



DIGITAL DESIGN SOLUTIONS
Technology for success

Agenda

- Current Trends and Challenges
- Automation in design development
- Data Management is more important than ever before.





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Greater Innovation Pressure on Suppliers

Global fuel economy & emission regulations drive technology change

Eco-driven Powertrain Concepts



- Plug-in Hybrids
- Electric Vehicles
- Combustion
- Powertrain efficiency
- Transmissions & Drives

Innovative and Lightweight Design



Creating Brand Value Through Performance



- Aerodynamics
- Driving Behavior
- Rolling Resistance
- Energy Management
- Climate Systems

System Optimization, Electronics Control



- Vehicle Performance
- Powertrain Optimization
- Load Reduction
- Cost Trade-offs
- Mechanical / Software Integration



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Greater Innovation Pressure on Suppliers

Eco-driven Powertrain Concepts



- Plug-in Hybrids
- Electric Vehicles
- Combustion
- Powertrain efficiency
- Transmissions & Drives

Innovative and Lightweight Design



- Vehicle Architecture
- Weight Efficiency
- Attribute Tradeoff
- Joining technology
- Materials

Creating Brand Value Through Performance



- Aerodynamics
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- Energy Management
- Climate Systems

System Optimization, Electronics Control



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**Rate of
technology
adoption
drives
increasing
cost pressure
and risk**

- **Rapidly increasing product and process complexity**
- **More NPD and variants per year**
- **New Products and materials**
- **Less development time**
- **Increasing quality requirements.**
- **Pressure on product and development cost**
- **Suppliers need to build to specification**



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Solutions for Industry

SOLUTIONS



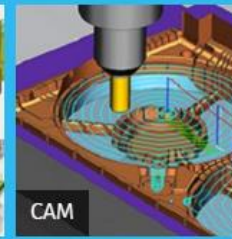
PRODUCT DESIGN



STYLING



TOOL DESIGN



CAM



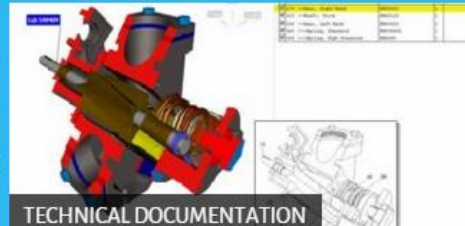
SIMULATION



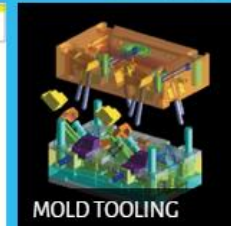
FORGING



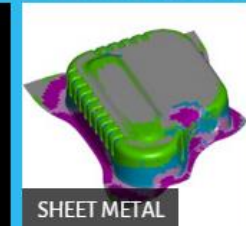
PLM



TECHNICAL DOCUMENTATION



MOLD TOOLING



SHEET METAL

Ask for a Quote



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NPD Process Automation

Flexible engineering tools that improve design efficiency and adhere to standards

Concurrent Engineering

Early participation in NPD for all stakeholders.

Maximize data re-use

Single Source of data and best tool for the job without converting data



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Intelligently Integrated Information boosts productivity



**Concept layout &
Styling**



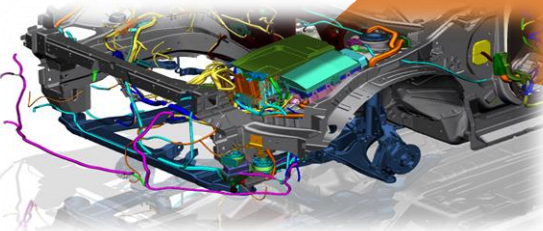
**Drafting &
Documentation**



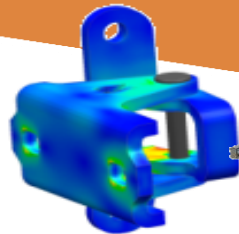
**Inspection
Programming**

**Product
Engineering**

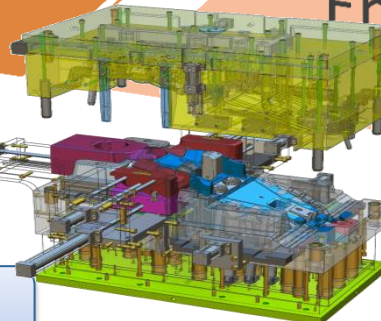
**Manufacturing
Engineering**



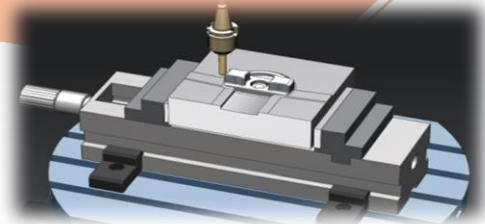
**Detail
Design**



**Simulation &
analysis**



**Tooling & fixture
design**



CAM Programming



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NX – CAD CAM CAE

- **Single tool offering comprehensive CAD CAM CAE Capability in a single environment delivers maximum productivity**
- **Parametric feature based modeling**
- **Synchronous Technology**
- **Freeform modeling**
- **Design for Manufacturability analysis**
- **Simulation for digital validation**
- **PDC Mold Design**
- **Simple to complex CNC machine programming**

“The difference lies in the way the functionality is made available. And in this respect NX scores high, as our people use it with pleasure.”

