



Model Based Engineering at Sandia National Laboratories

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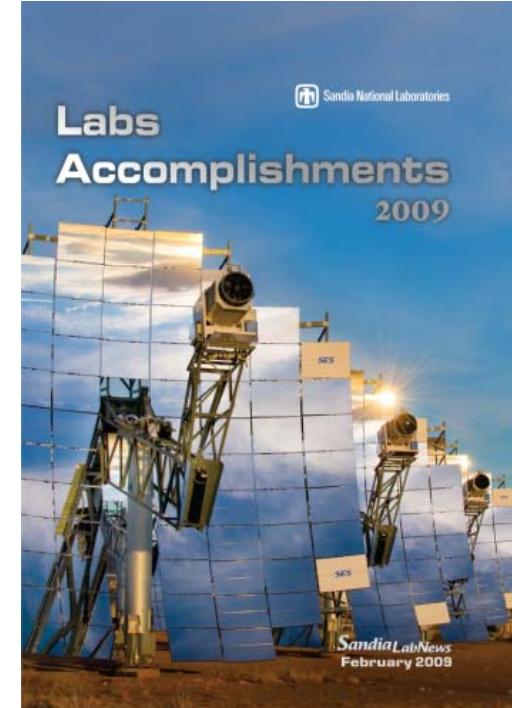
Definitions

- **Product Definition** – Is the information required to build weapon product (e.g. design definition set, EBOM, MBOM, specification, work instructions, engineering authorizations, quality documentation)
- **Design Definition Set** – Is the mechanical computer aided design (MCAD) files (i.e. Pro/E model, Pro/E drawing file, and 2D image file). This set is managed in PDMLink and is the information PRIDE (Product Realization Integrated Digital Enterprise) is committed to provide a common NSE approach.



NSE Transformation History

- Ten years of Pro/E as a drafting tool with minor engineering use
- Five years of Model Based Engineering development
- Five years of Pro/NC learning and use
- Five years of PDM usage (Matrix, Intralink, CMS, Pro/PDM, Metaphase, Sherpa)
- Heavy model usage in LEP's
- Usage of models as product definition has been recognized





Product Definition Today

- Authoritative Source is an image file in the Sandia National Laboratory Image Management System (IMS)
- Product Definition rules are written around mechanical drawings and people
- Systems are in place to move text and images in human readable format
- Redundancy is created at many steps in the process because product definition must be re-entered from text and images to computer definition to continue NC programming, inspection programming, analysis, tooling design, and quality documentation.
- Optimization exists for disconnected processes, not the entire product lifecycle process



Sandia is a Design Agency within NSE Enterprise Future – NSE- wide approach

- The M&O contractors must define and manage mechanical product definition set using a common NSE approach that meets one of the following criteria selected by the PRT (Product Realization Team):
 1. 3D mechanical models only
 2. 3D mechanical models with supporting 2D mechanical drawings
 3. 2D mechanical drawings with supporting 3D mechanical models
 4. 2D mechanical drawings without supporting mechanical models
- The M&O contractors must produce and manage a 2D mechanical drawing set using a common NSE approach prior to FPU, official product production.



DATA MANAGEMENT OF MCAD

- Product data management (PDM) and product lifecycle management (PLM) capability are required for options 1 and 2
- Option 3 (drawings and supporting mechanical models) has two variations;
 - a. Is with verified supporting models, which requires PLM
 - b. Is without verification and does not require PLM
- PLM is an integral part of mechanical product definition advancement

