Improve Quality with PMI

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#PLMCONX
Challenges

- Cost of Quality
  - External Failure Costs
  - Internal Failure Costs
  - Assurance Costs
  - Prevention Costs

- Manufacturing variation impacting product’s
  - Function
  - Assemble-ability
  - Fit & Finish (look & feel)

- Provide high quality products (customer satisfaction) with low cost (manufacturer profitability)

All of these problems could be a result of excessive manufacturing variation!
• Drawings are still used to communicate requirements for manufacturing of products

• Industry especially in automotive and aerospace sector moving to design models to be annotated to replace a traditional drawing

• Human mind can understand three dimensional data more easily

• It’s more efficient to simply reuse and organize the information needed while modeling a product then recreate that information in an additional file called a drawing

• **Model will become the single source of truth that is created efficiently and in a shorter time**
### How To Get Started

**Identify where you are**

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
<th>Primary Deliverable</th>
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</thead>
<tbody>
<tr>
<td><strong>Level 6</strong></td>
<td>Model Based Enterprise</td>
<td>Digital Product Definition Package and TDP via the web</td>
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<td><strong>Level 5</strong></td>
<td>Model Based Enterprise</td>
<td>Digital Product Definition Package and TDP</td>
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<td><strong>Level 4</strong></td>
<td>Model Based Definition</td>
<td>3D Annotated Model and LightWeight viewable via PLM</td>
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<td><strong>Level 3</strong></td>
<td>Native Model CAM – Disconnected Enterprise</td>
<td>3D Annotated Model and LightWeight viewable</td>
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<td><strong>Level 2</strong></td>
<td>Model Centric</td>
<td>2D Drawing and Native CAD Model</td>
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<td><strong>Level 1</strong></td>
<td>Native Model CAM – Disconnected Enterprise</td>
<td>2D Drawing and Native CAD Model</td>
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<tr>
<td><strong>Level 0</strong></td>
<td>Drawing Centric</td>
<td>2D Drawing</td>
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</tbody>
</table>

- Are you still in the early stages?
- Are you already well advanced or even far ahead of your competitors?
- To find it out, we launched a survey: [https://www.surveymonkey.com/r/C5WR5LT](https://www.surveymonkey.com/r/C5WR5LT)
- Please enter your e-mail address in order to receive the anonymized survey results.
Findings

- 2D drawing defines most or all part annotations and presents geometry from the model
- 3D model mainly define the geometry only and is associated to the drawing
- Annotations are validated on drawings
- Changes are mainly managed in model but in sync with drawing
- Product Manufacturing Information are provided on drawings to Manufacturing and Inspection
PMI-Driven Quality Lifecycle Management Solutions

Design:
Variation Simulation & Analysis (NX, VSA)

Planning:
Inspection Planning & Programming (NX, CMM)

Production:
Shop-floor Quality Control

Continuous improvement through a PLM Platform

See Presentation „Quality Lifecycle Management using PMI“ from Siemens PLM Connection 2015
What Is BCT Inspector?

Management of all characteristics in models and drawings

- Solution module to identify characteristics in PMI models and on drawings
- Unique identification of characteristics throughout the entire lifecycle of a model
- Extraction of all relevant data for production and quality management
- Generation of customized reports as well as (first article) inspection reports and change reports
- Automatic revision comparison with graphical and spreadsheet display of the distinctions
Use Cases

- PMI Management
- Inspection Reports
- Identify Changes
- Change Reports
- NX CMM Inspection
- Dimensional Planning & Validation
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PMI Management

Extract PMI information for downstream processes

- Extraction of all relevant data for production and quality departments
- Automatic generation of characteristics list (also fully automated in background)
- CAD-independent visualization
Demo
Feature Location Labels
Manage additional referenced features on PMI

- A feature location represents an additional location of a PMI
- In the quality process, there is a need to identify and measure each of these elements, identified by its exact position
- To fulfill this specification, it is necessary to place identification labels on each of these occurrences
Demo
Generation Of Reports

