6,678,000	222,600	.45
- PLANT FACILITIES USEFUL LIFE - 12 YRS	\$ 7,102,000	591,833	1.18
- MACHINERY & EQUIPMENT USEFUL LIFE - 12 YRS	\$33,920,000	2,826,666	5.65
			<u>\$9.99</u>

DEPRECIATION ÷ 500,000 UNITS = TOTAL DEPRECIATION PER UNIT = \$9.99

TAXES & INSURANCE AS PERCENT OF WAGE & FRINGE COST

T & I ESTIMATE OF 3.9% \$41.98 X 3.9% = \$1.64

OTHER MANUFACTURING COST AS PERCENT OF WAGE & FRINGE COST

OME ESTIMATE OF 13.2% \$41.98 X 13.2% = \$5.54

TOTAL WAGE & FRINGE COST	\$41.98
TOTAL DEPRECIATION COST	\$ 9.99
TOTAL TAXES & INSURANCE	\$ 1.64
TOTAL OME	\$ 5.54
	<u>\$59.15</u>

PLANT 30
STEERING COMPONENTS PLANT

STEERING COMPONENT PLANT

PRODUCT

The following component assemblies would be produced in this plant at the daily rates shown. Capacity Level I has been set at 500,000 Car Sets per year and Capacity Level II 1,000,000 Car Sets per year. The one exception to this is the power steering link for RWD vehicles has been set at Capacity Level I 250,000 units per year and Capacity Level II 500,000 units per year.

	DAILY RATE	
	LEVEL I	LEVEL II
o Steering Column and Shaft	2,040	4,080
- Shafts		
- Couplings		
- Column		
- Column Mounting Bracket		
- Housings		
- Shield		
- Cover		
o Rack & Pinion Steering Power & Manual	2,040	4,080
- Housing		
- Pinion		
- Rack		
- Rod Ends		
- Power Steering Unit		
- Steering Links		
o Steering Link (RWD)	1,020	2,040
PURCHASE PARTS:		
Steering Link Clamps		
Power Steering Pump		
Boots		
Steering Wheel		

STEERING COMPONENTS PLANT (CONT.)

FACILITIES -

Are provided to produce the products listed. Purchase parts are from another corporate plant or purchased from an outside supplier. Two Capacity Levels are shown for Facility Planning purposes. Capacity Level I 500,000 Car sets per year, Capacity Level II 1,000,000 car sets per year.

PRODUCTION

RATES

- Are shown for the daily rates of individual products at Capacity Level I & II, considering the usage per car on a straight time basis. A two shift operation for assembly and three shifts for detail operations is assumed.
- At maximum practical overtime (10% Overtime) - Capacity Level I 550,000 Car sets per year
Capacity Level II 1,100,000 Car sets per year

NUMBER OF STRAIGHT TIME DAYS -

245 Days per year

Note: In those years when there is a major change to the product, the number of production days per year may be reduced depending on the extent of the change.

LEVEL II	LEVEL I	LEVEL II	LEVEL I
		500,000 UNITS	1,000,000 UNITS
PURCHASE LAND (75 ACRES @ \$10,000/ACRE)		\$ 750,000	\$ 750,000
SITE DEVELOPMENT		1,250,000	1,250,000
	SUB TOTAL	\$ 2,000,000	\$ 2,000,000
ENGINEERING		\$ 1,200,000	\$ 1,200,000
MANUFACTURING BLDG. (0.408M Sq. Ft. @ \$55/Sq. Ft.)		22,440,000	22,440,000
AIR COMPRESSORS AND FIRE PROTECTION		1,500,000	1,500,000
WASTE TREATMENT		1,300,000	1,500,000
TANK FARM		300,000	400,000
OTHER		1,260,000	1,460,000
	USEFUL LIFE-30 YRS - SUB TOTAL	\$ 28,000,000	\$ 28,500,000 (1980 \$)
		+7% 29,960,000	+7% 30,495,000 (1981 \$)
ELECTRICAL		\$ 2,500,000	\$ 2,500,000
CRANES, CONVEYORS AND SCRAP HANDLING		1,500,000	2,000,000
HEATING AND VENTILATING (PENTHOUSE HEATERS)		2,300,000	2,300,000
UTILITIES (SEWER, WATER, GAS)		700,000	700,000
	USEFUL LIFE-30 YRS- SUB TOTAL	\$ 7,000,000	\$ 7,500,000 (1980 \$)
		+6% 7,420,000	+6% 7,950,000 (1981 \$)
TOOL ROOM AND CUTTER GRIND		\$ 2,500,000	\$ 2,500,000
MATERIAL HANDLING EQUIPMENT		600,000	1,000,000
WASHERS		800,000	1,200,000
OTHER		1,600,000	2,300,000
	USEFUL LIFE-12 YRS - SUB TOTAL	\$ 5,500,000	\$ 7,000,000 (1980 \$)
		+6% 5,830,000	+6% 7,420,000 (1981 \$)
STEERING COLUMN AND SHAFT		\$ 3,800,000	\$ 4,500,000
RACK AND PINTON STEERING (MANUAL AND POWER)		15,000,000	20,500,000
STEERING LINKS		2,000,000	2,100,000
CONTAINERS AND RACKS		600,000	1,100,000
OTHER		1,600,000	2,300,000
	USEFUL LIFE-12 YRS - SUB TOTAL	\$ 23,000,000	\$ 30,000,000 (1980 \$)
		+6% 24,380,000	+6% 31,800,000 (1981 \$)
TOTAL FACILITIES, EQUIPMENT AND TOOLING		\$ 65,500,000	\$ 75,500,000 (1980 \$)
		69,590,000	79,665,000 (1981 \$)
PRE-PRODUCTION AND LAUNCH @ APPROXIMATELY 20%		\$ 13,100,000	\$ 15,100,000 (1980 \$)
		13,918,000	15,933,000 (1981 \$)
TOTAL PROGRAM COST		\$ 78,600,000	\$ 90,600,000 (1980 \$)
		83,508,000	95,598,000 (1981 \$)

DATE March.1982

Level III

FACILITY TYPE	FACILITY ACTIVITIES		ANNUAL PRODUCTION RATE		MAJOR CAPITAL EXPENDITURE (\$ MILLIONS)		MANPOWER REQUIREMENTS		REMARKS
	FUNCTION	MATERIAL	LEVEL I	LEVEL II	LEVEL I	LEVEL II	LEVEL I	LEVEL II	
Steering Column & Shaft	oMachining -Shaft -Coupling -Bracket oStamping -Column -Column Mounting Bracket -Cover oPlastic -Housing -Shield oAssembly	Steel - Bar Forging - Steel Casting - Aluminum Steel -Tubing Steel - Sheet Steel - Sheet Molded-ABS Molded -ABS	500,000	1,000,000	\$ 3.5/\$4.1 (\$3.8)	\$ 4.1/\$4.9 (\$4.5)	49/61 (55)	91/109 (100)	
			500,000	1,000,000	13.5/16.5 (15.0)	18.5/22.5 (20.5)	112/138 (125)	215/265 (240)	
			500,000	1,000,000	1.9/2.1 (2.0)	1.9/2.3 (2.1)	4/6 (5)	9/11 (10)	
			500,000	1,000,000	2.1/2.3 (2.2)	3.2/3.6 (3.4)	165/205 (185)	315/385 (350)	408,000 Sq.Ft. Building
			500,000	1,000,000	11.5/13.5 (12.5)	13.3/15.7 (14.5)	108/132 (120)	190/230 (210)	Direct Labor
Steering Links	oMachining -End oOther oPlant Facilities oBuilding & Land	Steel - Tubing	500,000	1,000,000	27.0/33.0 (30.0)	27.5/33.5 (30.5)	72/88 (80)	126/154 (140)	Indirect Labor Salary
					\$59.5/\$71.5 (\$65.5)*	\$68.5/\$82.5 (\$75.5)*	345/425 (385)	631/769 (700)	
TOTALS									

*Major capital expenditures adjusted for 1981 economics \$69,590,000-Level I, \$79,665,000-Level II.

PROCESS AND COMPONENT SUMMARY
(PRODUCTION FACILITIES, TOOLS & EQUIPMENT ONLY)
(NOMINAL ESTIMATE)

Date: March 1982

Level IV

MAJOR DEPARTMENTS	DEPARTMENT FUNCTION	MAJOR CAPITAL EXPENDITURES (\$ MILLIONS)			AREA (SQ. FT.)	MANPOWER REQMT'S		REMARKS						
		LEVEL I	LEVEL II	TOTAL		LEVEL I	LEVEL II							
		D/L	D/L	D/L										
Steering Column & Shaft	Machining (Steel Rod) Machining (Steel Forging) Machining (Aluminum Casting)	\$ 3.8	\$ 0.7	\$ 4.5	80,000	55	100							
-Shaft														
-Coupling														
-Bracket														
-Column														
-Mounting Bracket	Stamping (Steel) Molded (Plastic) Molded (Plastic)	15.0	5.5	20.5	130,000	125	240							
-Housing														
-Shield														
Rack & Pinion Steering	Machining (Aluminum Casting) Machining (Steel - Bar) Machining (Steel - Bar) Machining (Steel Rod) Machining (Steel - Bar)								2.0	0.1	2.1	5,000 25,000 30,000	5	10
-Housing														
-Manual Power														
-Pinion														
-Rack														
-Rod Ends	Machining (Steel Forging) Storage Finished Storage													
-Power Pistons														
Steering Links														
Purchase Parts Storage														
Finished Storage														
TOTALS		\$20.8	\$6.3	\$27.1	270,000	185	350	TOTAL DIRECT LABOR						
						120	210	TOTAL INDIRECT LABOR						
						80	140	TOTAL SALARY LABOR						
						385	700	TOTAL MANPOWER						

STEERING COMPONENTS PLANT
(SQUARE FEET)

	<u>Area</u>
Manufacturing Building	
Machinery & Equipment (Incl. Aisle Allowance)	270,000
Shipping & Receiving	20,000
Tool Room & Cutter Grind	20,000
Production Offices & Maintenance	33,000
Labs (Quality & Engineering)	10,000
Utilitize Room (Air Compressor, Gas & Electrical)	12,000
Other (Rest Rooms, Eating Areas, Etc.)	18,000
Operations Offices	25,000
10 Bays @ 60 = 600' x 17 Bays @ 40 = 680'	
Auxiliary	
Total	408,000
	<u>10,000</u>
Grand Total	418,000

STEERING COMPONENTS PLANT

1,000,000 Car Sets/Year
4,080 Car Sets/Day (1)

(Square Feet)

<u>Office Operations</u> 25,000		<u>Steering Column and Shaft</u> 80,000	<u>Production Office and Maintenance</u> 33,000	<u>Rack & Pinion</u> <u>Steering</u> 130,000		<u>Purchased Parts Storage</u> 25,000	<u>Receiving</u> 10,000
<u>Utilitize Room</u> 12,000			<u>Other</u> 18,000	<u>Tool Room & Cutter Grind</u> 20,000	<u>Steering Links</u> 5,000	<u>Finished Parts Storage</u> 30,000	
<u>Lab</u> 10,000			<u>Shipping</u> 10,000				

680'

Total Area 408,000

600'

STEERING COMPONENTS PLANT
TOTAL MANUFACTURING COST
(EXCLUDING MATERIAL)

PRODUCTION: 500,000 UNITS PER YEAR

MANPOWER:	245 DAYS	EMPLOYEES	ANNUAL HOURS	HRS/UNIT
- DIRECT LABOR	1960	185	362,600	.73
- INDIRECT - HOURLY	1960	120	235,200	.47
- INDIRECT - SALARY	2000	80	160,000	.32
		<u>385</u>	<u>757,800</u>	<u>1.52</u>

ANNUAL HOURS ÷ 500,000 UNITS = HOURS PER UNIT = 1.52

WAGE & FRINGE COSTS:

- DIRECT LABOR	\$19.50	x	.73	=	\$14.24
- INDIRECT - HOURLY	\$21.50	x	.47	=	\$10.11
- INDIRECT - SALARY	\$23.50	x	.32		\$ 7.52
	TOTAL WAGES & FRINGE COSTS				
					<u>\$31.87</u>

INVESTMENT: (1981\$)

	FACILITIES COST	DEPRECIATION	COST-PER-UNIT
- BUILDING & SUPPORT FACILITIES USEFUL LIFE - 30 YRS	\$29,960,000	998,666	\$2.00
- BUILDING FACILITIES USEFUL LIFE - 30 YRS	\$ 7,420,000	247,333	\$.49
- PLANT FACILITIES USEFUL LIFE - 12 YRS	\$ 5,830,000	485,833	\$.97
- MACHINERY & EQUIPMENT USEFUL LIFE - 12 YRS	\$24,380,000	2,031,666	\$4.06
			<u>\$7.52</u>

DEPRECIATION ÷ 500,000 UNITS = TOTAL DEPRECIATION PER UNIT = \$7.52

TAXES & INSURANCE AS PERCENT OF WAGE & FRINGE COST

T & I ESTIMATE OF 3.9% \$31.87 X 3.9% = \$1.24

OTHER MANUFACTURING COST AS PERCENT OF WAGE & FRINGE COST

OME ESTIMATE OF 13.2% \$31.87 X 13.2% = \$4.21

TOTAL WAGE & FRINGE COSTS \$31.87

TOTAL DEPRECIATION COSTS \$ 7.52

TOTAL TAXES & INSURANCE \$ 1.24

TOTAL OME \$ 4.21

TOTAL \$44.84

PLANT 31
BUMPER (PLASTIC FASCIA) PLANT

<u>PRODUCT</u>		<u>NEW PLASTIC FASCIA BUMPER PLANT - ASSUMPTIONS</u>	
FRONT & REAR BUMPER ASSEMBLIES			
•	REACTION INJECTION MOLDING (R.I.M. FASCIA)		
•	HSLA STEEL REINFORCEMENT BAR		
•	FRONT BUMPER ASSEMBLY PRODUCT MIX		
	BUMPER SYSTEM ONLY	50%	
	INTEGRAL BUMPER & GRILLE/GRILLE OPENING	50%	
•	BUMPER SYSTEM DESIGNED TO MEET 5 MPH FMVSS TEST REQUIREMENTS.		
•	ENERGY ABSORBER UNITS (BUMPER SHOCKS) ARE ASSEMBLED TO BUMPER SYSTEMS		
	AT CAR ASSEMBLY PLANT LOCATIONS.		
•	FASCIA		

	PAINTED BODY COLOR	75%
	PRIMED ONLY (PAINTED AT CAR PLANT)	25%

PRODUCTION RATE

PLANT IS SIZED TO FURNISH REQUIREMENTS FOR 1,152,000 VEHICLES ON AN ANNUAL STRAIGHT TIME BASIS.

OPERATING PATTERN

NORMAL OPERATING PATTERN

FABRICATION - TWO (8) HOUR SHIFTS PER DAY

ASSEMBLY - TWO (8) HOUR SHIFTS PER DAY

240 DAYS PER YEAR

OVERTIME (AS REQUIRED)

9TH HOUR - 12.5 %

ALTERNATE SATURDAYS - 10 %

NEW PLASTIC FASCIA BUMPER PLANT - ASSUMPTIONS

FACILITIES & EQUIPMENT

REACTION INJECTION MOLDING

- O BULK PLANT STORAGE & BLENDING SYSTEM FOR (HIGH VOLUME) STANDARD PRODUCTION.
- O MINI-BULK SYSTEMS FOR MONOMER OR REINFORCING FILLER SPECIAL BLENDING REQUIREMENTS.
- O CURRENT STATE OF THE ART RIM MACHINES WITH MULTIPLE MIXING HEADS. UNIQUE SHOT SIZE & INJECTION RATE CAPABILITY FOR EACH HEAD. CLAMPING FORCE SPECIFICATION IN THE 75/100 TON RANGE

PAINT

- O AUTOMATED & MANUAL PROCESS
- O MANUAL APPLICATION FOR SPECIAL COLOR REQUIREMENTS
- O ELASTOMERIC MATERIAL

PRESS EQUIPMENT

CURRENT STATE OF THE ART STRAIGHT SIDE SINGLE & DOUBLE ACTION MECHANICAL PRESSES. AUTOMATED FEED (BLANK DESTACKER OR COIL) & MECHANICAL HANDLING (PART TRANSFER & UNLOAD) DEVICES FOR ALL STAMPING PRESS OPERATIONS WHERE FEASIBLE. QUICK DIE CHANGE FACILITIES PROVIDED FOR ALL PRESS EQUIPMENT.

