

MANUFACTURING PROCESS AND OPERATIONS

8.1 Certified Vehicle Production

Canadian Motor Vehicle Safety Standards (CMVSS) approval is only granted for production vehicles, and so implicit in the receipt of CMVSS certification is the proposed production process for the EXAR-1. As a rule of thumb, according to VEHMA, annual production quantities of less than 10,000 vehicles indicates a moving production line. The type of tooling used for chassis tooling, and for body panels, is similarly affected. The company proposes to design the EXAR-1 production line as a "low volume" plant.

For example, a one shift operation producing 5,000 cars annually over 50 weeks would produce 100 cars per week or 20 cars per day. Freight liner of Canada Ltd. in Burnaby, B.C. is reported to produce in the range of 8 to 15 heavy duty trucks per day, and is categorized as employing in the range of 200 to 499 employees. Western Star Trucks Inc., in Kelowna, B.C. is in the same size category.

The company forecasts that it will employ approximately 400 employees in its manufacturing operation.

8.2 Location

A location has not yet been chosen for the plant and the first plant location in a smaller regional center or larger metropolitan area would be acceptable because of initial sales forecast. A location in Western Canada is currently preferred.

8.3 Facilities and Equipment

The company has a preliminary "Standard Operating Procedures" outline for the

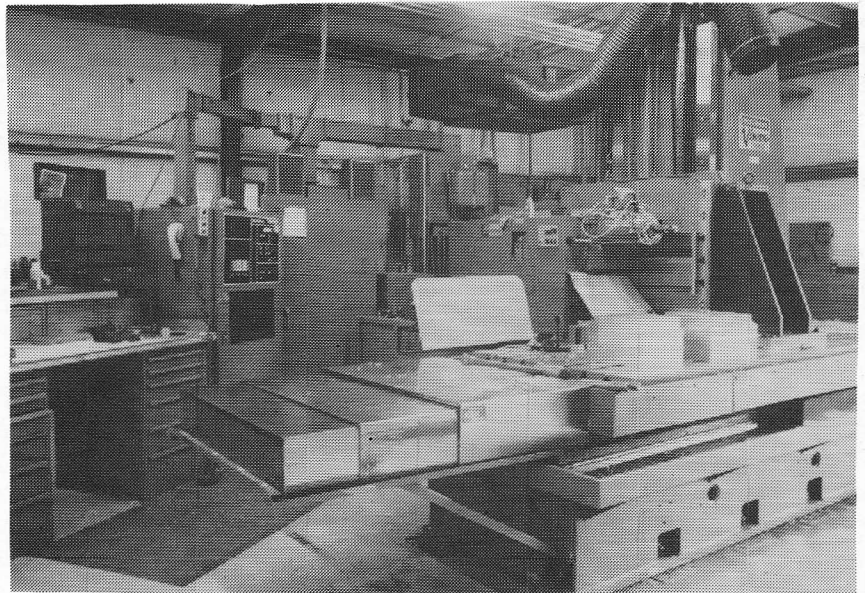
manufacturing process and facility. The following description is based on the SOP, (which will require revisions based on final facilities and location).

The plant size is 50,000 square feet, allowing for 6,000 square feet of office space and 44,000 feet of plant space. The building should be insulated and industrial ventilation provided in the plant. A plant layout sketch is provided in the Exhibits.

The building will have 22 to 24 foot ceilings, with four 14' doors, and both dock high and ground level access.

Power supply will be 1200 amp. 3 phase service. Natural gas service is required for the body molding process.

The key pieces of equipment are the vacuum forming and vacuum bonding equipment for the body panels, and the welding, metal working, and testing equipment. Material organization, inventory, and flow will be supported by appropriate conveyor and lift equipment. Assembly will be with pneumatic hand tools, requiring compressors.



