

## Course Summary

CLASSROOM: On-site Instructor-led Education

WEBINAR: Instructor-led On-line Training

ON-DEMAND: Virtual Self-Paced Learning

NO.	COURSE NAME	CLASSROOM*	WEBINAR	ON-DEMAND
<b>MBD/MBE EDUCATION // CAD AGNOSTIC</b>				
<u>101</u>	<u>MBE OVERVIEW</u>	\$250 2 hrs	\$196 75 min	\$130
<u>102</u>	<u>INTRODUCTION TO MBD</u>	\$375 3 hrs	\$295 2 hrs	\$195
<u>103</u>	<u>MBE IMPLEMENTATION TECHNIQUES</u>	\$375 3 hrs	\$295 2 hrs	\$195
<u>105</u>	<u>MODEL SCHEMA AND ORGANIZATION</u>	\$450 4 hrs	\$392 3 hrs	\$260
<u>108</u>	<u>REVIEWING &amp; COMMENTING 3D PDFS</u>	\$125 1 hr	\$90 45 min	\$50
<u>110</u>	<u>MBD USING MODERN GD&amp;T</u>	\$900 1 hr	---	---
<b>MBD IMPLEMENTATION // SOLIDWORKS</b>				
<u>201</u>	<u>USING SOLIDWORKS FOR MBD</u>	\$750 6 hrs	\$595 6 hrs	\$375
<u>202</u>	<u>SOLIDWORKS PDM FOR MBD</u>	\$750 6 hrs	\$595 6 hrs	\$375
<b>MBD IMPLEMENTATION // CREO</b>				
<u>301</u>	<u>USING CREO FOR MBD</u>	\$750 6 hrs	\$595 6 hrs	\$375
<u>303</u>	<u>MODELCHECK ADMINISTRATION AND BEST PRACTICES</u>	\$750 6 hrs	\$595 6 hrs	\$375
<b>MBD IMPLEMENTATION // NX</b>				
<u>401</u>	<u>USING NX FOR MBD</u>	\$750 6 hrs	\$595 6 hrs	\$375

\* Discounts available for more than 5 attendees. Travel and course materials are in addition to listed rates.

## 101: MBE Overview

**Synopsis:** Provides a vision of Model-Based Enterprise (MBE) that sources the digital thread and enables smart manufacturing using Model-Based Definition (MBD). Ground your understanding of model-based business processes.

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**COURSE SUMMARY**

**You Will Learn:** The fundamentals of model-based business processes. Clearly defined MBD/MBE terms and definitions. An overview of relevant standards. An understanding of the expanse of the MBE infrastructure. Current industry benefits and important factors for understanding MBD's return on investment (ROI).

**CAD AGNOSTIC** – applies to any CAD system

### Topics:

- What is MBE?
- What is MBD?
- Terms and Definitions
- Model-Based Philosophy
- Standards
- Benefits
- State of MBE

### Who Should Attend?

- C-Level Management
- Chief Engineers
- Chief Information Technology (IT) Officers
- Manufacturing Directors / Managers
- Quality Directors / Managers
- PLM Directors / Managers
- Procurement Directors / Managers
- Project Managers (PMs)
- Contracting Officers
- Configuration Managers
- Shop Floor Managers
- CAD Administrators
- IT Engineering Systems Analysts
- MBD CAD Specialists
- CAD/CAE Specialist

## 102: Introduction to MBD

**Synopsis:** Introduction and orientation to 3D Model-Based Definition (MBD) data sets and the purpose, application, and common practices for 3D Product and Manufacturing Information (PMI). This course incorporates the very latest in standards and common practices, including ASME Y14.41 and MIL-STD-31000.

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**You Will Learn:** Different annotation types for models versus drawings. Techniques to streamline preferred presentation methods, options for annotation authoring, and adherence to standards. Learn methods to evolve your drawing-based practices into model-based product definition. Learn the basics of Geometric Dimensioning and Tolerancing (GD&T) and MOM's (MBD Organization Method) Rules process to create 3D data sets for effective downstream consumption.

**CAD AGNOSTIC** – applies to any CAD system

### Topics:

- What is MBD?
- MBD Overview
- Intro to GD&T
- Annotation Practices
- Characteristics
- Modeling Practices
- Adding MBD to Models
- Data Exchange
- Nominal vs. Mean Modeling

### Who Should Attend?

- Manufacturing Directors / Managers
- Quality Directors / Managers
- PLM Directors / Managers
- Procurement Directors / Managers
- Project Managers (PMs)
- Contracting Officers
- Configuration Managers
- Shop Floor Managers
- CAD Administrators
- IT Engineering Systems Analysts
- MBD CAD Specialists
- CAD/CAE Specialists
- IT Practitioners
- CAD Users
- Prototype Engineers
- Design Engineers
- Product Definition Practitioners
- Manufacturing Engineers
- Quality Engineers
- Assembly Technicians
- CAM Operators
- Change Management Practitioners
- Artisans
- Assembly Technicians

## 103: MBE Implementation Techniques

**Synopsis:** Implementing a robust Model-Based Enterprise (MBE) infrastructure is the key to implementing Model-Based Definition (MBD) across your organization. A fully integrated model-based environment includes strategically implemented product data and lifecycle management (PDM & PLM), IT requirements, roles and responsibilities of the implementation team, and software and hardware requirements.