ASSEMBLY

AUTOMATIC & MANUAL RESISTANCE WELDING, MANUAL CO₂ WELDING.

**NEW PLASTIC FASCIA BUMPER PLANT
FACILITY COST - NOMINAL ESTIMATE**

<u>LEVEL II</u>			
<u>LAND</u>			
	PURCHASE LAND (60 ACRES @ \$10,000/ACRE)	\$ 600,000	
	SITE DEVELOPMENT	1,200,000	
	SUB TOTAL		\$ 1,800,000
<u>BUILDING & SUPPORT FACILITY</u>			
	ENGINEERING	\$ 2,200,000	
	MANUFACTURING BLDG. (320,000 Sq.Ft. @ \$70/Sq.Ft.)	22,400,000	
	AUXILIARY STRUCTURES (20,000 Sq.Ft. @ \$40/Sq.Ft.)	800,000	
	TANK FARM (INC. PAINT MIX)	1,000,000	
	OTHER (INC. PACKAGE BOILER/WASTE TREATMENT)	2,800,000	
	USEFUL LIFE-30 YRS - SUB TOTAL		\$29,200,000 (1980 \$)
		+7%	31,244,000 (1981 \$)
<u>BUILDING FACILITIES</u>			
	CRANES, CONVEYORS AND SCRAP HANDLING	\$ 1,500,000	
	ELECTRICAL	1,500,000	
	HEATING/VENTILATION/AIR COMPRESSORS	2,000,000	
	UTILITIES (INC. FIRE PROTECTION)	2,500,000	
	OTHER	1,100,000	
	USEFUL LIFE-30 YRS - SUB TOTAL		\$ 8,600,000
		+6%	9,116,000 (1981 \$)
<u>PLANT FACILITIES</u>			
	TOOL AND DIE ROOM	\$ 2,000,000	
	MATERIAL HANDLING EQUIPMENT	1,500,000	
	OTHER	400,000	
	USEFUL LIFE-12 YRS - SUB TOTAL		\$ 3,900,000 (1980 \$)
		+6%	4,134,000 (1981 \$)
<u>MACHINERY & EQUIPMENT</u>			
	REACTION INJECTION MOLDING EQUIPMENT	\$ 7,600,000	
	PAINT FACILITIES	8,000,000	
	PRESS EQUIPMENT (INC. COIL HANDLING AND BLANKING)	22,700,000	
	ASSEMBLY	4,000,000	
	INSPECTION AND TEST EQUIPMENT	1,500,000	
	OTHER	2,700,000	
	USEFUL LIFE-12 YRS - SUB TOTAL		\$46,500,000 (1980 \$)
		+6%	49,290,000 (1981 \$)
<u>LEVEL I</u>	TOTAL FACILITIES, EQUIPMENT AND TOOLING		\$90,000,000 (1980 \$)
			95,500,000 (1981 \$)
<u>PRE-PRODUCTION AND LAUNCH @ APPROXIMATELY 20%</u>			\$18,000,000 (1980 \$)
			19,116,800 (1981 \$)
	TOTAL PROGRAM COST		\$108,000,000 (1980 \$)
			114,700,800 (1981 \$)

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FACILITIES PLANNING AND PROCESS SUMMARY
(DATA) IS A NOMINAL ESTIMATE

March 1982

Level III

DEPARTMENT AND PROCESS	MATERIAL	AREA SQ.FT. (000)		ANNUAL CAPACITY (000)	MAJOR CAPITAL EXPENDITURES (DOLLARS IN MILLIONS)			DIRECT LABOR WORKING FORCE		REMARKS
		LEVEL I	LEVEL II		LEVEL I	LEVEL II	TOTAL	LEVEL I	LEVEL II	
OTHER M & E MISC. SUPT. LAND, BUILDING AND FACILITIES							\$ 3,8/\$4.6 (\$4.2)			AREA IS BALANCE. OF MFG. BUILDING
		175					\$39,0/48/0 (\$43.5)			
								160/220 (190)		DIRECT LABOR
								115/145 (130)		INDIRECT LABOR
								35/45 (40)		SALARY
TOTALS		320		1,152			\$80,5/\$99.5 (\$90.0)*	310/410 (360)		TOTALS

NEW PLASTIC FASCIA BUMPER PLANT
AREA BREAKDOWN

<u>MANUFACTURING BUILDING (800 FT X 400 FT)</u>	<u>SQ. FT.</u>
MATERIAL STORAGE - RECEIVING	25,000
INJECTION MOLDING (INCLUDING PRE-PROCESSING)	20,000
PAINT (INCLUDING MIX)	15,000
METAL STAMPING	40,000
ASSEMBLY	70,000
MATERIAL STORAGE	15,000
TOOL & DIE ROOM	20,000
MAINTENANCE & REPAIR	10,000
VENDING/RESTROOMS/LOCKERS	10,000
FINISHED PARTS SHIPPING	50,000
ADMINISTRATIVE OFFICE	8,000
ALL OTHER	
(INCLUDING UTILITIES/AIR COMPRESSOR/LABORATORIES)	37,000
AUXILIARY STRUCTURES	320,000
	20,000
TOTAL	340,000

NEW PLASTIC FASCIA BUMPER PLANT
PLANT LAYOUT

SQUARE FEET				
MATERIAL STORAGE RECEIVING 25,000	INJECTION MOLDING (RIM) 20,000	PAINT (INCL. PAINT MIX) 15,000	ALL OTHER 20,000	
METAL STAMPING 40,000	ASSEMBLY 70,000	FINISHED PARTS SHIPPING 50,000		
TOOL & DIE ROOM 20,000	MAINT. & REPAIR 10,000	MATERIAL STORAGE 15,000	VENDING REST ROOMS LOCKERS 10,000	ADMIN. OFFICE 8,000 ALL OTHER 17,000

400'

800'

TOTAL AREA: 320,000 SQ.FT.

BUMPER (PLASTIC FASCIA) PLANT
TOTAL MANUFACTURING COST
 (EXCLUDING MATERIAL)

PRODUCTION: 1,152,000 UNITS PER YEAR

<u>MANPOWER:</u>	<u>240 DAYS</u>	<u>EMPLOYEES</u>	<u>ANNUAL HOURS</u>	<u>HRS/UNIT</u>
- DIRECT LABOR	1920	190	364,800	.32
- INDIRECT HOURLY	1920	130	249,600	.22
- INDIRECT - SALARY	2000	40	80,000	.07
		<u>360</u>	<u>694,400</u>	<u>.61</u>

ANNUAL HOURS ÷ 1,152,000 UNITS = HOURS PER UNIT = .61

WAGE & FRINGE COSTS:

- DIRECT LABOR	\$19.50	x	.32	=	\$ 6.24
- INDIRECT - HOURLY	\$21.50	x	.22	=	\$ 4.73
- INDIRECT - SALARY	\$23.50	x	.07	=	\$ 1.65
	<u>TOTAL WAGES & FRINGE COSTS</u>				<u>\$12.62</u>

INVESTMENT: (1981\$)

- BUILDING & SUPPORT FACILITIES USEFUL LIFE - 30 YRS	<u>FACILITIES COST</u>	<u>DEPRECIATION</u>	<u>COST-PER-UNIT</u>
- BUILDING FACILITIES USEFUL LIFE - 30 YRS	\$31,244,000	1,041,466	\$.90
- PLANT FACILITIES USEFUL LIFE - 12 YRS	\$ 9,116,000	303,866	\$.26
- MACHINERY & EQUIPMENT USEFUL LIFE - 12 YRS	\$ 4,134,000	344,500	\$.30
	<u>\$49,290,000</u>	<u>4,107,500</u>	<u>3.57</u>
			<u>\$5.03</u>

DEPRECIATION ÷ 1,152,000 UNITS = TOTAL DEPRECIATION PER UNIT = \$5.03

TAXES & INSURANCE AS PERCENT OF WAGE & FRINGE COST

T & I ESTIMATE OF 3.9% \$12.62 X 3.9% = \$.49

OTHER MANUFACTURING COST AS PERCENT OF WAGE & FRINGE COST

OME ESTIMATE OF 13.2% \$12.62 X 13.2% = \$1.67

TOTAL WAGE & FRINGE COSTS	\$12.62
TOTAL DEPRECIATION COSTS	\$ 5.03
TOTAL TAXES & INSURANCE	\$.49
TOTAL OME	\$ 1.67
<u>TOTAL</u>	<u>\$19.81</u>

PLANT 32
SEAT BELT PLANT

NEW SEAT BELT PLANT - ASSUMPTIONS

PRODUCT

SEAT BELT RESTRAINT SYSTEMS

FRONT SEAT - OUTBOARD & CENTER POSITIONS

REAR SEAT - OUTBOARD & CENTER POSITIONS

FIVE TRIM COLOR AVAILABILITY

SYSTEM DESIGN

DRIVER & FRONT SEAT PASSENGER UNITS ARE SINGLE

(LAP & SHOULDER COMBINED) CONTINUOUS BELT SYSTEMS. THESE SYSTEMS INCORPORATE VEHICLE SENSITIVE SHOULDER BELT RETRACTORS DESIGNED TO RESTRICT BELT TRAVEL ONLY UPON IMPACT OR DURING VERY SUDDEN STOPS.

FRONT SEAT CENTER & REAR SEAT UNITS ARE LAP BELT SYSTEMS ONLY.

REAR SEAT OUTBOARD UNITS INCORPORATE RETRACTOR MECHANISMS.

ALL UNITS ARE DRIVER/PASSENGER ACTIVATED

PRODUCTION RATE

PLANT IS SIZED TO FURNISH REQUIREMENTS FOR 1,152,000 VEHICLES ON AN ANNUAL STRAIGHT TIME BASIS.

NEW SEAT BELT PLANT - ASSUMPTIONS

OPERATING PATTERN

NORMAL OPERATING PATTERN

FABRICATION - TWO (8) HOUR SHIFTS PER DAY

ASSEMBLY - TWO (8) HOUR SHIFTS PER DAY

240 DAYS PER YEAR

OVERTIME (AS REQUIRED)

9TH HOUR - 12.5%

ALTERNATE SATURDAYS - 10%

FACILITIES & EQUIPMENT

METAL STAMPING

- AUTOMATIC PRESS EQUIPMENT (PROGRESSIVE DIE) & TRANSFER DIE PROCESSING FOR SELECTED PARTS.

- SPECIALITY ITEMS (SPRINGS, FASTENERS, PRECISION/FINE SMALL PARTS PURCHASED.

- PLATING/HARDENING REQUIREMENTS PURCHASED.

ASSEMBLY

- AUTOMATED (ROTARY INDEX) EQUIPMENT FOR COMPONENT ASSEMBLY

ALL PLASTIC COMPONENTS PURCHASED

NEW SEAT BELT PLANT
FACILITY COST - NOMINAL ESTIMATE

<u>LEVEL II</u>				
<u>LAND</u>				
	PURCHASE LAND (30 ACRES @ \$10,000/ACRE)	\$ 300,000		
	SITE DEVELOPMENT	970,000		
				\$ 1,200,000
	SUB TOTAL			
<u>BUILDING & SUPPORT FACILITY</u>				
	ENGINEERING	\$ 900,000		
	MANUFACTURING BLDG. (160,000 Sq. Ft @ \$55/Sq. Ft.)	8,800,000		
	OTHER (INC. PACKAGE BOILER/WASTE TREATMENT/AUXILIARY STRUCTURES)	1,600,000		
				\$11,300,000 (1980 \$)
	USEFUL LIFE-30 YRS - SUB TOTAL		+7%	12,091,000 (1981 \$)
<u>BUILDING FACILITIES</u>				
	CRANES, CONVEYORS AND SCRAP HANDLING	600,000		
	ELECTRICAL	800,000		
	HEATING/VENTILATION/AIR COMPRESSORS	1,000,000		
	UTILITIES (INC. FIRE PROTECTION)	1,200,000		
	OTHER	800,000		
				\$ 4,400,000 (1980 \$)
	USEFUL LIFE-30 YRS - SUB TOTAL		+6%	4,664,000 (1981 \$)
<u>PLANT FACILITIES</u>				
	TOOL AND DIE ROOM	\$ 1,000,000		
	MATERIAL HANDLING EQUIPMENT	600,000		
	OTHER	400,000		
				\$ 2,000,000 (1980 \$)
	USEFUL LIFE-12 YRS - SUB TOTAL		+6%	2,120,000 (1981 \$)
<u>MACHINERY & EQUIPMENT</u>				
	PRESS EQUIPMENT (INC. COIL HANDLING AND BLANKING)	\$ 1,200,000		
	SEWING EQUIPMENT	300,000		
	WEB CUTTING EQUIPMENT	200,000		
	ASSEMBLY EQUIPMENT	1,200,000		
	INSPECTION AND TEST EQUIPMENT	400,000		
	OTHER	300,000		
				\$ 3,600,000 (1980 \$)
	USEFUL LIFE-12 YRS - SUB TOTAL		+6%	3,943,200 (1981 \$)
<u>LEVEL I</u>				
	TOTAL FACILITIES, EQUIPMENT AND TOOLING	\$22,500,000 (1980 \$)		
		24,018,200 (1981 \$)		
<u>PRE-PRODUCTION AND LAUNCH @ APPROXIMATELY 20%</u>				
		\$ 4,500,000 (1980 \$)		
		4,803,640 (1981 \$)		
		\$27,000,000 (1980 \$)		
	TOTAL PROGRAM COST	28,821,000 (1981 \$)		

DEPARTMENT AND PROCESS	MATERIAL	AREA SQ.FT. (000)		ANNUAL CAPACITY (000)		MAJOR CAPITAL EXPENDITURES (DOLLARS IN MILLIONS)			DIRECT LABOR		REMARKS
		LEVEL I	LEVEL II	LEVEL I	LEVEL II	TOTAL	WORKING FORCE				
							LEVEL I	LEVEL II			
METAL STAMPING	STEEL	10	1,152					\$1.0/\$1.4 (\$1.2)	8/12 (10)	CAPACITY IS EQUIVALENT VEHICLE CAR SET	
• BLANK											
• STAMPING PRESS											
- CONVENTIONAL (LINE DIE)											
- PROGRESSIVE											
- TRANSFER											
SEWING		14						\$0.4/\$0.6 (\$0.5)	90/110 (100)		
• WEB CUTTING											
• SEW ON TIPS											
BUCKLES & LABELS											
ASSEMBLY		60						\$1.0/\$1.4 (\$1.2)	70/90 (80)		
• AUTOMATIC ROTARY INDEX											
• MANUAL											
OTHER M & E											
• MISC. SUPPORT								\$0.6/\$0.8 (\$0.7)			
• INSPECTION & TEST											
LAND, BUILDING AND FACILITIES		76						\$17.0/\$20.8 (\$18.9)		AREA IS EQUIVA- LANCE OF MFG. BUILDING	
									168/212 (190)	DIRECT LABOR	
									110/140 (125)	INDIRECT LABOR	
									30/40 (35)	SALARY	
		160	1,152					\$20.0/\$25.0 (\$22.5M)	308/392 (350)	TOTALS	

*Major capital expenditures are adjusted for 1981 economics \$24,018,200.

NEW SEAT BELT PLANT
AREA BREAKDOWN

MANUFACTURING BUILDING: 400 FT X 400 FT

	<u>SQ.FT.</u>
MATERIAL STORAGE	10,000
METAL STAMPING	10,000
SEWING (INCLUDING WEB CUTTING)	14,000
ASSEMBLY	60,000
MATERIAL STORAGE	6,000
TOOL & DIE ROOM	6,000
MAINTENANCE & REPAIR	14,000
VENDING/REST ROOMS/LOCKERS	6,000
FINISHED PARTS SHIPPING	12,000
ADMINISTRATIVE OFFICE	6,000
ALL OTHER (INCLUDING UTILITIES/AIR COMPRESSORS/ LABORATORIES)	16,000
TOTAL:	160,000

NEW SEAT BELT PLANT
PLANT LAYOUT

SQUARE FEET			
MATERIAL STORAGE 10,000	METAL STAMPING 10,000	TOOL & DIE ROOM 6,000	MAINTENANCE AND REPAIR 14,000
SEWING 14,000	ASSEMBLY 60,000		
MATERIAL STORAGE 6,000			
ALL OTHER 16,000	VENDING, REST ROOMS LOCKERS 6,000	ADMIN. OFFICE 6,000	FINISHED PARTS SHIPPING 12,000

400'

TOTAL AREA: 160,000 SQ.FT.