STANDARD OPERATING PROCEDURES

Production Facility

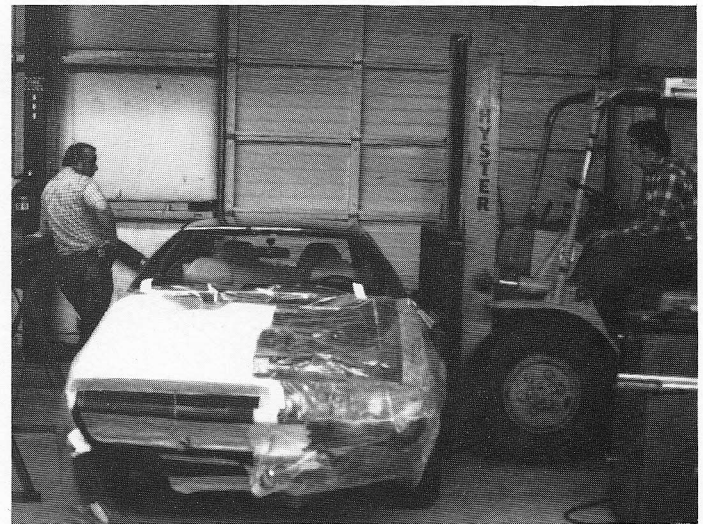
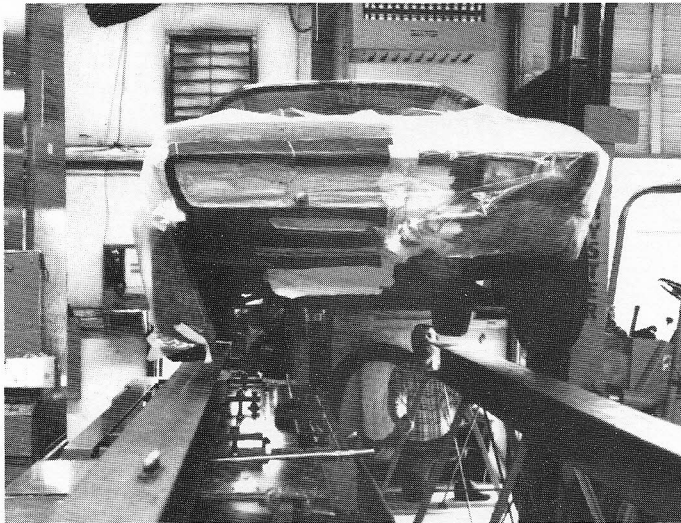
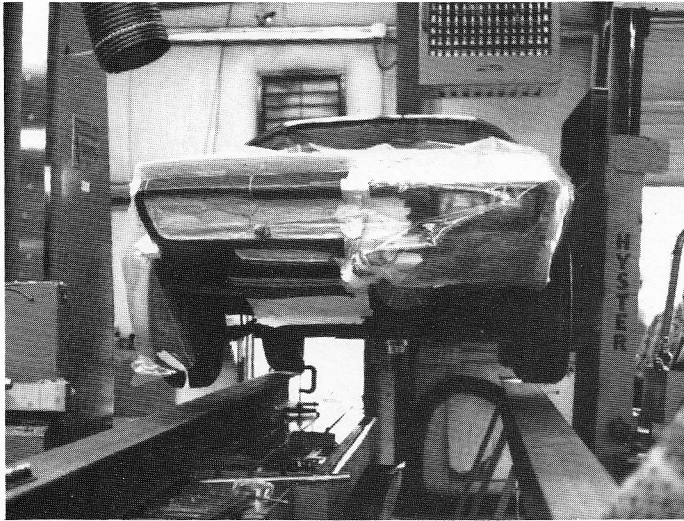
The following is a manufacturing outline of STANDARD OPERATING PROCEDURES (SOP), and a supporting commentary to the approach we have developed.

