

MBE Maturity Capability Levels									
MBE Maturity Level Number	Description of requirement	Overall intent of the requirement	Level 0	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6
Description			Drawing Centric	Model Centric		Model Based Definition		Model Based Enterprise	
			Disconnected Manufacturing Disconnected Enterprise	Neutral Model CAM Disconnected Enterprise	Native Model CAM Disconnected Enterprise	Native Model CAM Disconnected Enterprise	Integrated Manufacturing Disconnected Enterprise	Integrated Manufacturing Integrated Internal Enterprise	Integrated Manufacturing Integrated Extended Enterprise
Design Data (CAD)									
2D drawing creation & information content	This defines the requirements for information presented in 2d drawings if they are to be used.	As you increase in level than the requirement is for 2d drawings to contain less original information.	Defines all part annotations May also define part geometry	Defines most or all part annotations Presents geometry from the model	Defines most or all part annotations Presents geometry from the model	Presents geometry and part annotations from the model No information defined in the 2D drawing	Presents geometry and part annotations from the model No information defined in the 2D drawing	Presents geometry and part annotations from the model No information defined in the 2D drawing	Presents geometry and part annotations from the model No information defined in the 2D drawing
3D model creation & information content		As you increase in level that the model contains more/all defining data.	May or may not exist May define part geometry only	Defines all part geometry May define some part annotations	Defines all part geometry May define some part annotations	Defines all part geometry Defines all part annotations (including notes, dimensions, PMI, etc.)	Defines all part geometry Defines all part annotations (including notes, dimensions, PMI, etc.)	Defines all part geometry Defines all part annotations (including notes, dimensions, PMI, etc.)	Defines all part geometry Defines all part annotations (including notes, dimensions, PMI, etc.)
Model / drawing associatively	Defines if the Model is Associated to the Drawing. If the model is associated to the drawing then when model changes are made the model will be updated.	As you increase levels the drawings become a representation of the models only and contain no authoring data	3D model & 2D drawing associatively Does Not Exist	3D model & 2D drawing are associated	3D model & 2D drawing associatively is verified	2D drawings are an output of the 3D Model and verified (2d drawings or the exception)	2D drawings are an output of the 3D Model and verified (2d drawings or the exception)	2D drawings are an output of the 3D Model and verified (2d drawings or the exception)	No 2D drawings used
Supplementary Data (Notes, Parameters, Non geometric data)	Defines where notes are derived from and potentially linked to. If the notes are derived from a database they must remain linked to that database?	As you increase in level the notes become more managed and controlled.	Notes are defined as text on the 2D drawing	Notes are defined as text on the 2D drawing	Notes are defined as text on the 2D drawing	Notes are defined in the 3D model	Notes are defined in the 3D model	Notes are defined in a managed database	Notes are defined and controlled in a PLM system database
Checking & Model Quality	Defines how and when to check models and drawings. The items checked in the models and models will include: model quality, origination of annotation and notes, model completeness, ability to stand alone and any other needed.	As you increase in levels the models are checked more thoroughly and in a more automated fashion.	2D drawing contents validated 3D model NOT validated	2D drawing annotations validated 3D model geometry validated	2D drawing annotations validated 3D model geometry validated	3D model geometry and part annotations validated 2D drawing validated not to define any annotation content	3D model geometry and part annotations validated 2D drawing validated not to define any annotation content (Semi Automation using discrete tools)	3D model geometry and part annotations validated - Semi automation using PLM based tools 2D drawing validated not to define any annotation content (Semi Automation using discrete tools)	3D model geometry and part annotations validated - Semi automation using PLM based tools
BOM	States where the EBOM is managed and how it is linked. As you mature the ebom switches from manual control within an ERP system to control from within a PLM system.		eBOM manually defined in ERP eBOM not linked to the CAD models	eBOM managed in PLM eBOM linked to CAD models	eBOM managed in PLM eBOM linked to CAD models	eBOM managed in PLM eBOM linked to CAD models	eBOM managed in PLM eBOM linked to CAD models	eBOM managed in PLM eBOM linked to CAD models	eBOM managed in PLM eBOM linked to CAD models
Technical Data Package									
Collection of elements into TDP	States how the TDP is gathered into a package.	As you increase in maturity the TDP is gathered in a more automated (and controlled) method	Ad-hoc, manual collection of TDP data (digital and physical data)	Ad-hoc, manual collection of TDP data (digital and physical data)	Ad-hoc, manual collection of TDP data (digital and physical data)	Structured, manual collection of digital TDP data	Structured, manual collection of digital TDP data	Automated collection of digital TDP data by PLM	Automated collection of digital TDP data by PLM
Management of TDP	States how the TDP is delivered both internal and externally.	As you increase in maturity the TDP is delivered in a more automated method.	Manual physical delivery of TDP data	Manual physical delivery of TDP data	Manual physical delivery of TDP data	Manual digital delivery of TDP data	Manual digital delivery of TDP data	Manual digital delivery of TDP data	Automated digital delivery of TDP by PLM.