SEAT BELT PLANT
TOTAL MANUFACTURING COST
 (EXCLUDING MATERIAL)

PRODUCTION: 1,152,000 UNITS PER YEAR				
<u>MANPOWER:</u>				
	<u>240 DAYS</u>	<u>EMPLOYEES</u>	<u>ANNUAL HOURS</u>	<u>HRS/UNIT</u>
- DIRECT LABOR	1920	190	364,800	.32
- INDIRECT - HOURLY	1920	125	240,000	.21
- INDIRECT - SALARY	2000	35	70,000	.06
		<u>350</u>	<u>674,800</u>	<u>.59</u>
ANNUAL HOURS ÷ 1,152,000 UNITS = HOURS PER UNIT = .59				
<u>WAGE & FRINGE COSTS:</u>				
- DIRECT LABOR	\$19.50	x .32	=	\$ 6.24
- INDIRECT - HOURLY	\$21.50	x .21	=	\$ 4.51
- INDIRECT - SALARY	\$23.50	x .06	=	\$ 1.41
	TOTAL WAGE & FRINGE COSTS			<u>\$12.16</u>
<u>INVESTMENT: (1981\$)</u>				
- BUILDING & SUPPORT FACILITIES USEFUL LIFE - 30 YRS		<u>FACILITIES COST</u>	<u>DEPRECIATION</u>	<u>COST-PER-UNIT</u>
- BUILDING FACILITIES USEFUL LIFE - 30 YRS		\$12,091,000	403,033	\$.35
- PLANT FACILITIES USEFUL LIFE - 12 YRS		\$ 4,664,000	155,466	\$.13
- MACHINERY & EQUIPMENT USEFUL LIFE - 12 YRS		\$ 2,120,000	176,666	\$.15
		\$ 3,943,200	328,600	<u>\$.29</u>
				<u>\$.92</u>

DEPRECIATION ÷ 1,152,000 UNITS = TOTAL DEPRECIATION PER UNIT = \$.92

TAXES & INSURANCE AS PERCENT OF WAGE & FRINGE COST
T * I ESTIMATE OF 3.9% \$12.16 X 3.9% = \$.47
OTHER MANUFACTURING COST AS PERCENT OF WAGE & FRINGE COST
OME ESTIMATE OF 13.2% \$12.16 X 13.2% = \$1.61
TOTAL WAGE & FRINGE COSTS \$12.16
TOTAL DEPRECIATION COSTS \$.92
TOTAL TAXES & INSURANCE \$.47
TOTAL OME \$ 1.61
TOTAL <u>\$15.16</u>

PLANT 33
INSTRUMENTATION PLANT

NEW INSTRUMENTATION PLANT - ASSUMPTIONS

PRODUCT

INSTRUMENTATION COMPONENTS & ASSEMBLIES INCLUDING SELECTED
INSTRUMENTATION SENSING & ENGINE FUNCTION DEVICES.

● INSTRUMENTATION COMPONENTS

SPEEDOMETER/ODOMETER

FUEL GAUGE

ALTERNATOR (GAUGE & WARNING LIGHT APPLICATIONS)

OIL PRESSURE (GAUGE & WARNING LIGHT APPLICATIONS)

ENGINE COOLANT (GAGE & WARNING LIGHT APPLICATIONS)

● INSTRUMENT CLUSTER ASSEMBLIES

STANDARD DESIGN

RALLYE DESIGN

● ELECTRICALLY WOUND MECHANICAL (ANALOG) CLOCK

● SPEEDOMETER CABLE ASSEMBLY

● RADIATOR THERMOSTAT

● EXHAUST MANIFOLD HEAT CONTROL VALVE

● OIL LEVEL INDICATOR

● TRANSMISSION SPEEDOMETER PINION

● VAPOR CANISTER

● FUEL TANK SENDING UNIT

● ENGINE OIL PRESSURE SWITCH

● TEMPERATURE SENDING UNIT

● MANIFOLD VACUUM FITTING

● EXHAUST GAS RECIRCULATION (EGR) SYSTEM

NEW INSTRUMENTAITON PLANT - ASSUMPTIONS (CONT.)

PRODUCTION
RATE

PLANT IS SIZED TO FURNISH 1,152,000 EQUIVALENT CAR SET REQUIREMENTS ON AN ANNUAL STRAIGHT TIME BASIS. IN ADDITION, SERVICE REQUIREMENTS AMOUNTING TO 10 PERCENT OF PRODUCTION VOLUME FOR SELECTED COMPONENTS CAN BE ACCOMMODATED.

OPERATING
PATTERN

NORMAL OPERATING PATTERN

- FABRICATION - TWO (8) HOUR SHIFTS PER DAY
- ASSEMBLY - TWO (8) HOUR SHIFTS PER DAY
- 240 DAYS PER YEAR

OVERTIME (AS REQUIRED)

- 9th HOUR - 12.5%
- ALTERNATE SATURDAYS - 10%

FACILITIES &
EQUIPMENT

INJECTION MOLDING

- CURRENT STATE OF THE ART EQUIPMENT
- REGRIND CAPABILITY (20/30%) PROVIDED.

METAL STAMPING

- AUTOMATIC PRESS EQUIPMENT (PROGRESSIVE DIE) & TRANSFER DIE PROCESSING FOR SELECTED PARTS.

- SPECIALITY ITEMS (SPRINGS, FASTENERS, PRECISION/FINE SMALL PARTS) PURCHASED.

ASSEMBLY

- AUTOMATED (ROTARY INDEX, SYNCHRONOUS CAROUSEL & INSERTION) COMPONENT ASSEMBLY EQUIPMENT.
- MANUAL ASSEMBLY FOR SELECTED OPERATIONS.

NEW INSTRUMENTATION PLANT (NOMINAL ESTIMATE)

LEVEL	NEW INSTRUMENTATION PLANT (NOMINAL ESTIMATE)		LEVEL I LEVEL II
<u>LAND</u>	PURCHASE LAND (50 AREAS @ \$10,000/ACRE)	\$ 500,000	
	SITE DEVELOPMENT	<u>1,000,000</u>	
	SUB TOTAL		\$ 1,500,000
<u>BUILDING & SUPPORT FACILITY</u>	ENGINEERING	\$ 1,400,000	
	MANUFACTURING BLDG. (280,000 Sq. Ft. @ \$55/Sq. Ft.)	15,400,000	
	AUXILIARY STRUCT. (20,000 Sq. Ft. @ \$40/Sq. Ft.)	800,000	
	TANK FARM	500,000	
	OTHER (INC. PACKAGE BOILER/WASTE TREATMENT)	<u>2,900,000</u>	
	USEFUL LIFE-30 YRS - SUB TOTAL		\$21,000,000 (1980 \$) 22,470,000 (1981 \$)
<u>BUILDING FACILITIES</u>	CRANES, CONVEYORS AND SCRAP HANDLING	\$ 1,000,000	
	ELECTRICAL	1,200,000	
	HEATING/VENTILATION/AIR COMPRESSORS)	1,500,000	
	UTILITIES (INCLUDING FIRE PROTECTION)	2,000,000	
	OTHER	<u>1,000,000</u>	
	USEFUL LIFE-30 YRS - SUB TOTAL		\$ 6,700,000 (1980 \$) 7,102,000 (1981 \$)
<u>PLANT FACILITIES</u>	TOOL AND DIE ROOM	\$ 1,500,000	
	MATERIAL HANDLING EQUIPMENT	<u>1,000,000</u>	
	OTHER	300,000	
	USEFUL LIFE-12 YRS - SUB TOTAL		\$ 2,800,000 (1980 \$) 2,968,000 (1981 \$)
<u>MACHINERY & EQUIPMENT</u>	INJECTION MOLDING EQUIPMENT	\$ 3,000,000	
	METAL STAMPING (PRESS) EQUIPMENT	900,000	
	ASSEMBLY/TEST/CALIBRATION EQUIPMENT	5,100,000	
	ALL OTHER	<u>1,000,000</u>	
	USEFUL LIFE-12 YRS - SUB TOTAL		\$10,000,000 (1980 \$) 10,600,000 (1981 \$)
<u>LEVEL I</u>	TOTAL FACILITIES, EQUIPMENT AND TOOLING		\$42,000,000 (1980 \$) 44,640,000 (1981 \$)
PRE-PRODUCTION AND LAUNCH @ APPROXIMATELY 20%			\$ 8,400,000 (1980 \$) 8,928,000 (1981 \$)
TOTAL PROGRAM COST			\$50,400,000 (1980 \$) 52,568,000 (1981 \$)

Level III

DEPARTMENT AND PROCESS	MATERIAL	AREA SQ.FT. (000)			ANNUAL CAPACITY (000)		MAJOR CAPITAL EXPENDITURES (DOLLARS IN MILLIONS)			DIRECT LABOR		REMARKS
		LEVEL I	LEVEL II	LEVEL III	LEVEL I	LEVEL II	TOTAL	LEVEL I	LEVEL II			
										WORKING FORCE	LEVEL I	
INJECTION MOLD GRIND DRY HEAT INJECT	ACETAL, NYLON & POLYESTER RESIN FORMULATIONS		30		1,152			\$ 2.5/\$3.5 (3.0)		10/14 (12)	CAPACITY IS EQUIVALENT VEHICLE CAR SET	
METAL STAMPING OBLANK O STAMPING PRESS -PROGRESSIVE DIE -TRANSFER DIE	STEEL		6					\$ 0.7/\$1.1 (\$0.9)		6/10 (8)		
ASSEMBLY, TESTING & CALIBRATION			110					\$ 4.6/\$5.6 (\$5.1)		100/140 (120)		
OTHER M & E								\$0.8/\$1.2 (\$1.0)				
OMISC. SUPPORT LAND, BUILDING & FACILITIES			154					\$28.9/35.1 (\$32.0)				
										116/164 (140)	DIRECT LABOR	
										80/100 (90)	INDIRECT LABOR	
										20/30 (25)	SALARY	
	TOTALS		300		1,152			\$37.5/46.5 (\$42.0)*		216/294 (255)	TOTALS	

*Major capital expenditures adjusted for 1981 economics \$44,640,000.

NEW INSTRUMENTATION PLANT

AREA BREAKDOWN

MANUFACTURING BUILDING: 700 FT X 400 FT.

	<u>SQ.FT.</u>
MATERIAL STORAGE	34,000
INJECTION MOLDING	30,000
METAL STAMPING	6,000
ASSEMBLY	110,000
TOOL & DIE ROOM	20,000
MAINTENANCE & REPAIR	10,000
VENDING/REST ROOMS/LOCKERS	10,000
FINISHED PARTS SHIPPING & STORAGE	20,000
ADMINISTRATIVE OFFICE	6,000
ALL OTHER	
(INCLUDING UTILITIES/AIR COMPRESSOR/LABORATORIES)	34,000
	<u>280,000</u>
AUXILIARY STRUCTURES	20,000
	<u>300,000</u>
TOTAL	

PLANT LAYOUT

400,

700:

INSTRUMENTATION PLANT
TOTAL MANUFACTURING COST
(EXCLUDING MATERIAL)

PRODUCTION: 1,152,000 UNITS PER YEAR

MANPOWER:	240 DAYS	EMPLOYEES	ANNUAL HOURS	HRS/UNIT
- DIRECT LABOR	1920	140	268,800	.23
- INDIRECT - HOURLY	1920	90	172,800	.15
- INDIRECT - SALARY	2000	25	50,000	.04
		<u>255</u>	<u>491,600</u>	<u>.42</u>

ANNUAL HOURS ÷ 1,152,000 UNITS = HOURS PER UNIT = .42

WAGE & FRINGE COSTS:

- DIRECT LABOR	\$19.50	x	.23	=	\$4.49
- INDIRECT - HOURLY	\$21.50	x	.15	=	\$3.23
- INDIRECT - SALARY	\$23.50	x	.04	=	\$.94
					<u>\$8.66</u>

TOTAL WAGES & FRINGE COSTS

INVESTMENT: (1981\$)

	FACILITIES COST	DEPRECIATION	COST-PER-UNIT
- BUILDING & SUPPORT FACILITIES USEFUL LIFE - 30 YRS	\$22,470,000	749,000	\$.65
- BUILDING FACILITIES USEFUL LIFE - 30 YRS	\$ 7,102,000	236,733	\$.21
- PLANT FACILITIES USEFUL LIFE - 12 YRS	\$ 2,968,000	247,333	\$.21
- MACHINERY & EQUIPMENT USEFUL LIFE - 12 YRS	\$10,600,000	883,333	\$.77
			<u>\$1.84</u>

DEPRECIATION ÷ 1,152,000 UNITS = TOTAL DEPRECIATION PER UNIT = \$1.84

TAKES & INSURANCE AS PERCENT OF WAGE & FRINGE COST

T & I ESTIMATE OF 3.9% \$8.66 X 3.9% = \$.34

OTHER MANUFACTURING COST AS PERCENT OF WAGE & FRINGE COST

OME ESTIMATE OF 13.2% \$8.66 X 13.2% = \$1.14

TOTAL WAGE & FRINGE COSTS	\$ 8.66
TOTAL DEPRECIATION COSTS	\$ 1.84
TOTAL TAXES & INSURANCE	\$.34
TOTAL OME	\$ 1.14
	<u>\$11.98</u>

PLANT 34
FOAM, PAD AND SUPPORT PLANT

NEW FOAM, PAD AND SUPPORT PLANT - ASSUMPTIONS

PRODUCT

- CUSHION & BACK FOAM PADS
 - FRONT SEATS
 - REAR SEATS
- PAD SUPPORTS
 - CUSHIONS
- HEADRESTS
 - FRONT SEATS
- ARM RESTS
 - FRONT DOOR
 - REAR DOOR
 - QUARTER TRIM PANEL
- INSTRUMENT PANEL CRASH PAD

PRODUCTION RATES

- LEVEL I
 - TO PROVIDE THE ABOVE PRODUCTS TO TWO 75 PER HOUR CAR ASSEMBLY PLANTS
- LEVEL II
 - TO PROVIDE THE ABOVE PRODUCTS TO FOUR 75 PER HOUR CAR ASSEMBLY PLANTS

NEW FOAM, PAD AND SUPPORT PLANT - ASSUMPTIONS (CONT.)

OPERATING PATTERN

- STRAIGHT TIME

- THREE 8 HOUR SHIFTS PER DAY
 - 20 HOURS OF ACTUAL RUNNING TIME OF MACHINES & PRODUCTION LINES PER DAY
 - MAXIMUM PRACTICAL OVERTIME
- EVERY OTHER SATURDAY - THIS PATTERN RESULTS IN 10% ADDITIONAL PRODUCTION ANNUALLY.

NUMBER OF STRAIGHT TIME DAYS

- 245 DAYS PER YEAR - NOTE: IN THOSE YEARS WHEN THERE IS A MAJOR CHANGE TO THE PRODUCT, THE NUMBER OF PRODUCTION DAYS PER YEAR MAY BE REDUCED.