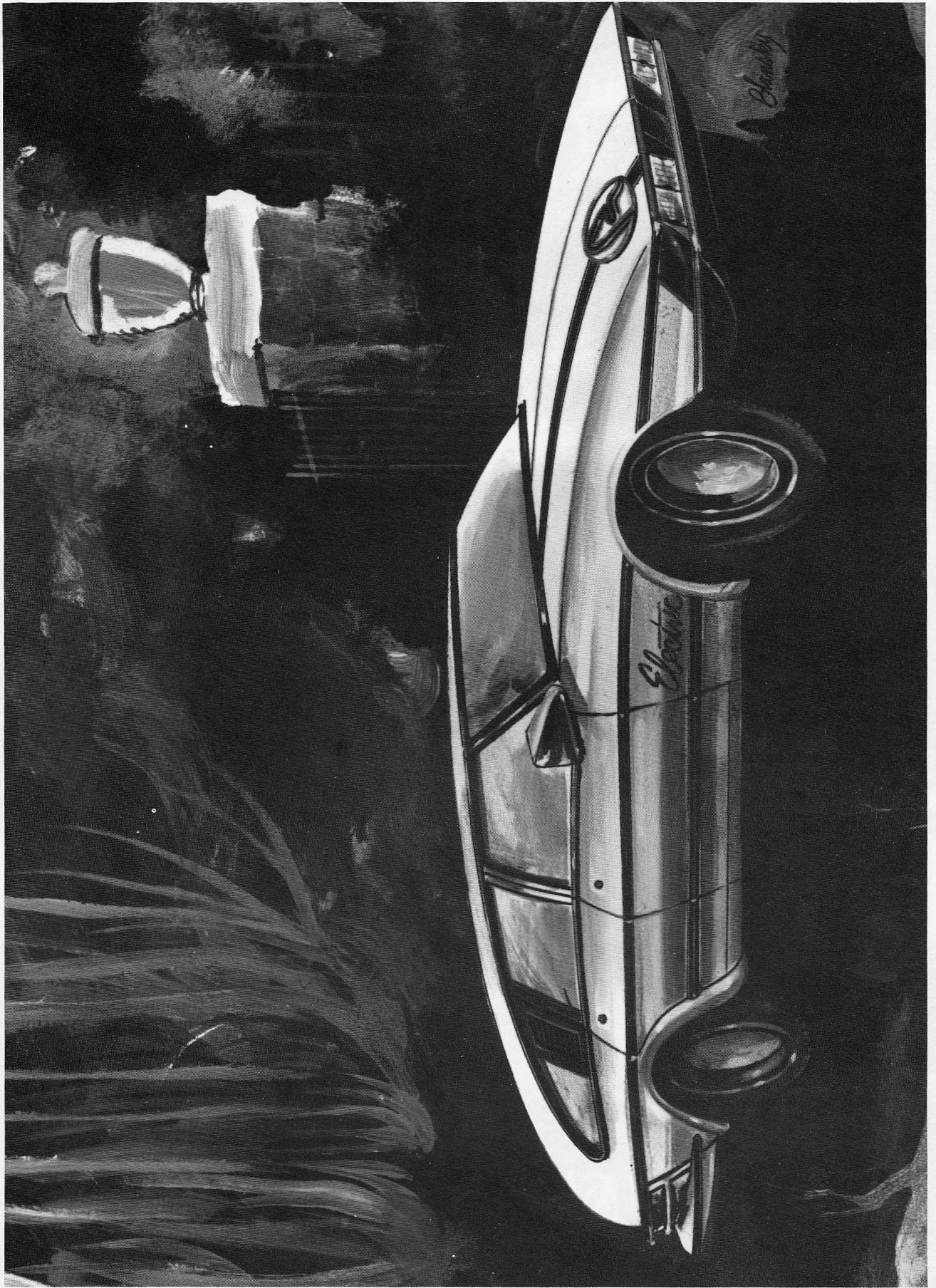
There is nothing to prevent increasing costs due to inflation or other factors, nor decreasing the cost from the current budget by downgrading or deletion of certain extras. A direct unmultiplied price increase which still maintains a suitable net profit will easily be accepted by the public due to the fact that our automobiles are being purchased direct from the factory at a savings to the public of between twenty-eight (28) and thirty (30) percent of what would normally be the retail price of this automobile.

