NX4 Routing Systems

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NX will perform associative mechanical & electrical routing through an integrated, seamless design environment

- STEP Compliance
- PLM XML based data exchange
- Mechanical Analysis integration
- Knowledge Driven Authoring
- All data and administrative files managed by Teamcenter.
- P&ID (external support)
Routing Systems Strategy and Roadmap

GOAL 1 – Journaling and automation
Implement journaling throughout Routing

GOAL 2 – Mechatronic interfaces
Support external P&ID, HVAC and Electrical interfaces to 3rd party applications and Teamcenter.

GOAL 3 – Extend Routing tool suite
Extend features and functionality to facilitate design of routed systems

GOAL 4 – Knowledge-driven routing design automation
Intelligent processes that automatically route paths, handle tubular and flat components, select standard parts, etc.

GOAL 5 – Achieve first time quality
Continue focus on quality management with zero defects
Goal 1 – Journaling and Automation

Goal objective
- Supports corporate initiative
- Allow users to easily automate Routing functionality within NX
- Quickly capture error conditions for playback
- Provide Knowledge Fusion coverage for Routing objects

Why is this important to you?
- Facilitates customization of the Routing products
- Time savings due to automation

<table>
<thead>
<tr>
<th>Routing System</th>
<th>Journaling Coverage</th>
<th>Automation Coverage</th>
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</thead>
<tbody>
<tr>
<td>NX 3 2004</td>
<td>No</td>
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<td>NX 4 2005</td>
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<td>NX 5 2006</td>
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Goal 2 – Mechatronic Interfaces

Goal objective

- Support Mechatronics initiative
- Leverage PLMXML and AP212 to provide robust electrical data exchange mechanism
- Seamless integration for data transfer and management
- Open and documented

Why is this important to you?

- Centralized data management
- Uses established non-proprietary standards
- UGS open standards based on industry standards (STEP)
- Reduces design time thru data re-utilization

Export AP212 Connectivity (XML Part 28)
Manage AP212 based Data in Teamcenter (PLM XML)
Mechatronics Interface / Zuken, CIM-Team,
Routing Physical Without Functional
Logical-Physical Consistency Analysis

NX 3 2004
NX 4 2005
NX 5+

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Goal 2 – Mechatronic Interfaces

Goal Projects

**Enhance electrical data model**
- Revision of Electrical Routing internal data model to be compliant with the Mechatronics and AP212 data models

**API to electrical data model**
- User function (Automation) interfaces developed to retrieve/set data defined in project number 170154 Enhanced Electrical Data Model
Goal 2 – Mechatronic Interfaces

Goal Projects cont’d

**NX 4 Mechatronics Integration**

- Complete the Electrical data integration of NX and Mentor Graphics providing customers with a best-in-class solution for ECAD/MCAD interoperability.

**NX 4 Teamcenter mechanical routing integration**

- Multi release project to extend Teamcenter integration with Routing Mechanical.

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Goal 3 – Extend Routing Tool Suite

Goal objective
- Provide tools to automate common routing operations
- Address specific customer requests for functionality enhancements

Why is this important to you
- Easy to use tool suite for creation and editing 3D data
- Facilitates re-use of existing 3D data
- Streamlined interfaces reduce overall design time

Routing Systems

Flexible component & variable component positioning support
Automated Terminal Block
Standard Part Enhancements
Pipe Bend Alignment

NX 3 2004
NX 4 2005
NX 5+
Goal 3 – Extend Routing Tool Suite

Goal Projects

Flexible routing assemblies (Phase 1)

- This project will make use of current Assemblies functionalities (Flexible Component / Variable Component Positioning) within the Routing application

Flexible Routing Assemblies
Same part number used many times with different orientations
Goal 4 – Knowledge-driven Routing

Goal objective

- Provide rules based automation for part selection, path creation, path editing and validation in support of Electrical and Mechanical Systems integration.

Why is this important to you?

- Facilitates rule driven design creation and re-utilization
- Robust, common UI for all applications
- 70% time and effort savings over existing methods

Goal 4 – Knowledge-driven Routing
Goal Detail

Validation
Integration, KF intelligent Routing objects

3D constraint solver

Smart Router
Physical properties utilization

NX 3
2004

NX 4
2005

NX 5+

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Goal 4 – Knowledge-driven Routing

Goal Projects

**Routing Systems**

**Validation Integration**

**Design rules integration**

- Routing Systems design rules mechanism incorporation into the validation toolset (Check-mate)
Goal 5 – Achieve First Time Quality

Goal objective

- Reduce Routing PR count and improve maintainability of core architecture.
- Improve Routing User Interface based on customer input.

Why is this important to you?

- First release quality product
- No PR’s
- Increase ease of use and customer productivity

Rigorous code change request management

Utilization of Journaling for extensive test scenarios

Improved test plans

NX 5
2006

NX 6
2007

NX 7
2008

NX 8
2009
2 weeks…. 6June2005 (Mechanical) and 27June2005 (Electrical).

A large amount of expertise was focused on NX4

- 21 participants representing 12 companies
- Exclusively St. Louis, MO (Routing Systems Development HQ)

All the new functionality and enhancements were tested

Existing customer processes and environments were tested

Held in St. Louis to ensure testing environment is established with development team interaction each day.

Our aim is to have this extensive interactive testing make NX Routing Systems a better product!!!!

NX5 Testing dates: 25-SEPT2006 (Electrical) and 16-OCT2006 (Mechanical).
### NX 5 Project Summary (Subject to Change)

**Goal 1 - Journaling and automation**
- Journaling phase 2

**Goal 2 - Mechatronic interfaces**
- Routing Physical without Functional
- Logical-Physical consistancy anlysis
- TcEng mechanical routing integration
- Mechatronics interfaces / Zuken,CIM-Team
- TcEng in-class specification enhancement

**Goal 3 - Extend routing tool suite**
- Preferences Rationalization
- Automated Terminal Block
- Pipe Bend alignment
- Standard part Enhancements

**Goal 4 - Knowledge-driven automation**
- 3D Constraint Solver Implementation