NEW FOAM, PAD AND SUPPORT PLANT
(NOMINAL ESTIMATE)

<u>LEVEL</u>	<u>LEVEL I</u>	<u>LEVEL II</u>
<u>LAND</u>		
	PURCHASE OF LAND (100 ACRES @ \$10,000/ACRE)	\$ 1,000,000
	SITE DEVELOPMENT	2,000,000
	SUB TOTAL	\$ 3,000,000
<u>BUILDING & SUPPORT FACILITY</u>		
	ENGINEERING	\$ 1,400,000
	MANUFACTURING BLDG. (.504M @ \$55/Sq. Ft.)	27,500,000
	POWER HOUSE	6,000,000
	WASTE TREATMENT	4,000,000
	TANK FARM	3,000,000
	OTHER (INC. OFFICES)	2,100,000
	USEFUL LIFE-30 YRS - SUB TOTAL	\$ 44,000,000
		+7% 47,080,000 (1980 \$)
		50,290,000 (1981 \$)
<u>BUILDING FACILITIES</u>		
	UNDERGROUND SERVICES	\$ 3,000,000
	UTILITIES (SEWER, WATER, GAS)	3,500,000
	HEATING AND VENTILATION	2,500,000
	ELECTRICAL	3,500,000
	USEFUL LIFE-30 YRS - SUB TOTAL	\$ 12,500,000
		+6% 13,250,000 (1980 \$)
		14,310,000 (1981 \$)
<u>PLANT FACILITIES</u>		
	TOOL & DIE AND MAINTENANCE	\$ 1,500,000
	CRANES AND CONVEYORS	2,500,000
	MATERIAL HANDLING EQUIPMENT	2,000,000
	OTHER	1,500,000
	USEFUL LIFE-12 YRS - SUB TOTAL	\$ 7,500,000
		+6% 7,950,000 (1980 \$)
		11,660,000 (1981 \$)
<u>MACHINERY & EQUIPMENT</u>		
	PAD MOLDING CENTERS INCLUDING CURING	\$ 20,000,000
	CLEANING AND TRIMMING	4,000,000
	SUB-ASSEMBLIES AND PAD ASSEMBLY	3,000,000
	SUPPORT EQUIPMENT	2,000,000
	CONTAINERS, RACKS AND BINS	1,000,000
	OTHER	2,000,000
	USEFUL LIFE-12 YRS - SUB TOTAL	\$ 26,000,000
		+6% 27,560,000 (1980 \$)
		41,340,000 (1981 \$)
<u>STORAGE BUILDING</u>		
	ENGINEERING	\$ 1,000,000
	STORAGE BUILDING	15,000,000
	(2 @ 0.125 MM @ 60/Sq. Ft. (COMPLETE BUILDING)	5,500,000
	AUTOMATIC STORAGE AND HANDLING	8,000,000
	OTHER	1,500,000
	USEFUL LIFE-30 YRS - SUB TOTAL	\$ 25,500,000
		+6% 27,030,000 (1980 \$)
		27,030,000 (1981 \$)
<u>LEVEL I</u>		
	TOTAL FACILITIES, EQUIPMENT AND TOOLING	\$139,000,000 (1980 \$)
		147,630,000 (1981 \$)
<u>PRE-PRODUCTION AND LAUNCH @ APPROXIMATELY 20%</u>		
		\$ 27,800,000 (1980 \$)
		29,526,000 (1981 \$)
	TOTAL PROGRAM COST	\$166,800,000 (1980 \$)
		177,560,000 (1981 \$)

NEW FOAM, PAD AND SUPPORT PLANT

PRODUCT	PIECES PER CAR	CARS PER DAY		UNITS PER DAY (PER HOUR)	
		LEVEL I	LEVEL II	LEVEL I	LEVEL II
FRONT SEATS					
- CONVENTIONAL BENCH					
• CUSHION	1	960	480 (24)	960 (48)	
• SPLIT BACK	2	960	960 (48)	1,920 (96)	
- SPLIT BENCH					
• CUSHION	2	480	480 (24)	960 (48)	
• BACK	2	480	480 (24)	960 (48)	
- BUCKET					
• CUSHION	2	1,440	1,440 (72)	2,880 (144)	
• BACK	2	1,440	1,440 (72)	2,880 (144)	
- FULL STAMPED					
• CUSHION	1	1,920	960 (48)	1,920 (96)	
• Back	1	1,920	960 (48)	1,920 (96)	
- ARM RESTS	2	4,800	4,800 (240)	9,600 (480)	
- HEAD RESTS	2	4,800	4,800 (240)	9,600 (480)	
REAR SEATS					
- CONVENTIONAL BENCH					
• CUSHION	1	1,440	720 (36)	1,440 (72)	
• SPLIT BACK	1	1,440	720 (36)	1,440 (72)	
- FULL STAMPED					
• CUSHION	1	1,440	720 (36)	1,440 (72)	
• Back	1	1,440	720 (36)	1,440 (72)	

NEW FOAM, PAD AND SUPPORT PLANT (CONT.)

PRODUCT	PIECES PER CAR	CARS PER DAY	UNITS PER DAY (PER HOUR)	
			LEVEL I	LEVEL II
- FOLD DOWN				
• CUSHION	1	1,920	960 (48)	1,920 (96)
• BACK	1	1,920	960 (48)	1,920 (96)
- ARM RESTS				
• REAR DOOR &				
QUARTER TRIM PANEL	2	4,800	4,800 (240)	9,600 (480)
- INSTRUMENT PANEL				
• CRASH PAD	1	4,800	2,400 (120)	4,800 (240)

OTHER

FACILITIES PLANNING AND PROCESS SUMMARY
(DATA) IS A NOMINAL ESTIMATE

Level III

DEPARTMENT AND PROCESS	MATERIAL	AREA SQ.FT. (000)			ANNUAL CAPACITY (000)			MAJOR CAPITAL EXPENDITURES (DOLLARS IN MILLIONS)			DIRECT LABOR WORKING FORCE		REMARKS
		LEVEL I	LEVEL II	LEVEL III	LEVEL I	LEVEL II	LEVEL III	LEVEL I	LEVEL II	TOTAL	LEVEL I	LEVEL II	
MOLDING CENTERS • FOAM POUR MACHINES • MOLDS • CURING FURNACE • CONVEYOR LINE	- VINYL SHEET			120	576	1,152		\$13.5/\$16.5 (\$15.0)	\$18.0/\$22.0 (\$20.0)		81/99 (90)	148/182 (165)	
	- URETHANE FOAM												
				40				\$ 2.7/\$3.3 (\$3.0)	\$ 3.6/\$4.4 (\$4.0)		36/44 (40)	68/82 (75)	
	- MOLDED URETHANE FOAM PADS, HEAD RESTS, ARM RESTS & CRASH PADS												
CLEANING & TRIMMING • CLEAN	- VINYL COVERS FOR HEAD RESTS ARM RESTS & CRASH PADS												
	- HEAD REST POSTS			50				\$ 2.7/\$3.3 (\$3.0)	\$ 4.5/\$5.5 (\$5.0)		81/99 (90)	162/198 (180)	
COMPONENTS & SUB ASSEMBLIES	- ARM REST SUPPORTS												
	- CRASH PAD SUPPORTS												
	- BORDER WIRE ASSEMBLIES												
	- INTEGRAL SUP- PORT WIRE ASSYS.												

FACILITIES PLANNING AND PROCESS SUMMARY (CONT.)
(DATA) IS A NOMINAL ESTIMATE

March 1982
Level III

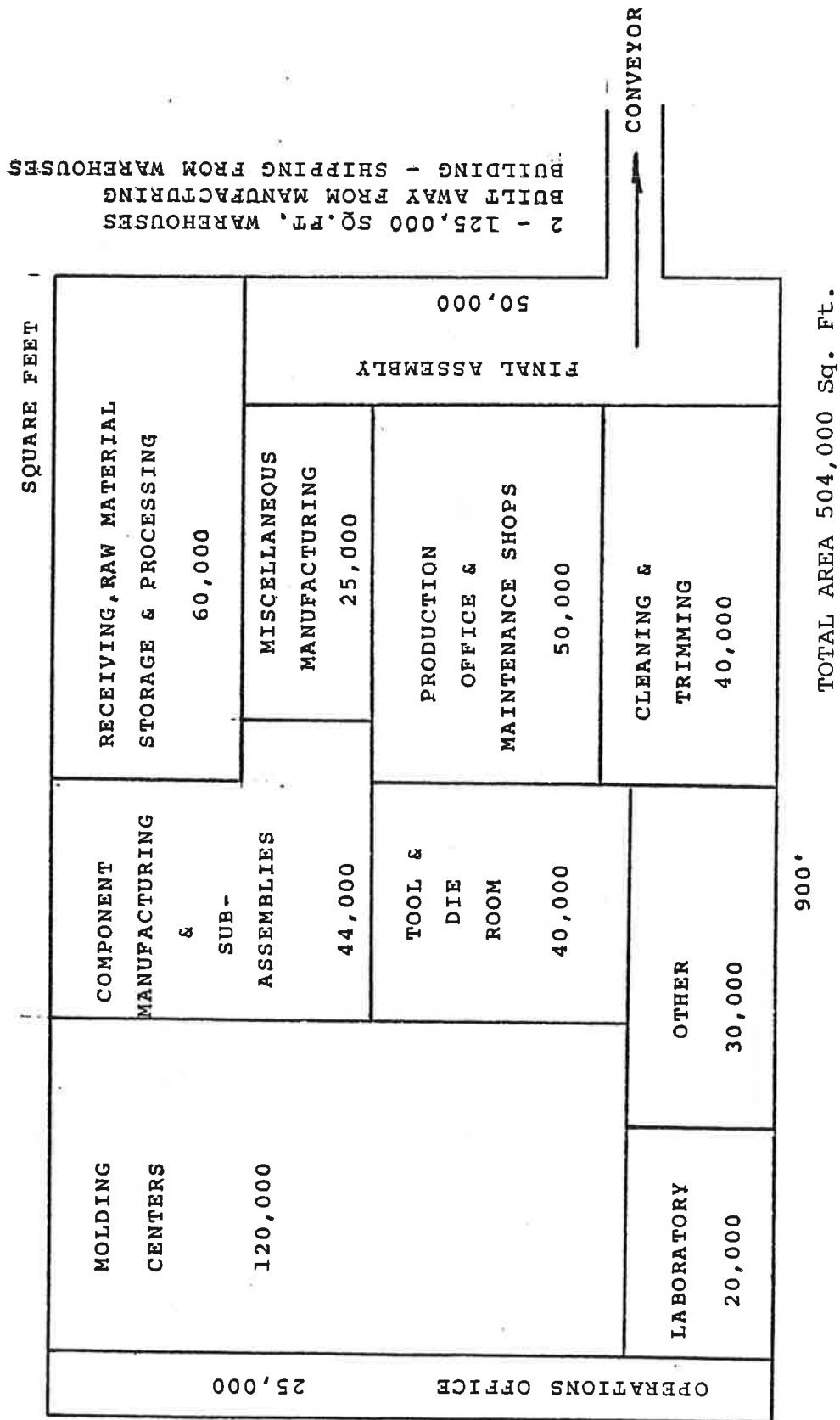
DEPARTMENT AND PROCESS	MATERIAL	AREA SQ.FT. (000)		ANNUAL CAPACITY (000)		MAJOR CAPITAL EXPENDITURES (DOLLARS IN MILLIONS)			DIRECT LABOR WORKING FORCE		REMARKS
		LEVEL I	LEVEL II	LEVEL I	LEVEL II	LEVEL I	LEVEL II	TOTAL	LEVEL I	LEVEL II	
MISCELLANEOUS MANUFACTURING	- FORMED WIRES		25			\$ 1.8/\$2.2 (\$2.0)	\$3.6/\$4.4 (\$4.0)		27/33 (30)	54/66 (60)	
	- WIRE COATING										
FINAL ASSEMBLY AND PACKAGING	- CRASH PAD		40						54/66 (60)	108/132 (120)	
	- HEAD REST										
OTHER	- ARM REST										
			30			\$ 2.7/\$3.3 (\$3.0)	\$5.4/\$6.6 (\$6.0)				
PLANT FACILITIES			195			\$18.0/\$22.0 (\$20.0)	\$22.0/\$27.0 (\$24.5)				
						\$41.9/\$51.1 (\$46.5)	\$45.0/\$55.0 (\$50.0)				
BUILDING AND LAND			250			\$13.5/\$16.5 (\$15.0)	\$22.9/\$28.1 (\$25.5)				
STORAGE AND SHIPPING									279/341 (310)	540/660 (600)	DIRECT LABOR
									162/198 (180)	250/310 (280)	INDIRECT LABOR
									72/88 (80)	110/130 (120)	SALARY
			750	576	1,152	\$96.8/\$118.2 (\$107.5)	\$125.0/\$153.0 (\$139.0) *		513/627 (570)	900/1,100 (1,000)	GRAND TOTALS

*Major capital expenditures adjusted for 1981 economics, \$116,040,000-Level I, \$147,630,000-Level II.

NEW FOAM, PAD AND SUPPORT PLANT

	<u>SQ.FT.</u>
<u>MANUFACTURING BUILDING (INCLUDING IN-PROCESS STORAGE)</u>	
MACHINES & EQUIPMENT (INCLUDING AISLE ALLOWANCE)	
PAD MOLDING CENTERS (12)	120,000
PAD CLEANING & TRIMING	40,000
PAD COMPONENTS & SUB-ASSEMBLIES	44,000
FINAL ASSEMBLY, REPAIR & PACKAGING	50,000
MISCELLANEOUS PRODUCTION	25,000
RECEIVING, STORAGE AND RAW MATERIAL PROCESSING	60,000
TOOL & DIE ROOM AND DIE MAINTENANCE	40,000
PRODUCTION OFFICES AND PLANT MAINTENANCE SHOPS	50,000
LABS - TESTING & QUALITY CONTROL	20,000
OPERATIONS OFFICES	25,000
OTHER	30,000
	<u>504,000</u>
<u>FINISHED STORAGE & SHIPPING BUILDINGS</u>	
TWO @ 125,000 EACH	250,000
	<u>754,000</u>
<u>SUPPORT BUILDINGS</u>	
	25,000
	<u>779,000</u>
TOTAL MANUFACTURING	
GRAND TOTAL	

NEW FOAM, PAD AND SUPPORT PLANT



PLANT 35
SEAT FRAME AND SPRING PLANT

NEW SEAT FRAME & SPRING PLANT - ASSUMPTIONS

PRODUCT

SEAT FRAME & SPRING ASSEMBLIES

● FRONT SEAT

BUCKET

BENCH

SPLIT BENCH

● REAR SEAT

BENCH

FOLD DOWN BACK OPTION

TWO ENGINEERING DESIGN CONCEPTS

● CONVENTIONAL FRAME & FORMED WIRE ASSEMBLY

FRAME DESIGN CAN BE A COMBINATION OF STAMPED & ROLL FORMED PARTS

○ MULTI-PIECE FULLY STAMPED ASSEMBLY

SEAT FRAMING & SUPPORT AREA ARE INTEGRATED INTO A COMMON COMPONENT.

DEPENDING ON SPECIFIC APPLICATION CUSHION & BACK MAY BE ASSEMBLED

AS A SINGLE UNIT.

PRODUCTION RATE

PLANT IS SIZED TO FURNISH 1,152,000 EQUIVALENT CAR SET REQUIREMENTS ON AN

ANNUAL STRAIGHT TIME BASIS.

OPERATING PATTERN

NORMAL OPERATING PATTERN

○ FABRICATION - TWO (8) HOUR SHIFTS PER DAY

○ ASSEMBLY - TWO (8) HOUR SHIFTS PER DAY

○ 240 DAYS PER YEAR

NEW SEAT FRAME & SPRING PLANT - ASSUMPTIONS

OPERATING PATTERN (Continued)

OVERTIME (AS REQUIRED)

- 9TH HOUR - 12.5%
- ALTERNATE SATURDAYS - 10%

FACILITIES & EQUIPMENT

METAL STAMPING

- AUTOMATIC PRESS EQUIPMENT & TRANSFER DIE PROCESSING FOR SELECTED PARTS.
- AUTOMATED FEED (BLANK DESTACKER) & MECHANICAL HANDLING (PART TRANSFER & UNLOAD) DEVICES FOR STAMPING PRESS OPERATIONS.

