NX CMM Inspection Programming

Automate programming directly from 3D CAD for faster quality

Ashley Kerth : 6dms, Inc.
NX CMM Inspection

Offline-Programming of Coordinate Measurement Machines (CMM)

- Next Generation CMM programming solution available since NX 7.5
- Using existing framework for Design, CAM and Data Management
- Enhanced work flows, dialogs and user interfaces
- Support for new measurement technologies
NX CMM Customer Value

- Automates program generation
- Verifies programs and avoids collisions by using 3D solids simulation
- Automatically updates programs to design changes
- Is fully integrated into CAD modeling and PLM workflows
- Produces Certified Standard DMIS for any brand of CMM
- Provides an open architecture for custom processes
Value to High Technology Market

- Significant improvement in productivity over legacy systems (up to 35%)
- Common solution for ease of training and support
- Common IT footprint for easy deployment and updates
- Users only need to learn one language for programming
- Provides a uniform method to integrate suppliers
NX CMM in Aerospace Market

Value to the A&D market

- Natively embedded in NX
- Common solution that works with all brands and types of CMMs
- Ease of use: leverage NX User Interface
- Closely integrated with the world’s most widely used PLM system Teamcenter
- Ability to leverage Product Manufacturing Information (PMI) in the programming of the system
NX CMM Inspection Programming

Key Themes

1. Advanced Capability
2. Programming Automation
3. Inspection Ready Output
4. Integrated Solution
5. Ease of Use
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Advanced Capability
- benefits

- Produce better quality programs, faster
- Take advantage of the latest CMM equipment & inspection processes
  - High speed contact scanning
  - Multi-axis scanning
- Quickly respond to design changes

CAD model with 3D annotation (PMI)
Advanced Capability
- key features

- Program directly to design and manufacturing requirements (CAD model & annotation)
  - Input 3D geometry with broad range of data translators
  - Program in the context of the CMM machine
  - SPLM JT translators for CATIA V5 FTA and Pro-E 3D Annotations to NX PMI
Advanced Capability
- key features

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- Rapidly program with a wide range of feature and tolerance types
Advanced Capability
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Programming Automation
- benefits

- Standard operations can be defined in template parts to reduce effort to create program
- Machine, head and tools can be pre-loaded
- Standard sensors can be defined
- Custom inspection methods can be defined
- Enhances re-use of best practices
Programming Automation - benefits

- Reduction of programming time with automation
  - Automate:
    - Feature creation
    - Tolerance specification
    - Path creation from customer defined templates

- Achieve faster, repeatable CMM programming, requiring less expertise
Programming Automation
- NX Product and Manufacturing Information

- Product and Manufacturing Information (PMI) directly on 3D model
  - Dimensions w/ tolerances
  - Datums and targets
  - Feature control frames
  - Associative notes / URL

- Model Views
  - PMI created in each view
  - Filters control visibility
  - 3D section views
  - Query associated objects

- NX PMI automatically saved to JT PMI and reusable by downstream applications.
Programming Automation
- key features: PMI-driven inspection programming

NX automates inspection programming by using:

1. CAD geometry & PMI to identify and create inspection features
2. PMI information use to specify dimensional tolerances
3. Inspection method and feature types to define the inspection path
Automatic update of programs to design changes

Original PMI or 3D feature

Design change

Out-of-date inspection operation in NX CMM

Automatic update of associative inspection program
Programming-automation video
NX CMM Programming Inspection
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Inspection Ready Output
- benefits

- Right first time on the CMM - detect potential collisions even before inspecting parts

- Eliminate time-consuming testing on the CMM

- Flexibility - inspection programs are not tied to a specific CMM programming language or brand of CMM

Prepare & validate inspection programs before running on the CMM
Inspection Ready Output
- key features

- Machine (CMM) simulation and collision detection
  - Runs program in the context of the physical machine environment
  - Identify and visualize collisions
  - Quickly fix the program
Inspection Ready Output
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- Generate machine-ready program directly from NX
  - DMIS 5.2 NIST Certified
  - Configure CMM-specific postprocessors
Dmis video
Inspection Ready Output
- key features

- NIST Certified DMIS 5.2 output
- Prismatic Level 2
- Specific post-processor available for download from GTAC
- Includes NIST conformance checker that validates each DMIS file generated
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5. Ease of Use
Ease of Use
- benefits

- Easily learn the application and quickly become productive
- Minimize training expenses
- Rapidly deploy (easily integrates into an existing Siemens PLM IT footprint)
- Configure the application to adapt to business processes
Ease of Use
- key features

- Streamlined & simple workflow - from CAD model to program

- Reuse PMI information from NX model or JT with “Real PMI”

- Full machine code simulation and collision detection

- NX CAM Post processor (TCL & MOM) configurable output

- OOTB CMM neutral output DMIS 5.2 industry standard
Ease of Use - key features

- Streamlined & simple workflow - from CAD model to program

- Easy to Use
  - Resource library with out of the box content
  - Capture and reuse standard resources
  - Utilize NX CAM post processor technology for custom posts

Re-use standard resources
NX CMM Inspection Programming
- Additional Features

- Probe tool management in Teamcenter
- NX reuse library for fixtures and “jo plugs”
- Advanced possibilities of rule-based path generation
- 5 Axis Scanning (Revo)
- Rotary Table Programming and Simulation
- Integration of “Shop Docs”
5 Axis Curve Scanning

- New Inspection sub-operation type
- New parameters to define probe angle between the surface and the curve
- Probe maintains constant orientation with respect to the surface normal and curve direction
- Works with any 5 axis scanning head (tested with Renishaw REVO)
 Rotary Table Support

- New Operation Type
- Support for one or two rotary tables
- Tables defined in Machine Tool Builder
- Absolute or increment angle
- 3 PCS updating options: none, total and origin
Enhanced Simulation of Tool Changes

- Define and mount a tool rack on the machine

- Place probes/tips in the rack

- Define entry and exit motion for tool change

- Simulate the machine motion during probe change
Collision Avoidance

- Possibilities of path optimization using algorithm for collision avoidance
- Various properties selectable
Thank you!

www.siemens.com/plm