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ORIGINAL ARTICLE

ROLE OF PRODUCT DATA MANAGEMENT IN CONCURRENT ENGINEERING

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Abstract:

Time is money. This seems to be the mantra of success today. But the norms of our thinking are "we don't want to step twice in same river". It can be avoidable, but the emerging industrial revolution is not allowing to do so. Hence, an effort is required to reduce these kinds of activities. One of the major constraints present in the manufacturing industries are managing the data flow between various departments. It is needed to follow a same loop until a requirement achieved. Here we are breaking the norm. By organizing frequently & controlling of the product information as it is created, a dedicated computer program is needed to record. To automate the various on process in the product life cycle to avoid the time delay. The program should accomplish in the ERP solution as well as CAD/CAM/CIM field irrespective of function. To succeed in the contemporary world we need the data explosion. It can be only achieved by managing the product data. Hence, the dedicated program is to be product data management. In this article, reviewed the concurrent engineering with respect to the product data management in the world.

KEYWORDS:

Concurrent Engineering, Product Data Management, Process Management, Enterprises Resource Planning, Electronic Data Management.

INTRODUCTION:

Fundamentally Concurrent Engineering is a new era of world Competition, in which time is the key differentiator for success of a project & Product design engineering determines and defines the end product in the form of Engineering instructions like drawings, geometric models and bills of materials that specify what purchase departments must make and assemble to produce the end product consecutively, with little overlap. Concurrent engineering means product design. Process design engineering determines the processes that define the machinery and work station arrangements that specify how the product will be made and assembled. Traditionally these two engineering functions were conducted engineering and process design engineering being performed concurrently, so it is a marriage of these two engineering functions. As with many other success stories down through history, necessity is the mother of invention. With worldwide pressure to introduce products sooner, it is no wonder that ways have been discovered to shorten the development time by doing things in parallel instead of series hence the birth of concurrent engineering. Concurrent engineering aims at developing products and their related manufacturing and support processes concurrently. This approach helps the technology development group of engineers to consider and implement in the product development stage, all elements of product life such as user requirements and available manufacturing capabilities which include performance, quality, costs, schedule, maintenance and repair.

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2. PRODUCT DATA MANAGEMENT

Starting in the mid 1980s, a new class of applications called Electronic Data Management (E D M) emerged. But, its use was limited to only data generated by the CAD / CAM / CAE tools in the same application. Subsequently a type of standalone application called Product Data Management (PDM) as shown in fig.1, entered the market trying to alleviate this limitation configuration management of almost any type of dataset.

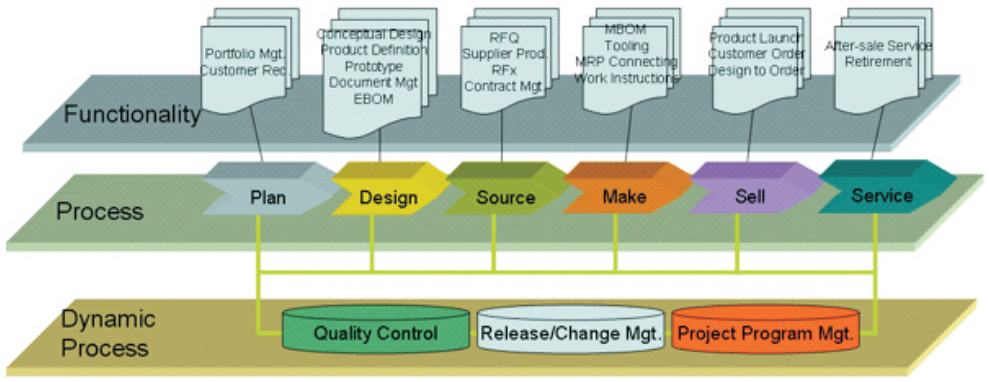

Fig.1 PDM System in enterprise

3. PDM IN CONCURRENT ENGINEERING

Concurrent engineering was heralded as the new panacea for manufacturing in the 1990s; its strength rooted in its emphasis on 'reducing time-to-market' thereby reducing associated costs and delivering competitive advantage. But for concurrent engineering to be successful, cross functional design teams, along with their associated data must be brought together. PDM assists in implementing a concurrent engineering strategy successfully because a PDM system