With a capital expense of Ten Million Dollars (\$10,000,000.00), a factory could be functioning in ten to twelve months, this is no "Blue Sky guess, we are using actual current delivery data from vendors of essential equipment.

Our factory consist of only eight major pieces of equipment; two machines for the construction of the body, an automatic welder, a tube bending machine, an automatic steel saw, weld-inspection x-ray equipment, a fork lift truck, and a front-end alignment system, Several compressors and an inventory of pneumatic tool (i.e., hammers, ratchet drives, impact wrenches, torque meters, drills, polishers, body jacks, lifts, and various sundry small testing equipment for batteries and electronic); provide the balance of the physical equipment. Total cost of factory equip- ment after initial tooling would be approximately One Million Dollars (\$1,000,000,00). The two major machines for the construction of the body are the most expensive initial component of the factory. This equipment produces all of the interior and exterior body panels that make up our electric automobile. The molds for this equipment are made by hand. They are specifically designed so that the molds may be copied innumerable times; therefore, the hundreds of thousands of dollars spent to create the first totally man-made mold set and temperature con- trolled mold handlers, can be duplicated for approximately Six Million Dollars (\$6,000,000.00).

We require some sixty-two (2) stations of which only forty-two (42) are active assembly positions. Three () categories of operation exist for our assembly line: (1) Pre-line work, (2) Pre-assembly, and; () assembly line. In order to control these areas we project the following breakdown of personnel: the factory will consist of ten section heads, ten sub-groups of four worker, or a total of 160 employees. (See attachment A). Pre- line work is all activity required prior to any assembly. The distribution of parts and inventory to specific pre-assembly area is effected after all preparation of materials, unpacking and preparation of inventoried items.





BUILDING and LAND ANALYSIS FOR
AMECTRAN FACTORY RECOMMENDATION

The following cost analysis assumes a concrete tilt-slab shell structure, however, Amectran has the option depending on the mode of financing and other factors, of using a metal building system for the shell structure. This system would be considerably cheaper, cutting some 20% of the price of construction. BUT IS NOT RECOMMENDED

After making an in-depth study of the best structure system for its factory, Amectran has elected to erect a concrete building if possible, due to its prolonged life, excellent durability, and appreciation (as opposed to the depreciation of the standard metal system) in value. Naturally, since the company image is of utmost importance, the characteristics of concrete would be most beneficial.

The structure will be equipped with completely air conditioned and heated office area and space air conditioning and heating in the factory area.