Lau Reijnen
General Manager
DuvedeC Europe BV



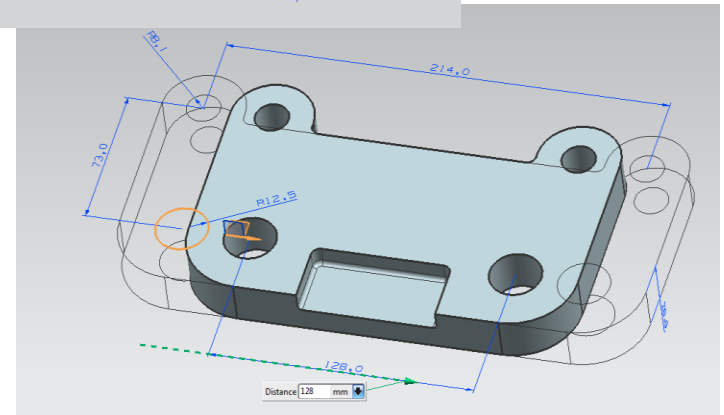
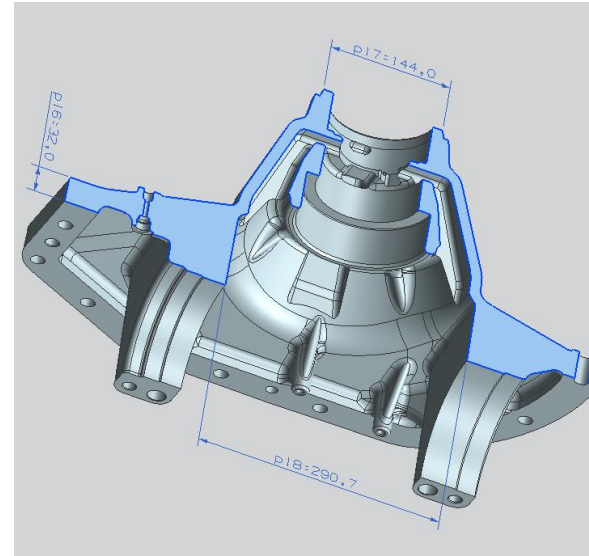


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Synchronous Technology

Productive Design That is Easy To Use

- **Synchronous technology enables**
 - Simple, direct pull/push tools for editing and creation
 - Modify a part – even if you don't know how it was created
 - Select and drag with real time preview
 - Immediate feedback on design changes
 - Add intelligence to dumb data

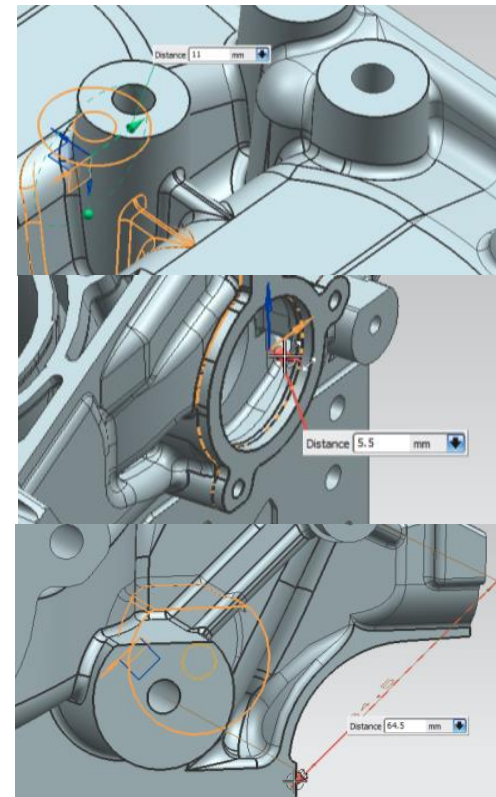




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Synchronous Technology

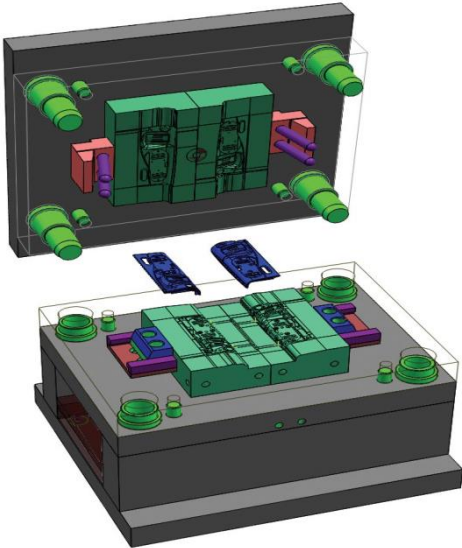
- No need to understand model history, and feature Relationships-dependencies in order to make a change
- Modification and constraints are applied directly to model geometry (faces, edges) increasing flexibility
- Efficient response to model changes
- Easy to modify imported models when needed
- Fully integrated with parametric feature based workflow
- Solves complex core design issues like draft and blends





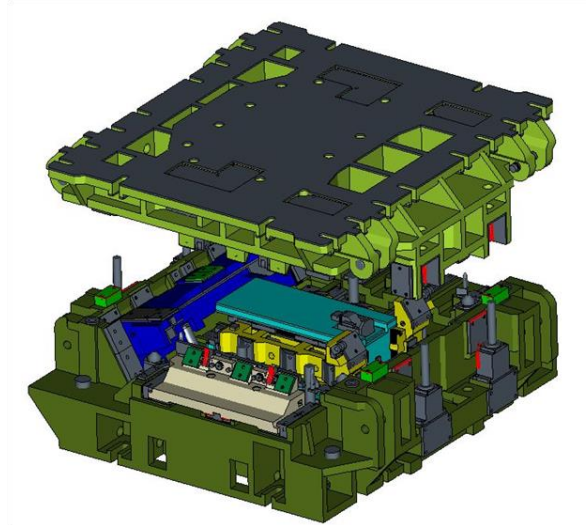
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Tool Design specialized tools for different applications



