

EDM/PDM: The Demise Of The CAD/CAE Industries

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Most industry experts agree that Engineering Data Management [EDM] and/or Product Data Management [PDM] systems will be used by all industries in the long run. The movement of the design world to electronic format necessitates the creation of a vault at minimum to store this intellectual property. Much as drawing cabinets were used to store “drafting board” drawings. Much as filing cabinets were used to store microfiche files of older converted paper drawings. EDM/PDM is the electronic drawing filing cabinet. Quite straightforward. Once this “enabling technology” is in place, the “electronic vault,” other business processes can subsequently be automated.

The electronic vault is key. Any company that has implemented the vault will testify that it is a challenge to define and implement. Then, there are the maintenance requirements. Then, after an arduous one to three years period, the leverage begins. It is worth the effort and the wait, and the investment. A great deal of time is spent, on a daily basis, searching for drawings and other design intellectual property. Amounts range from as low as 5% in some companies, to 20% in most companies, to 50% in a few. Certain functions, individuals spend up to 70% of their time managing or accessing drawings to do their job. Not only is there the direct cost of the professionals involved, but the opportunity cost not redirecting them into contribution-producing activities. For example, in a medium to large company at least 10 people will spend 40% of their time chasing drawings. Assume, “after PDM,” that they would still spend 10% using an automated computer interface. If these professionals together averaged US \$40,000.00 per year then the potential savings opportunity would be 30% times 10 people times \$40,000, or \$120,000 per year. This figure does not include each and every member of the design staff at high salary that spend 10%-30% of their time searching, which could be reduced to 5%-10%. The payback can be measured in months in certain companies.

The vault enables a second major benefit as well, Reuse. Incremental product lines and products contain 50%-85% intellectual property used in previous products. The actual reuse, measured either by “percent of product cost reused” or “number of parts reused,” results in a



significantly lower figure. Professionals are taking time to design a great deal of incremental products from scratch when they should be reusing within a flexible and modular product line architecture. Marvin L. Patterson, former corporate vice president of engineering at Hewlett-Packard, in his book entitled "Accelerating Innovation," indicates that 85% of new product designs consist of intellectual property from prior products. It is the remaining 15% of the design that customers actually purchase each time as a new product. GGI client surveys indicate that there is a wide range and it depends on which type of reuse. In most companies there are opportunities to reuse: specifications, designs, layouts, software, test software and fixtures, and manufacturing or fabrication processes. EDM/PDM will enable structured reuse freeing up big blocks of time to work on product designs and components that make new products. It costs companies big money when their designers and new product development professionals work on components and subassemblies that already exist in the company parts master file and/or are purchasable as standard product. The ability to reuse designs and parts will ultimately positively influence a consistent architecture and configuration management ability. Companies are then in a position to minimize parts and standardize on components.

Once the enabling vault technology is in place, it is now possible to automate other business processes that also take time and increase development and product costs.

- Drawing Routing & Approval
- Redlining
- Engineering Change Management
- Technical Documentation

Each of these processes typically requires some type of routing process to a variable list of people. Once the communication reaches a person's desk, it stays there until they perform the necessary work or activity, then it gets passed on to the next person and so on. This process takes weeks or months typically and there are many drawings and engineering changes to be routed for each and every product. With EDM/PDM technology, everyone works simultaneously. Electronic copies go out to each person for completion and the total elapsed time

is simply the time of the slowest person on the list. This is much shorter than the cumulative total of each person's time. Paperwork can never get misplaced or lost. The system can be designed to send electronic prompts to be cleared from a user's screen when sign-offs are critical in timing. It is the capability to automate these types of processes that industry now refers to a "workflow." EDM/PDM will significantly reduce these types of development cost while also reducing time-to-market in the process. The financial benefits are quite tangible. The service or time management benefits are noticeable by customers.

If you are not convinced, the software suppliers in industry are. There is a great deal of money to be made in selling systems of this type to businesses. The payback can be easily justified. The fallout of the EDM/PDM software wars will likely determine the direction of design and information systems in companies well into the 21st century. The reason that EDM/PDM is likely drive a long-run transformation is that finally, in terms of computer technology, the "engineering design systems world" and the "business systems world" now meet for the first time at the data level. Object technology enabled the meeting, which is taking place in this decade and next. What will happen will surely be interesting.

Since the beginning of the applications software industry, CAD vendors have been quite separate from companies that make business systems software such as manufacturing systems, distribution systems, and financial systems. This situation used to exist between the initial suppliers of these types of systems. Then, as the different markets matured, it was necessary for software companies to either develop new software that expanded product lines into adjacent markets or to merge with suppliers in different markets. Initially, users saw Order Processing merge with MRP. Then, Distribution-DRP software became bundled. Then, software companies started marketing Enterprise Resource Planning-ERP systems with complete financial systems. Then, enabling database technology prior to objects caused the transformation of certain aspects of ERP systems to become Execution Systems. All this time, as the entire business systems community was heading to "solutions," the engineering community



remained separate. Separate, even to the extent that operating systems and hardware were different. Design managers were passionate about their solutions, almost cultist. Then, object technology arrived which has the ability to open up the company to a common technology environment that all can utilize. The final onslaught for control of the design environment has begun.

We first see the erosion of the CAD/CAE industry in terms of the changing operating systems and hardware platforms. Business systems suppliers are not migrating to Unix and workstations, design systems suppliers are migrating to PCs and PC-based operating systems. The "rules" for developing on these platforms were set entirely by the business systems community. It is not clear what the long term effect on design systems will be once conformity to this environment pervades commonly used design software.

The next and possibly final erosion of the CAD/CAE industry will be EDM/PDM. It is starting now and it may take twenty years to know the answer, much like it took twenty years for ERP to evolve. Until these past few years, the line of demarcation was the bill-of-materials subsystem. The design systems were one environment and set of files, and the item master and bill-of-material were the first representations of new part and/or product data in business systems which everyone else in the company used. Now, object technology has enabled a single repository system that everyone uses. In the past, engineering always held control through controlling the rate at which drawings became visible. With unique hardware platforms, only persons in engineering could view progress and results at the analysis and drawing level. Now, with everyone having the enabling technology to view all company information the issue has been reduced to one of setting access codes and security. Little by little, the work of design professionals will become totally visible throughout all aspects of product creation and design. Creativity will have to be performed in an environment of visibility.

There was perhaps an opportunity lost by the collective population of design systems suppliers, almost an ironic analogy. Engineers are often accused of focusing too much on the technology

and not enough on the business aspects. A high-level financial summary would indicate the same is true of design systems suppliers versus business systems suppliers. Over the past twenty years, in which both tiers of software have been developing in parallel, the business systems suppliers now supply the software that controls 85-90% of resources, assuming R&D investment ranges 10-15%. They even supply the office support and business systems used within the design environment further increasing their % penetration. The average business systems company is quite large and provides solutions. The design systems community is still fragmented. Customer solutions are created through the purchase and custom integration of software from several suppliers.

The ratio of the installed-base is overwhelming. The competitive position of big companies in a fairly mature industry versus tools providers in a fragmented industry is overwhelming. It is possible that design systems suppliers could have foresaw the disproportionate business ratios that were developing more than ten years ago and redirected strategy so as to create more critical mass within the industry. In the long run, for the design systems providers to retain autonomy and keep their industry independent, more complete solutions environments will have to be provided. Business systems suppliers will soon burn through the EDM/PDM market and further extend the capability of their ERP systems into adjacent markets. In twenty years, 3D, CAD, and CAE companies could well be owned by business systems providers.

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