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PLM Solution to Auto Industry Challenges
An Implementation Perspective

About the Author

This whitepaper is written by Mahender Bist from Rapidflow Apps. Mahender Bist has over 20 years of industry experience in Operations Management and Information Technology consulting. He has is a strong advocate of Product Lifecycle Management (PLM) has been part of many complex and challenging PLM assignments.

About the Company

Rapidflow Apps was founded with the sole objective of providing high quality, innovative and practical solutions to the real world business problems of our clients in the areas of Supply Chain Planning, Product Lifecycle Management, Master Data Management and Business Intelligence.

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Executive Summary

The global economy has been turbulent for the last couple of years but the automotive industry, in particular, has been encountering the most challenging environment. Market dynamics are changing rapidly, thus forcing the auto makers to change their business strategies and to implement them successfully in order to stay competitive. Auto parts makers are further squeezed as they need to satisfy more diverse product requirements with low room for errors in a relatively much shorter time span. As radical technological trends are inevitable, harnessing this opportunity will enable companies with innovative products to gain market share.

The following key trends have been shaping the auto industry:

Auto-crisis: The latest crisis led to excess inventory and massive debt accrual for a number of big automakers in the US and Europe. At the same time, strong growth and a healthy economic outlook in BRIC nations has helped their local companies make headway into local as well as international markets. The financial landscape is forcing the big auto companies in the US, Europe and Japan to rapidly shift their strategy and to innovate faster in order to compete with the Asian auto and auto part makers.

Globalization: The opening of the international trade boundaries has helped companies expand into new growing markets such as Asia; however, it adds to the complexity of satisfying different types of local customer requirements making auto development complexity increase manifold. Alternately, globalization is also increasing the threat of serious competition from Asian OEMs that are buying the anemic divisions of western OEMs thereby leapfrogging into gaining intellectual capital that can be easily exploited in conjunction with their cheap labor. Quality, reliability and product differentiation to suit the local market at lower prices are becoming essential to a successful product portfolio. While protecting intellectual property rights, internal collaboration as well as that across the global supply chain has become paramount.

Regulations and sustainability: Increasing focus on pollution and fuel economy regulations is forcing companies to look beyond gas engines as there is a limit to reducing the emission and increasing fuel efficiency using conventional engines. With the maturity of battery technology, electric cars are changing the landscape rapidly and may even make the hybrid cars less relevant in the coming years. Safety issues can lead to costly legal battle and product recalls for the auto manufacturers. Companies need to exceed the government controls standards for their own good.

Technology: The vehicle landscape is changing rapidly. Newer technologies in auto battery, increased numbers of electronic components and control systems, software/hardware integration etc. are redefining the marketplace. Increased technological innovation along with shrinking product development cycles is overburdening the auto industry.

Cost: One of the biggest challenges is to lower the cost while maintaining high quality with a faster rate of product innovation in global marketplace, increased number of product types to suit local markets, and compliance with multiple set of regulations in different markets.
How does Product Lifecycle Management (PLM) help?

To address the automotive industry challenges brought about by the pace setting trends, companies need an in-depth understanding of trends impacting their specific business areas as well as a disciplined system and non-system based strategy formulation and execution strategy.

For the system based strategy, a complete solution must be flexible, robust and integrated utilizing Customer Need Management, Customer Relationship Management, Quality Management, Supply Chain Management and Product Lifecycle Management. A holistic system management approach is the right roadmap for auto companies but since business revolves around the products or services a company offers, PLM could be the single most rewarding area to focus on in system implementation.

Integrated or standalone, PLM solutions should be given a priority as it can deliver:

- Integrated design with product record
- Collaborative distributed design and feedback loop
- Manufacturer, Supplier and Customer Collaboration
- Building the right product the first time using distributed manufacturing
- Tracking and minimizing cost
- Protecting intellectual property
- Maintaining regulatory, environmental and corporate compliance
- Tracking product portfolio, product and project lifecycles
- Closed loop quality feedback
- Corrective and preventive action
- Driving innovation at a faster pace
- Increased profitability

PLM Vendor Selection

A number of PLM systems are available in the market today and a careful analysis is required with respect to cost and benefit analysis while selecting the PLM Vendors. While it may be difficult to quantify the benefits of PLM savings as a result of PLM deployment, it can be calculated using a matrix of the following criterion:

1. Cost
   a. Software and Hardware
   b. Business Process Designing/Re-engineering
   c. Implementation and support
   d. Integration and synchronization with ERP and other system of product records
   e. Training and Change Management
2. Benefits
   a. Business problems solved e.g. collaboration during new product introduction, change management and CAD management, proprietary information security and access to new markets due to product compliance
   b. Quality gains e.g. reduced quality related recalls, quality action requests etc.
   c. Process efficiency gains e.g. efficient searches and part reusability, new product introduction time reduction, change management time reduction and data entry related improvements.

3. Return on investment
   An in depth cost and benefit analysis matrix can help companies estimate the ROI as well as the overall impact of PLM on the overall productivity.