Mold Design

- Plastics
- Rubber
- Casting



Stamping Tool Design

- Draw
- Trim
- Restrike



Progressive Die Design

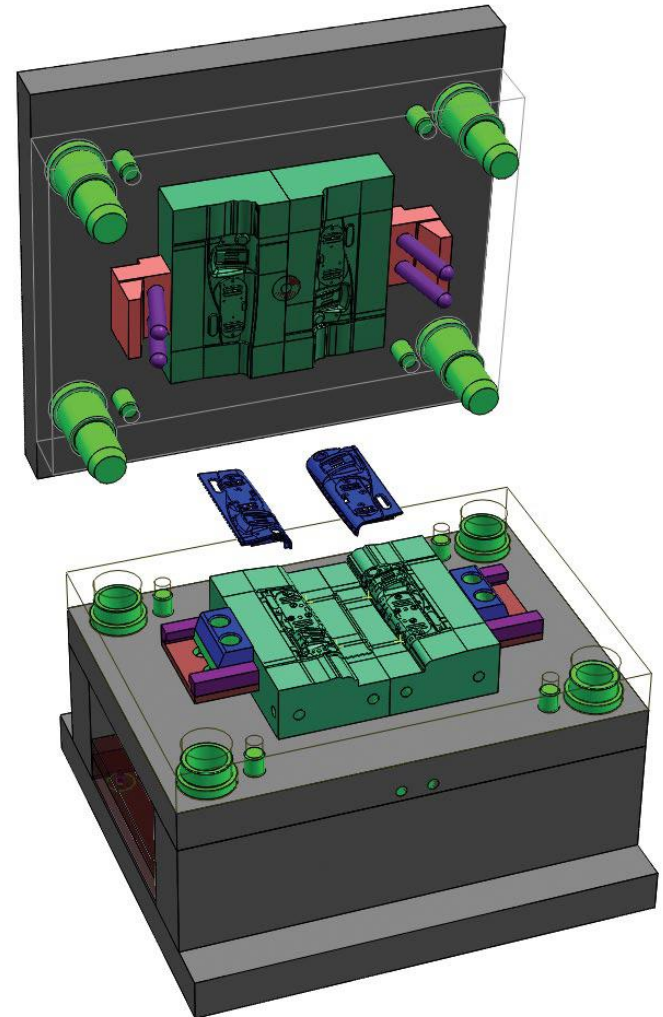
- Strip layout
- Simulation
- Standard Die base



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NX Mold Wizard

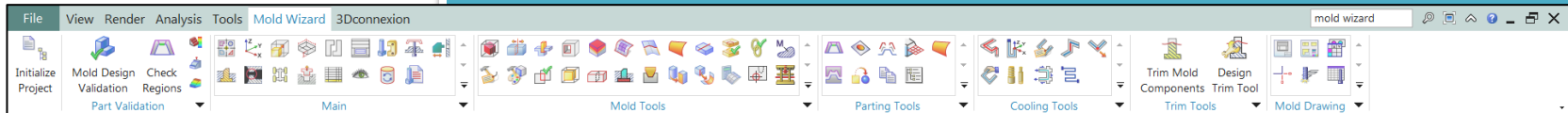
- Step-by-step process for mold design
- Structured workflow based on expert best practices
- Automation of mold-specific tasks
- Mold component libraries
- Dramatically more productive than traditional CAD
- Promotes the most efficient workflow





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Embedded Process Expertise for Mold Design



Design Change Propagation and Control

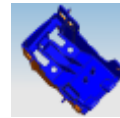
Product Analysis



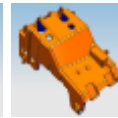
Wall thickness



Radius / Sharp Corner



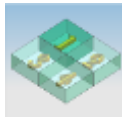
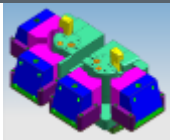
Draft Analysis



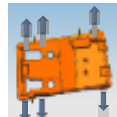
Shrinkage



Core / Cavity



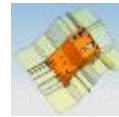
Layout



Region definition



Shut-off



Parting

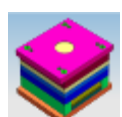
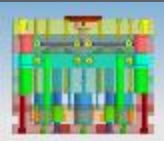


Core / Cavity Split



Slides / Lifters

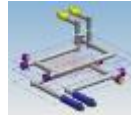
Mold Structure



Mold base



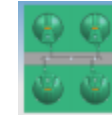
Ejector pins



Cooling



Gates

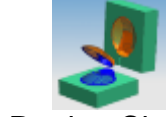
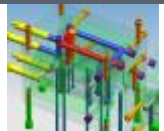


Runners



Standard parts

Validation



Parting Check

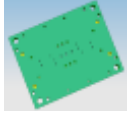
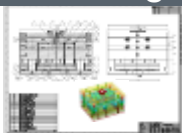


