

## EXECUTIVE SUMMARY

### 0.1 PROFILE OF PASSENGER CAR INDUSTRY

0.1.1 The passenger car industry in India started in 1928 when General Motors set up an assembly plant at Bombay in 1928. The next stage was starting of three Indian companies for assembly of cars from CKD packs in forties. However, the industry can really be considered to have started in 1953, when Government decided to allow only projects with phased manufacturing programmes. The assembly of cars with imported CKD packs in 1948 was around 3000 cars per year. Gradually the production increased as also the indigenous content and current production is 176600 nos. (in 1990). At present in most cases the indigenous content is over 90%. The production in last 11 years has been as under:-

TABLE I

#### PASSENGER CAR PRODUCTION FROM 1980 TO 1990

Year	Production	No. of Units
1980	30538	4
1981	42106	4
1982	42674	4
1983	45090	5
1984	64013	5
1985	102456	5
1986	116006	5
1987	148495	5
1988	159941	5
1989	177190	4
1990	176600	4

0.1.2 The initial manufacturers after independence were HM, Premier and Standard Motor Product of India Ltd. (SMPI). While HM and Premier are still two major units, SMPI has been closed for last more than two

years. For the initial almost 30 years car production remained with the initial three units. In 1976 Sipani entered the field. Sipani are a small unit with maximum production of a little over 900. They have not made any mark in the industry. Sipani has not produced any car in 1989. In 1983 Maruti entered the industry in a big way and in a few years has become the leading car manufacturer with around 60% of the total production. The production of various manufacturers in last few years is as under:-

	HM	Premier	SMPI	Sipani	Maruti	Total
1987	25561	31191	484	350	90909	148495
1988	27557	36567	217	210	95390	159941
1989	29326	42033	5	-	105826	177190
1990	-	-	-	-	-	176609

- 0.1.3** For many years the off take was very limited and manufacturers persisted with the same design for many years with minor changes. The new models brought out were also based on models obsolete with the collaborators for which 2nd hand dies for the body could be obtained at reasonable cost.
- 0.1.4** All manufacturers started production with foreign collaboration. Even when they were bringing out new models, these were produced on the basis of imported designs and know-how. The older manufacturers did make minor modifications and improvements in their cars on their own. But when they wanted a completely new model, they obtained fresh technical know-how.
- 0.1.5** The passenger cars produced were current 'State of Art' designs with modern features when first produced. However, the level of R&D in passenger car industry is still limited and mainly looks after import substitution and minor modifications. Without a considerable increase in R&D, it thus appears that the industry will keep falling behind and when new models needs to be introduced, they may have to depend on foreign technology.

**0.1.6** Exports in the past have been very limited, the value of exports in 1987-88 being Rs. 8.9 crores. Recently Maruti is taking special action to make changes to suit specific market of different European countries and is exporting to Hungary, Bulgaria, Malta, France and Italy.

## **0.2 TECHNOLOGY STATUS-INDIVIDUAL UNITS**

### **0.2.1 Hindustan Motors Ltd.**

HM was the first unit to manufacture passenger cars. Starting with Hindustan 10, it later produced Hindustan 14, Landmaster and Ambassador. Ambassador was produced in different models Mark I, Mark II, Mark III, Mark IV and Nova. The initial collaboration was with Nuffield of UK and Ambassador has strong resemblance to Morris Coley which went out of production in UK in mid fifties.

Recently HM has brought out a new model Contessa Classic with Isuzu engine and power train and Vauxhaul body. This car qualifies for the fuel efficient norms specified by the Government of India.

The Company, in addition to making improvements from time to time in their models, have carried out the following major projects on their own:

- Engineering of Contessa with original Ambassador engine.
- Engineering of Contessa with imported Isuzu engine.
- Improvements in Ambassador 1500 cc engine.

The Company has the following current collaborations:-

- Ricardo of UK for improving fuel efficiency of 1500 cc engine.
- Isuzu of Japan for 1800 cc engine and power train assemblies used in Contessa.
- Isuzu of Japan for a 4 cylinder diesel engine proposed to be fitted in cars.
- Mckenzie of USA for organisation and productivity improvements.

### **0.2.2 Premier Automobiles Ltd.**

Premier Automobiles Ltd. (PAL) was set up in late 40's initially for assembly of cars. The manufacture of cars was later taken up with technical collaboration of FIAT of Italy.

The company originally produced Millecento and then Fiat 1100. After the collaboration was over, they named the car as Padmini. The changes in the design were marginal and company met criticism on this account by putting forth that low volume and lack of resources did not permit any large scale R&D.

With the advent of Maruti Udyog with a modern fuel efficient car and large production volume, PAL took urgent steps to meet the challenge and retain reasonable share of the market. They made the following improvements:-

- Improved fuel efficiency
- Reduced exhaust pollution
- Development of air conditioned model
- Dieselised version of car

The company also introduced a new model NE 118 with a new Fiat body and Nissan engine. The technology was imported for this car. The design has stabilised and is proving popular.