METAL FORMING

- AUTOMATED OFF-SET & FORMED WIRE FABRICATION

ASSEMBLY

- MANUAL (SINGLE GUN), MULTI POINT RESISTANCE (AUTOMATIC) AND CO₂ WELDING PAINT

- WATER BASE/DIP PROCESS

- SELECTED USE OF SPRAY EQUIPMENT AS REQUIRED

NEW SEAT FRAME & SPRING PLANT
FACILITY COST - NOMINAL ESTIMATE

<u>LEVEL II</u>			
<u>LAND</u>			
	PURCHASE LAND(50 ACRES @ \$10,000/ACRE)	\$ 500,000	
	SITE DEVELOPMENT	1,000,000	
	SUB TOTAL		\$ 1,500,000
<u>BUILDING & SUPPORT FACILITY</u>			
	ENGINEERING	\$ 1,500,000	
	MANUFACTURING BLDG. (300,000 Sq. Ft. @ \$55/Sq. Ft.)	16,500,000	
	AUXILIARY STRUCTURES (10,000 Sq. Ft. @ \$40/Sq. Ft.)	400,000	
	TANK FARM (INC. PAINT MIX)	600,000	
	OTHER (INC. PACKAGE BOILER/WASTE TREATMENT)	2,500,000	
	USEFUL LIFE-30 YRS - SUB TOTAL		\$21,500,000 (1980 \$)
		+7%	23,005,000 (1981 \$)
<u>BUILDING FACILITIES</u>			
	CRANES, CONVEYORS AND SCRAP HANDLING	\$ 2,500,000	
	ELECTRICAL	1,500,000	
	HEATING/VENTILATION/AIR COMPRESSORS	1,200,000	
	UTILITIES (INC. FIRE PROTECTION)	2,000,000	
	OTHER	1,000,000	
	USEFUL LIFE-30 YRS - SUB TOTAL		+6% \$ 7,700,000 (1980 \$)
			8,162,000 (1981 \$)
<u>PLANT FACILITIES</u>			
	TOOL AND DIE ROOM	\$ 1,800,000	
	MATERIAL HANDLING EQUIPMENT	1,000,000	
	OTHER	500,000	
	USEFUL LIFE-12 YRS - SUB TOTAL		+6% \$ 3,300,000 (1980 \$)
			3,498,000 (1981 \$)
<u>MACHINER & EQUIPMENT</u>			
	PRESS EQUIPMENT (INC. COIL HANDLING AND BLANKING)	\$ 7,500,000	
	WIRE FORMING	550,000	
	ROLL FORMING	350,000	
	ASSEMBLY (AUTOMATIC AND MANUAL)	4,000,000	
	PAINT FACILITIES	700,000	
	INSPECTION AND TEST EQUIPMENT	700,000	
	OTHER	1,200,000	
	USEFUL LIFE-12 YRS - SUB TOTAL		+6% \$15,000,000 (1980 \$)
			15,900,000 (1981 \$)
<u>LEVEL I</u>			
	TOTAL FACILITIES, EQUIPMENT AND TOOLING	\$49,000,000 (1980 \$)	
		52,065,000 (1981 \$)	
<u>PRE-PRODUCTION AND LAUNCH @ APPROXIMATELY 20%</u>			
		\$ 9,800,000 (1980 \$)	
		10,413,000 (1981 \$)	
	TOTAL PROGRAM COST	\$58,800,000 (1980 \$)	
		62,478,000 (1981 \$)	

FACILITIES PLANNING AND PROCESS SUMMARY
(DATA) IS A NOMINAL ESTIMATE

March 1982
Level III

DEPARTMENT AND PROCESS	MATERIAL	AREA SQ.FT. (000)		ANNUAL CAPACITY (000)		MAJOR CAPITAL EXPENDITURES (DOLLARS IN MILLIONS)		DIRECT LABOR WORKING FORCE		REMARKS
		LEVEL I	LEVEL II	LEVEL I	LEVEL II	LEVEL I	LEVEL II	LEVEL I	LEVEL II	
METAL STAMPING o BLANK o AUTOMATIC & LINE DIE STAMPING PRESS	STEEL & ALUMINUM	60		1,152		\$ 6.5/\$8.5 (\$7.51)		70/90 (80)		CAPACITY IS EQUIVALENT VEHICLE CAR SET
METAL FORMING o WIRE o ROLL ASSEMBLY	STEEL STEEL & ALUMINUM	20				\$ 0.7/\$1.1 (\$0.91)		12/16 (14)		
o MANUAL & AUTOMATIC WELDING o INSERT WIRE SPRINGS		60				\$ 3.5/\$4.5 (\$4.01)		230/290 (260)		
PAINT	WATER BASE	8				\$ 0.6/\$0.8 (\$0.7)		4/8 (6)		
OTHER M & E o MISC. SUPPORT o INSPECTION & TEST						\$ 1.7/\$2.1 (\$1.9)				
LAND, BUILDING AND FACILITIES		162				\$30.5/\$37.5 (\$34.0)				AREA IS BALANCE OF MFG. BLDG.
								316/404 (360)		DIRECT LABOR
								225/275 (250)		INDIRECT LABOR
								55/65 (60)		SALARY
		310		1,152		\$43.5/\$54.5 (\$49.0)*		596/744 (670)		TOTALS

*Major capital expenditures adjusted for 1981 economics \$52,065,000.

NEW SEAT FRAME & SPRING PLANT
AREA BREAKDOWN

<u>MANUFACTURING BUILDING:</u>	<u>600 FT X 500 FT</u>	<u>SQ.FT.</u>
MATERIAL STORAGE		20,000
METAL STAMPING		60,000
ROLL FORMING		6,000
WIRE FORMING		14,000
ASSEMBLY		60,000
PAINT		8,000
MATERIAL STORAGE		20,000
TOOL & DIE ROOM		20,000
MAINTENANCE & REPAIR		10,000
VENDING/REST ROOMS/LOCKERS		10,000
FINISHED PARTS SHIPPING		30,000
ADMINISTRATIVE OFFICE		10,000
ALL OTHER		
(INCLUDING UTILITIES/AIR COMPRESSOR/LABORATORIES)		32,000
AUXILIARY STRUCTURES		300,000
		10,000
TOTAL:		310,000

NEW SEAT FRAME & SPRING PLANT

PLANT LAYOUT

SQUARE FEET

MATERIAL STORAGE 20,000	ROLL FORM 6,000	WIRE FORMING 14,000	MAINT. & REPAIR 10,000	ALL OTHER 10,000
METAL STAMPING 60,000	ASSEMBLY 60,000			
MATERIAL STORAGE 20,000	TOOL AND DIE ROOM 20,000	LABS 12,000	PAINT 8,000	
ALL OTHER 10,000	VENDING REST ROOMS LOCKERS 10,000	ADMIN. OFFICE 10,000	FINISHED PARTS SHIPPING 30,000	

600'

TOTAL AREA: 300,000 SQ.FT.

SEAT FRAME AND SPRING
TOTAL MANUFACTURING COST
 (EXCLUDING MATERIAL)

PRODUCTION: 1,152,000 UNITS PER YEAR

<u>MANPOWER:</u>	<u>240 DAYS</u>	<u>EMPLOYEES</u>	<u>ANNUAL HOURS</u>	<u>HRS/UNIT</u>
- DIRECT LABOR	1920	360	691,200	.60
- INDIRECT - HOURLY	1920	250	480,000	.42
- INDIRECT - LABOR	2000	60	120,000	.10
		<u>670</u>	<u>1,291,200</u>	<u>1.12</u>

ANNUAL HOURS ÷ 1,152,000 UNITS = HOURS PER UNIT = 1.12

WAGE & FRINGE COSTS:

- DIRECT LABOR	\$19.50	x	.60	=	\$11.70
- INDIRECT - HOURLY	\$21.50	x	.42	=	\$ 9.03
- INDIRECT - SALARY	\$23.50	x	.10	=	\$ 2.35
	TOTAL WAGES & FRINGE COSTS				<u>\$23.08</u>

INVESTMENT: (1981\$)

	<u>FACILITIES COST</u>	<u>DEPRECIATION</u>	<u>COST-PER-UNIT</u>
- BUILDING & SUPPORT FACILITIES USEFUL LIFE - 30 YRS	\$23,005,000	766,833	\$.67
- BUILDING FACILITIES USEFUL LIFE - 30 YRS	\$ 8,162,000	272,066	.24
- PLANT FACILITIES USEFUL LIFE - 12 YRS	\$ 3,498,000	291,500	.25
- MACHINERY & EQUIPMENT USEFUL - 12 YRS	\$15,900,000	1,325,000	1.15
			<u>\$2.31</u>

DEPRECIATION ÷ 1,152,000 UNITS = TOTAL DEPRECIATION PER UNIT = \$2.31

TAXES & INSURANCE AS PERCENT OF WAGE & FRINGE COST

T & I ESTIMATE OF 3.9% \$23.08 X 3.9% = \$.90

OTHER MANUFACTURING COST AS PERCENT OF WAGE & FRINGE COST

OME ESTIMATE OF 13.2% \$23.08 X 13.2% = \$3.05

TOTAL WAGE & FRINGE COSTS \$23.08

TOTAL DEPRECIATION COSTS \$ 2.31

TOTAL TAXES & INSURANCE \$.90

TOTAL OME \$ 3.05

\$29.34

PLANT 36
FIBERGLASS REINFORCED PLASTIC PRODUCTS PLANT

NEW FIBERGLASS REINFORCED PLASTIC PRODUCTS PLANT - ASSUMPTIONS

PRODUCT

FIBERGLASS REINFORCED PLASTIC PANELS & COMPONENT PARTS

DESCRIPTION	APPLICATION
● FRONT GRILLE PANEL	PASSENGER CAR/SELECTED MODELS
● RADIATOR SUPPORT PANEL	PASSENGER CAR/ALL MODELS
● HOOD PANEL - OUTER	TRUCK - VAN & WAGON MODELS
● TAIL GATE PNL. - INNER & OUTER	PASSENGER CAR/STATION WAGON
● ROOF HEADLINER	PASSENGER CAR/ALL MODELS

PRODUCTION RATE

PLANT IS SIZED TO FURNISH 576,000 EQUIVALENT CAR SET REQUIREMENTS FOR PASSENGER CARS & 96,000 HOOD PANELS FOR COMPACT VAN & WAGON TRUCK REQUIREMENTS ON AN ANNUAL STRAIGHT TIME BASIS. IN ADDITION, SERVICE REQUIREMENTS AMOUNTING TO 10 PERCENT OF PRODUCTION VOLUME FOR SELECTED COMPONENTS CAN BE ACCOMMODATED.

OPERATING PATTERN

NORMAL OPERATING PATTERN - PRESS/ASSEMBLY/PAINT

- TWO (8) HOUR SHIFTS PER DAY
- 240 DAYS PER YEAR

OVERTIME (AS REQUIRED)

- 9TH HOUR - 12.5%
- ALTERNATE SATURDAYS - 10%

NORMAL OPERATING PATTERN - SHEET MOLDING COMPOUND FABRICATION

- THIRD SHIFT REQUIRED FOR LEVEL 11 VOLUME REQUIREMENTS.

NEW FIBERGLASS REINFORCED PLASTIC PRODUCTS PLANT
FACILITY COST - NOMINAL ESTIMATE

FACILITIES & EQUIPMENT

SHEET MOLDING COMPOUND (SMC) FABRICATION

- AUTOMATED RAW MATERIAL HANDLING & MIX CONTROL SYSTEM
- TEMPERATURE & HUMIDITY CONTROLLED MATURATION ROOM
(AVERAGE TIME THREE TO FIVE DAYS.)

MOLDING PRESS

- CURRENT STATE OF THE ART HYDRAULIC PRESS EQUIPMENT

ASSEMBLY

- SPECIAL FIXTURES & TOOLING FOR ADHESIVE BONDING OF INNER & OUTER
(TAILGATE) PANELS.

- HAND TOOLS/SPECIAL FIXTURES FOR ATTACHING MISCELLANEOUS BRACKETS

PAINT

- AUTOMATIC & MANUAL SPRAY APPLICATION OF PRIMER COAT.

NEW FIBERGLASS REINFORCED PLASTIC PRODUCTS PLANT - ASSUMPTIONS
(NOMINAL ESTIMATE)

<u>LEVEL II</u>	<u>LEVEL I</u>	<u>LEVEL II</u>
<u>LAND</u>		
PURCHASE LAND (30 ACRES @ \$10,000/ACRE)	\$ 300,000	\$ 300,000
SITE DEVELOPMENT	700,000	900,000
SUB TOTAL	\$ 1,000,000	\$ 1,200,000
<u>BUILDING & SUPPORT FACILITY</u>		
ENGINEERING	\$ 800,000	\$ 900,000
MANUFACTURING BLDG. (160,000 Sq.Ft. @ \$55/Sq.Ft.)	8,500,000	8,800,000
AUXILIARY STRUCTURES (10,000 Sq.Ft. @ \$40/Sq.Ft.)	400,000	400,000
TANK FARM/PACKAGE BOILER/WASTE TREATMENT	1,600,000	2,000,000
USEFUL LIFE-30 YRS - SUB TOTAL	\$11,300,000	\$12,100,000 (1980 \$)
	+7% 12,091,000	12,947,000 (1981 \$)
<u>BUILDING FACILITIES</u>		
CRANES, CONVEYORS AND SCRAP HANDLING	\$ 400,000	\$ 600,000
ELECTRICAL	600,000	800,000
HEATING/VENTILATION/AIR COMPRESSORS	1,000,000	1,500,000
UTILITIES (INC. FIRE PROTECTION)	1,000,000	1,400,000
OTHER	600,000	800,000
USEFUL LIFE-30 YRS - SUB TOTAL	\$ 3,600,000	\$ 5,100,000 (1980 \$)
	+6% 3,816,000	5,406,000 (1981 \$)
<u>PLANT FACILITIES</u>		
TOOL AND DIE ROOM	\$ 800,000	\$ 1,200,000
MATERIAL HANDLING EQUIPMENT	400,000	800,000
OTHER	400,000	600,000
USEFUL LIFE-12 YRS - SUB TOTAL	\$ 1,600,000	\$ 2,600,000 (1980 \$)
	+6% 1,696,000	2,756,000 (1981 \$)
<u>MACHINERY & EQUIPMENT</u>		
SMC FABRICATION AND HANDLING	\$ 2,000,000	\$ 2,000,000
MOLDING PRESS	9,500,000	17,500,000
ASSEMBLY	300,000	600,000
PAINT	3,500,000	4,500,000
INSPECTION AND TEST EQUIPMENT	400,000	600,000
OTHER	1,300,000	1,800,000
USEFUL LIFE-12 YRS - SUB TOTAL	\$17,000,000	\$27,000,000 (1980 \$)
	+6% 18,020,000	28,620,000 (1981 \$)
<u>LEVEL I</u>		
TOTAL FACILITIES, EQUIPMENT AND TOOLING	\$34,500,000	\$48,000,000 (1980 \$)
	36,623,000	50,929,000 (1981 \$)
PRE-PRODUCTION AND LAUNCH @ APPROXIMATELY 20%	\$ 6,900,000	\$ 9,600,000 (1980 \$)
	7,324,600	10,185,800 (1981 \$)
TOTAL PROGRAM COST	\$41,400,000	\$57,600,000 (1980 \$)
	43,947,600	61,114,800 (1981 \$)

FACILITIES PLANNING AND PROCESS SUMMARY

Level III

DEPARTMENT AND PROCESS	MATERIAL	AREA SQ.FT. (000)			ANNUAL CAPACITY (000)		MAJOR CAPITAL EXPENDITURES (DOLLARS IN MILLIONS)			DIRECT LABOR WORKING FORCE		REMARKS
		LEVEL I	LEVEL II	LEVEL III	LEVEL I	LEVEL II	LEVEL I	LEVEL II	TOTAL	LEVEL I	LEVEL II	
S.M.C. FABRICATION o BLENDING/ MIXING o ROLL ON SHEETING LINE o CURE IN TEMPERATURE & HUMIDITY CONTROLLED ENVIRONMENT	GLASS FIBER ROVING POLYESTER RESIN SELECTED FILLER MATERIAL & REACTIVE CHEMICALS		15		288,000 48,000	576,000 96,000	\$ 1.8/\$2.2 (\$2.0)	-0-	\$ 1.8/\$2.2 (\$2.0)	6/10 (8)	12/16 (14)	CAPACITY IS EQUIVALENT CAR SETS FOR PASS.CAR & HOOD PANELS FOR COMPACT VAN & WAGON TRUCK.
MOLDING PRESS o CUT SMC SHEET TO 'BLANK' SIZE o PLACE SHEET IN DIE o APPLY COATING/ LAMINATE AS REQUIRED o TRIM AS REQ'D			25				\$ 8.5/10.5 (\$9.5)	\$ 7.0/9.0 (\$8.0)	\$15.5/19.5 (\$17.5)	27/33 (30)	50/62 (56)	
ASSEMBLY o ADHESIVE BOND INNER & OUTER PANELS o ATTACH MISC. BRACKETS			10				\$ 0.2/\$0.4 (\$0.3)	\$ 0.2/\$0.4 (\$0.3)	\$0.4/\$0.8 (\$0.6)	8/12 (10)	14/22 (18)	
PAINT o PREPARE SURFACE o APPLY PRIMER			8				\$ 3.0/\$4.0 (\$3.5)	\$ 0.8/\$1.2 (\$1.0)	\$ 3.8/\$5.2 (\$4.5)	3/5 (4)	6/10 (8)	
OTHER M & E o MISC.SUPPORT o INSPECTION & TEST							\$ 1.5/\$1.9 (\$1.7)	\$ 0.5/\$0.9 (\$0.7)	\$ 2.0/\$2.8 (\$2.4)			