Interference / Clearance

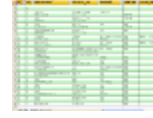


Compare Swap Map

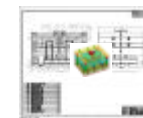
Detailing



Pocketing



BOM

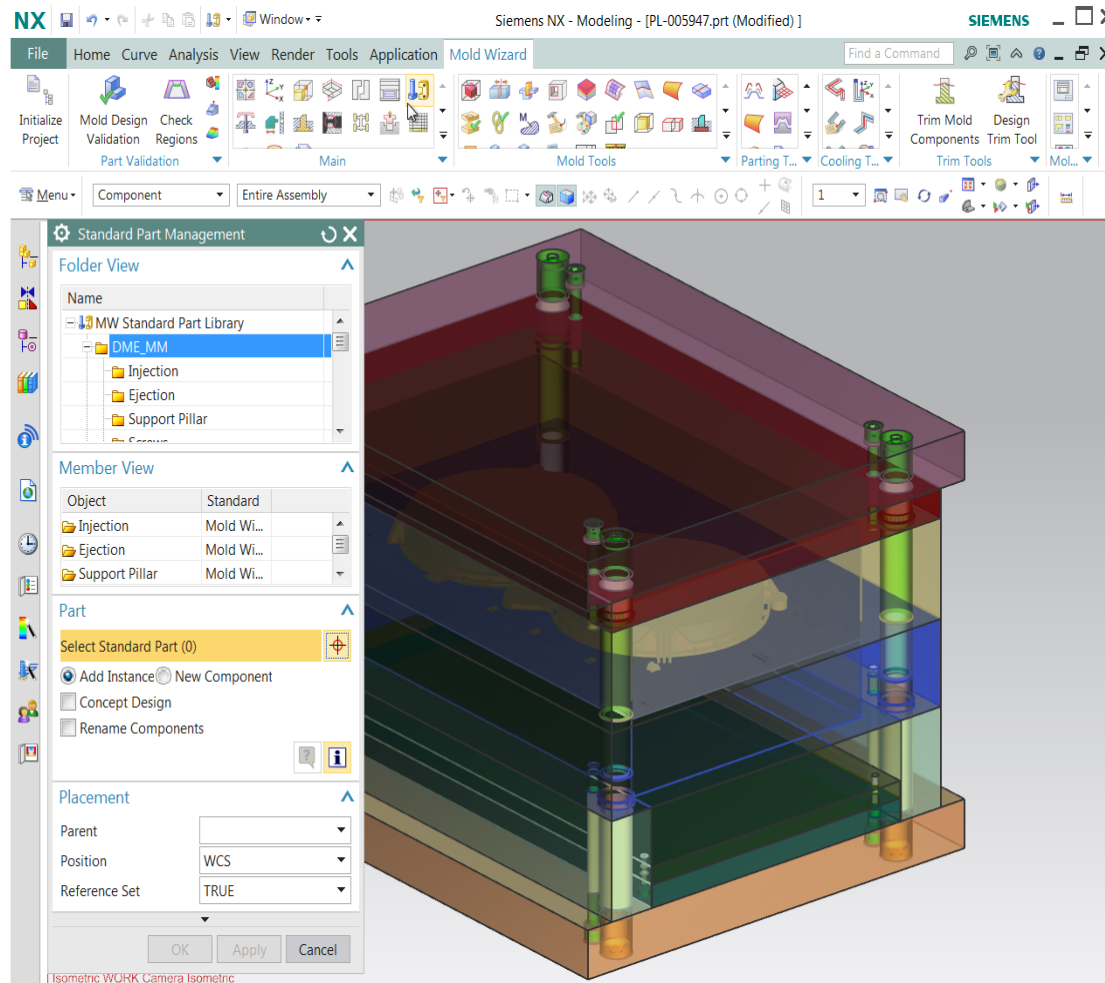


Drawings



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Automated Mold Base Design Demonstration





DFM -Industry Challenges

Importance of checking designs for manufacturability

Business Challenges

Automotive recalls (18 million in US in 2012)

Example: mounting holes in the seat belt anchor plates fitted to the vehicle are too small. ...the anchor plate may not be able to rotate about the fastening bolt as designed...seat belt may not be routed optimally...or may potentially loosen...increasing the risk of injury during a crash.

Source: National Highway Traffic Safety Commission

Consumer recalls

Example: Children's toy (sold at exclusive store) recalled due to sharp edges...the largest plastic castle block could crack during use, creating sharp edges that can pose a laceration hazard to young children.

Source: cpsc.gov

Engineering Challenges

Meeting Project Schedule

- Higher delays due to rework
- Lower productivity

Quality Management

- Quality problems due to inexperienced engineers
- Downstream quality issues
- Regulatory demands

Controlling Production Costs

- Excess scrap generation
- Expensive tooling
- Cost overruns

Improving Innovation

- More time spent on reviews and rework activity



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DFMPro for NX

– Get your designs right first time

DFMPro for NX

- Enables upstream manufacturability validation, identifying design areas that are difficult, expensive or impossible to manufacture
- Automates and formalizes the design review process for manufacturability
- Provides a mechanism for best practice knowledge capture and reuse for continuous improvement
- Reduces rework cost

DFMPro for NX not only highlights the problem but suggests corrective action and values from best practice handbooks and knowledge repository





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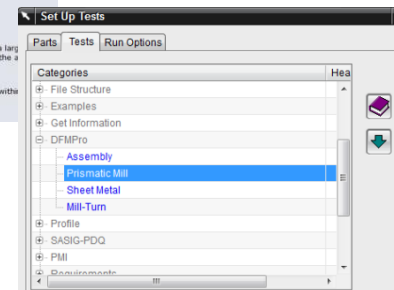
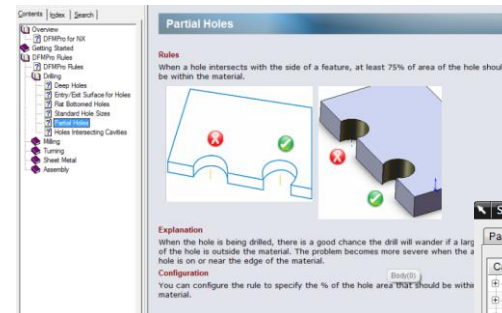
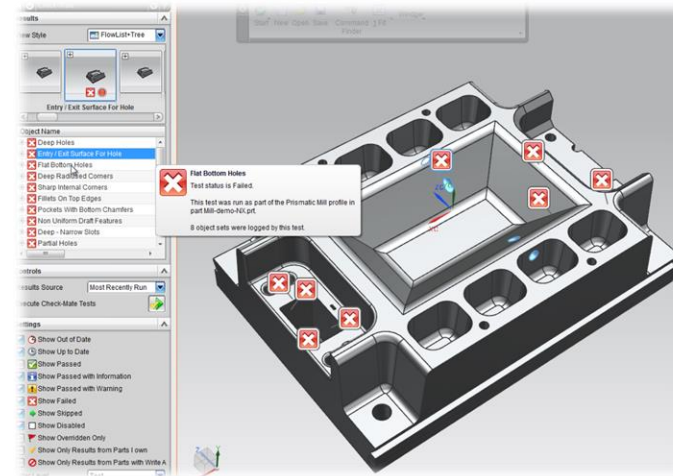
DFMPro for NX

– Seamlessly integrated inside NX

DFMPro for NX runs inside NX

- Uses the existing, familiar and proven Check-Mate framework
- HD3D interface for problem navigation and tagging
- DFM Checks provided out-of-the-box for machining, sheet metal, injection molding, assembly and casting manufacturing processes
- Utilizes Check-Mate results tools and Teamcenter integration