**CAD vs. Non-CAD PLM criteria**

Often CAD design becomes the center of attention while selecting PLM systems in engineering centric sectors such as the automotive industry. Electrical Computer Aided Design (ECAD) and Mechanical Computer Aided Design (MCAD) are definitely critical for engineering functions but the PLM solution must extend across various functional areas in the extended supply chain. PLM software with strong engineering collaboration and CAD integration capabilities to automate the item/BOM creation in the ERP/PLM system should be seriously considered while selecting the right PLM vendor. The best-of-the-breed PLM software with a complete enterprise solution and integrated service oriented architecture capability can easily outdo just the CAD based PLM systems in overall collaboration and efficiency gains.

On one hand, CAD based PLM vendors Dassault Systemes, PTC, and Siemens offer integration from CAD to their own PLM while lacking integration with the other CAD tools. On the other hand, software tool like Oracle Agile with non-CAD PLM tend to be more flexible in integration with all the major CAD tools and also provides Application Integration Architecture (AIA) to propagate the Product /BOM data into the ERP systems. This can be particularly important for those organizations following a growth by acquisition strategy, as hard to replace CAD systems in acquired/merged entities can be easily integrated with the central PLM and the ERP systems of the parent company thereby reducing the cost substantially.

To sum up, completeness of out-of-the-box features, user-friendliness, integration capabilities, high degree of configurability and extendibility in the product suite are particularly important in the vendor selection as using multiple PLM system can prove costly and can lead to an inconsistent user application experience. Architecture, data model and process standardization must be integral of the long-term strategy in the PLM system business decision.
PLM Solutions

Companies may be in different phases of the maturity spectrum to formulate, adopt and implement PLM strategies; however, a long term perspective should be taken on how the business will morph, thereby, creating a need to deploy future solutions that will forge the way to stay ahead of the competition.

Auto companies should look into adopting flow-based PLM solutions where streamlining the business processes is the main focus. Business flows can span across the cross-functional business area as well as the product modules. Some of the key business flow solutions can be outlined as:

- **Customer Need to Product Formulation**
  Product design is usually originated by the marketing or product development team who comes out with either a new product concept or requirement(s) expressed by the customers. Customer needs can be captured from forums, enhancement requests, CRM and quality systems or any other documents. Such requirements can be converted into products using collaborative efforts and cross functional interactions.

- **Requirements to New Part Introduction (NPI)**
  Once a product idea is approved internally, the part is created in the system. Product bill of material configuration, supplier part numbers, manufacturer’s part number, attachment and other associated detailed attributes are added to the part number as a part of the NPI process. Workflow driven processes greatly facilitate the progression and reduce the time frame while increasing data accuracy.

- **Design to Release**
  Any good change control process to manage the product lifecycle phases should be workflow driven to increase efficiency, streamline the process and track changes. Various workflows based change types can be used to manage the product, structure, MPN change/ bulk change processes and automatically implement changes upon approval.

- **Engineering Design Collaboration**
  A number of internal teams as well as external vendor engineers could work on designing the product at multiple locations and this engineering collaboration can be the key to designing the product right the first time. Apart from CAD design collaboration, another aspect of engineering collaboration is to automate the creation of the product BOM structure into the central product record system where non-engineering users can utilize the information to manufacture, procure and market.

- **Product Record Management**
  Centralization of product records is important because distributed inconsistent and partial information can increase the data maintenance cost, operation cost and quality cost substantially. A single source of truth for product, product attributes, BOM, supplier and supplier parts, manufacturer and manufacturer parts and site information is critical to the PLM
systems implementation strategy. Product record can be synchronized to another system of records using web services (Service Oriented Architecture) from the record master system.

- **Document Management**
  Intellectual property security protection is all the more important with global product collaboration. Document management includes check-in, check-out, checksum, document change control and bulk change capability with integrated workflow for review and approval.

- **Product Portfolio to Profitability**
  Companies launch various projects and programs during the product lifecycle to manage, control and track the risk involved in cost, product rollout timeframe and compliance etc. Integration with Microsoft Projects can be an important capability of any product portfolio management solution.

- **Quality Review to Conformance**
  Proactive monitoring and managing of product quality during the entire lifecycle is the key to success for any company. Quality review to conformance deals with the managing process during manufacturing, customer complaints, methodical defects detection, enhancement, and corrective and preventive actions.

- **Product Governance and Compliance**
  Company products need to comply with various standards, regulations or tracking guidelines to conduct business in any country. Product governance and compliance solutions can be used for creating, maintaining and tracking to stay compliant.

- **Product Cost Management**
  Tracking and managing the product cost against target cost levels is the key to maintaining profitability. The product cost management solution is used to calculate part and resource costs across the supply chain throughout the entire product lifecycle.

**Conclusions**

The automotive industry is showing signs of life in the wake of the economic recovery; however, a number of companies are still struggling in their product strategy. The auto industry challenges are real and their response can make or break the companies. Product innovation, quality, compliance and product lifecycle reduction while keeping the costs down are fundamental factors to survive and thrive. Implementing PLM can provide the necessary leverage to companies in catching up and staying ahead of the competition. Choosing the right consulting partner can steer you in the right direction.