provides the mechanism to capture and enforce the specific product development process consistently according to the way in which a company does business. A PDM system within an enterprise organizes provides access and control of data related to its products and manages the entire life cycle of the product. Every new product design sets in motion a torrent of tasks required for designing, manufacturing and servicing of a product. Manufacturing the physical parts of a product is only a small part of these life cycle tasks. Understanding the total complexity of these tasks and simplifying those which give customers and manufacturers the greatest benefit gives the winning advantage and facilitate true concurrent engineering enterprise-wide. Studies have found that most engineers are able to spend only 20 percent of their time – only a day per week, on an average – actually designing products. On the other hand, they spend nearly twice as much time, approximately 35 percent, looking for and verifying data regulating design revisions, performance calculations and drawings. Overtime, failure to manage data effectively can have a devastating effect on a company's competitiveness, so it becomes crucial to minimize lost engineering productivity. If engineers are spending 80 percent of their time not developing new products, it follows logically that products are brought to market later than possible. These products may not offer the full range of features, because of the time that would be required to developed and refine them. And they may cost more to produce because the time required to exploring alternative materials, packaging would have resulted in additional delays. The PDM system strives to overcome these problems by keeping information required for decision making current and accessible – PDM can be considered accurately as the critical component in helping manufacturers improve product quality and reliability , accelerate time – to – market, and reduce a product development costs.

4. EXPLOSIVE OF PRODUCTIVE DATA

PDM supports to DFA (Design for Assembly) as follow:

The PDM system provides flexible product assembly structures supporting complex relationships between parts, drawings, supporting documents, Meta – data, people and groups of people. Roles and

responsibilities are represented for project control and are always be present for access control. The engineering content of CAD files, scanned images and word – processed documents are sorted in a secure vault and free text – indexes are available for the text documents.Check–in and check–out of documents and drawings are a part of a simple change control and document distribution process which can be elaborated by custom programming: either by using PDM system own scripting language or by making calls to its published API (Application Programming Interface). Thus, PDM covers some of the key core technical capabilities from each of the related software markets. There is a wide spectrum: the most innovative are new and cannot boast of a long history of trans – continental reliable operation, the easiest to learn do not have the depth of those offering complex relationships and those constructed as a collection as a collection of separately developed mature packages have extensibility and scalability problems.

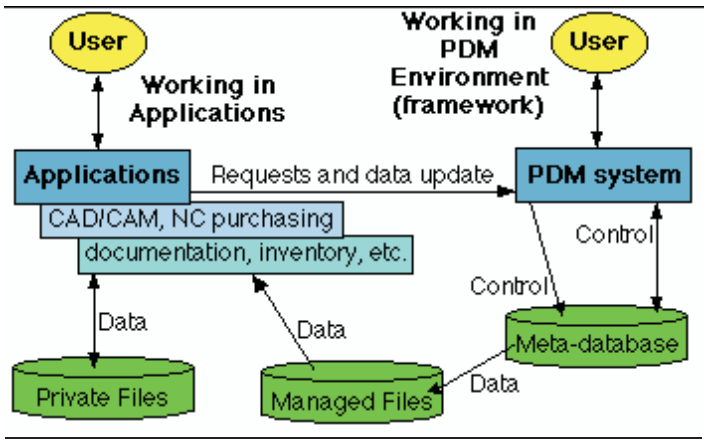

Fig.2. PDM Environment in Enterprises

5. FUNCTIONAL VIEW OF PDM SYSTEM

There are four major components of PDM system, Data Model, Vaulting, Revision, Identification, CAD integration. These functions can be predefined and used by any customer.

5.1 PDM with respect to ERP

The question of which type of Software Company will dominate the PDM market is an open one: It could be one of the ERP, CAD or PDM companies. As more engineering data became electronic, the need arose to better manage the multitudes of files created during the design process. Realizing this need, some large and mid – range ERP companies added a basic PDM module to their ERP package encompassing Parts Master, Bills of Material, Routings and Engineering Change. But unfortunately the ERP vendors failed to fully understand and support PDM for several and commercial reasons.

PDM development requires a flexible mind set based on networks of relationships and classification hierarchies. This network approach is in direct contrast to the table driven approach of ERP suites.

ERP companies derive now, and will continue to derive, the vast bulk of their profits from financial and manufacturing modules of their products. As this is where the added value arises in the manufacturing process thus within an ERP company, a PDM product champion would always have a small voice. CAD companies also have a mindset problem with PDM company and coined its own its own phrase 'electronic product definition' to mean PDM, or as much of PDM as the current collection of their software packages can manage. There are a handful of independent truly innovative and purely PDM companies selling software today that go well beyond that available from CAD and ERP developers. But in light of today's business scenario these would be bought by larger CAD or ERP companies; those bought by CAD companies may end up in charges as PDM as they become increasingly responsible for much of the revenue. The remaining independent PDM companies can probably only flourish by making close partnership with large system integrators and international management consultancies. That can continue so long as PDM software components do not become commodities since as the partnership continues the intellectual understanding of PDM – type problems would come to reside in the consultancies as well as

PDM companies. In the long term, the common computing platform will acquire some work – flow like function as standard and the existing workflow software companies would also have to manage processes containing increasing complex databases. Thus it may be a small step for them to absorb the engineering PDM market by providing commodity software to system integrators.