Change and Configuration Management Data									
Release and Change Processes	Defines where (Model or Drawing) data is authored and changed.	As you increase in maturity the system of record increasingly becomes the model.	Drawing Based	Drawing Based	Drawing Based	Model Based	Model Based	Model Based	Model Based
Element Management (Supplementary Data, 3Dmodel/Drawing)	Defines how the supplementary data that can be created from the model is managed and linked to the model.	As you increase in maturity the model becomes linked to all of the supplemental data and becomes the system of record for the supplemental data.	2D drawing is managed. 3D model is Not managed	3D model is managed in sync with 2D drawing	3D model is managed in sync with 2D drawing	3D model is managed 2D drawing created by exception and managed in sync with 3D model	3D model is managed 2D drawing created by exception and managed in sync with 3D model	3D model is managed 2D drawing created by exception and managed in sync with 3D model	3D model is managed No 2D drawing created
Authority	States what the system of record is for data	As you increase in maturity the model increasingly becomes the system of record for all data.	2D drawing	2D drawing	2D drawing	Geometric definition is defined by the B-REP of the 3D and 2D drawing defines the PMI. -- Both are considered authoritative for there respective data	3D model	3D model	3D model
External and Internal Manufacturing Data Exchange									
Process for providing PMI Data to Mfg and Inspection and any other groups that may need PMI	This is the process for sending all PMI to downstream group. PMI (Product Manufacturing Information) can be a set of all of the manufacturing data associated to a model.	As you increase in maturity the PMI becomes more directly linked to the model. The ebom also becomes directly linked to the model set.	2D drawing viewable and eBOM manually sent to mfg supplier	2D drawing viewable, eBOM and native 3D CAD model (or exported 3D neutral model) manually sent to mfg supplier	2D drawing viewable, eBOM and native 3D CAD model (or exported 3D neutral model) manually sent to mfg supplier	Native 3D CAD model, 3D lightweight viewable and eBOM manually sent to mfg supplier both internal and external (also support neutral file export)	Native 3D CAD model, 3D lightweight viewable and eBOM manually sent to mfg supplier both internal and external (also support neutral file export)	Native 3D CAD model, 3D lightweight viewable and eBOM manually sent to mfg supplier both internal and external (also support neutral file export)	External and Internal PLM access to native 3D CAD model, 3D lightweight viewable and eBOM
Mfg Process Generation (Process Plans & Work Instructions)	Describes how process plans will be generated and what they will be generated with.	As you mature the native 3d model will be used. This will require less and less re-work to the dataset as change occurs.	Remaster 3D model to generate process plans and work instructions	Exported 3D neutral models used to generate process plans and work instructions	Exported 3D neutral models used to generate process plans and work instructions	Exported 3D neutral models used to generate process plans and work instructions	Native 3D CAD models used to generate process plans and work instructions	Native 3D CAD models used to generate process plans and work instructions	Native 3D CAD models used to generate process plans and work instructions
Mfg Code Generation	Describes how manufacturing / production code is generated and controlled.	As you mature the native 3D model will be directly imported to the appropriate CAM system and the code will be controlled within the PLM system.	Manufacturing code is generated by using the 2D drawing or regenerated using a model as reference only. Code is stored independent from 2D drawings and/or models.	Manufacturing code is generated by using the 2D drawing or regenerated using a model as reference only. Code is stored independent from 2D drawings and/or models.	Manufacturing code is generated by using the 2D drawing or regenerated using a model as reference only. Code is stored independent from 2D drawings and/or models.	Controlled within PLM system and alerts downstream users of changes to the code and product definition.	Associated to model and controlled within PLM system	Associated to model and controlled within PLM system	Associated to model and controlled within PLM system
Mfg Data Management (Process Plans & Work Instructions)	State how mfg data will be controlled and saved.	As you mature the mfg data will need to be controlled in the same environment as the design data. This correlated to other requirements that state the mfg data will increasingly be linked to the native CAD models.	Managed in separate mfg database	Managed in separate mfg database	Managed in separate mfg database	Managed in separate mfg database	Managed in the same PLM system as design models and most data is derived from models (at a minimum process plans and work instructions should be stored and managed in PLM)	Managed in the same PLM system as design models and all manufacturing data is derived from models.	Managed in the same PLM system as design models and all manufacturing data is derived from models.