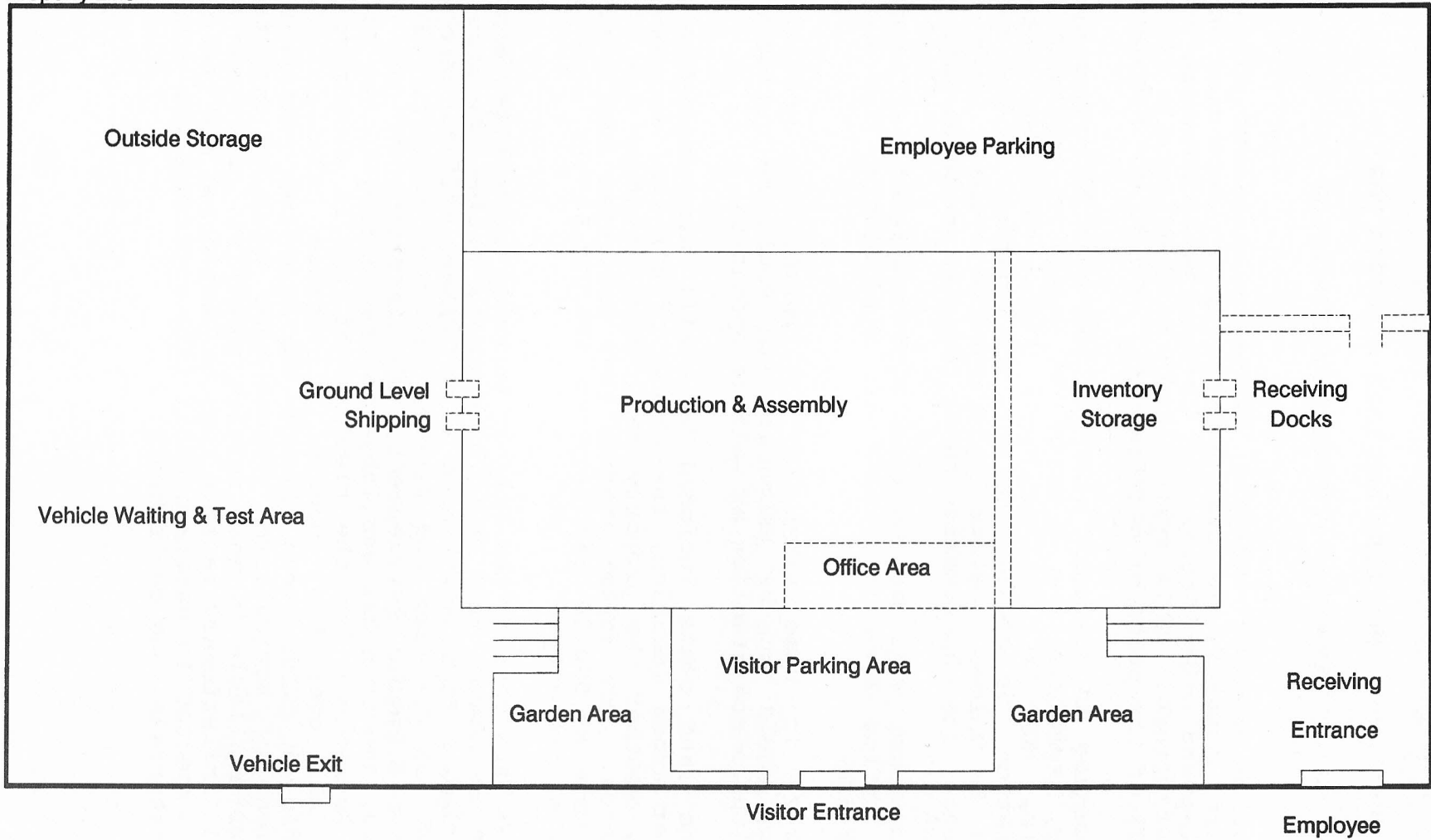
Obviously, in some areas of the world, air conditioning and/or heating, would not be necessary and would be reflected in a cost reduction in construction as well as operation.

The land costs included here will vary depending mainly on a rural or urban location, the amount of off-site development which is needed, whether the property has choice frontage and if it is in a prime area. Our market studies have indicated land costs to run the gamut from \$5,000.00 per acre to 150,000.00 per acre and more for industrial property.

Although land cost in the city is normally quite high, many cities have offered to donate the land in order to entice Amectran to locate a plant there. This would have advantageous effects especially in the area of job creation and general economic support. In conjunction with the Economic Development, Administration of the Department of Commerce, Amectran has available to its funding in the form of Federal Loan Guarantees for the creation of job in economically depressed cities all over the country. Likewise, similar guarantees are available in rural areas through the Farm-Home Administration of the Department of Agriculture. These same types of assistance programs are also available in most foreign countries. As it can be reasonably assumed, inflationary factors must be considered and the cost herewith, can be expected to escalate until firm contracts are acquired for all land, materials, and contractors.

