

Trends and Opportunities in the U.S. Automotive Component Markets: Original Equipment Manufacture (OEM) and Aftermarket

Global competition, fuel efficiency, warranty issues, federal safety & emission requirements, and U.S. customer vehicle preferences have deeply influenced the market trends in U.S. automotive industry. These business issues brought more vehicle models to the market. Proliferation of vehicle models has reduced the average sales per vehicle with important consequences on the OEM manufacturing sector. OEM's have responded by adopting "modular" and "flexible" production technology in the assembly plants. OEM have also increased the outsourcing of components, even sharing the burden of research and development with preferred suppliers.

The major emphasis of this review paper is on the trends of automotive components in the U.S. markets – OEM and aftermarket. However, since much of the business is now global, world-wide automotive component market trends are also discussed.

The U.S. automotive market size is growing at a rate of 1.5% with U.S. passenger vehicle (light truck and passenger car) production at 12 million in 2007. Currently, the U.S. has 185 million passenger vehicles on U.S. roads. Automotive component outsourcing needs in the USA is growing at a faster pace due to both OEM and aftermarket demands.

U.S. automotive OEM and major suppliers (Tier 1) business trends are towards forming alliances and joint ventures. This is mainly due to the modular production approach. Suppliers are now an important part of the vehicle development and manufacturing process, rather than being a standard supplier to OEM specification. US Auto Alliance urges the suppliers to invest in following areas to be competitive in global economy:

- Field testing,
- Mechanical engineering analysis,
- product safety testing,
- new product testing
- new product development,
- rapid product development,
- product design and manufacturing,
- specialty product manufacturing,
- product failure analysis,
- failure mode and effect analysis
- failure mode analysis,
- rapid prototyping,
- prototyping
- product development consulting firm,
- product development firm,

The impact on the component industry will be the continued emphasis on improved durability, performance, quality, value, and innovation.

The primary impact explored in components will be in five areas: 1) Performance; 2) Durability; 3) Quality; 4) Value; and 5) Innovation.

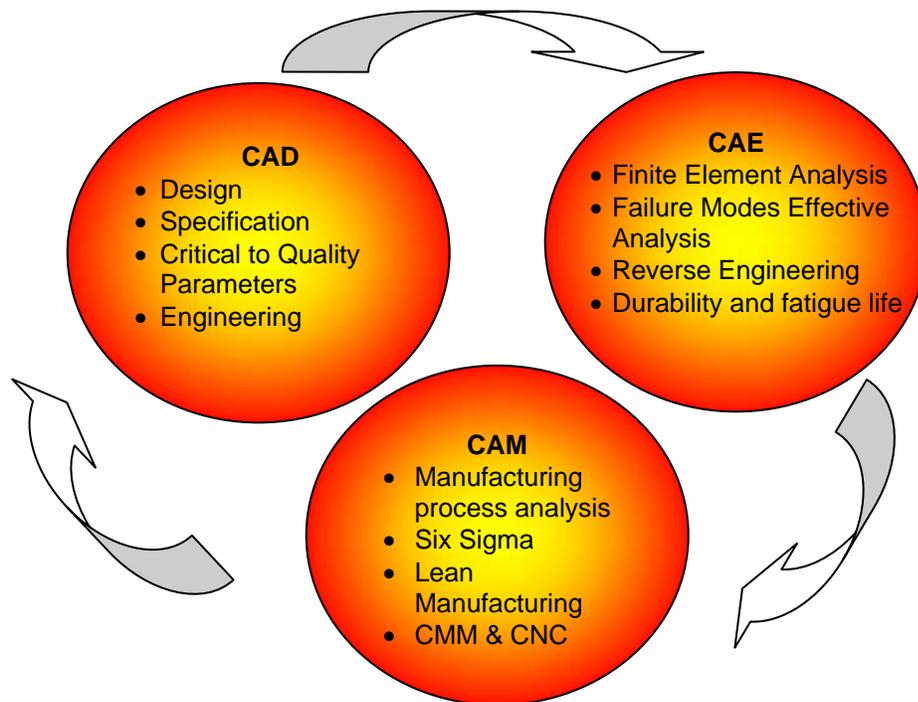
U.S. automotive companies want outsourcing manufacturing partners to introduce innovation into their process, help manage cost and service, and use relevant and emerging technology. U.S. companies also demand the outsourcing supplier companies understand their specific requirements and business.

Lean manufacturing, Just-in-time(JIT), Zero Defects, Six Sigma, Continuous Improvement, and Computer Aided Design/Engineering/Manufacturing (CAD/CAE/CAM) have revolutionized entire U.S. automotive industries and dramatically reduce operating costs while improving quality, competitiveness, and productivity. Now, these same principles are also being translated to the development and marketing of new products.