Automatic generation of scalable reports in BCT Inspector

• Generation of customer defined reports
• Generation of first article inspection reports (FAIR)
• Complete generation of change reports
Use Cases

- PMI Management
- Inspection Reports
- Identify Changes
- Change Reports
- NX CMM Inspection
- Dimensional Planning & Validation
Identification Of Changes

Automatic compare of drawing and model revisions

- Automatic comparison of drawing and model changes
- Simple identification of deleted, new and modified characteristics
- Graphical & spreadsheet comparison of drawing sheets and JT PMI models
Identification Of Changes

Demo
Identification Of Changes In AWC

Easy comparison in Active Workspace Client
Identification Of Changes In AWC

Easy comparison in Active Workspace Client
Use Cases

- PMI Management
- Inspection Reports
- Identify Changes
- Change Reports
- NX CMM Inspection
- Dimensional Planning & Validation
NX CMM Inspection Planning

Use of Standard Tolerances and NX drawings in NX CMM inspection

- Virtual measurement programming based on PMI information directly in NX
- Automatic generation of measuring paths based on given PMI and feature information
- Simulation directly on 3D model and elimination of collisions by adjusting measurement paths

Benefits from BCT Inspector
- Additional virtual measurement programming based on **drawing information** directly in NX
- Use of standard tolerances
- Automatic generation of tolerances and features
- Tolerances are linked with corresponding features at export
Use Cases

- PMI Management
- Inspection Reports
- Identify Changes
- Change Reports
- NX CMM Inspection
- Dimensional Planning & Validation
DPV - Dimensional Planning and Validation

Production Quality Control

- Identify and resolve manufacturing quality issues near real time
- DPV collects, reports and analyzes quality data from shop floor
- Feeding shop-floor data back to product and process design

Benefits from BCT Inspector
- Enables connection between design, planning and production
- Provides Product Manufacturing Information (e.g. nominals, tolerances etc.) directly to DPV
From **PMI Manager** views launched from the product structure (mBOM), you can:

- Import new PMI or update PMI objects in Teamcenter from BCT Inspector
- Remove PMI objects/DCDs from the product structure
- Filter PMI objects that are assigned or not assigned to the process structure
BCT Inspector Project File

The technical data package for quality management and suppliers

• The data package comprises several relevant data of a revision:
  • Complete characteristics table
  • NX drawings in neutral format
  • Reference to JT PMI model
  • CAD neutral
  • Follows QDAS standard

• Data package can be opened with BCT Inspector NX / Neutral / Viewer:
  • Generation of inspection reports
  • Comparison of model and drawing revision including characteristic data
  • Stamping can be continued CAD independently (e.g. by supplier)
Advantages And Benefits Of BCT Inspector

In a nutshell

**Design**
- Simple control of all changes over several part revisions
- No additional time effort as characteristics identification can be done in the background (e.g. during release)
- Simple feedback of change instructions from quality assurance (also from suppliers)
- Simple generation of change documentations

**Quality Management**
- Automatic capture of characteristics from drawings and PMI models, thus reduction of time effort and error occurrence
- CAD-neutral visualization of inspection characteristic lists and inspection drawings
- Simple transfer of characteristic data to CMM process
- Customizable export of inspection and change reports
- Automatic transfer of design changes

**Company**
- **Error avoidance** already in product development
- **Avoidance of error costs** through *early identification* of errors
- **Time saving** and **error reduction** for generation of inspection plans
- **Reduction** of **time for revisions** and thus faster time to market
Summary

Value to Customer:
- Less faults, better quality, and faster launch
- Big-data supports manufacturing intelligence
- Issue management, change management and workflow

Why PMI-Driven QLM?
- Complete: Closed-loop Solutions supporting System Engineering and Concurrent Engineering
- Effective: PMI Driven End-to-end
- Scalable: Site to Enterprise
Thank You!

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