Total Building Area: 50,000 sq.ft.
Minimum Total Land Area: 2.63 acres
Property Line

Amectran Factory Layout



I. BUILDING CONSTRUCTION

A. Specifications

1. Size Factory 47,000 sq. ft.
Office 3,000 sq. ft.
TOTAL 50,000 sq. ft.
2. Shell Construction Concrete Tilt-Slab
3. Ceiling Clearance 22' - 24' high
4. Loading Dock-High Ground Level access
5. Overhead doors 4' - 14' doors
6. Electrical requirements 1200 amps 240 volt, 3-phase
7. Lighting requirement Office type lighting in 75% of factory area for production
8. Air conditioning 100% of office and factory air conditioned
9. Rail requirements Optional, most vendors transport
10. Fencing All area used for product storage to be surrounded by 8' chain link fence
11. Sprinkler System Fire sprinkler system in entire area according to building code regulations

COST BREAKDOWN

B. Building Cost

Factory Shell Construction

Concrete Tilt-Slab @ \$30,00/sq. ft.	\$1,500,000.00
Interior Office Finish-Out @ \$20.00/sq. ft.	60,000.00
Extra Air Conditioning For Factory area @ \$5.00/sq.ft	28,000.00
Extra Lighting for Production Line @ \$1.50/sq. ft.	70,500.00
Concrete Pad for Outside Vehicle Storage & Parking @ \$3.50/sq. ft.	206,600.00
Chain Link Fencing @ \$16.00/lineal ft.	48,000.00

	\$2,125,100.00
Soft Costs, etc. 15%	318,765.00

	\$2,443,865.00
	=====

This is per square foot cost of \$49.00

***NOTE: The figures represented above are subject to change based on the variables involved.

II. LAND

A. Specifications

1. Minimum land requirements for plant - 2 1/2 acres. Land cost may vary greatly depending on many variables. Two factors of immense importance are whether the location will be urban or rural.
2. Industrially zoned
3. Water Sewer available
4. Adequate electric power supply
5. Rail access option

B. Cost

1. URBAN

\$150,000.00 - \$500,000.00/per acre depending on location Therefore, 2 1/2 acres - \$375,000 - \$1,250,000.00

2. RURAL

\$20,000.00 - \$75,000.00/per acre
Therefore, 2 1/2 acre - \$50,000 - \$187,500.00

TOTAL LAND BUILDING COST

- | | |
|----------|-------------|
| A. URBAN | \$3,693,865 |
| B. RURAL | \$2,631.365 |

III. MACHINERY & EQUIPMENT

1. Vacuum Forming Machine
2. Vacuum Bonding Machine
3. Tube Bending Machine
4. Automatic Welder Back-Up Equipment
5. X-Ray Equipment
6. Automatic Saw
7. Fork Lift
8. Compressors Related Accessory Equipment
9. Small Pneumatic Hand Tools
10. Small Hand Tools
11. Overhead Conveyors
12. Shelving & Storage Materials
13. MISCELLANEOUS FACTORY EQUIPMENT
 - a. Security Alarms
 - b. Fire Extinguishers
 - c. Water Coolers
 - d. Office Furniture and Related Equipment
 - e. Office Supplies
 - f. Computer Related Accessories
 - g. Employee Rest Area Furniture and Accessories
 - h. Medical Supplies

***NOTE: Trained Industrial Nurse and appropriate medical supplies required by Federal Regulation and may not be required in certain foreign countries. These are provided for the employee under Job-Safety Regulations.

IV. MOLDS, TOOLS, DIES

A. Tooling - Exterior Skins

1. Roof panel
2. Front panel
3. Rear panel
4. Left side front panel
5. Left side rear panel
6. Right side front panel
7. Right side rear panel
8. Right door
9. Left door
10. Hatch-back assembly
11. Sun roof assembly

Tools will require patterns, matched metal tool for rigidizing and special design tools not to be identified in this paper.

