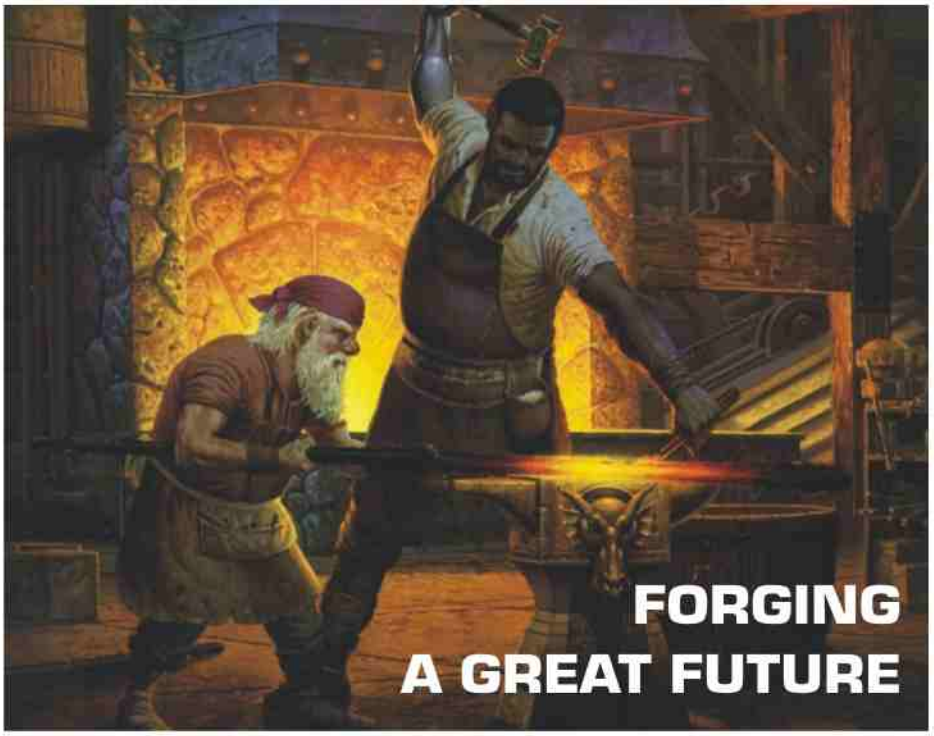

INDIAN FORGING INDUSTRY

THE PRESENT AND THE FUTURE

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Forging process is the product of work on plastic metal to a desired shape by application of pressure. The working of metal into the shape by means of modern forging methods refines the grain structure, develops its inherent strength, enhances chemical homogeneity, improves the mechanical properties and produces the structural uniformity free from hidden internal defects. The forged products possess toughness and strength to resist nominal loading coupled with ductility to resist failure under unexpected shock loading that may exceed the design criteria. The grain-flow orientation in forging process results in improved impact strength and fatigue resistance, with values greater than any other metal working process, leading to increased life expectancy. Also, the higher strength to weight ratios obtained in forgings can be utilized to reduce section thickness of the individual part designs without jeopardizing the performance characteristics and safety.

Forging Industry in India

The forging industry is one of the oldest and the most indispensable sector influencing people in their day-to-day life. Its origins can be traced to the beginning of metallurgy with hand forging for making small tools and tackles. Today, a host of mechanized forging processes have evolved which are either run by hydraulic or pneumatic means for producing a variety of components.

Steel has emerged as a prime material in forging industry mainly due to its versatility of providing a wide range of tailor made properties by choosing the appropriate composition / processing to exhibit high strength for load bearing components, toughness for usage in extreme temperatures, high hardness for use as cutting tool, low hardness for machining, shaping & drilling operations and high temperature resistance. Also, steel is favored because of its recycle-ability coupled with favorable price compared to other materials. Modern technologies in the development of wide variety of steels made it possible to select the best suitable steel for the required product; through the appropriate forging process with heat treatment for production of steel forgings to meet the application requirements. In order to meet the requirement of the various sectors, the forging steels should meet the critical level of set properties like strength, toughness, fatigue, fracture resistance, wear-resistance etc. for use in manufacture of innumerous components. Accordingly, the customers demand highest degree of consistency in the quality both metallurgical and dimensional as a means to cut down costs on shaping, forming, heat treatment and machining. Forging Quality Steels are produced through ingot cast-rolled-forged, ingot cast-forged, ingot cast-forged-forged, continuous cast-rolled-forged and continuous cast-forged routes. The route selection for these steels primarily depends on the shape of the forged component, the metallurgical attributes it confers and the economics of production.