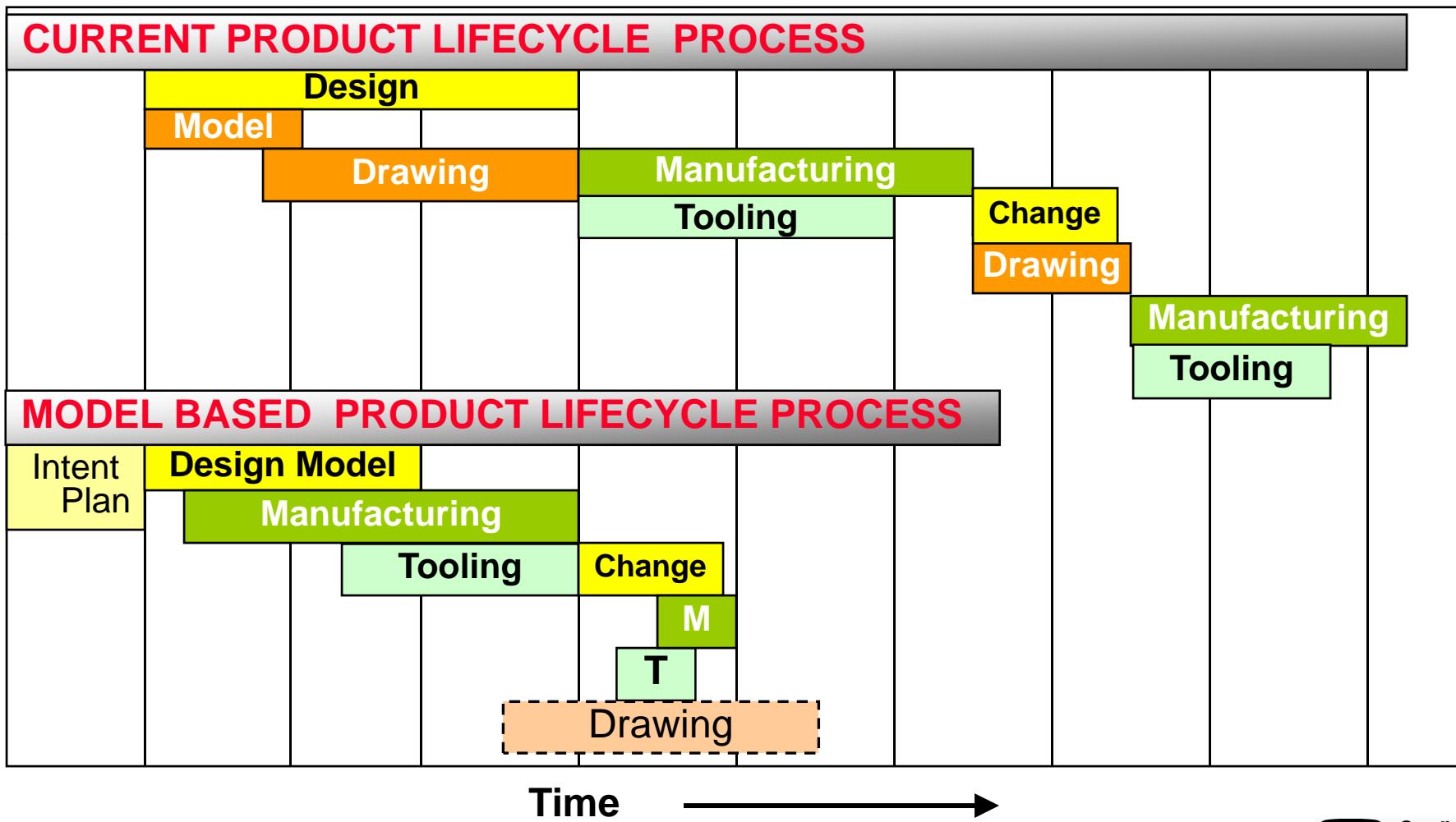


Production MCAD System Requirements

- Manages the complexity of Pro/E models and assemblies (PDM)
- Manages the parametric structure for Manufacturing (PLM)
 - Tool design
 - Process planning
 - Fabrication
 - Inspection
 - Assembly
 - Quality documentation
 - Engineering Authorization
 - Administrative Documentation



Model Based Product Lifecycle Process





Conclusion

PRIDE solutions are ready to support transformation

- **PRIDE piloted NSE-wide solution “3D mechanical models with supporting 2D mechanical drawings”**
- **PRIDE has production infrastructure at all sites across NSE in place.**
- **Business rules nearing completion to allow for PRT selected approach**
 - **3D mechanical models only**
 - **3D mechanical models with supporting 2D mechanical drawings**
 - **2D mechanical drawings with supporting 3D mechanical models**
 - **2D mechanical drawings without supporting mechanical models**