B. Tooling - Body-Pan ..

1. Matched metal tools
2. Rigidizing
3. Thermal control

C. Tooling - Interior

1. Dash panel
2. Headlight panel
3. Windshield panel
4. All glass panels
5. Roof panel
6. Front panel

7. Rear panel
8. Left side rear panel
9. Left side front panel
10. Right side front panel
11. Right side rear panel

D. Tooling - Cap Skins

1. Corner posts
2. Pillar members
3. Splash guards
4. Bumpers
5. Battery compartment

E. Tooling

Trim, Fabrication Fixtures Machinery.

Total Machinery Equipment Costs: \$8,000,000.00

***COSTS ARE APPROXIMATE AS OF OCTOBER 18, 1988 BUT WE ARE ASSURED A
MAXIMUM INCREASE OF NO MORE THAN SIX PERCENT TO SEVEN PERCENT.

8.5 Manufacturing Process - Quick

Summary

The manufacturing process consists of the welding related to chassis production, thermal vacuum forming for body panel production, component assembly, and vehicle assembly.

The source of the assembly components will determine the lead times and hence inventories necessary. An estimate of 21 days supply, or 420 cars of inventory has been used in the plan.

The source of the thermal forming equipment and molding technology has been identified as the Snow Corporation in Fort Worth, Texas. The Snow Corporation has provided cost estimates regarding the capital cost of the thermal-forming machinery as well as the estimated acrylic body cost and the cost of a new set of body design molds. The Snow Corporation was involved in preparing a plastic body for the Bricklin automobile, and is a company supplying various plastic components and machinery to the automobile and truck industries. Customers of Snow include the most prestigious organizations in the world.

8.6 Labor - Quick Summary

The labor required is composed of the assembly crew and the support staff, as outlined in the business plan. Apart from 10 key supervisors and key support staff, most labor and staffing should be available in most industrial environments.

It is assumed that the work force will be non-union because of the employee involvement in company programs.

8.7 Environmental and Economic

Impact

The nature of the plant is basically environmentally clean, and non-polluting. There are no anticipated noxious fumes or effluents, as there is no paint shop or metal finishing involved in the manufacturing operation.

By virtue of the primary manufacturing of the operation, and dependent upon the source of the sub-assemblies and components, the company could expect an economic multiplier of 3, suggesting that a total of 1,200 direct and indirect jobs could be created by this new plant.



Department of Water and Power



the City of Los Angeles

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DANIEL W. WATERS, *Assistant General Manager - External Affairs*
NORMAN J. POWERS, *Chief Financial Officer*

January 4, 1989

Gentlemen:

The City of Los Angeles Department of Water and Power requests responses to the enclosed "Request for Proposal - An Initiative to Stimulate Electric Vehicle Market Penetration in Southern California" (RFP).

With the active support of Councilman Marvin Braude, the Los Angeles City Council, and Southern California Edison Company, the Los Angeles Department of Water and Power (DWP) is sponsoring this initiative in the belief that market conditions in Southern California are appropriate for the commercial introduction of electric vehicles.

Although current technology restricts the market to short-range fleet applications, the opportunity provided is significant - particularly when the impact of air quality restrictions is considered. In the South Coast Air Basin, which includes Metropolitan Los Angeles and the urban areas of San Bernardino, Riverside and Orange Counties, failure to meet air quality standards established by the Environmental Protection Agency has resulted in a need for very stringent rules for fleet owners. For example, all fleet vehicles replaced after 1990 will be required to be of clean fuel type. However, even if all vehicles are converted to clean fuel (methanol, ethanol, compressed/liquefied natural gas), the standards cannot be met.

The only reasonable alternative is electric vehicles, and it is for this reason that we believe that the time is right for the aggressive expansion of this technology.