FACILITIES PLANNING AND PROCESS SUMMARY
(DATA) IS A NOMINAL ESTIMATE

March 1982

Level III

DEPARTMENT AND PROCESS	MATERIAL	AREA SQ.FT. (000)		ANNUAL CAPACITY (000)		MAJOR CAPITAL EXPENDITURES (DOLLARS IN MILLIONS)			DIRECT LABOR WORKING FORCE		REMARKS
		LEVEL I	LEVEL II	LEVEL I	LEVEL II	LEVEL I	LEVEL II	TOTAL	LEVEL I	LEVEL II	
LAND BUILDING & FACILITIES			102			\$15.5/\$19.5 (\$17.5)	\$ 3.0/\$4.0 (\$3.5)	\$18.5/\$23.5 (\$21.0)			AREA IS BALANCE OF MFG. BLDG.
									44/60 (52)	82/110 (96)	DIRECT LABOR
									34/46 (40)	60/80 (70)	INDIRECT LABOR
									12/18 (15)	15/25 (20)	SALARY
	TOTALS		160	576,000 96,000		\$30.5/\$38.5 (\$34.5)*	\$11.5/\$15.5 (\$13.5)	\$42.0/\$54.0 (\$48.0)*	90/124 (107)	157/215 (186)	TOTALS

*Major capital expenditures adjusted for 1981 economics \$36,623,000-Level I, \$50,929,000-Total

NEW FIBERGLASS REINFORCED PLASTIC PRODUCTS PLANT
AREA BREAKDOWN

<u>MANUFACTURING BUILDING:</u>	<u>400 FT X 400 FT.</u>	
MATERIAL STORAGE		SQ.FT.
SMC FABRICATION (INCLUDING MATURATION)		10,000
MOLDING PRESS		15,000
ASSEMBLY		25,000
PAINT		10,000
MATERIAL STORAGE		8,000
TOOL & DIE ROOM		10,000
MAINTENANCE & REPAIR		15,000
VENDING/REST ROOMS/LOCKERS		10,000
FINISHED PARTS SHIPPING		5,000
ADMINISTRATIVE OFFICE		20,000
ALL OTHER (INCLUDING UTILITIES/AIR COMPRESSOR/LABORATORIES)		5,000
		27,000
		160,000
AUXILIARY STRUCTURES		
		10,000
		170,000
	TOTAL	

SUB TOTAL

NEW FIBERGLASS REINFORCED PLASTIC PRODUCTS PLANT
PLANT LAYOUT

SQ. FT.				
MATERIAL STORAGE 10,000	S. M. C. FABRICATION 15,000	MAINTENANCE & REPAIR 10,000	ALL OTHER	
MOLDING PRESS 25,000		TOOL & DIE ROOM 15,000		
PAIN T 8,000	ASSEMBLY 10,000	MATERIAL STORAGE 10,000	ALL OTHER 27,000	
FINISHED PARTS SHIPPING 20,000		VENDING/ REST ROOMS/ LOCKERS/ ADMIN. OFFICE 10,000		
400'				

TOTAL AREA : 160,000 SQ. FT.

FIBERGLASS REINFORCED PLASTIC PRODUCTS PLANT
TOTAL MANUFACTURING COST
 (EXCLUDING MATERIAL)

<u>PRODUCTION:</u>	336,000	UNITS PER YEAR			
<u>MANPOWER:</u>		<u>240 DAYS</u>	<u>EMPLOYEES</u>	<u>ANNUAL HOURS</u>	<u>HRS/UNIT</u>
- DIRECT LABOR		1920	52	101,920	.30
- INDIRECT - HOURLY		1920	40	76,800	.23
- INDIRECT - SALARY		2000	15	30,000	.09
			<u>107</u>	<u>208,720</u>	<u>.62</u>
ANNUAL ÷ 336,000 UNITS = HOURS PER UNIT = .62					
<u>WAGE & FRINGE COSTS:</u>					
- DIRECT LABOR	\$19.50	x	.30	=	\$ 5.85
- INDIRECT - HOURLY	\$21.50	x	.23	=	\$ 4.95
- INDIRECT - SALARY	\$23.50	x	.09	=	\$ 2.12
	TOTAL WAGE & FRINGE COSTS				\$12.92
<u>INVESTMENT: (1981\$)</u>				<u>FACILITIES COST</u>	<u>DEPRECIATION</u>
- BUILDING & SUPPORT FACILITIES USEFUL LIFE - 30 YRS				\$12,091,000	403,033
- BUILDING FACILITIES USEFUL LIFE - 30 YRS				\$ 3,816,000	127,200
- PLANT FACILITIES USEFUL LIFE - 12 YRS				\$ 1,696,000	141,333
- MACHINERY & EQUIPMENT USEFUL LIFE - 12 YRS				\$18,020,000	1,501,666
					<u>\$1.20</u>
					<u>.38</u>
					<u>.42</u>
					<u>4.47</u>
					<u>\$6.47</u>

DEPRECIATION ÷ 336,000 UNITS = TOTAL DEPRECIATION PER UNIT = \$6.47

TAXES & INSURANCE AS PERCENT OF WAGE & FRINGE COST
 T & I ESTIMATE OF 3.9% \$12.92 X 3.9% = \$.50
 OTHER MANUFACTURING COST AS PERCENT OF WAGE & FRINGE COST
 OME ESTIMATE OF 13.2% \$12.92 X 13.2% = \$1.71
 TOTAL WAGE & FRINGE COSTS \$12.92
 TOTAL DEPRECIATION COSTS \$ 6.47
 TOTAL TAXES & INSURANCE \$.50
 TOTAL OME \$ 1.71
\$21.60

PLANT NO. 37
MANUAL TRANSMISSION PLANT

RWD MANUAL TRANSMISSION PLANT ASSUMPTIONS

PRODUCT

- 4 & 5 SPEED MANUAL TRANSMISSION FOR REAR WHEEL DRIVE LIGHT DUTY TRUCKS.
- FULLY SYNCHRONOUS IN ALL FORWARD GEARS.
- INTEGRAL CLUTCH HOUSING
- TWO EXTENSIONS UTILIZED TO MATCH PRODUCT USAGE.
- TWO BACK OF BLOCK CONFIGURATIONS TO MATCH ENGINE USAGE.
- 240 & 270 MM CLUTCH ASSEMBLIES
- INCLUDES CLUTCH PEDAL AND LINKAGE ASSEMBLIES

PRODUCTION
RATE

- PLANT SIZED FOR 400,000 TRANSMISSIONS ANNUALLY-STRAIGHT TIME BASIS.
 - 300,000 4 SPEED
 - 100,000 5 SPEED
 - 250,000 240 MM CLUTCH ASSEMBLIES
 - 150,000 270 MM CLUTCH ASSEMBLIES
 - 400,000 FLYWHEELS AND RING GEARS
- 1,632 TRANSMISSIONS PER DAY
- 102 TRANSMISSION ASSEMBLIES PER HOUR - TWO SHIFT BASIS.
- AT MAXIMUM PRACTICAL OVERTIME - CAPACITY 440,000 UNITS PER YEAR (10% OVERTIME)

PLANT ASSUMPTIONS

OPERATING

PATTERN

- STRAIGHT TIME

- ASSEMBLY OPERATIONS - TWO EIGHT HOUR SHIFTS PER DAY
 - MACHINING OPERATIONS - THREE EIGHT HOUR SHIFTS PER DAY
- OVERTIME
- EVERY OTHER SATURDAY (8 HOURS PER SHIFT)

NUMBER OF DAYS

STRAIGHT TIME

- 245 DAYS PER YEAR - NOTE: IN THOSE YEARS WHEN THERE IS A MAJOR CHANGE TO THE TRANSMISSION, THE NUMBER OF PRODUCTION DAYS PER YEAR MAY BE REDUCED SIGNIFICANTLY.

NEW RWD MANUAL TRANSMISSION PLANT (NOMINAL ESTIMATE)

<u>LEVEL I</u>		<u>LEVEL II</u>
<u>LAND</u>		
	PURCHASE OF LAND (120 ACRES @ \$10,000/ACRE)	\$ 1,200,000
	SITE DEVELOPMENT	2,000,000
	SUB TOTAL	\$ 3,200,000
<u>BUILDING & SUPPORT FACILITIES</u>		
	ENGINEERING	\$ 1,900,000
	MANUFACTURING BUILDING (0.69M Sq. Ft. @ \$55/Sq. Ft.)	38,000,000
	POWER HOUSE - BOILERS & COMPRESSORS	8,000,000
	WASTE TREATMENT	5,000,000
	TANK FARM	1,500,000
	OTHER (INCLUDING OFFICES)	2,600,000
	- USEFUL LIFE 30 YRS - SUB TOTAL	\$ 57,000,000 (1980 \$) 60,990,000 (1981 \$)
<u>BUILDING FACILITIES</u>		
	CENTRAL COOLANT SYSTEM	\$ 3,500,000
	ELECTRICAL	5,000,000
	HEAT AND VENTILATING	3,000,000
	HEAT TREAT EQUIPMENT	6,000,000
	UNDERGROUND SERVICES	2,500,000
	BUILDING UTILITIES	2,500,000
	- USEFUL LIFE 30 YRS - SUB TOTAL	\$ 22,500,000 (1980 \$) 23,850,000 (1981 \$)
<u>PLANT FACILITIES</u>		
	TOOL ROOM CUTTER GRIND & MAINTENANCE	\$ 6,000,000
	AUTOMATIC STORAGE SYSTEM	4,000,000
	MATERIAL HANDLING EQUIPMENT	2,500,000
	WASHERS	4,000,000
	OTHER	2,800,000
	- USEFUL LIFE 12 YRS - SUBTOTAL	\$ 19,300,000 (1980 \$) 20,458,000 (1981 \$)
<u>MACHINERY & EQUIPMENT</u>		
	TRANSFER LINES	\$ 17,500,000
	TRANSMISSION MACHINING	44,000,000
	TRANSMISSION ASSEMBLY & TESTING	7,000,000
	CLUTCH DETAILS & ASSEMBLY PRODUCTION	8,000,000
	CLUTCH PEDAL & LINKAGE	2,000,000
	FLYWHEEL & RING GEAR	6,000,000
	CONTAINERS & RACKS	3,000,000
	OTHER	2,500,000
	- USEFUL LIFE 12 YRS - SUB TOTAL	\$ 90,000,000 (1980 \$) 95,400,000 (1981 \$)
<u>LEVEL I</u>		
	TOTAL FACILITIES, EQUIPMENT AND TOOLING	\$192,000,000 (1980 \$) 203,898,000 (1981 \$)
	PRE-PRODUCTION AND LAUNCH @ APPROXIMATELY 20%	\$ 38,400,000 (1980 \$) 40,779,600 (1981 \$)
	TOTAL PROGRAM COST	\$203,400,000 (1980 \$) 244,677,600 (1981 \$)

FACILITIES PLANNING AND PROCESS SUMMARY (DATA) IS A NOMINAL ESTIMATE

DATE March 1982
Level III

DEPARTMENT AND PROCESS	MATERIAL	AREA SQ. FT. (000)		ANNUAL CAPACITY (000)	MAJOR CAPITAL EXPENDITURES (DOLLARS IN MILLIONS)			DIRECT LABOR WORKING FORCE		REMARKS
		LEVEL I	LEVEL II		LEVEL I	LEVEL II	TOTAL	LEVEL I	LEVEL II	
FOUR & FIVE MANUAL TRANSMISSION • MACHINING -CASES -EXTENSIONS -SHAFTS -GEARS	ALUMINUM		70				\$12.6/\$15.4 (\$14.0)	54/66 (60)	54/66 (60)	
	ALUMINUM		30				\$ 3.2/\$3.8 (\$3.5)	9/11 (10)	9/11 (10)	
	STEEL		40				\$ 6.8/\$8.2 (\$7.5)	29/35 (32)	29/35 (32)	
	CAST IRON & STEEL		90				\$20.3/24.7 (\$22.5)	113/139 (126)	113/139 (126)	
	CAST IRON & STEEL		30				\$ 7.2/8.8 (\$8.0)	29/35 (32)	29/35 (32)	
- FLYWHEEL & & RING GEAR - MISCELLANEOUS	CAST IRON & STEEL		25				\$ 5.4/\$6.6 (\$6.0)	76/92 (84)	76/92 (84)	
	ALUMINUM, CAST IRON & STEEL		25				\$ 5.4/\$6.6 (\$6.0)	38/46 (42)	38/46 (42)	
	STEEL		15				\$5.4/\$6.6 (\$6.0)	36/44 (40)	36/44 (40)	
	STEEL									
	STEEL									
• STAMPING -CLUTCH PLATES -DISC -CLUTCH COVERS -PRESSURE PLATES -BRACKETS -CLUTCH PEDAL -COVERS -MISC.	STEEL									
	STEEL									
	STEEL									
	STEEL									
	STEEL									

FACILITY TYPE/PRODUCT: RWD MANUAL TRANSMISSION PLANT

FACILITIES PLANNING AND PROCESS SUMMARY (DATA) IS A NOMINAL ESTIMATE

DATE March 1982
Level III

DEPARTMENT AND PROCESS	MATERIAL	AREA SQ.FT. (000)		ANNUAL CAPACITY (000)		MAJOR CAPITAL EXPENDITURES (DOLLARS IN MILLIONS)		DIRECT LABOR WORKING FORCE		REMARKS
		LEVEL I	LEVEL II	LEVEL I	LEVEL II	LEVEL I	LEVEL II	LEVEL I	LEVEL II	
• HEAT TREAT -GEARS -SHAFTS -RINGS	ANNEAL, CARBURIZING, & INDUCTION HARDENING		50					32/40 (36)	32/40 (36)	
• TRANSMISSION ASSEMBLY & TEST			80					201/247 (224)	201/247 (224)	
• CLUTCH ASSEMBLY			6					36/44 (40)	36/44 (40)	
• SHIFT LINKAGE AND CLUTCH PEDAL ASSEMBLY			4					18/22 (20)	18/22 (20)	
• PLANT FACILITIES			226							
• MATERIAL HANDLING & OTHER										
• LAND & BUILDING										731,000 SQ.FT.TOTAL BUILDINGS
										DIRECT LABOR
										INDIRECT LABOR
										SALARY
TOTALS			691		400					TOTALS
						\$172.8/ \$211.2 (\$192.0)*			1,328/ 1,624 (1,476)	

FACILITY TYPE: RWD MANUAL TRANSMISSION PLANT

*Major capital expenditures 034-24-1 0 000-

NEW RWD MANUAL TRANSMISSION PLANT

(SQ.FT.)

MANUFACTURING BUILDING

	<u>AREA</u>
MACHINE & EQUIPMENT (INCLUDING AISLE ALLOWANCE)	
TRANSFER LINES (CASES & EXTENSIONS)	100,000
SHAFTS	40,000
GEARS	90,000
SYNCHRONIZERS	30,000
CLUTCH, FLYWHEEL & SHIFT LINKAGE	35,000
STAMPINGS	15,000
MISCELLANEOUS	25,000
TRANSMISSION ASSEMBLY & TEST	80,000
HEAT TREAT	50,000
RECEIVING AND SHIPPING	75,000
TOOL ROOM AND CUTTER GRIND	30,000
PRODUCTION OFFICE AND MAINTENANCE	50,000
LABORATORY	15,000
OTHER	31,000
OPERATIONS OFFICES	25,000
12 Bays @ 60' = 720' x 24' Bays @ 40' = 960'	TOTAL 691,000
AUXILIARY	40,000
	GRAND TOTAL 731,000

NEW RWD MANUAL TRANSMISSION PLANT

400,000 UNITS PER YEAR

1,633 UNITS PER DAY

(SQ.FT.)