The key driver of demand of forgings is the automobile industry comprising of two wheelers, three wheelers, utility vehicles, passenger cars, commercial vehicles, tractors and the auto ancillaries. About 65% of the total forging production is utilized in this sector. Thus, the fortunes of the forging industry are undoubtedly dependant upon the growth of the automobile industry. Other industries that consume forgings include the engineering industry, Railways, Defense, Chemical process industries, Oil exploration, Cement, Steel industry etc.

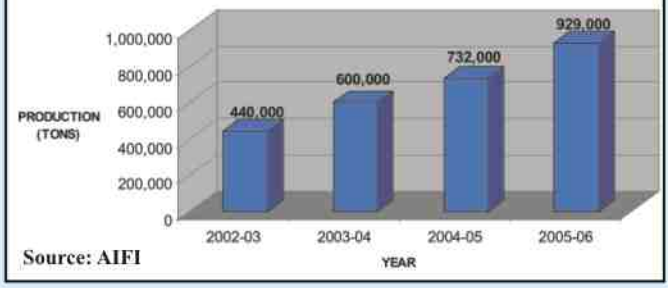
The Indian forging industry is pyramidal in nature constituting of about 10 large units followed by 100 medium & small scale units and about 220+ tiny units. In the tiny sector, the units functioning are far too many and their number is difficult to estimate. This structure of the industry is an example of the maximum competition and lowest margins in the small and tiny sector units which primarily cater to replacement, small sized and low value markets. The medium and large forging units are highly quality & value driven and hence remain as suppliers to Original Equipment Manufacturers (OEMs) in the automobile sector.

The domestic forging industry is characterized by fragmented capacities. The unorganized sector has major presence in Open Die Forging segment, which has lower capital costs, while the organized players dominate the Closed Die Forging segment. Out of the total forgings produced in the country, 70% is through Closed Die Forging, 15% by Open Die Forging and the balance 15% for meeting precision forging products.

The industry was previously more labour intensive (it is estimated that this industry provides direct employment to about 38,000 people), but now with increasing globalization, it is becoming more capital intensive. The total investment in the large and medium sectors is estimated at around US $ 700 million. Today, the small scale units too are hovering at technology and quality up gradation through increase in capital investment for broadening the areas of demand for forgings.

The total capacity of forging industry in India is about 1.1 million tons per year. The forging production has grown from a mere 188,000 tons in 1987-88 to 929,000 tons in 2003-04. The production statistics is illustrated in Fig.1 which shows growth at 37.05% per annum from 2002-03 onwards.

FIG.1. FORGINGS PRODUCTION IN INDIA

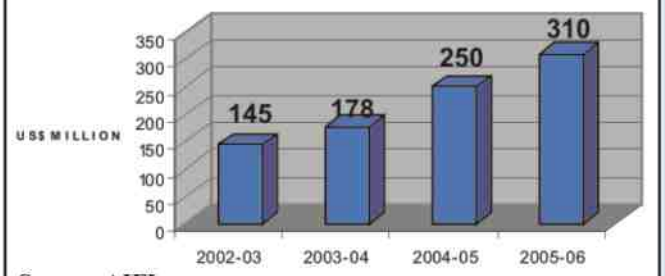


Source: AIFI

The overall production of the forging industry improved by 27% in 2005-06 over 2004-05 with considerable improvement in overall capacity utilization to 85% thanks to the excellent performance of the automotive sector especially the passenger car segment in the sub-continent.

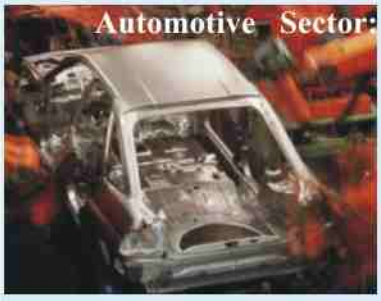
The Indian forging industry has emerged as a major contributor to the manufacturing sector of the Indian economy. It has shown a commendable performance by registering an export growth of about 24% in 2005-06 over the earlier year to reach US $310 million and the export statistics is illustrated in Fig.2 which reveals growth at 37.93% per annum from 2002-03 onwards. The major markets for export are USA, Europe, China, etc. However, not more than 30 to 35 manufacturing units are engaged in direct exports. The technology gap is therefore constantly bridged thereby attracting more forging units towards the export market. The progress made in the field of technology, cost competitiveness caused by low labour cost coupled with the strict pollution control norms levied in the developed countries led to increased growth in exports. Also, Indian companies are expanding their global footprint by establishing their presence in some of the world's largest markets. India hardly imports 5% of the total requirement of forgings.

FIG.2. TREND OF FORGING EXPORTS



Source: AIFI

Along with the automotive sector, there has been a steady progress made by the forging industry to cater forging quality steel requirements for Defense, Railways, Oil refinery, Power plants, Steel industry etc. However, the growth in the forging industry can be attributed to capacity expansion, modernization and cost cutting measures with the global buyers looking at India as a major outsourcing market especially for automotive components.