Mfg Process Associatively (Process Plans & Work Instructions, tooling) Combined with Data Management	Describes how process associatively will occur.	As you mature the native 3d model will be used. This will require less and less re-work to the dataset as change occurs.	No associatively to design models	No associatively to design models	No associatively to design models	No associatively to design models	Managed in the same PLM system as design models and most data is derived from models (at a minimum process plans and work instructions should be stored and managed in PLM)	Fully associative to design models	Fully associative to design models
Quality Requirements, Planning, and Inspection Code Generation									
Quality/Inspection Code Generation	Defines how the quality inspection code will be defined.	As you increase in maturity the inspection code will be increasingly using model data that is the native. As you increase in maturity the quality data will be controlled in the PLM system.	Remaster 3D model to generate NC / CMM programs	Exported 3D neutral models used to generate NC / CMM programs	Use copies of native 3D design models to generate NC / CMM programs	Use copies of native 3D design models to generate NC / CMM programs	Use native 3D design models to generate NC / CMM programs	Use native 3D design models to generate NC / CMM programs (Parallel Process)	Use native 3D design models to generate NC / CMM programs (Parallel Process)
Quality Requirement Data Management	Defines how the Quality requirement data is to be controlled		Managed in separate database outside of PLM	Managed in separate database outside of PLM	Managed in separate database outside of PLM	Managed in separate database outside of PLM	Fully managed in PLM	Fully managed in PLM	Fully managed in PLM
Enterprise Collaboration and Data Exchange									
Design Data provided to internal enterprise	Defines how data will be provided and accessed from within the enterprise	As you mature the internal enterprise will increasingly have more access to the native CAD geometry or native approximates. Also as you mature the users will increasingly have more defined access to data based on their roles. This is due to the increased non-CAD users using this data.	Internal PLM access to 2D drawing viewable and eBOM	Internal PLM access to 2D drawing viewable and eBOM Exported 3D CAD neutral model manually provided by engineering	Internal PLM access to native 3D CAD model, 2D drawing viewable and eBOM. Exported 3D CAD neutral model provided by engineering as requested. This will be given to all internal users of the system with little regard to their role.	Differentiated user access to all model data based on user roles within the organization.	Differentiated user access to all model data based on user roles within the organization.	Differentiated access to all model data based on user roles within the organization. The differential access to data will also be segregated with respect to attribute data within the model or it's associated part	Differentiated access to all model data based on user roles within the organization. The differential access to data will also be segregated with respect to attribute data within the model or it's associated part
Design Data use by the internal enterprise	Defines how data will be used from within the enterprise	As you mature the internal enterprise will use the native CAD data for enterprise processes. (Note: difference between "provide" and "use" in this context) stems from the fact that lower maturity organizations will not be able to use native CAD data even though it is available.	Product data inputs are remastered	Product data inputs are remastered or exported 3D neutral model used	Product data inputs are remastered or exported 3D neutral model used	Product data inputs are remastered or exported 3D neutral model used	Product data inputs are remastered or exported 3D neutral model used	Native 3D CAD model, 3D lightweight viewable leveraged by the internal enterprise	Native 3D CAD model, 3D lightweight viewable leveraged by the internal enterprise
Design Data provided to external Design Authority	Define how and what will be provided to an external design authority	As you mature you will increasingly deal with native cad geometry and with design external design authorities having the ability to see and approve the native geometry. Also as you mature the control over what data is sent out based on the role defined for the external entity.	2D drawing viewable and eBOM manually sent to external enterprise	2D drawing viewable, eBOM and exported 3D CAD neutral model manually sent to external enterprise	2D drawing viewable, eBOM and exported 3D CAD neutral model manually sent to external enterprise	Native 3D CAD model, 3D lightweight viewable and eBOM sent to external enterprise using automated methods	Native 3D CAD model, 3D lightweight viewable and eBOM sent to external enterprise using automated methods.	External PLM access to native 3D CAD model, 3D lightweight viewable and eBOM. Access to native models, Neutral models, and metadata decided by the type of relationship with external design authority.	External PLM access to native 3D CAD model, 3D lightweight viewable and eBOM. Access to native models, Neutral models, and metadata decided by the type of relationship with external design authority.