DFMPro for NX is seamlessly part of NX, running inside Check-Mate, reducing the learning curve for existing Check-Mate users





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DFMPro for NX

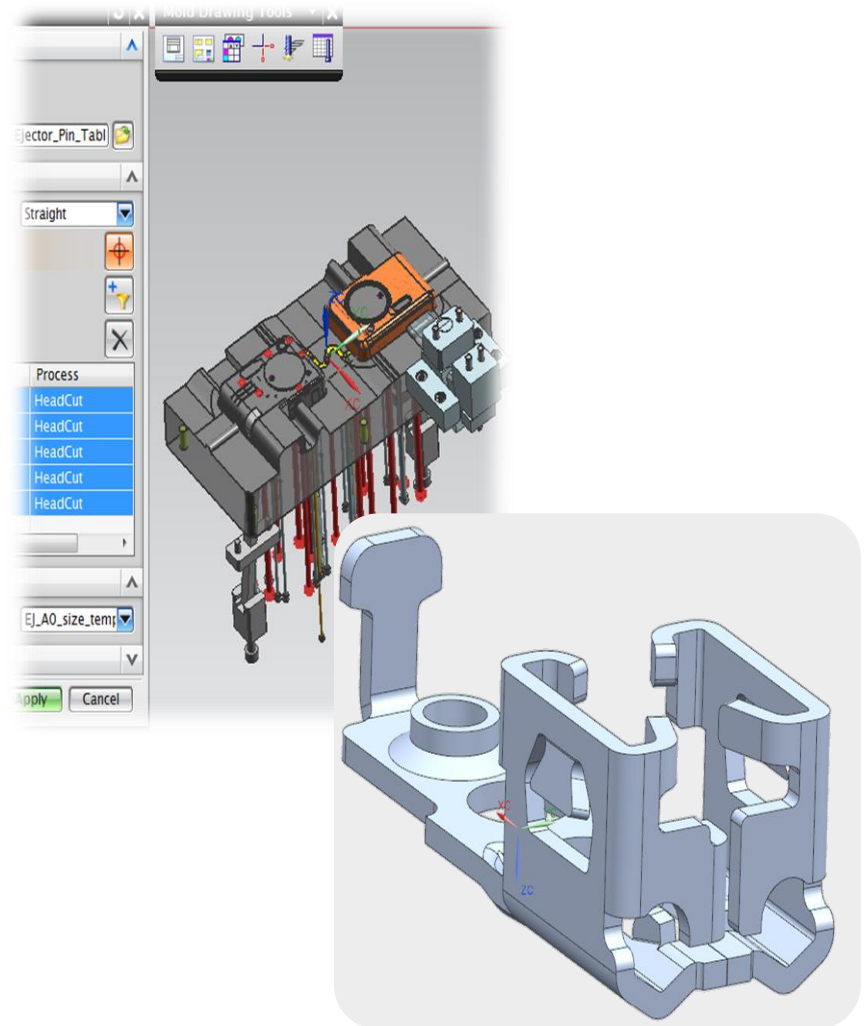
– Examples of OOTB Checks

molding checks include:

- Sudden wall thickness variation
- Tall/thick/thin ribs
- Boss height, thickness and radius
- Thin or undercut regions

Sheet metal checks include:

- Slot parameters
- Hole parameters
- Multiple bends, bend parameters and cutouts
- Hem parameters





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Product and Tool Costing

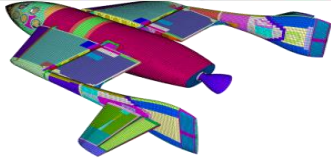
- Product Costing
- Automated tools to analyze product and machining features.
- Attribute material, man, machine, consumable cost based on your standards.
- Variable cost depending on volumes, plants etc.

- Tool Costing
- Manufacturing feasibility
- Identify product features and decide tool configuration, slides etc.
- Derive machining cost
- Material cost
- Standard parts etc

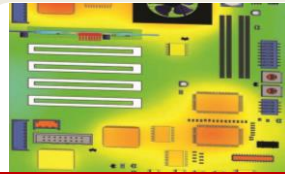


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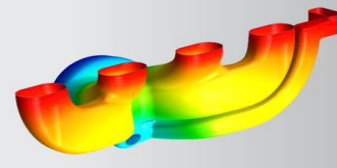
NX Advanced Simulation