Influencing the Forging Industry

The excellent growth of the forging industry that one sees today is attributed to the great performance of the automotive sector in the country. The forged products that are used in automotive components are front and rear hubs, shafts for front and rear axle, front axle beams, connecting rods, differential cases and housing, engine and control mounting brackets, levers, spring shackles, cam shaft, crank shaft, spring hanger brackets, intake and exhaust manifolds, leveling gear box, bolts, studs, fasteners, steering arms, needle bearing cups, tappet bodies, idler arm brackets, steering sockets, wheel bearing races, blanks for differential drive pinions, clutch release fork, bearing cage, life rod yoke, axle housing, steering gears, propeller shafts, brake assembles etc.

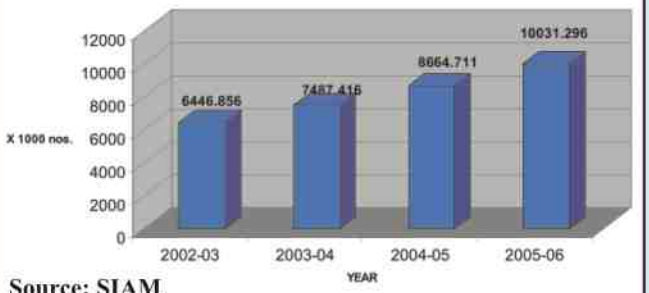
The approximate consumption of forgings in various segments of the Automobile Industry is shown in Table1 below.

Segment	Consumption [kgs.]	No. Of Parts
Heavy Commercial Vehicles	400 - 450	60 - 70
Light Commercial Vehicles	300 - 325	60 - 70
Tractors	300 - 350	60 - 70
Two Wheelers	25 - 30	50
Passenger Cars	50	60 - 70

The automobile production in the sub-continent has been growing steadily at 18.53% per annum from 2002-03 onwards with total vehicle production standing at a mammoth 1,00,31,296 nos. in 2005-06 as is shown in Fig.3.

Among the automobiles, two-wheelers account for 75.77%, cars about 11.09%, 3-wheelers to the tune of 4.33%, tractors about 2.95%, buses and trucks constitute 2.19%, Multi Utility Vehicles (MUVs) to the tune of 1.96% and Light Commercial Vehicles (LCVs) about 1.71% of the total number of automobiles produced in the country. Presently, India is the second largest market after China for two & three wheelers. In tractors production, India is one of the two largest manufacturers in the world along with China. The sub-continent stands as the 4th largest producer of trucks in the world. Coming to the passenger car segment, the country is

FIG.3. INDIAN AUTOMOBILE PRODUCTION

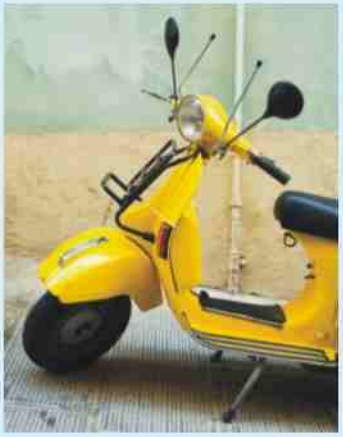


Source: SIAM

positioned 11th in car production in the world.

The Indian passenger car market is far from being saturated leaving ample opportunity for volume growth since the per capita car penetration per 1,000 is only 7 compared to 500 in Germany. The production of cars in the country has been growing at a mammoth 27.58% per annum from 2002-03 onwards and stands at 1,11,2542 nos. in 2005-06. In general, cars are broadly classified as Mini, Compact, Mid-Size, Executive & Premium varieties. There has been steady rise in compact car production from 3,33,000 in 2002-03 to 7,15,000 in 2005-06, mid-size cars from 1,22,000 to 2,04,000 nos., executive cars from 2,000 to 23,000 nos. and premium variety cars from 4,000 in 2002-03 to 5,000 nos. in 2005-06. The mini-car segment production reduced from 1,50,000 in 2002-03 to 98,000 nos. in 2005-06. These statistics vividly reveal the increasing affordability of the Indian customer thus driving the passenger car demand rapidly up the price ladder. Analysts speculate car production in the sub-continent to touch 15,75,000 units in 2009 and 26,54,000 by 2014. Cars and MUVs exports rose from 72,000 in 2002-03 to reach 176,000 nos. in 2005-06 with growth at 48.155 per annum from 2002-03 onwards.