6. PRESENT STATUS

There are about fifty PDM vendors ranging from small stand – alone companies to division within large corporations, such as IBM and Hewlett – Packard. Products like EDS and Intergraph have stemmed from vendor's roots in CAD. But some of these packages can be 'pricey' for smaller midrange companies. Versions with attractive pricing for midrange companies are now surfacing. At this time, no single PDM vendor dominates the market. Individual vendor market share percentage range from five percent down.

7. WEB ENABLED PDM SYSTEM

The internet has brought about a tremendous change in almost every aspect of human lives. Keeping in tune with its impact on the manufacturing business environment the world of PDM is embracing the Internet in a big way. We are now entering an age where Web – enabled PDM, Web – based PDM, Web – centric PDM and Applications Service Providers (ASPs) offering virtual product data management, real – time online collaboration 'visiting centers' and even downloadable 3D modeling environments existing in neutral territory for inter – corporation collaborative product development efforts are being developed and perfected. PDM and the Internet both offer the same benefits: access and connection. This is what drives the Internet revolution and gives PDM the process control that has made it a staple of the Engineering and Manufacturing world. Instant access to what and whom we need through constant connection gives control that both the Web and PDM provide. The mating of these two technologies is nearly a perfect concept with only the particulars to be worked out eventually. Net work and infrastructure concerns will become less of a factor in deciding how a company would mate their PDM system with the Web. In tomorrow's world of mega – corporations positioned in the centre and directing the activities of vast networks of supply chain entities and outsource vendors, and company that isolated itself from the world's manufacturing community will do so at its own peril. Web – centric PDM however will be the basis of how large product creating corporations design and develop the products that would define our daily lives.

8. CHOOSING A PDM SYSTEM

As with any new technology, pitfalls abound in choosing a system, which will dovetail with needs of an organization, and yet offer the flexibility to grow. PDM systems range from simple, off the shelf packages to complex, advanced systems that can be further developed to fit a company's needs exactly. The only way of differentiating a supplier's ability to deliver is to look at its most recent successes, its product strategy and its financial stability.

8.1 Few fundamental requirements:

Every organization has different priorities, different implantation strategies thus requiring different levels of PDM capabilities. Hence, to provide flexibility, any PDM system must be fully scalable.
A system must be easy to use. The software must be easy to tailor to an organization's needs. A PDM system must, absolutely, keep things easy for the end user – for in case of PDM; the end user might be an administrative assistant, a shop floor worker or a stress analyst.

The system should have an open structure in order to allow the user to integrate it with tools used for design, engineer and manufacture.

To assure a common, concurrent engineering environment, the PDM system should be available on a wide variety of platform and functions across heterogeneous networks.

A system must be rules based write the rules controlling how the system functions: the are not forced to adhere to constraints imposed by the software.

9. FUTURE

In today's rapidly evolving business environment, tracking the explosive array of data generated by multiple legacy systems used in design and manufacture gained priority over automation and computerization of different manufacturing processes. PDM has become an indispensable part of a

successful; enterprise as it maximizes the time – to – market benefits of concurrent engineering by effectively controlling the data and distributing it automatically to the people who need it when they need it.

It has evolved through the past two decades and now armed with the benefits of the powerful Web technology, it is all set to dramatically increase productivity reduce cycle time bringing product development into the age of global interconnection. Although Web – enabled PDM industry is still in its infancy, with issues like security, networking and infrastructure still unresolved, the future still belongs to the Web – centric PDM solutions. “where are we in this race to create products in real time through an Internet web. It is no longer a matter of 'how 'and 'why' but just a matter of time.

10. BENEFITS OF PDM

Reduce time – to – market by making data instantly available as and when required, support concurrent task management and allow authorized team members to access all relevant data, all the time, with the assurance it is the latest version

Improve productivity by proving appropriate tools to access data efficiently , thereby removing dead time Almost entirely and eliminating the 'reinvented wheel' syndrome

Improve design and manufacturing accuracy by ensuring everyone is working on the same set of data that is always up to date. Thus overlapping or inconsistent designs are eliminated – even when people are working concurrently

Better use of creative team skills by keeping tract of all the documents and test results, reducing risk of failure by sharing risk with others and encouraging team problem solving by leveraging packet – transfer facility

Data integrity safeguard by using the central vault concept that ensures immediate access to data to those who need it, while all master documents and records of historical change remain absolutely safe and secure

Comfort of use , Better control of projects & better management of engineering change

Major step towards TQM.

11. CONCLUSION

Product Data Management (PDM), the market trying to alleviate this limitation by allowing configuration management of almost any type of dataset. So as a result, initiatives and methodologies such as concurrent engineering (CE), total quality management (TQM) and design for manufacture, assembly and support have become popular ways for manufacturers to gain competitive advantages and reduce time – to – market, or even used as means of survival. And PDM emerged, as a common enabler for these initiatives is to treat information as a corporate asset of the enterprise. From this paper conclude that PDM, by organizing, tracking and access to product informations are networked.

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