

The Five Fundamentals of a True Model Based Enterprise

by Howard Schimmoller

Drawings, whether paper or electronic, have traditionally been at the center of the product development universe. But as more and more companies transform into model based enterprises (MBE), there are five fundamental concepts they should keep in mind.

A Brief History of the MBE Evolution

Product design and development is historically based in the manual creation of drawings. Collaboration with the rest of the enterprise meant manually interpreting drawings to derive any needed information. Drawings were the definitive definition of the product.

As CAD technology became more robust, product design became more model-based, and models became the foundation of the product definition. Some other pockets of the enterprise began to recognize the potential of using model data to augment drawing information to improve efficiency, but this usually meant companies were using both a drawing and a model as the engineering data set for a product.

This led to increased risk, especially when models and drawings were used outside of engineering. Data management practices around the engineering models and drawing, as a set of data, were immature. Data derived throughout the enterprise was largely uncontrolled.

The concept of a model based enterprise was developed to address these issues. MBE policies and methods were introduced to ensure the value of complete data sets (models, drawings, and derived data) as the product definition. To truly make the transformation to a MBE, the data set must be complete, accurate, under control, and managed as the basis of enterprise collaboration and reuse. The data must be easy to access, and trusted by users, so that adoption is widespread.

This transformation is anything but easy.

The Five Fundamentals of a Transformation to a Model Based Enterprise

The transformation to a model based enterprise is a journey. Here are five things that are fundamental to your success.

1. Ensure visible executive support and governance
2. Don't mandate the elimination of drawings
3. [Enforce CAD standards](#)
4. Communicate the benefits across the enterprise
5. Prepare for a culture change

Ensure Visible Executive Support and Governance

Visible executive support and transparent governance are the simplest ways enable the transformation to a MBE. Lack of executive support or governance is sure to limit the initiative before it even gets started. Executives must proactively justify the need for change, communicate the organizational benefits to users, announce progress, manage expectations, and use a clear governance process that removes barriers and allows change adoption in all impacted functions of the organization. Visible leadership will also help minimize the temporary productivity dip during the transformation.

Don't Mandate the Elimination of Drawings

Many businesses assume that MBE is about eliminating drawings; it is not. Drawing-less design is possible, but at its core, model based engineering is about making sure that the data you create to define your product is complete, accurate, under control, and managed throughout the product's total lifecycle – from concept to disposal.

It starts with creating a common set of templates for drawings, parts, and assemblies. Then making sure that users have very limited flexibility with configuration settings that alter aspects of CAD system behavior. Ensure that the CAD configuration settings, like systems of units, views, notes, tolerances, esthetics of arrows, cross sections, etc. are consistent across users.

Some users will complain that you are limiting their creativity. The simple response is that users should focus on creating innovative products; changing configuration settings does not restrict creativity. Common templates and settings help ensure that standards are universally applied and followed.

[Enforce CAD Standards](#)

You must establish and hold the enterprise accountable to standard CAD practices. What should be included in a CAD standard? Leading practices for modeling, drawing creation and change management. Document the best techniques and conventions used within the organization.

Standards for CAD use are important enablers of MBE, but they do not provide value without holding users accountable through enforcement. CAD without standards will cause serious problems anywhere people try to reuse data or make business decisions based on it. CAD standards set clear expectations and allow consistent CAD documentation. Bottom line: standards encourage trust in the data, which reduces overall development time. This trust starts in engineering.

Designers and engineers will complain about standards. They are likely to suggest that complying with standards takes extra time and effort. It's certainly true that it does take a little longer to do a job well; to do a job right. Second, it must be pointed out that they are wrong. If you consider the time wasted repeatedly reinterpreting and fixing data, doing things right the first time saves time across the enterprise.

Accountability is extremely important; without it, nobody will comply with the standards. Someone has to be the bad guy; someone has to say, "This job does not meet our expectations and needs. You can't release it."

It's also important to remember that adhering to good CAD practices does not mean you have a good design. A good design must meet customer expectations and industry mandates. A customer doesn't really care what your design method is or how complete your data is. But enforcing standards will help make sure the customer's quality expectations are met, and your co-workers will appreciate the consistency.

Communicate the Benefits Across the Enterprise

The most common model based engineering benefits are reduced changes in product designs and an overall reduction in product development time. Reported improvements range between 25 to 50% reductions for both measures. Other benefits include efficiencies gained by increasing the reuse of datasets, and the reduction of product nonconformance and recall risk.

Quantifying these benefits, largely outside of engineering, is difficult. Corporate scrap/rework or product recall costs are closely held proprietary information. However, a review of recent headlines suggest that the financial impact of product liability and product recall costs could be massive, easily dwarfing any cost associated with implementing good MBE methodologies.

It is important to note that MBE benefits are dependent on the existence of a functioning product lifecycle management (PLM) system. The assumptions are that 1) MBE data sets are managed in a PLM system throughout release and change, and 2) the data standards are enforced assuring good quality at release and during subsequent change management.

Prepare for a Culture Change

The transformation to a model based enterprise is largely an exercise in culture change. Any change this significant requires executive enablement and an active governance process that acts to protect the investment and improve the value of PLM and CAD tools.

Culture change is made in small steps, not big jumps. Don't get caught in the "eliminate drawings" hype. Be aware of the high expectations and plan reasonable steps in MBE maturity.

Make sure that the best techniques and conventions are used throughout the organization. Ensure that expectations are clear, so all users behave in a consistent manner.

Repeatedly communicate progress and benefits. Communication must be tailored to the different audiences across the enterprise and is best delivered in multiple forms.

Culture change is hard work, but hardly impossible.

More Reading

[Leading Practices to Become a Model Based Enterprise: PLM and CAD Standards](#)

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