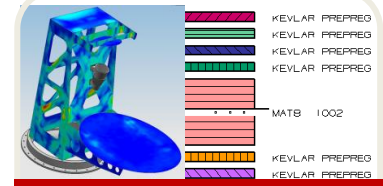
NX Nastran



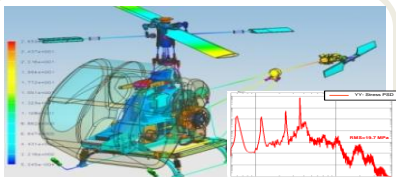
PCB Thermal Analysis



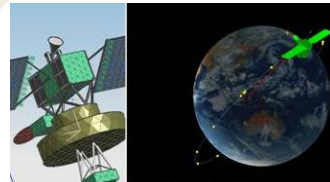
Thermal



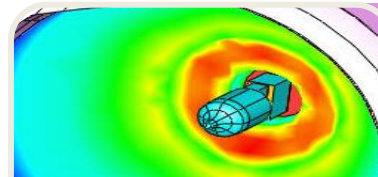
Laminate Composites



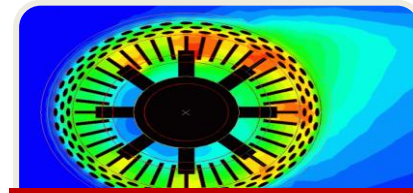
Response Simulation



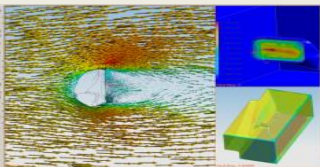
Space Systems Thermal



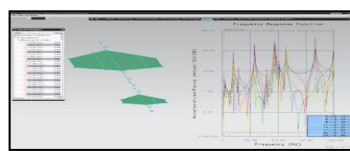
Advanced Thermal



Advanced Flow



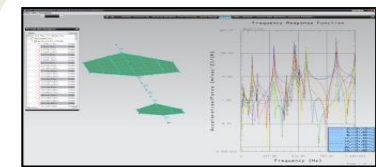
Flow



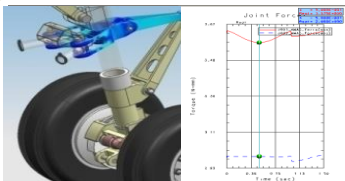
FE Model Correlation



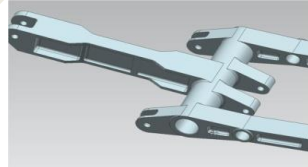
Electronic Cooling



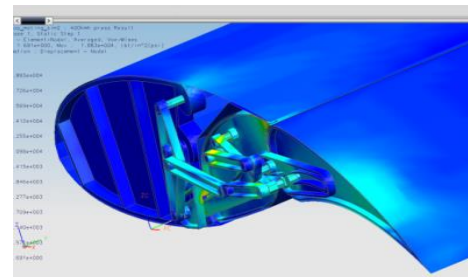
FE Model Update



Motion and Controls



Optimization, Fatigue



Flexible Body

Visit us at www.ddsplm.com

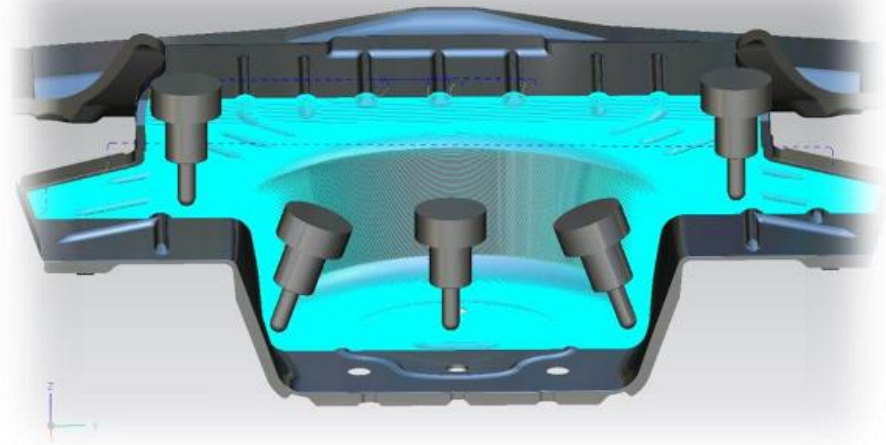


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General NX CAM Capabilities

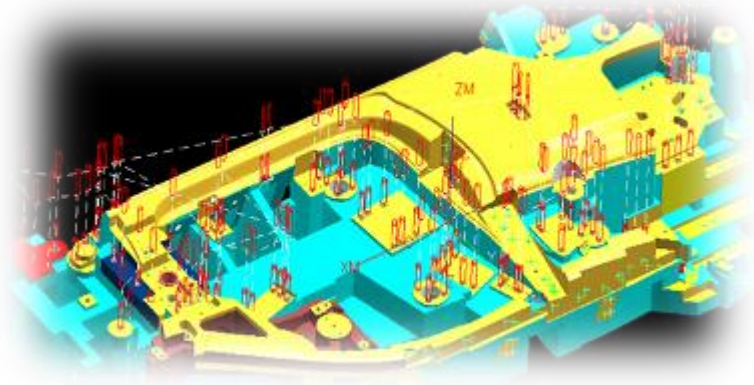
Current Capability

- Broad capabilities in one system
 - 2½D machining for die structure
 - 3D machining for die face
- Associative links to design
- Rich automation capabilities
- Rich modeling capabilities available for NC prep work
- Highly realistic simulation



Customer Value

- One system – no data transfers
- Associativity reduces rework effort
- Automation reduces work, improves standardization and process stability





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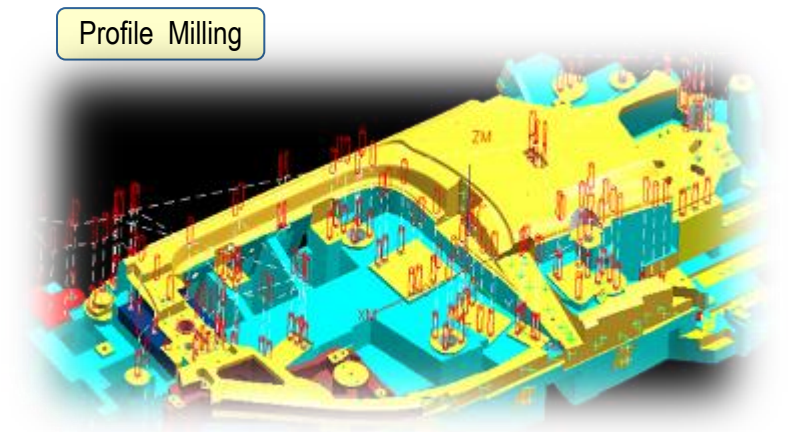
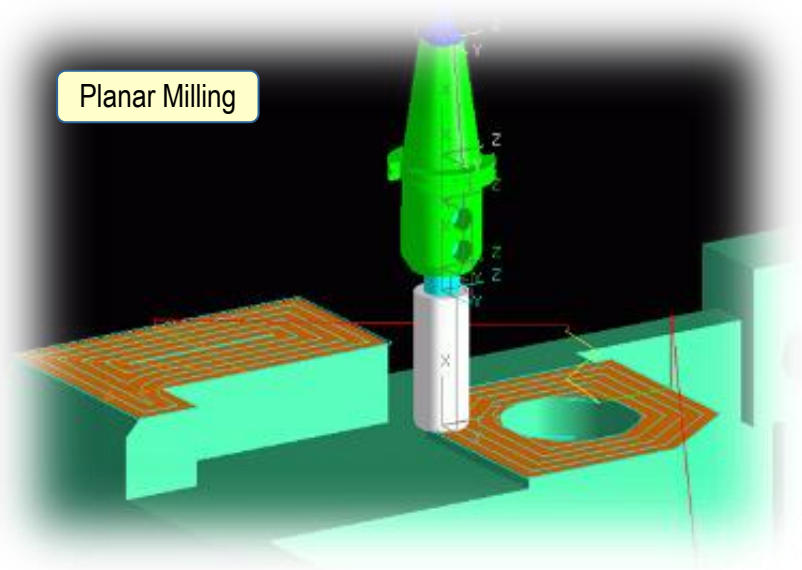
Milling and Drilling