<u>SHIPPING & RECEIVING</u> 35,000		<u>SHAFTS</u> 40,000	
<u>GEARS</u> 90,000	<u>HEAT TREAT</u> 50,000	<u>SYNCHRONIZERS</u> 30,000	<u>STAMPING</u> 15,000
		<u>CLUTCH FLYWHEEL</u> 35,000	
<u>PRODUCTION OFFICE & MAINTENANCE</u> <u>TOOL ROOM & CUTTER GRIND</u> 80,000		<u>& SHIFT LINKAGE</u> 35,000	
<u>TRANSFER LINES</u> 100,000		<u>TRANSMISSION ASSEMBLY & TEST</u> 80,000	
<u>LABS</u> 15,000	<u>OTHER</u> 31,000	<u>SHIPPING</u> 40,000	
<u>OPERATIONS OFFICE</u> 25,000		<u>MISCELLANEOUS</u> 25,000	

960'

MANUAL TRANSMISSION PLANT
TOTAL MANUFACTURING COST
(EXCLUDING MATERIAL)

PRODUCTION: 400,000 UNITS PER YEAR

<u>MANPOWER:</u>	<u>245 DAYS</u>	<u>EMPLOYEES</u>	<u>ANNUAL HOURS</u>	<u>HRS/UNIT</u>
- DIRECT LABOR	- 1960 -	746	1,462,160	3.66
- INDIRECT - HOURLY	- 1960 -	440	862,400	2.16
- INDIRECT - SALARY	- 2000 -	290	580,000	1.45
		<u>1476</u>	<u>2,904,560</u>	<u>7.27</u>

ANNUAL HOURS ÷ 400,000 UNITS = HRS PER UNIT = 7.27

WAGE & FRINGE COSTS:

- DIRECT LABOR	\$19.50	X	3.66	=	\$71.37
- INDIRECT - HOURLY	\$21.50	X	2.16	=	\$46.44
- INDIRECT - SALARY	\$23.50	X	1.45	=	\$30.08
					<u>\$147.89</u>

INVESTMENTS: (1981\$)

	<u>FACILITIES COST</u>	<u>DEPRECIATION</u>	<u>COST-PER-UNIT</u>
- BUILDING & SUPPORT FACILITIES USEFUL LIFE - 30 YRS	\$60,990,000	2,033,000	\$5.08
- BUILDING FACILITIES USEFUL LIFE - 30 YRS	\$23,850,000	795,000	1.99
- PLANT FACILITIES USEFUL LIFE - 12 YRS	\$20,458,000	1,704,833	4.26
- MACHINERY & EQUIPMENT USEFUL LIFE - 12 YRS	\$95,400,000	7,950,000	19.88
			<u>\$31.21</u>

DEPRECIATION ÷ 400,000 UNITS = TOTAL DEPRECIATION PER UNIT = \$31.21

TAXES & INSURANCE AS PERCENT OF WAGE & FRINGE COST

T & I ESTIMATE OF 3.9% \$147.89 X 3.9% = \$5.77

OTHER MANUFACTURING COST AS PERCENT OF WAGE & FRINGE COST

OME ESTIMATE OF 13.2% \$147.89 X 13.2% = \$19.52

TOTAL WAGE & FRINGE COST	\$147.89
TOTAL DEPRECIATION COST	\$ 31.21
TOTAL TAXES & INSURANCE	\$ 5.77
TOTAL OME	\$ 19.52
	<u>\$204.39</u>

PLANT NO. 38
FRAME PLANT

NEW HEAVY STRUCTURAL STAMPING PLANT ASSUMPTIONS

PRODUCTS

- o FULL FRAME ASSEMBLIES FOR CONVENTIONAL REAR WHEEL DRIVE PASSENGER CAR & LIGHT TO MEDIUM DUTY TRUCK MODELS IN BOTH RWD & 4 WD DESIGNS.

PASSENGER CAR - (ONE) ASSEMBLY
TRUCK - (FOUR) RWD & (TWO) 4 WD ASSEMBLIES. ALL TRUCK
ASSEMBLIES SHARE CERTAIN PART COMMONALITY.

OPERATING
PATTERN

- o NORMAL OPERATING PATTERN

TWO (8) HOUR SHIFTS PER DAY
245 DAYS PER YEAR

- o OVERTIME

9TH HOUR - 12.5%
ALTERNATE SATURDAYS - 10%

PRODUCTION

- o PLANT IS SIZED TO PRODUCE 400,000 COMPLETE ASSEMBLIES ANNUALLY ON A STRAIGHT TIME BASIS.

FACILITIES &
EQUIPMENT

- o PRODUCT MIX ABOUT 75% PASSENGER CAR/25% TRUCK
- o CONVENTIONAL (NON AUTOMATED) DIE CHANGE
- o ELECTRO DEPOSITION PAINT FACILITIES.

**FACILITIES PLANNING
NEW HEAVY STRUCTURAL STAMPING PLANT
(NOMINAL ESTIMATE)**

			LEVEL I	LEVEL II
<u>LEVEL II</u>				
<u>LAND</u>				
	PURCHASE LAND (50 ACRES @ \$10,000/ACRE)	\$ 500,000		
	SITE DEVELOPMENT	1,500,000		
	SUB TOTAL			\$ 2,000,000
<u>BUILDING & SUPPORT FACILITIES</u>				
	ENGINEERING	\$ 1,100,000		
	MANUFACTURING BLDG. (450,000 Sq. Ft. @ \$90/Sq. Ft.)	40,500,000		
	POWER HOUSE - BOILERS & COMPRESSORS	6,000,000		
	SCRAP BAILER	400,000		
	WASTE TREATMENT	7,000,000		
	MISC. OTHER	3,000,000		
	- USEFUL LIFE-30 YRS - SUB TOTAL		+7%	\$58,000,000 (1980 \$) 62,060,000 (1981 \$)
<u>BUILDING FACILITIES</u>				
	ELECTRICAL	\$ 2,500,000		
	CRANES, CONVEYORS & SCRAP HANDLING	5,000,000		
	UTILITIES (SEWER, WATER & GAS)	2,500,000		
	HEATING & VENTILATING	1,500,000		
	- USEFUL LIFE-30 YRS - SUB TOTAL		+6%	\$11,500,000 (1980 \$) 12,190,000 ((1981 \$)
<u>PLANT FACILITIES</u>				
	TOOL & DIE ROOM	\$ 4,000,000		
	MATERIAL HANDLING EQUIPMENT	2,000,000		
	MISC. OTHER (INCL. IN PLANT CONTAINERS & RACKS)	1,500,000		
	- USEFUL LIFE-12 YRS - SUB TOTAL		+6%	\$ 7,500,000 (1980 \$) 7,950,000 (1981 \$)
<u>MACHINERY & EQUIPMENT</u>				
	BLANKER & AUTOMATIC PRESS	\$ 3,500,000		
	MAJOR PRESS (INCLUDING SIDE RAIL LINE)	43,500,000		
	FLOOR MOUNTED PRESS EQUIPMENT	1,000,000		
	ASSEMBLY EQUIPMENT (MANUAL & AUTOMATIC)	10,000,000		
	INSPECTION & TEST EQUIPMENT	2,000,000		
	PAINT FACILITIES	6,000,000		
	MISC. OTHER	4,000,000		
	- USEFUL LIFE-12 YRS - SUB TOTAL		+6%	\$70,000,000 (1980 \$) 74,200,000 (1981 \$)
<u>LEVEL I</u>				
	TOTAL FACILITIES, EQUIPMENT AND TOOLING			\$149,000,000 (1980 \$) 158,400,000 (1981 \$)
	PRE-PRODUCTION AND LAUNCH @ APPROXIMATELY 20%			29,800,000 (1980 \$) 31,680,000 (1981 \$)
	TOTAL PROGRAM COST			\$178,800,000 (1980 \$) 190,080,000 (1981 \$)

CAPACITY LEVEL I 400,000

FACILITIES PLANNING
(NOMINAL ESTIMATE)

CAPACITY LEVEL II

DATE March 1982

Level III

FACILITY TYPE	FACILITY ACTIVITIES		ANNUAL PRODUCTION RATE		MAJOR CAPITAL EXPENDITURES (\$ MILLIONS)		MANPOWER REQUIREMENTS		REMARKS
	FUNCTION	MATERIAL	LEVEL I	LEVEL II	LEVEL I	LEVEL II	LEVEL I	LEVEL II	
HEAVY STRUCTURAL STAMPING	BLANKER & AUTOMATIC		400,000		3/4 (3.5)		13/17 (15)		INCL. SIDE RAIL
	MAJOR PRESS				40/50 (43.5)		120/150 (135)		
	FLOOR MOUNTED PRESS				0.5/1.5 (1.0)		18/22 (20)		
	ASSEMBLY (SUB & FINAL)				10/14 (12.0)		70/90 (80)		MANUAL & AUTO. WELDING. TEST & INSPECTION.
	PAINT				5/7 (6.0)		8/12 (10)		
	LAND, BLDG. & EQUIPMENT				69/91 (83)				DIRECT LABOR INDIRECT LABOR SALARY
TOTALS			400,000		127/167* (149)		229/291 (260) 260/320 (290) 90/110 (100)		
							579/721 (650)		

*Major capital expenditures adjusted for 1981 economics \$158,400,000.

PRODUCT FULL FRAME ASSEMBLIES

PROCESS AND COMPONENT SUMMARY

CAPACITY LEVEL I 400,000

(NOMINAL ESTIMATE)

DATE March 1982

CAPACITY LEVEL II

Level IV

MAJOR REQUIREMENTS	DEPARTMENT FUNCTION	MAJOR CAPITAL EXPENDITURES (\$ MILLIONS)			AREA (SQ. FT.)	MANPOWER REQUIREMENTS		REMARKS
		LEVEL I	LEVEL II	TOTAL		LEVEL I	LEVEL II	
						D/L	D/L	
LARGE PRESS	DECOIL, BLANK & AUTOMATIC PRESS FORMING	\$ 3.5			24,000	15		SUB ASSY. & FINAL ASSY. OPERATIONS
	SIDE RAIL & CROSS MEMBER PRESS FORMING	43.5			95,000	135		
	PRESS FORMING MISC. PARTS	1.0			22,500	20		
	MANUAL & AUTOMATIC WELDING & INSPECTION	12.0			90,000	80		
FLOOR MOUNTED PRESS	PAINT ASSEMBLIES	6.0			60,000	10		ELECTRO DEPOSITION
ASSEMBLY								
PAINT								
TOTALS		\$66.0			291,500	260		TOTAL DIRECT LABOR
						290		TOTAL INDIRECT LABOR
						100		TOTAL SALARY LABOR
						650		TOTAL MANPOWER

PRODUCT FULL FRAME ASSEMBLIES

NEW HEAVY STRUCTURAL STAMPING PLANT

AREA BREAKDOWN

SQ. FT.

MANUFACTURING BUILDING

RAW STEEL STORAGE	30,000
BLANKER & AUTOMATIC PRESS	24,000
MAJOR PRESS	95,000
FLOOR MOUNTED PRESS	22,500
ASSEMBLY	90,000
PAINT (FIRST FLOOR 40,000/SECOND FLOOR 20,000)	60,000
FINISHED PARTS SHIPPING	30,000
TOOL & DIE ROOM	11,000
MAINTENANCE & REPAIR	11,500
VENDING, REST ROOMS & LOCKERS	3,500
FINISHED & IN PROCESS INVENTORY STORAGE	15,000
ADMINISTRATIVE OFFICE	22,500

TOTAL MANUFACTURING BLDG. 415,000

SUPPORT BUILDINGS

POWER HOUSE
SCRAP BAILER

15,000
20,000

TOTAL SUPPORT BUILDINGS

35,000

TOTAL PLANT

450,000

NEW HEAVY STRUCTURAL STAMPING PLANT

RAW STEEL STORAGE / BLANKER & AUTOMATIC PRESS 54,000 SQ. FT.	MAJOR PRESS 95,000 SQ.FT.	ASSEMBLY 90,000 SQ.FT.
ADMINISTRATIVE OFFICE 22,500 SQ.FT.	22,500 SQ.FT. FLOOR MOUNTED PRESS	PAINT (1ST FLOOR) 40,000 SQ.FT.) (2ND FLOOR - 20,000 SQ.FT.)
TOOL & DIE MAINTENANCE 22,500 SQ. FT.	TOOL & DIE ROOM MAINTENANCE & REPAIR - MISC.	FINISHED & IN PROCESS INVENTORY STORAGE 45,000 SQ.FT. FINISHED PARTS SHIPPING

HEAVY STRUCTURAL STAMPING PLANT

TOTAL MANUFACTURING COST (EXCLUDING MATERIAL)

PRODUCTION: 400,000 UNITS PER YEAR

MANPOWER:	240 DAYS	EMPLOYEES	ANNUAL HOURS	HRS/UNIT
- DIRECT LABOR	- 1960 -	260	509,600	1.27
- INDIRECT - HOURLY	- 1960 -	290	568,400	1.42
- INDIRECT - SALARY	- 2000 -	100	200,000	.50
		650	1,278,000	3.19

ANNUAL HOURS ÷ 400,000 UNITS = HOURS PER UNIT = 3.19

WAGE & FRINGE COSTS:

- DIRECT LABOR	\$19.50	X	1.27	=	\$24.77
- INDIRECT - HOURLY	\$21.50	X	1.42	=	\$30.53
- INDIRECT - SALARY	\$23.50	X	.50	=	\$11.75
					\$67.05

TOTAL WAGE & FRINGE COSTS

INVESTMENT: (1981\$)

	FACILITIES COST	DEPRECIATION	COST-PER UNIT
- BUILDING & SUPPORT FACILITIES USEFUL LIFE - 30 YRS	\$62,060,000	2,068,666	\$5.17
- BUILDING FACILITIES USEFUL LIFE - 30 YRS	\$12,190,000	406,333	1.02
- PLANT FACILITIES USEFUL LIFE - 12 YRS	\$ 7,950,000	662,500	1.66
- MACHINERY & EQUIPMENT USEFUL LIFE - 12 YRS	\$74,200,000	6,183,333	15.46
			\$23.31

DEPRECIATION ÷ 400,000 UNITS = TOTAL DEPRECIATION PER UNIT = \$23.31

TAXES & INSURANCE AS PERCENT OF WAGE & FRINGE COST

T & I ESTIMATE OF 3.9% \$67.05 X 3.9% = \$2.61

OTHER MANUFACTURING COST AS PERCENT OF WAGE & FRINGE COST

OME ESTIMATE OF 13.2% \$67.05 X 13.2% = \$8.85

TOTAL WAGE & FRINGE COST	\$67.05
TOTAL DEPRECIATION COST	\$23.31
TOTAL TAXES & INSURANCE	\$ 2.61
TOTAL OME	\$ 8.85
TOTAL	\$101.82

PLANT NO. 39
AIR BAG PLANT

AIR BAG MANUFACTURING PLANT

● PRODUCT

- PASSENGER SIDE CUSHION INFLATOR ASSEMBLIES

● TORSO AIR CUSHION

● INNER AIR CUSHION

- DRIVER SIDE CUSHION INFLATOR ASSEMBLIES

- PROPELLANT MANUFACTURE

- SQUIB AND SENSORS ARE PURCHASED PARTS

● PRODUCTION RATES

- STRAIGHT TIME

● 1,000,000 PASSENGER SIDE CUSHION INFLATOR ASSEMBLIES

● 1,000,000 DRIVER SIDE CUSHION INFLATOR ASSEMBLIES

● 8,333 ASSEMBLIES PER DAY

● OPERATING PATTERN

- NORMAL STRAIGHT TIME, TWO EIGHT HOUR SHIFTS PER FIVE DAY WEEK

- MAXIMUM PRACTICAL CAPACITY BASED ON TWO NINE HOUR SHIFTS IS 9,375 PER DAY OR 2,250,000 ANNUALLY

● MANUFACTURING

- SEPARATE BUILDING FOR PROPELLANT MANUFACTURE AND FOR BAG MANUFACTURE AND ASSEMBLY

- BUILDINGS SEPARATED FOR SAFETY REASONS

MANUFACTURED COMPONENTS
INFLATOR ASSEMBLY

COMPONENTS

1 INFLATOR HOUSING
1 CONE (INJECTION MOLDING)
1 COVER (INJECTION MOLDING)
1 MESHWIRE
1 STEEL WOOL
1 SILICA PAD
1 SUPPORT TUBE

