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Tech-Clarity Insight: Consolidating CAD

Benefits of a Unified CAD Strategy

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Executive Overview

The recent down economy found many companies looking at the potential benefits of consolidating their software systems. One system that manufacturers should consider standardizing is Computer Aided Design (CAD). Even in good times, manufacturers should consider standardizing on a single CAD solution. Clearly, companies in any market conditions find cost savings attractive, and these are certainly attainable through consolidation. Beyond cost savings, though, are even more strategic benefits.

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At the workgroup level, manufacturers can take advantage of ease of design collaboration and reuse of CAD models. Broader benefits include the ability to share best practices across the enterprise. Even more strategic is the ability to unify product development processes and data across the enterprise. Common processes and centralized data are particularly advantageous as a part of a full system for product design and development that includes analysis tools, data management, product compliance, documentation, and other related innovation tools.

At the highest level, standardizing CAD software offers corporate benefits. For example, a single CAD environment can enable a "design anywhere – build anywhere" strategy. This approach allows companies to rapidly adjust to market changes and resource shortages, and offers the ability to transfer design or production to new facilities without concern for incompatible design data, tools, or processes. Of course not all businesses have the opportunity to unify their CAD solutions due to customer and supplier constraints, but there are multiple advantages for those that can.

Lean IT Overhead

Perhaps the first benefit companies recognize is cost savings. While this is a tactical advantage versus a strategic one, it is still important. This benefit extends beyond software licensing fees, as operating multiple solutions extends many of the "cost drivers" that make up the total operating cost of a software solution. In fact, many of the license fees are one-time costs, where other cost drivers provide ongoing savings in the annual Engineering IT and operational budgets. Even hardware and software infrastructure costs may come down because there is no need to support specific instances and versions to support different packages and architectures.

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The following example is a representative view of the cost savings available from consolidating CAD solutions. These costs are highly dependent on the specifics of each individual company' s business and the solutions they have implemented, but this example can serves a framework to analyze the costs as they apply to multiple solutions (Figure 1).

Cost Driver	Cost*	Source of Savings	Redundancy	Frequency	Annual Savings*
License Fees	100%	Removal of redundant licenses	10%	One Time	2.0%
Maintenance	20%	Discontinuation of maintenance	10%	Annual	2.0%
Customization, Configuration, Wizards, Templates	10%	Eliminate need for redundant application	50%	One Time	1.0%
Upgrades	20%	Eliminate need for redundant application	50%	Every other year	5.0%
Third Party Applications - License	20%	Reduce duplication due to incompatibility	25%	One Time	1.0%
Third Party Applications - Maintenance	4%	Reduce duplication due to incompatibility	25%	Annual	1.0%
Third Party Applications - Upgrades	4%	Reduce duplication due to incompatibility	25%	Every other year	0.5%
User Training - Development	10%	Eliminate need for training on redundant solution	50%	Every other year	2.5%
User Training - Delivery	5%	Eliminate need for training on redundant solution	10%	Annual	0.5%
Technical Training	5%	Eliminate need for training on redundant solution	10%	Annual	0.5%
Internal Help Desk	5%	Support for one system, one vendor	25%	Annual	1.3%

Cost Driver	Cost*	Source of Savings	Redundancy	Frequency	Annual Savings*
Software Administration	2%	Eliminate need for redundant application	50%	Annual	1.0%
Server Hardware and Software and Operating System	20%	Reduce duplication due to incompatibility, increased scalability	25%	Annual	5.0%
Workstation Hardware and Operating System	50%	None, assume compatibility on workstations	0%	Every other year	0.0%
Total					**23.3%**

Table 1: CAD Consolidation Cost Savings as Percent of License Fees

* Note: Costs and Annual Savings are represented as a percentage of license fees

The example above assumes that ten percent of employees would have license for both systems. It also assumes that one-half of third-party applications are CAD-specific and incompatible. Help desk reductions were based on the need to support multiple systems, streamlined vendor relationship, and reuse of FAQ/common problems. For this example, one-time savings were annualized over a five year period. These are conservative assumptions, and actual savings may be significantly higher. Of course each company needs to evaluate these numbers for their own situation.

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"*In my experience, standardizing CAD is cheaper from the IT perspective,*" explains Paul Hoch, Team Leader Product Engineering Services for lighting solutions manufacturer Zumtobel AG, "*A single solution allows a common upgrade strategy, shared knowledge, and central help desk across all sites*." But cost is only one aspect of the benefits available, and although potentially significant software costs should not be the only considerations in a CAD consolidation strategy.

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Reuse

A common CAD system across the enterprise also enables manufacturers to more readily reuse existing intellectual property (IP) embedded in their 3D models. Reuse of existing designs happens at the product level, but also for existing parts and assemblies using common parts libraries. For example, Zumtobel's strategy is to share designs and design expertise around the enterprise. "*We are reusing parts from other sites*," Mr. Hoch explains. "*Even just looking at them and understanding what the other site is doing can give a lot of help or seeing a solution to a problem*."

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Design reuse prevents reinventing the wheel. Designs developed using a common CAD package are easier to reuse, which encourages engineers to adopt existing, proven designs. "*Our engineers can access and reuse current models in their engineering process*," explains Zumtobel's Mr. Hoch. Reuse saves time and money, and also improves quality as parts that have proven experience in the field are incorporated into new products.