Water and Power Conservation . . . a way of life

111 North Hope Street, Los Angeles, California Mailing address: Box 111, Los Angeles 90051
Telephone: (213) 481-4211 Cable address: DEWAPOLA

January 4, 1989

While it is the intention of the sponsors to purchase some of these vehicles for their own fleets, the ultimate reason for this RFP is to open the Southern California market to electric vehicles. Therefore, while the sponsors will assist the successful respondent(s) in marketing, service, and subsidies (if necessary), the goal of each respondent should be to provide a marketable vehicle and the means to develop and sustain the marketing, sales, distribution, and service effort as it relates not only to the 10,000 vehicles specified but to subsequent sales as well.

It is our expectation that innovative designers, manufacturers and marketers will accept this challenge, carefully review the RFP and develop imaginative, competitive proposals.

Since the sponsors are encouraging respondents to submit complete proposals, some companies/individuals may wish to establish relationships with other entities in order to pool their resources. To facilitate this effort, a list of companies/individuals to whom this RFP is being mailed is enclosed.

Respondents are requested to provide five (5) copies of their proposal by April 3, 1989, to:

Mr. Gerald H. Enzenauer
Los Angeles Department of Water and Power
Post Office Box 111, Room 1106
Los Angeles, California 90051

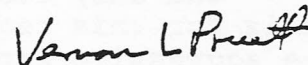
The DWP will conduct an initial screening of proposals with the intention of entering into competitive negotiations with a select group of finalists by May 31, 1989.

Determination of the successful participants(s) can be expected prior to August 1, 1989.

Questions concerning the RFP should be addressed to Mr. Gerald H. Enzenauer at (213) 481-5698.

We look forward to your response.

Sincerely,



VERNON L. PRUETT
Engineer of System Development

Enclosures

V. ECONOMICS

COST BREAKDOWN PER WEEK
(100 UNITS)

Production Cost - Materials	\$ 8,328
Labor	1,180
Operating Overhead	80
Contingency	50

TOTAL	\$ 9,638

Total Production Cost \$ 9,638

Plus administration, advertising, computer network,
government regulations 390

Materials Cost 8,328 - 9,994

100 UNITS X \$ 1,700 - \$170,000

BALANCE BREAKDOWN

START 48 MONTHS	EMPLOYEES
\$ 6,000 - \$ 7,865	10 Skilled (\$500/wk + 7 % yearly increase & proficiency incentive programs)
13,500 - 17,643 80	Semi-skilled (\$450/wk +7% yearly increase incentive programs)
36,000 - 46,800	120 Unskilled (\$300wk + \$5 wk increase for each 3 month service efficiency competitive incentive programs).

Unskilled Laborers will be allowed time quota relief and job-lot or diversification opportunity + Employee Stock Option Plan (ESOP)

***NOTE: Labor cost increased approximately 31% in four years.

\$55,500 - \$72,308 Total of salaries (see above)

8,000	8,000	Facility
3,000	4,000	Electricity
8,000	10,000	Insurance (Comp., Maj., Med., etc.)
4,000	5,800	Factory Insurance
3,000	4,000	Maintenance & Supplies
49,500	26,892	Inflation & Contingency

131,000 131,000 BALANCE

***NOTE: Inflation Contingency fund will increase to the end of the 2nd year and start to decrease to the end of the 4th year of operation. Therefore, while labor costs over a four year period are scheduled to increase, contingency funds will cover the expense on salaries without an increase the automobile price (except for inflationary increases on materials). It should be pointed out that according to government regulation, and because this is an entirely new industry, the salaries of our employee are furnished in part or total by the government through OJT, CETA, etc. for first six months of their employment and some of those various programs continue for a period of seven (7) years for each new employee hired. This is done to help defray cost for "start-up" industries and provide employers hiring the mentally and physically handicapped, and veterans.

UNIT COST BREAKDOWN

Cost analysis of a finished product (update taken to October, 18 1988), following data is based on:

COST PER UNIT

Administration	\$	100
Advertising		45
Computer Network		45
Government Regulation		200
Labor		1,180
Materials		8,328 to 9,994
Operating Overhead		80
Contingency		50
TOTAL		----- 10,028
Net Profit		2,000
RETAIL COST		\$12,028 to 13,694