Current Capability

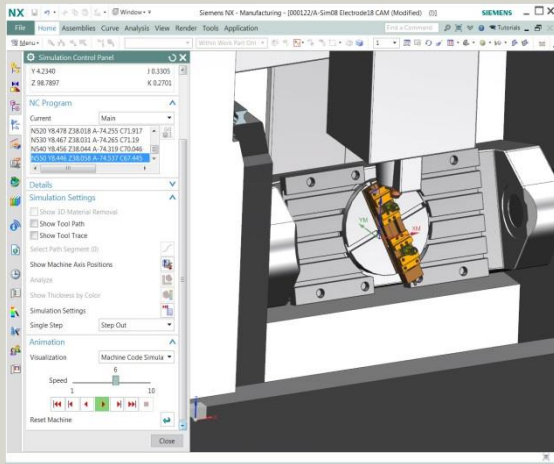
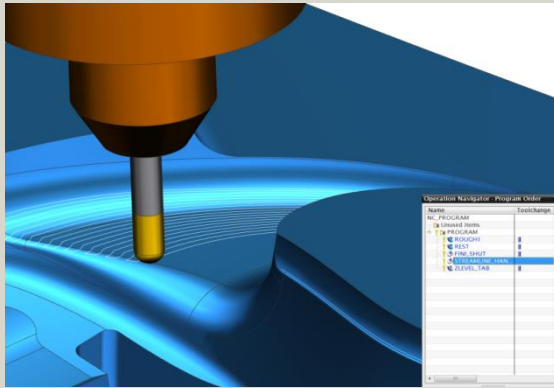
- Roughing -- cavity & pocket milling
- Finishing -- planar, face, plunge milling
- Drilling (manual or feature-based) holes
- Automation based on machining knowledge database, features, attributes, PMI
- General Features
 - In-Process Workpiece (IPW)
 - Tool path Editor
 - Toolpath verification

Customer Value

- Automation reduces work, improves standardization and process stability



Mold and Die Machining

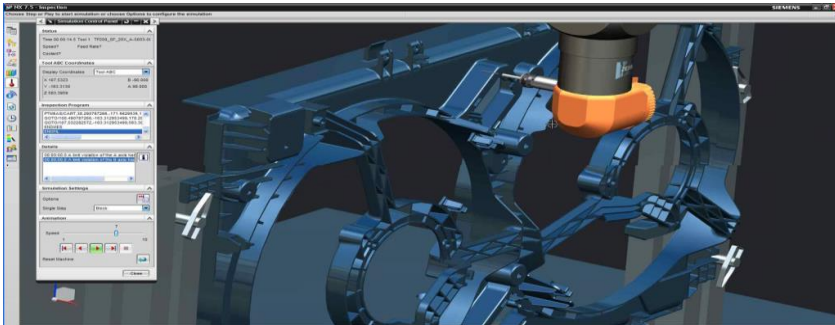


- **A complete CAM solution for tool surfaces and structures**
 - Automation with feature-based machining (FBM)
 - High speed machining for hard tool steels
 - Advanced 5 axis programming and simulation
- **Integrated machine tool simulation**
 - Based on NC Output with fully Collision check parallel during Programming
- **Resource library for tool and machining data**



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NX CMM Inspection Programming



- **A new approach to CMM inspection programming**
 - Based on PMI and data point on 3D models
 - Pre-defined inspection process
- **Output file to CMM inspection machines**
 - Uses standard DMIS format
- **Inspection data read back into NX for checking**
- **Faster to make changes – design to inspection**
 - Uses same NX model used for tool design and CAM



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Process solution for tooling industry

Metal Flow simulation software for casting industry.