Cost drivers can also be applied to reuse. Savings from reuse are not limited to reduced design efforts. Reuse also impacts the work required to validate new parts, ensure environmental compliance, test, source, and potentially validate redundant suppliers. Reuse also impacts inventory. Cost drivers impacted by reuse include the cost of carrying excess inventory such as:

- Poor volume pricing
- Duplicate inventory for safety stocks
- Obsolescence and scrap
- Additional warehousing space and insurance
- Other inventory carrying costs

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Excess inventory also ties up capital that could be working elsewhere in the company. While a common CAD solution is not an absolute requirement to enable design reuse, it certainly helps to encourage and facilitate the process.

Collaboration

In addition to reuse, a unified CAD strategy also helps to encourage better product development and design collaboration. For example in a design review, engineering participants understand the CAD model as well as the design. Also, if one engineer sends an expert a model they understand not only the design but the actual modeling techniques, and can work on it directly. "*If we weren't in the same tool, we couldn't discuss designs between sites and departments and they would have more problems than they should have*," explains Mr. Hoch. The commonality approach also enables centers of excellence for design to rapidly pick up CAD models from local engineering teams and quickly add value in a common environment.

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Working with a single CAD tool also helps enable concurrent engineering, where multiple aspects of a design are developed in parallel instead of in a serial fashion. This technique helps to compress product development times, but also enables better input into designs by the parties that are impacted downstream. For example Manufacturing, Sourcing, Documentation, and Service departments can all provide input, and can also get started on their product development and launch responsibilities. Broader participation in the design helps drive better quality and reduces late surprises in addition to the benefit of faster time to market. Solutions exist that enable collaborative access to designs from multiple CAD solutions, but this adds a level of complexity.

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A common CAD solution can also provide vertically integrated companies, contract design resources, or suppliers an easy way to share designs in process, and develop their designs in context of the assembly or product they are working with. As collaboration expands using social computing techniques, a common system will also help enable social product development strategies. "*Another benefit is that we have a common understanding*," explains Zumtobel's Hoch. "*One user can help the other user, there is a social aspect*."

Enabling the Bigger Product Development Picture

A common solution can support best practices in engineering and product development, which can be stored as templates, communicated, and reused. "*We taught all of the engineers common conventions*," explains Mr. Hoch. "*We have common ways to set up models*." In a similar way, design automation can be leveraged across the enterprise, as best practices are automated or turned into wizards.

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Perhaps the most important aspect of standardizing on a common CAD solution is that it helps to enable a well integrated PLM environment. A single CAD solution simplifies the overall product development system that includes Computer Aided Engineering (CAE) and other tools for engineers, but also project management, compliance, and documentation tools. "*We care more about the PLM system (as opposed to standalone CAD), it is more business relevant and critical today*," explains Zumtobel's Paul Hoch. "*Today, we won't get the full benefit from our 3D models if we are just using them locally*." A unified CAD strategy can help companies develop and communicate best practices and share processes on a larger scale.
This is the reason many companies have consolidated, to implement a common product development and engineering process in their business, enabled by PLM.

The Corporate Advantage

One final aspect worth discussing about a common CAD and PLM infrastructure is corporate flexibility. Today's global, competitive business environment demands that manufacturers remain agile in order to adapt to changing market conditions. By standardizing processes and tools, companies enable themselves to more readily share resources to balance design capacity with demand. Many companies are adopting a "design anywhere – build anywhere" strategy that allows them to take advantage of opportunities as they arise. "*We see a big benefit today because we can move some products from one site to another site, for example from England to Germany or to Asia*," describes Mr. Hoch "*It would be a big problem if they don't have the native data and weren't trained in the same system*." With a common solution, work and designs can be transferred across the enterprise easily.

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Conclusion

CAD consolidation and standardization have multiple benefits. The first that comes to mind for most is cost which is just one, tactical view. More strategic advantages include improved design reuse, collaboration, and sharing best practices. Corporate flexibility and agility are also important benefits, allowing manufacturers to shift work across the globe as available resources and market conditions dictate. Of course there may be reasons that may not allow companies to consolidate their CAD solutions, such as customer mandates to use specific tools. In these cases, a multi-CAD environment is required and must be supported. But the benefits clearly lean towards consolidation to improve time to market, reduce cost, and improve quality. "*Our common tool is the basic infrastructure that allows us to make quick decisions on product and plant locations*," Mr. Hoch summarizes, "*It provides management with the flexibility and agility they need*."

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Recommendations

- Understand the complete cost of operating multiple CAD systems
- Evaluate the opportunity to consolidate CAD systems to reduce cost, recognizing the multiple cost drivers go well beyond software license fees
- Ensure that engineers are enabled with a full-featured, scalable CAD tool that meets the needs of generalists and specialists alike
- Help workgroups collaborate and reuse by providing common processes and tools
- Enable a broader PLM approach, leveraging product development solutions that are integrated with a central CAD environment
- Enable corporate benefits and flexibility by creating an agile enterprise that can exchange work readily

About the Author

Jim Brown is the President of Tech-Clarity, an independent research and consulting firm that specializes in analyzing the true business value of software technology and services. Jim has over 20 years of experience in software for the manufacturing industries, with a broad background including roles in industry, management consulting, the software industry, and research. His experience spans enterprise applications including PLM, ERP, quality management, service, manufacturing, and others. Jim is passionate about improving product innovation, product development, and engineering performance through the use of software technology and social computing techniques.

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