MATERIAL

STEEL TUBING
GLASS FILLED NYLON
HYTREL
STEEL
STEEL
SILICA
STEEL

ASSEMBLY

1 FILTER ASSEMBLY
1 FILTER/BODY ASSEMBLY
1 PROPELLANT PACKAGE
1 INITIATOR ASSEMBLY
1 CONE ASSEMBLY

MANUFACTURED COMPONENTS

AIR BAG ASSEMBLY

COMPONENTS

- ① REACTION STAMPING
- ① MOUNTING BRACKET STAMPING
- ① DIFFUSER TUBING
- ① RETAINER - KNEE BAG
- ① COVER STAMPING
- ① HEAT SHIELD
- ① KNEE BAG
- ① TORSO BAG

MATERIALS

STEEL
STEEL
STEEL TUBING
STEEL
STEEL
SILICONE RUBBER
POLYESTER
NYLON

ASSEMBLY

- ① KNEE BAG/HEAT SHIELD/DIFFUSER
- ① DIFFUSER TO TORSO BAG
- ① DIFFUSER/BAG INTO REACTION CAN
- ① INSTALL INFLATOR
- ① QUALITY CONTROL INSPECTION

AIR BAG PLANT (NOMINAL ESTIMATE)

<u>LEVEL II</u>		<u>LEVEL I</u>	<u>LEVEL II</u>
<u>LAND</u>			
	PURCHASE LAND (50 ACRES @ \$10,000 PER ACRE SITE DEVELOPMENT	\$ 500,000 <u>1,200,000</u>	
	SUB TOTAL		\$ 1,700,000
<u>BUILDING & SUPPORT FACILITY</u>			
	ENGINEERING	\$ 2,400,000	
	MANUFACTURING BLDG. - PROPELLANT (206,000 SQ. FT. @ \$65)	13,390,000	
	MANUFACTURING BLDG. AIR BAG & ASSY (365,000 SQ. FT. @ \$65)	20,750,000	
	PACKAGE BAILER/AUXILIARY STRUCTURES	<u>2,750,000</u>	
	- USEFUL LIFE - 30 YRS - SUBTOTAL		\$39,290,000 (1981 \$)
<u>BUILDING FACILITIES</u>			
	ELECTRICAL	\$ 2,400,000	
	HEATING & VENTILATION	4,000,000	
	UTILITIES (STEAM, AIR, WATER, GAS)	<u>3,100,000</u>	
	- USEFUL LIFE - 30 YRS - SUBTOTAL		\$ 9,500,000 (1981 \$)
<u>PLANT FACILITIES</u>			
	MATERIAL HANDLING EQUIPMENT	\$ 800,000	
	TOOL ROOM/MAINTENANCE	<u>1,200,000</u>	
	- USEFUL LIFE - 12 YRS - SUBTOTAL		\$ 2,000,000 (1981 \$)
<u>MACHINERY & EQUIPMENT</u>			
	AIR BAG ASSEMBLY	\$ 1,200,000	
	PRESS EQUIPMENT	600,000	
	CUT & SEW FACILITIES	2,800,000	
	SUB ASSEMBLY	1,900,000	
	FINAL ASSEMBLY	<u>1,200,000</u>	
	- USEFUL LIFE - 12 YRS - SUBTOTAL		\$ 7,700,000 (1981 \$)
<u>MACHINERY & EQUIPMENT</u>			
	PROPELLANT MANUFACTURING	\$ 1,800,000	
	GRINDING/SIEVING/BLENDING/PELLETING	<u>900,000</u>	
	PACKAGE & ASSEMBLY		
	- USEFUL LIFE - 12 YRS - SUBTOTAL		\$ 2,700,000 (1981 \$)
	TOTAL MACHINERY & EQUIPMENT		<u>\$10,400,000</u>
<u>LEVEL I</u>	TOTAL FACILITIES, EQUIPMENT AND TOOLING		\$62,970,000 (1981 \$)
	PRE-PRODUCTION AND LAUNCH @ APPROXIMATELY 20%		<u>\$12,580,000</u>
	TOTAL PROGRAM COST		\$75,480,000

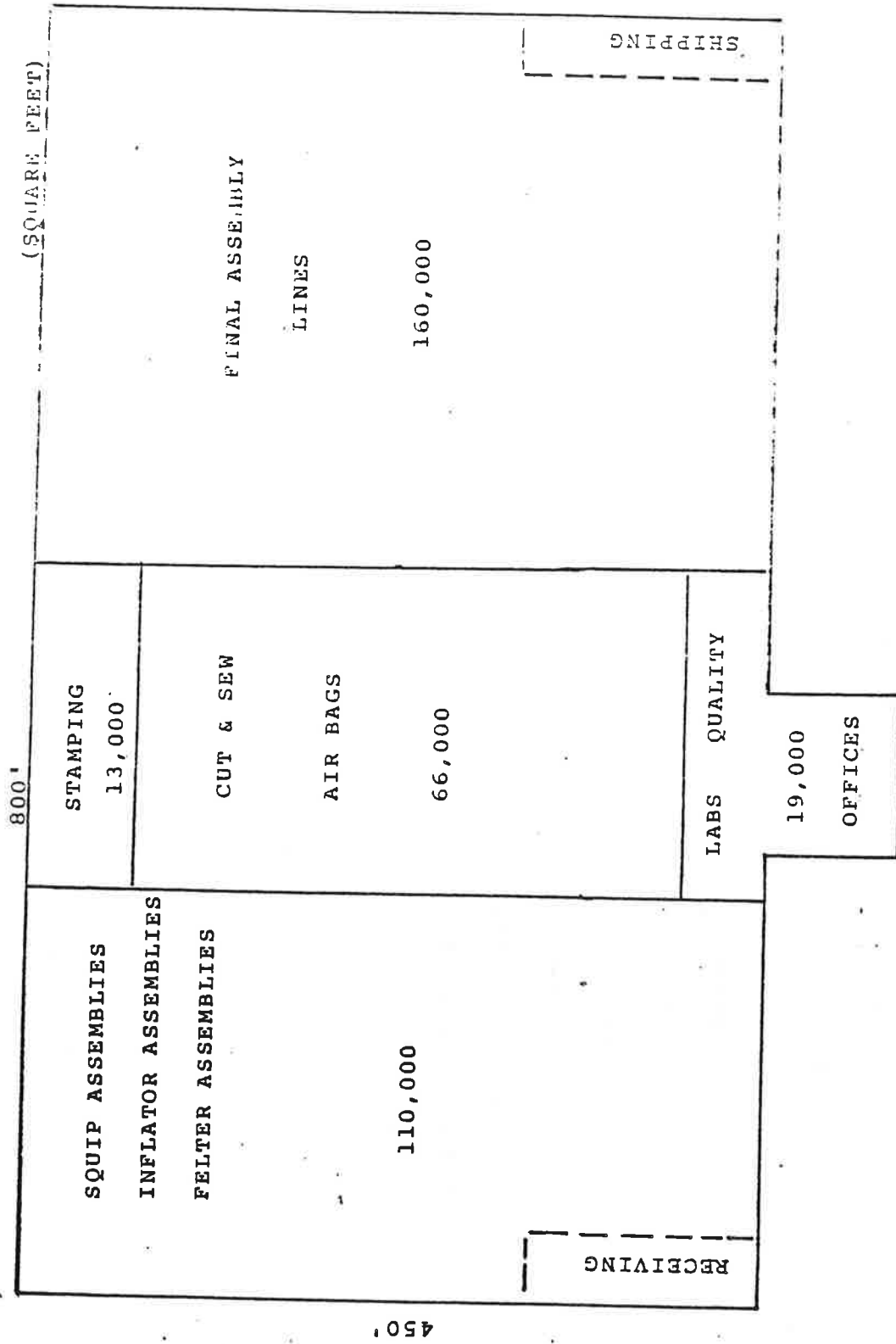
FACILITIES PLANNING AND PROCESS SUMMARY
NOMINAL ESTIMATE (AIR BAG MFG. PLANT)

DEPARTMENT AND PROCESS	MATERIAL	AREA SQ.FT. (000)		ANNUAL CAPACITY (000)		MAJOR CAPITAL EXPENDITURES (DOLLARS IN MILLIONS)		DIRECT LABOR WORKING FORCE		REMARKS
		LEVEL I	LEVEL II	LEVEL I	LEVEL II	LEVEL I	LEVEL II	LEVEL I	LEVEL II	
LAND AND SITE DEVELOPMENT										
BUILDING AND SUPPORT FACILITIES										
PLANT FACILITIES & EQUIPMENT										
MACHINERY AND EQUIPMENT										
-AIR BAG ASSEMBLY										
o STAMPING & FORMING		13							40	
o CUT AND SEW		66							32	
o SUB-ASSEMBLY		110							40	
o FINAL ASSEMBLY		160							60	
o INSPECTION/TEST		8							12	
o TOOL ROOM/MAINTENANCE		7							48	
OFFICE AND SALARY		7							105	
-PROPELLANT MANUFACTURING										
o GRINDING/SIEVING		120							140	
BLENDING/PHELETING										
o PACKAGING & ASSEMBLY		42							40	
o CANNISTER ASSEMBLY		35								
-LABORATORY/TEST		6							28	
TOTAL		574			1,000 CAR SETS				563	
									323	DIRECT LABOR
									135	INDIRECT LABOR
									105	INDIRECT LABOR
									563	TOTAL

AIR BAG ASSEMBLY BUILDING

● SQUIB ASSEMBLIES	
● INFLATOR ASSEMBLIES	110,000
● FILTER ASSEMBLIES	
● CUT AND SEW AIR BAGS	66,000
● STAMPING OPERATIONS	13,000
● FINAL ASSEMBLY	160,000
● OFFICES	4,000
● TEST LABS/QUALITY CONTROL	8,000
● TOOL ROOM AND MAINTENANCE	7,000
TOTAL AREA	368,000

AIR BAG MANUFACTURING BUILDING

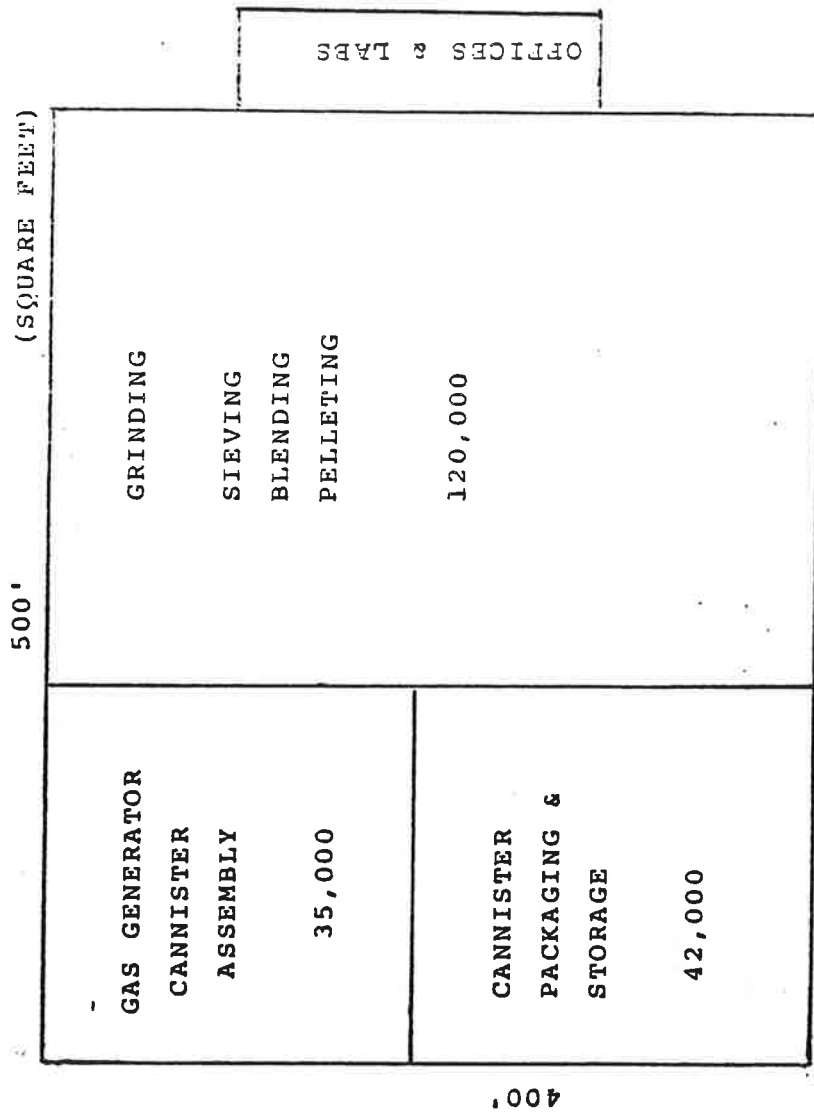


PROPELLANT MANUFACTURING BUILDING

AREA (SQ. FT.)

● GRINDING (IF REQUIRED)	
● SIEVING - POWER	
● BLENDING OF PROPELLANT	
● PELLETING	
SUB-TOTAL	120,000
● CANNISTER PACKAGING AND STORAGE	42,000
● GAS GENERATOR/CANNISTER ASSEMBLY	35,000
● LABORATORY	6,000
● OFFICES	3,000
TOTAL AREA	206,000

PROPELLANT MANUFACTURING BUILDING



BUILDING 206,000 SQUARE FEET

AIR BAG PLANT
TOTAL MANUFACTURING COST
(EXCLUDING MATERIAL)

PRODUCTION: 2,000,000 UNITS PER YEAR

MANPOWER:	240 DAYS	EMPLOYEES	ANNUAL HOURS	HRS/UNIT
- DIRECT LABOR	- 1920 -	323	620,160	.31
- INDIRECT - HOURLY	- 1920 -	135	259,200	.13
- INDIRECT - SALARY	- 2000 -	105	210,000	.11
		563	1,089,360	.55

ANNUAL HOURS ÷ 2,000,000 UNITS = HOURS PER UNIT = .55

WAGE & FRINGE COSTS:

- DIRECT LABOR	\$19.50	X	.31	=	\$ 6.05
- INDIRECT - HOURLY	\$21.50	X	.13	=	\$ 2.80
- INDIRECT - SALARY	\$23.50	X	.11	=	\$ 2.59
	TOTAL WAGE & FRINGE COSTS				\$11.44

INVESTMENT: (1981\$)

	FACILITIES COST	DEPRECIATION	COST-PER-UNIT
- BUILDING & SUPPORT FACILITIES USEFUL LIFE - 30 YRS	\$39,290,000	1,309,666	\$.65
- BUILDING FACILITIES USEFUL LIFE - 30 YRS	\$ 9,500,000	316,666	.16
- PLANT FACILITIES USEFUL LIFE - 12 YRS	\$ 2,000,000	166,666	.08
- MACHINERY & EQUIPMENT USEFUL LIFE - 12 YRS	\$10,400,000	866,666	.43
			<u>\$1.32</u>

DEPRECIATION ÷ 2,000,000 UNITS = TOTAL DEPRECIATION PER UNIT = \$1.32

TAXES & INSURANCE AS PERCENT OF WAGE & FRINGE COST

T & I ESTIMATE OF 3.9% \$11.44 X 3.9% = \$.45

OTHER MANUFACTURING COST AS PERCENT OF WAGE & FRINGE COST

OME ESTIMATE OF 13.2% \$11.44 X 13.2% = \$1.51

TOTAL WAGE & FRINGE COSTS	\$11.44
TOTAL DEPRECIATION COSTS	\$ 1.32
TOTAL TAXES & INSURANCE	\$.45
TOTAL OME	\$ 1.51
TOTAL	<u>\$14.72</u>

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