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**You Will Learn:** Learn about the model-based landscape and how to avoid pitfalls for implementing a model-based environment for your organization.

**Pre-Requisites:** 101, 102

**CAD AGNOSTIC** – applies to any CAD system

### Topics:

- Data Management – What and Why
- Terms and Definitions
- PDM / PLM Infrastructure
- Anatomy of the Software Infrastructure
  - Process vs. Tools
  - Workflows
  - States
  - Approvals
  - Libraries & Catalogues
- Software Tools
- IT (Hardware and Network) Requirements
- What people do I need?
  - Organizational Requirements
  - Roles, Responsibilities, and Skill Sets
- What training do I need?

### Who Should Attend?

- MBD CAD Specialists
- CAD/CAE Specialists
- IT Practitioners
- CAD Users
- Design Engineers
- Product Definition Practitioners
- Manufacturing Engineers
- Quality Engineers
- Change Management Practitioners

## 105: Model Schema and Organization

**Synopsis:** Explains the purpose of using a model schema and why you should spend time organizing your models. Learn methods to organize 3D data sets to comply with ASME Y14 series and MIL-STD-31000. This course is the basis for writing a robust, well defined, and repeatable modeling standard.

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**COURSE SUMMARY**

**You Will Learn:** Learn rules and recommended practices for accurately and efficiently creating, authoring, and managing 3D model-plus-drawing and model-only data sets. Includes general schema rules and best practices for all CAD files, while also drilling into the detail of parts, assemblies, and drawings.

**CAD AGNOSTIC** – applies to any CAD system

**Pre-Requisites:** 102

### Topics:

- Purpose of a Model Schema
- 3D Model Organization Requirements
- Terms and Definitions
- Rules for All CAD Files – Metadata, Numbering, Naming, Modeling to Nominal, Tolerances, Notes, Holes, Coordinate Systems, Planes
- Best Practices for All CAD Files – Grouping, Display Types, Saved Views, Filters, Design Intent
- Part Modeling
  - Terms and Definitions
  - Rules
  - Best Practices
- Assembly Modeling
  - Terms and Definitions
  - Rules
  - Best Practices

### Who Should Attend?

- Quality Managers
- PLM Managers / Administrators
- CAD Administrators
- MBD CAD Specialists
- CAD/CAE Specialists
- IT Practitioners
- CAD Users
- Prototype Engineers
- Design Engineers
- Product Definition Practitioners
- Manufacturing Engineers
- Quality Engineers
- Assembly Technicians
- CAM Operators
- Change Management Practitioners
- Artisans
- Assembly Technicians

## 108: Reviewing & Commenting 3D PDFs

**Synopsis:** Using a lightweight viewer such as Adobe Reader is an excellent strategy to enable Model-Based Definition (MBD) sharing. However, tackling a new tool to review, comment, and use a 3D PDF can be disorienting. The revision of the Technical Data Package (TDP) standard MIL-STD-31000 opens the possibilities of grouping digital files together that relate to the design, manufacturing, and inspection intent of a product. Today, a TDP is easily instantiated as a 3D PDF.

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**You Will Learn:** Learn how to open, navigate, and provide feedback using a 3D PDF. Learn the basics of using Data Packages to group files together to enable complete manufacturing.

### Topics:

- Overview of 3D PDF
- Settings for Adobe Reader that enable 3D models and Product and Manufacturing Information (PMI)
- Navigation
- Typical 3D PDF Layouts
- Attachments
- Data Package Concepts

### Who Should Attend?

- Quality Managers
- PLM Managers / Administrators
- CAD Administrators
- MBD CAD Specialists
- CAD/CAE Specialists
- IT Practitioners
- CAD Users
- Prototype Engineers
- Design Engineers
- Product Definition Practitioners
- Manufacturing Engineers
- Quality Engineers
- Assembly Technicians
- CAM Operators
- Change Management Practitioners
- Artisans
- Assembly Technicians

## 110: MBD Using Modern GD&T

**Synopsis:** For good MBD, you need proper GD&T. Drawings are okay, but MBD is better. If you've dipped your toes into Model-Based Definition, then you know the devil is in the details. GD&T and MBD experts will guide you through the What, Why, and How of Model-Based Definition and the right way to apply GD&T for MBD.