Company has commissioned AVL of Austria to make improvement in 1100cc engine to bring it to world class level. This is expected to be implemented in 1991.

While there was negligible R&D by the company for the initial 30 years, currently the R&D and manufacturing capacity has matured to a level where they can absorb imported technology and make improvements. They are still very far from having ability to design and develop a completely new model.

### 0.2.3 Maruti Udyog Ltd.

Maruti was incorporated in 1981 as a Government company. They started production in December 1983 with collaboration from Suzuki of Japan. Initially Suzuki had 26% equity which has since increased to 40%.

The original model was replaced in the 2nd year itself with a new streamlined model with more leg room and better fuel efficiency. A van (now called Omni) in two types of roof and a Jeep type vehicle Gypsy, were also introduced in quick succession.

The various cars proved extremely popular and production has already crossed 100,000 nos. which is 60% of the total production of passenger car. The company has an up to date manufacturing facility and absorbed the technology successfully. The foreign equity and presence of a number of Japanese experts has helped in the stabilisation of production.

In the initial stages Maruti set up a limited R&D department for absorbing the technology that was being imported. Even at this stage Maruti made certain modifications in the imported technology on market considerations e.g.

- Application engineering to develop special bodies for school van, taxi, delivery van, executive van, ambulance.
- Improved suspension and seating for OMNI, which was used more as a car than a commercial vehicle.
- Modifications in Gypsy and Maruti 800 to meet export requirements of various countries.
- Various other minor improvements.

In next 5 years, Maruti plans to invest in basic test facilities for their R&D. These facilities are for evaluating the vehicle performance and mass emission etc. as basic requirements for audit checking of vehicles for export to Europe.

### **0.3 TECHNOLOGY STATUS IN COMPONENT INDUSTRY**

**0.3.1** There are a large number of old established companies mostly set up with foreign collaboration initially, who are supplying components such as electricals, pistons, rings, brakes, wheels, carburettors and shock absorbers. These have developed and manufactured components for Maruti, Contessa and NE 118 mostly on their own but in some cases with assistance from their previous collaborators. In a few cases they needed fresh foreign technical know-how e.g. carburettors for Maruti 800. These companies have benefitted from contact with Japanese vehicle specifications in maintaining quality standards. Many of these companies are already exporting their product.

**0.3.2** In some cases units have been set up specifically for supplying to Maruti. Here joint venture companies have been set up with Maruti and technical know-how is mostly on the basis of Maruti's collaboration with Suzuki, or fresh collaboration with Suzuki's suppliers. Some examples are:-

- Jai Bharat Maruti                      for sheet metal component
- Machino Plastic                        for plastic items
- Bharat Seats                            for seats
- Sona Steering                            for steering gears

Sona steering have a collaboration with Koyo of Japan, and Bharat seats with Howa Kagis of Japan.

**0.3.3** Though initially there had been some problems with indigenising of imported items because of time taken by component manufacturers to develop components of acceptable quality, the component manufacturers have by now developed most of the items. One problem faced by component manufacturers was that in many cases materials to the required specification were not available and had to be imported.

**0.3.4** Most component manufacturers state that they are conversant with the latest developments in the world for their products and would be in a position to develop these when required by vehicle manufacturers.

## **0.4 TECHNOLOGY STATUS—VEHICLES**

- 0.4.1** With the introduction of the three new passenger vehicles all with Japanese engines, the present new Indian passenger cars had become comparable with those available in the world. However, none of the manufacturers have developed capability for introduction of new indigenous vehicles and engines. HM and Premiers have however developed and introduced improved versions of Ambassador and Padmini cars.
- 0.4.2** With the low level of R&D set up with various manufacturers, there is every reason to fear that with passage of time the Indian industry would not be able to keep up with world standards and unless some special action is taken, will again fall behind. Maruti has already taken up massive R&D expansion and HM and PAL may also take action to strengthen the R&D set ups considerably so that they are able to keep up their technology to a reasonable level when compared to world levels.

## **0.5 RESEARCH & DEVELOPMENT**

- 0.5.1** All the car manufacturers have their own R & D (excepting Sipani). The expenditure is however quite low and is well below 1% of the turnover as against 3-5% of many manufacturers in the world. The manufacturers should try to increase R&D expenditure to 1% of turnover immediately and 2% in next few years so that sufficient resources are available for development.
- 0.5.2** ARAI, Pune has impressive facilities for research and they have the expertise and experience to assist car and component manufacturers for improvements in engines and different components design and performance. VRDE have also good testing facilities which can be available to the automobile industry.
- 0.5.3** Various IITs, IISc Bangalore and engineering institutions can also assist automotive industry in tackling specific problems.

