Leading Practices to Become a Model Based Enterprise: PLM and CAD Standards

by Howard Schimmoller and Jason Milo

More and more companies are transforming into model based enterprises (MBE) to help ensure the completeness, accuracy and accessibility of product data. Companies that successfully consolidate the product definition, improve data quality and build trust will reap significant benefits, including fewer product design changes and reduced product development time.

There are five fundamental things companies should consider when making this transformation. One of the most important is establishing and enforcing product lifecycle management (PLM) and CAD standards. Good standards build trust in the data and drive user adoption.

Here are some leading practices to make this part of the journey a little easier.

0. Standardize the Supported/Allowable Tool Suites

Before you even start out on an MBE journey, decide on tool suites that are going to be allowed and supported. Ironically, many companies allow end users to pick CAD, CAM, and CAE tool suites with little oversight other than the initial purchase cost. Users don’t get this luxury with other enterprise systems, such as an e-mail or accounting system, for obvious reasons. Organizations must develop and enforce business rules for enabling new tool suites, or they will undermine the benefit from the following standard practices.

1. Use Standardized CAD and Document Templates

Templates save time by ensuring common enterprise information needs are accounted for, including attribute data, standard views, and other information.

2. Create Naming and Numbering Conventions

Establish the naming and numbering conventions for components of project and product structures, documents, and CAD data. Automating these conventions establishes consistency, which saves time and limits information omissions. Conventions help everyone in the enterprise to quickly identify product development data.

3. Develop Standards for Constructing Models: Modeling and Dimensioning Practices

If a model is to be used effectively by downstream users, standard modeling and dimensioning practices will establish consistency and build trust in the product defining data set. Leading practices are only valuable if they support the effective design, model user intent, part fabrication method, and quality assurance and inspection approach.

Organize complex product data sets with logical and predictable structures that minimize dependencies to help project members to find information much more efficiently. Organize model features using the same philosophy.

Assign meaningful names to CAD model views and features, such as mating holes, faces, or flanges to help downstream users quickly understand models.

Standardize how that data is instantiated into the design model and PLM system. Entering product data once during the design process and referring to it throughout the product lifecycle increases accuracy and saves time.

Establish company standards for orienting models to make it easier to quickly position parts, understand model features, and leverage common views.

Capture appropriate design intent. For example, model symmetry - arranging features around a plane of symmetry so that changes to part dimensions retain their symmetrical character. Put in important features first and add details such as fillets, chamfers, and fastener holes at the end.

4. Check Data Sets Before Release and After Changes

CAD model and drawing checkers (including PTC’s Creo Model Check, Siemens’ NX Check Mate, or Dassault’s SolidWorks Design Checker) can find errors such as unlinked data sets, improper units, non-standard hole sizes, missing properties, models with rebuild errors or drawings with faked dimensions. However, they are not complete and must be augmented with manual inspection via old fashioned checklists.
Develop checklists that cover:

- Completeness
- Functional requirements
- Modeling structure and geometry

CAD practice automation and checklists will improve efficiency when assuring data set compliance, but they do not replace design reviews. Design reviews should be focused on designing the right product and designing the product right.

5. Use a PLM System Throughout the Product Lifecycle

Use a PLM system for release, change-control, and management of relationships to other data that are artifacts of the product development process, such as requirements, documents, tests, simulations, and reports. With traceability throughout the product development history, the PLM system practically pays for itself.

6. Establish Libraries

Standardize information about materials, surface finishes, notes, supplier names and part numbers, costs, designers, and design dates in libraries, so they can be efficiently leveraged by designers. These libraries of commonly used information will save time and labor. Manage these libraries in a PLM system to establish solid library management policies around intended reuse and compliance. Don’t forget to empower someone to be the enterprise librarian.

5. Automate Designs

Chances are you can find many opportunities to automate the routine design of part families and subassemblies through the application of design options and variants. Be careful to consider the total lifecycle of the automation, including implications of family table use in product management, the maintenance of automation through system upgrades, and documentation so that designs can be properly understood for years to come.

6. Recognize the Role and Authority of System Administrators

Good PLM and CAD systems do not administer themselves. Proactive administration can do wonders for system performance and practice conformance. Consider people as well as hardware and software for greater productivity and efficiency.

7. Train End Users

Untrained employees are less productive. Focus training around real enterprise needs, new expectations, and system capabilities that people will use; omit features that users do not need. Don’t forget the non-users – those that are impacted by the system changes but may not use the system on a regular basis. These people often don’t get any of the communications and are rarely trained, but their buy-in and support are critical for success. Make sure to capture leading practice techniques and make sure that all users have access to leverage this knowledge.

8. Provide for Proactive Care and Maintenance

PLM and CAD systems - and their associated leading practices - evolve over time, just like any other aspect of business. Businesses must plan accordingly. Budget both money and employee time for reactive and proactive efforts, including:

- System monitoring and maintenance
- Organization of internal super-users and extended user community
- Attendance at vendor events
- Communication to individual contributors and executive sponsors

Through these leading practices, businesses establish themselves as true model based enterprises, and position themselves to maintain the value of this investment in PLM and CAD systems. As organizations mature, they will identify new opportunities for continuous improvement, take advantage of unexpected system capabilities, and develop new leading practices for continuous improvement.

More Reading

The Five Fundamentals of a True Model Based Enterprise
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