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### You Will Learn:

- The What, Why, and How of Model-Based Definition
- GD&T the Right Way for Model-Based Definition – how to implement the latest offerings of the ASME Y14.5-2009 standard

**Instructed By:** Action Engineering and Scott Neumann, [Technical Consultants Inc.](#)

**CAD AGNOSTIC** – applies to any CAD system

### Topics:

#### What is MBD/MBE?

MBD. DPD. MBE. TDP. Confused already? We will start with basic nomenclature to ground everyone's language around this topic, to facilitate meaningful discussion throughout the course.

- Model-Based Definition and Model-Based Enterprise definitions
- MBD's four parts
- MBD classification levels
- What it means to leverage a closed loop digital manufacturing technique

#### Not Your Grandparents' GD&T (aka GD&T for the Modern World)

You may be familiar with GD&T, but are you stuck in the 'olden times'? The tolerancing definitions in ASME Y14.5 haven't changed much in recent years, but the way we apply geometric tolerancing has improved! The move away from plus/minus tolerancing into full position and profile tolerances on features is needed for a simpler and clearer design intent. Join us in the modern age to learn how to implement the latest methods of using the GD&T standards. We'll demonstrate unambiguous product definition with GD&T through a variety of examples.

- Quick review of GD&T principles
- Why plus/minus tolerancing cannot be trusted
- Full GD&T is necessary for better MBD

#### Why MBE?

Understand the purpose and benefits of MBE for organizations leveraging 3D annotated models. Spoiler: MBE is not one size fits all.

- Model-based philosophies
- Purpose of drawings and MBD/MBE
- Standards adoption – why and which ones
- Engineering benefits
- Enterprise-wide business value
- ROI opportunity

**Getting Started with MBD**

Learn what it takes to move MBE forward. Leverage your rich 3D data by understanding how to bundle data together for Design, Manufacturing, and Inspection.

- Understand how to apply ASME Y14.41.1 constructs for "complete" digital product definition.
- Learn a methodical method for applying MBD in any 3D CAD system.

**A More Functional Datum Reference Frame**

Learn the differences between Datums and Datum Features through examples. Simpler and more functional Datum Reference Frames are the key to better part control. Separate our requirements for better Design, Manufacturing, and Inspection documentation.

- Datum Reference Frame created from actual Datum Features
- Expanding from one drawing to three plans
- G&T for Design (modeling), Manufacturing (work instructions), and Inspection (plans)

**Data Packages: Flavors, Buckets, and Bundles**

Understand the importance and functionality of Data Packages throughout the product lifecycle to capture Design, Manufacturing, and Quality (Inspection) intent. Expand Product Information into a unique 3-plan system.

- Technical Data Package components
- Data Package interoperability
- Game changing 3D PDFs

**BYO Laptop MBD**

Bring your own laptop to build MBD in your preferred 3D CAD software program, using examples. Our experts will guide the way.

**GT (No D) Exercises for MBD**

Putting pencil to paper is the best way to learn proper GT (and we don't mean D) for MBD. Work through pump assembly examples together, both on paper and using 3D CAD software, with the focus on functional design requirements.

**Who Should Attend?**

- MBD CAD Specialists
- CAD/CAE Specialists
- CAD Users
- Prototype Engineers
- Design Engineers
- Product Definition Practitioners
- Manufacturing Engineers
- Quality Engineers
- Assembly Technicians
- CAM Operators
- Change Management Practitioners



## 201: Using SOLIDWORKS for MBD

**Synopsis:** Focus on how to use the SOLIDWORKS MBD module in a model-based environment. Apply the basics of Model-Based Definition (MBD) using the SOLIDWORKS tool set and discover how to create, use, and modify 3D semantic annotations. Practice with real-world examples to learn the most efficient methods to prepare models with MBD annotations for downstream digital consumption. SOLIDWORKS 2016 and up are supported.

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**You Will Learn:** Learn how to use SOLIDWORKS CAD tools such as DimXpert to enable the maximum downstream re-usability of semantic 3D annotations. Also, understand recommended practices for CAD modeling that will support a model-based philosophy and how to create accurate 3D annotations in DimXpert. Learn techniques for authoring annotations that are in compliance with ASME Y14.5, ASME Y14.41, and other model-based standards.

**Pre-Requisites:** 102

### Topics:

- SOLIDWORKS CAD Modeling Techniques for MBD
- Types of Annotations
- Setup – Settings for System Options and Document Properties
- Creating Annotations - DimXpert
- Creating Presentation - 3D Views
- Modifying Annotations
- Advanced Annotations Practices
- How to Create MBD in SOLIDWORKS
- Open-lab Hands-on Practice

### Who Should Attend?

- MBD CAD Specialists
- CAD/CAE Specialists
- IT Practitioners
- CAD Users
- Prototype Engineers
- Design Engineers
- Product Definition Practitioners
- Manufacturing Engineers
- Quality Engineers
- Assembly Technicians
- CAM Operators
- Change Management Practitioners
- Artisans
- Assembly Technicians

## 202: SOLIDWORKS PDM for MBD

**Synopsis:** Focus on how to set up SOLIDWORKS PDM in a model-based environment. Learn the what and how of 3D model-based workflows and recommended practices for using SOLIDWORKS PDM in compliance with model-based standards.