## **0.6 MAJOR TECHNOLOGY GAPS**

### **0.6.1 Engine Assembly**

- Pollution levels
- Noise levels
- Engine weight and size
- Electronic programmed ignition
- Direct injection petrol engine

### **0.6.2 Transmission, Steering, Suspension and Brakes**

- Automatic transmissions
- Electronic power steering
- Adjustable steering columns
- Air suspension-auto levelling
- Special retarders

### **0.6.3 Body, Seats, Heating and Cooling**

- Low drag coefficient bodies
- Electronic controlled heating & cooling systems
- Better sealed doors and windows for noise elimination
- Corrosion resistant body & chassis
- Safety seats

### **0.6.4 Material**

- Stronger & lighter steel and aluminium alloys
- FRP components
- Plastic components
- Ceramic components

### **0.6.5 Electrical & Lighting Systems**

- Variable speed generators
- Steerable front lights
- Plastic lenses (light wt.)
- HID lights
- Long storage life batteries



### **0.6.6 Accessories**

- Heat shutting safety glass
- Anti lock brakes
- Wheel rims on which car can run till next service station in case of tyre puncture.

**0.6.7** Some of the developments are still at experimental stage and have yet to be fully implemented. Others are cosmetic changes. It is necessary for Indian manufacturers to examine techno-economic viability of each item for Indian conditions before implementation.

## **0.7 RECOMMENDATIONS**

**0.7.1** In view of the introduction of a number of latest generation of cars in 1980's and the build up of R&D capability in the industry, the industry may consider R&D collaborations for fuel efficient nonpolluting engines beside collaborations of the type entered into by Hindustan Motors and Premier Automobile for upgrading their older models, as such collaborations are more economic both in initial costs and in initial import of components.

**0.7.2** Physical incentives may be considered by the Government to encourage indigenous designs, developments and marketing e.g.:-

- (i) Weighted deduction for approved R&D expenditure.
- (ii) Grant of soft loan/subsidy for R&D into approved projects of national importance e.g. fuel efficiency, pollution control, development of new technology etc.
- (iii) Excise and Sales Tax relief on products based on indigenous R&D.
- (iv) Promote indigenous development.

**0.7.3** Indian manufacturers should earmark larger resources for R&D. An initial target may be taken as 1.0% of the sales turnover, gradually increasing to around 2% of the sales turnover.

**0.7.4** Vehicle manufacturers should take action to optimise performance of their vehicles in the following areas:-

- (i) Analysing feedback from service outlets to improve reliability, reduce maintenance and increase period between maintenance.
- (ii) Continuous development to reduce fuel consumption.
- (iii) Constant endeavours to reduce weight without affecting performance or reliability.
- (iv) Minimising exhaust and noise pollution.
- (v) Increased comfort and safety for passengers without any additional cost.
- (vi) Improved power and pick up.

Car and component manufacturing companies can usefully employ the services of specialist consulting firms in the field of research, product development, manufacturing and planning, available within the country, and if necessary, abroad, rather than enter into collaborations with manufacturing firms abroad. This approach will minimise foreign exchange for initial fees as also for import of components. It will also assist in building in house R&D capability.

**0.7.5** Vehicle manufacturers must improve customer education for operation and maintenance by:

- Well written operating and maintenance manuals.
- Network of approved service points.
- Availability of spares at reasonable cost.

**0.7.6** Vehicle manufacturers may study special requirements of urban and tourist taxis and make available modified vehicles for such use.

**0.7.7** Government may consider sponsoring R&D in areas of common interest with national institutions such ARAI, VRDE, CMERI or technical educational institutions. Some areas for consideration are:-

**i. Materials**

Study into development and use of better materials such as, stronger and lighter steel alloys, corrosion resistant alloys, aluminium alloys, ceramic components, powder metallurgy components, plastics etc.

**ii. Component Life**

Fatigue life studies of components and suggestions for improving fatigue life of components.

**iii. Exhaust Pollution**

Identify modifications necessary in existing vehicles to conform to specified pollution standards. These standards have to be periodically made stiffer in line with practices in foreign countries. This should also cover cars powered by alternate nonpolluting sources such as batteries and CNG.

**iv. Fuel Quality Improvement**

Studies for improving quality of petrol and diesel to improve performance and reduce pollution.

**v. Lubricating Oil Quality Improvement**

Studies into improved performance of lubricating oils so as to increase period between oil change.

**vi. Road Improvement**

Studies into improving quality of roads, alignment, surface condition, crossings, traffic control etc.

**vii. Noise**

Engines and modifications required to meet specified standards. These levels have to be periodically made stiffer in line with foreign practices.

- 0.7.8** There is need for a joint effort of vehicle manufacturers with specialised institutions, with a view to utilise the considerable facilities provided at such institutions and expertise developed by them.
- 0.7.9** In view of large availability of natural gas, Government may consider possibility of incentives for use of CNG in Passenger cars on the lines of New Zealand Govt. Such use would reduce petrol consumption and also save foreign exchange.
- 0.7.10** To meet the long term expected objectives in the area of Passenger Car, a National Car project can be taken up through a consortium approach involving agencies such as VRDE, ARAI, MUL, PAL, HM and National Laboratories. Expert consultancy group from abroad could also be involved.