Out of the two-wheelers produced in India, motorcycles account for 81.59%, scooters about 13.42% and mopeds to the tune of 4.99% of the total production. The production of two-wheelers has been growing at 16.58% per annum from 2002-03 onwards and stands at 76,00,801 nos. Out of this, motorcycles have exhibited production growth at 19.99% per annum, scooters at 6.74% per annum and mopeds at 2.65% per annum from 2002-03 onwards. Two-wheeler production units in India constitute of Japanese OEMS (Original Equipment Manufacturers) which include Hero Honda Motors, Honda Motorcycle & Scooter India (P) Ltd., Yamaha Motor India (P) Ltd. & Suzuki Motorcycle India (P) Ltd. and Indian OEMs consisting of Bajaj Auto Ltd., TVS Motor Company Ltd., LML Ltd., Kinetic Engineering Ltd., Majestic Auto Ltd., Kinetic Motor Company Ltd. and Royal Enfield of Eicher Ltd. Out of the aforementioned, Hero Honda accounts for 39.55%, Bajaj Auto about 26.87%, TVS Motors 17.98%, Honda Motors 7.94%, Yamaha Motors 3.27%, LML 1.41% and the remaining 2.98% of the total two- wheelers production in the country. The exports of two-wheelers made a significant growth from a level of 180,000 in 2002-03 to reach 513,000 nos. in 2005-06. The latest estimates put up production of two-wheelers to 13.6 million by 2009.



The production of Multi Utility Vehicles (MUVs) has been showing sparkling growth at 23.84% per annum, Light Commercial Vehicles (LCVs) at 35.49% and Medium & Heavy Commercial Vehicles (M & HCVs) at 27.33% per annum from 2002-03 onwards. In 2005-06, the production of Multi Utility Vehicles (MCVs) has been 196,371 nos., Light Commercial Vehicles (LCVs) about 17,17,781 nos. and Medium & Heavy Commercial Vehicles (M & HCVs) stands at 219,297 nos. Industry analysts put up MUVs production to reach 207,000 in 2009 and 277,000 in 2014. Commercial vehicle exports made a steady growth from a level of 11,000 in 2002-03 to 41,000 in 2005-06.

The manufacturing units for four-wheelers in India constitute of Japanese OEMs covering Maruti Udyog Ltd., Toyota Kirloskar Motor (P) Ltd., Honda Siel cars India Ltd. & Swaraj Mazda Ltd., Indian OEMs consisting of Tata Motors Ltd., Mahindra & Mahindra Ltd., Ashok Leyland Ltd., Force Motors Ltd., Eicher Motors Ltd. & Hindustan Motors Ltd., Korean OEM Hyundai Motor India Ltd., American OEMs which include General Motors India (P) Ltd. & Ford India (P) Ltd. and European OEMs consisting of Skoda Auto India (P) Ltd., Daimler Chrysler India (P) Ltd., Volvo India (P) Ltd., Tatra Trucks India Ltd. & Fiat India (P) Ltd. Presently, Maruti Udyog accounts for 33.24%, Tata Motors 26.14%, Hyundai Motors 15.13%, Mahindra & Mahindra 7.47%, Ashok Leyland 3.78%, Toyota Kirloskar 2.61%, Honda Siel Cars 2.40%, Force Motors 2.08%, General Motors 1.78%, Ford India 1.57%, Eicher Motors 1.41% and others 2.39% of the total production of four wheelers in India.

The tractors production in the country has been making a steady growth at 25.80% and three wheelers at 19% per annum from 2002-03 onwards. The production of tractors has been 296,080 nos. and 3 wheelers about 4,34,424 nos. in 2005-06.

The Indian automobile industry is flooded with huge investments involving

green field and brown field projects. Also, Indian auto component industry is fast emerging as an attractive OEM & Tier 1 supplier. The auto component exports from India rose from a mere US$ 0.760 billion in 2002-03 to US$ 1.8 billion in 2005-06 showing growth of 45.61% per annum from 2002-03 onwards. All these indicate towards further increase in demand for auto components. Based on the sparkling growth in demand for auto components, global auto majors and domestic giants have been investing heavily in India because of India's competitive advantage.

Accordingly, the total investment in Indian auto component industry has been showing a tremendous growth at 22.12% per annum from 2002-03 onwards and is about US$4.4 Billion in 2005-06. Also, Indian auto component manufacturers are substantially increasing investments in production capacities, establishing partnerships in India and abroad and have been investing in or acquiring companies overseas. In continuation with this, global multi nationals are shifting automotive design centers into India with India evolving as an excellent automotive R & D base for prototyping, testing, validating and production of auto components caused by excellent IT skills & exemplary automotive domain knowledge.

These trends in the automotive sector have paved way towards higher growth of forgings that speaks volumes about the influence of this sector on overall performance of the forging industry in India.

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