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**You Will Learn:** Learn the best ways to use SOLIDWORKS PDM in a collaborative design environment.

**Pre-Requisites:** 201

**Topics:**

- SOLIDWORKS PDM Setup Checklist
- SOLIDWORKS Templates
- SOLIDWORKS Settings and Options

**Who Should Attend?**

- Quality Managers
- PLM Managers / Administrators
- CAD Administrators
- MBD CAD Specialists
- CAD/CAE Specialists
- IT Practitioners
- Change Management Practitioners

## 301: Using Creo for MBD

**Synopsis:** Focus on how to use the Creo Annotate Toolbar in a model-based environment. Apply the basics of Model-Based Definition (MBD) using the Creo tool set and discover how to create, use, and modify 3D semantic annotations. Practice with real-world examples to learn the most efficient methods to prepare models with MBD annotations for downstream digital consumption. Creo 3.0 and up are supported.

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COURSE SUMMARY

**You Will Learn:** Learn how to use Creo to enable maximum downstream re-usability of semantic 3D annotations. Also, understand recommended practices for CAD modeling that will support a model-based philosophy and how to create accurate 3D annotations. Learn techniques for authoring annotations that are in compliance with ASME Y14.5, ASME Y14.41, and other model-based standards.

**Pre-Requisites:** 102

### Topics:

- Creo CAD Modeling Techniques for MBD
- Types of Annotations
- Setup - config.pro settings
- Creating Annotations
- Creating Presentation
- Modifying Annotations
- Advanced Annotation Practices
- How to Create MBD in Creo
- Open-lab Hands-on Practice

### Who Should Attend?

- MBD CAD Specialists
- CAD/CAE Specialists
- IT Practitioners
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## 303: ModelCHECK Administration and Best Practices

**Synopsis:** Model-Based Definition (MBD) data is inherently rich in detailed data, and it is critical that the data is precise and accurate. Increased quality performance and MBD drives the requirement to verify and validate all product definition to certify its release to production. This course exposes the necessary “how to” of administering, running, and reading ModelCHECK reports using PTC ModelCHECK. Instructs administrators how to set up ModelCHECK for the purpose of reviewing data packages.

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**You Will Learn:** Learn how to set up, administer, maintain, and run ModelCHECK software. Understand the variety of verification and validation methods possible. Learn recommended practices to set up ModelCHECK for MBD data checking.

**Pre-Requisites:** 102

### Topics:

- How to check your data using Creo
- ModelCHECK Categories
  - Start Part Setup Checks
  - Parameter Setup Checks
  - View Setup Checks
  - Naming Convention Setup Checks
  - Geometry Setup Checks
- ModelCHECK Setup
  - Running Checks
  - Recommended Configuration/Settings for MBD
  - Reading the Reports
- Implementation Strategy
- Setting up ModelCHECK using the Customer's parameters
- Setting up start parts using the Customer's parameters
- Using ModelCHECK to evaluate models from the Customer's sample data sets

### Who Should Attend?

- MBD CAD Specialists
- CAD/CAE Specialists
- IT Practitioners
- CAD Users
- Design Engineers
- Product Definition Practitioners
- Manufacturing Engineers
- Quality Engineers
- Change Management Practitioners

## 401: Using NX for MBD

**Synopsis:** Focus on how to use the NX Product and Manufacturing Information (PMI) Application in a model-based environment. Apply the basics of Model-Based Definition (MBD) using the NX tool set and discover how to create, use, and modify 3D semantic annotations. Practice with real-world examples to learn the most efficient methods to prepare models with MBD annotations for downstream digital consumption. NX 11.0 and up are supported.

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**COURSE SUMMARY**

**You Will Learn:** Learn how to use NX to enable maximum downstream re-usability of semantic 3D annotations. Also, understand recommended practices for CAD modeling that will support a model-based philosophy and how to create accurate 3D annotations. Learn techniques for authoring annotations that are in compliance with ASME Y14.5, ASME Y14.41, and other model-based standards.

**Pre-Requisites:** 102

### Topics:

- NX CAD Modeling Techniques for MBD
- Types of Annotations
- Setup
- Creating Annotations
- Creating Presentation
- Modifying Annotations
- Advanced Annotation Practices
- How to Create MBD in NX
- Open-lab Hands-on Practice

### Who Should Attend?

- MBD CAD Specialists
- CAD/CAE Specialists
- IT Practitioners
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