Moldex - Plastic and Rubber molding simulation

Dynaform- Sheetmetal Stamping Simulation

Qform- Metal forming simulation, Forging, Extrusion, Rolling



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Charting Your Success

PDM is important

Your Goals

Critical Success Factors

Strategic Initiatives

Accelerate NPI

- Single Source of

Information

- Product & Process

Traceability

- Change Implementation

- CAD Management

- APQP Program

Management

- Engineering Change

Management

Continuous Improvement

- Design / Knowledge Re-use

- First time right

- Reduce Scrap / Rework

- Standardization

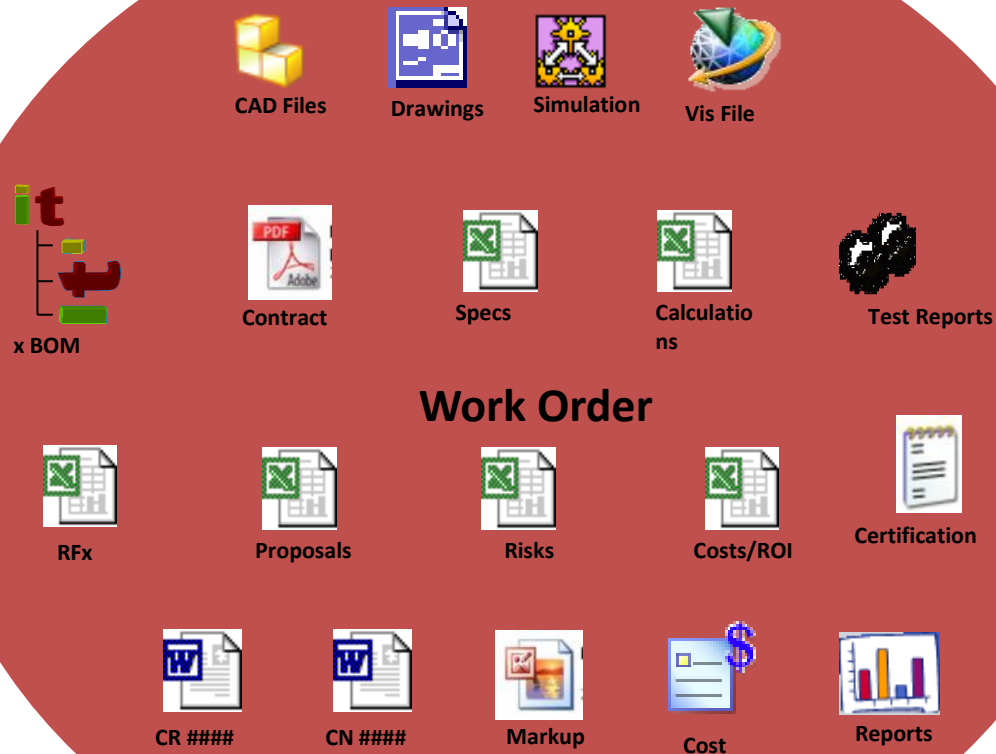
- Manufacturing Validation

- Closed Loop Quality



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Engineering Data





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Vault

Projects



Proposals Risks Costs/ROI



Drawings



Contract



Specs



CN #####



Marku

Supplier Data



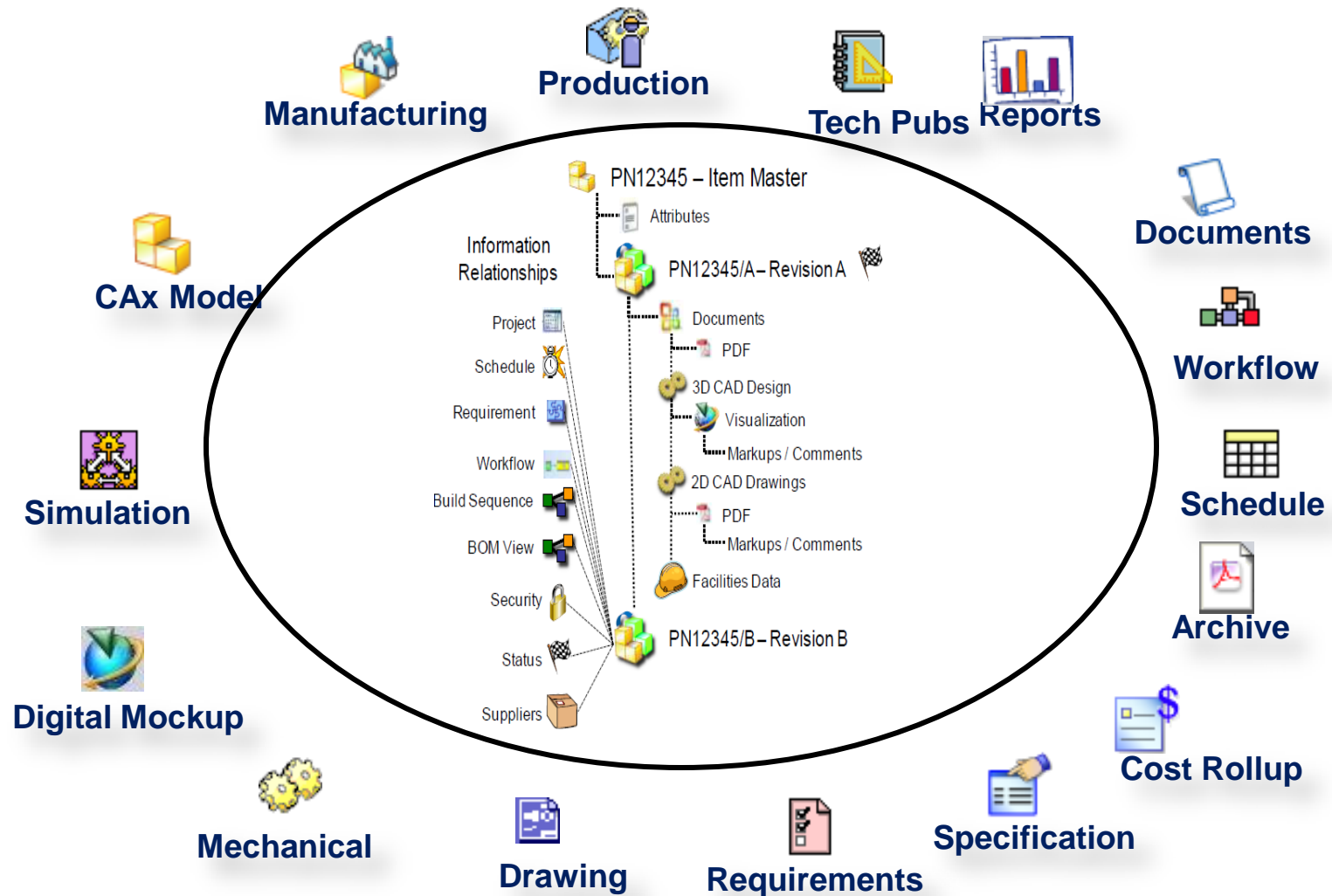
Simulation

x BOM



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Single Source of Information





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Engineering Collaboration

- CAD Data Management
- Early view to all stakeholders.
- Zero data redundancy.
- APQP Program Management
- Engineering Change Management
- Safekeeping of valuable records.



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THANK YOU

Manish Garg
manish@ddsplm.com
9810121890