Computer-Aided Design, Engineering and Manufacturing (CAD/CAE/CAM) are tools that help reduce costs and shorten the design, prototype and production cycle. These computer-aided tools can also help to incorporate Six Sigma, Lean manufacturing and Just-In-Time (JIT) in the supplier processes bringing credibility to new design concepts. Supplier should utilize these tools to provide a manufacturing solution by bringing new automotive components to the marketplace in the shortest possible time, with the lowest cost, and highest quality.

CAD/CAE/CAM are becoming more popular as a standard analysis tools in the automotive industry for design, failure and manufacturing process analyses. Another notable reason for this popularity is the recent changes in automotive specification requirement for parts comprised of new materials or designs. The automotive industry is trying to make components that could withstand 300,000 miles (10 years) of minimum warranty.

The automotive OEM companies have been changing their way of doing business. Traditionally the automotive companies would design and develop a product, perform comprehensive testing, send prints and specifications to suppliers for quotes. The most cost competitive supplier got the business. To remain competitive on a global basis, the automotive companies now are relying on their suppliers to provide product design, analysis, testing and manufacturing. This is an evolution of the old supply and demand chains into new one-to-one supplier relationship. In the past, it may have been enough to have the lowest cost. Now, a supplier must have world class quality, excellent service, low cost, be globally competitive and deliver just in time. In order to obtain these goals, it is essential that manufacturers reduce their product development design cycle time. They should shorten the time necessary to introduce a product to the market. CAD/CAE/CAM is tremendous productivity tools for the suppliers to create, test, modify and manufacture design ideas.



Schematic overview of the manufacturing solution with just-in-time delivery

Cost Evaluation:

Automotive suppliers could arrive at the manufacturing costs of the part by considering the following items:

- **PART #:** The part number being quoted.
- **PART NAME:** The name of part being quoted.
- **DWG LEVEL:** The change level of the drawing provided by the customer for quoting.
- **RFQ #:** Request for Quotation.
- **SUPPLIER NAME:** Name of the company quoting the part.
- **PLANT LOCATION:** The location where the supplier intends to manufacture the part.
- **CURRENCY:** The local currency of the manufacturing facility.
- **EXCHANGE RATE:** The exchange rate upon which the quote is based.
- **VOLUME QUOTED:** The anticipated yearly volume of the part for production.
- **TOOLING CAPACITY:** The number of parts that can be produced from the tooling quoted.
- **@ HRS/DAY:** the number of hours per day that the tools will be running to reach the tooling capacity stated above.
- **@ DAYS/WEEK:** The number of days per week that tools will be running to reach capacity stated above.
- **PREPARED BY:** The name of the individual who completed the piece price breakdown worksheet.

- **ITEM DESCRIPTION:** Identify the material and type of that material and / or identify the name of the purchased component that will be used in manufacturing of the part being quoted.
- **GROSS WEIGHT PER PART:** Identify the unit of measure and how much of that unit it takes for one part (I.e., kg/pc ; lbs/pc ; components/pc)
- **UNIT PRICE:** Identify the cost per unit of each material / component. (\$ / kg ; \$ / lb ; \$ / pc)
- **SCRAP WEIGHT PER PART:** Gross weight minus net weight is scrap weight.
- **SCRAP PRICE:** Identify the cost per unit.
- **SCRAP RATE:** Percentage of scrap for each material.
- **OPERATION / DISCRPTION:** List each operation required to manufacture the part being quoted.
- **LABOR RATE:** Identify the base direct labor rate for each operation. Note if fringes are included in the labor rate or in the burden detail.
- **STANDARD MIN:** Identify the time it takes for one part to be processed; this can be show as standard minutes or by the hourly production rate.
- **LABOR COST:** Multiply the LABOR RATE / 60 by the STD MIN or LABOR RATE divided by the hourly production rate
- **VARIABLE COST:** Identify the portion of burden cost per hour which varies directly with activity level (I.e.:indirect material,power,supplies,freight,etc.)
- **FIXED COST:** Identify the portion of burden cost per hour which remains constant regardless of change in activity level (i.e.:depreciation, supervisory salaries,maintenance,etc.)
- **PROFIT:** Percentage
- **PACKING AND FREIGHT COSTS**

This will enable every auto OEM manufacturer to break down the final cost very clearly and will also make the quoting process more transparent. This will also provide an easy medium for every supplier all around the world to follow.

Conclusion

American demand for vehicle is increasing and changing with increasing strength of the end consumer. In the past 10 years, the US vehicle industry has switched from a seller's market to a buyer's market, leaving many US automotive component suppliers caught with unsustainable business needs and requirements from the OEM. This major transition between old and new supply-demand business models brought new challenges for automotive component outsourcing from India and China.

It is an accepted fact that Computer-Aided Design, Engineering and Manufacturing (CAD/CAE/CAM) has an important role to play in the industry as a tool for design analysis and manufacturing process simulation. CAD/CAE/CAM can be used as a powerful tool for design of products and manufacturing equipment. CAD/CAE/CAM provides a detailed analysis of proposed design before making the final prototype which will improve the chances of getting it right the first time in a cost effective manner. .