Improving Tool Room Productivity with an Integrated Solution “NX”

Essentials for Excellence: Mold, Tool & Die Industry
Key Business Issues

PAST

PRESENT
Key Business Issues

Local Competition

- Products are not complex, possibility of margin in simple jobs
- Low ratio “Quality vs Price”

Global Competition

- How to win more jobs, compete on price, and shorten delivery times?
- Product are more complex
- How to win on complex jobs?
- High ratio “Quality vs Price”
- How to meet quality demands?
Outline

1. Current Trends and Challenges
2. Siemens PLM Solution NX
3. Demonstration
Industry trends
3D Printing in Mold Development

PolyJet Mold (Prototype/Validation)

3D Printed Conformal Cooling Channel

Source: Stratasys Corp

Source: EOS GmbH
Best-in-class hit targets > 96%

Key technology enablers:

- Integrated CAD/CAM/CAE
  - Accelerate tool development with maximum automation
- Assess part and tooling manufacturability with simulation (DFM)
- Manage tooling development with PDM/PLM
- Capture tooling expertise for reuse

SOURCE: ABERDEEN GROUP, THE 21ST CENTURY MOLD & DIE SHOP
The Challenge

Product Engineering

Manufacturing Engineering

Production

Bridge the gaps
An Integrated Process
An Integrated Process

Product Engineering  Manufacturing Engineering  Production
Tooling Design
Challenges

Dealing with customer data
Different data formats

Reduce turnaround time
Get designs out faster

Increase confidence in designs
Designs you can trust
Siemens Solutions

Dealing with customer data
Different data formats

Multi-CAD
Use/modify CAD data regardless of the source

Reduce turnaround time
Get designs out faster

Automated design tools
Take advantage of existing data (reuse)

Increase confidence in designs
Designs you can trust

Validation
Verify designs early
Multi-CAD
Use/modify CAD data regardless of the source

Automated design tools
Take advantage of existing data (reuse)

Validation
Verify designs early
Multi-CAD
Use and modify CAD data regardless of source

### Multiple formats

<table>
<thead>
<tr>
<th>IGES</th>
<th>STEP</th>
<th>DXF</th>
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<tbody>
<tr>
<td>DWG</td>
<td>JT</td>
<td>X_T/X_B</td>
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### Modify non-NX data

**Synchronous technology**
- No need for pre-translation
- Less chance of error
- Faster, more reliable

### Read / modify directly from other systems

- CATIA
- SolidWorks
- AutoCAD
- Solid Edge
- Neutral formats
Siemens Solutions

Multi-CAD
Use/modify CAD data regardless of the source

Automated design tools
Take advantage of existing data (reuse)

Validation
Verify designs early
Embedded tooling expertise

**Integrated process**
- Full associativity between product and mold models
- Advanced parting tools
- Automated shut-offs

**Knowledge reuse**
- Mold base library
- Standard part catalogs
- NX Reuse Library integration

**Automated Drawing & BoM**
- Ejector pin drawings
- Hole tables
- Inspection, shop floor assembly documents
NX Mold Wizard
Automation of mold-specific tasks

Embedded process expertise drives productivity and quality with specialized applications and workflows

Achieve speed and consistency with re-usable design standards, custom /standard component libraries

Confidence and reputation soar when mold designs are validated and verified

Processes improve when the solution set is integrated
“NX Mold Design encompasses best practices derived from a wide base of mold manufacturers. We are taking advantage of these techniques and directly applying them to our mold design process.”

Narottam Jethva
General Manager
Sridevi Tool Engineers
Multi-CAD
Use/modify CAD data regardless of the source

Automated design tools
Take advantage of existing data (reuse)

Validation
Verify designs early
Validation
Verify designs early

<table>
<thead>
<tr>
<th>Mold and part quality</th>
<th>Mold flow analysis</th>
<th>Tooling Analysis</th>
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</thead>
<tbody>
<tr>
<td>Validation of the mold &amp; the parts</td>
<td>Mold flow simulation</td>
<td>Tool validation clearance check</td>
</tr>
<tr>
<td>Analysis of draft, shrinkage, radii, and more</td>
<td>Fully integrated</td>
<td>Parting and relief check</td>
</tr>
<tr>
<td>Design for manufacturability check (DFMPro)</td>
<td>Powered by Moldex3D</td>
<td>Improve tool longevity with strength analysis and sharp corner detection</td>
</tr>
</tbody>
</table>
Validation
Improving molded part quality

- Shrinkage accommodation
- Warping - non-uniform wall thickness
- Moldability - corner radii analysis
- Moldability – draft analysis
- Sinking - wall thickness analysis
- Moldability – undercut analysis
Validation
Ensuring mold tool quality, Motion Simulation

- Cooling analysis
- Interference / clearance analysis
- Parting analysis
- Sharp corner detection
- Electrode burn area analysis
- Electrode interference analysis
An Integrated Process

Product Engineering

Manufacturing Engineering

Production
Tooling Manufacturing Challenges

Accelerate job delivery
Overcome inefficient processes

Increase throughput
Be more competitive

Achieve reliability
Produce high quality parts
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| **Accelerate job delivery**  
  Overcome inefficient processes |
| **Increase throughput**  
  Be more competitive |
| **Achieve reliability**  
  Produce high quality parts |
| **Synchronize the manufacturing process**  
  Drive the process with a single model |
| **Maximize efficiency of machining**  
  Program any job |
| **Achieve production targets**  
  Connect planning to production |
Siemens Solutions

Synchronize the manufacturing process
Drive the process with a single model

Maximize efficiency of machining
Program any job

Achieve production targets
Connect planning to production
A Model-Driven Process

Part model
A Model-Driven Process

Preparation
- Mold preparation / Fixture design

Programming
- Mold programming
- Shop documentation

Production
- Shop floor

INTEGRATED SYSTEM
- Mold design
- Electrode preparation
- Electrode programming
- CNC / inspection programs
“Master model enables a design change to propagate through tool design into NC programming.

It ensures accuracy through the entire assembly knowing that the finished product is what the customer ordered.”

Jim Sutton
Engineering Manager
Minco Tool & Mold
Synchronize the manufacturing process
Drive the process with a single model
Maximize efficiency of machining
Program any job
Achieve production targets
Connect planning to production
Maximize efficiency of machining

Intelligent tool paths
For efficient machining

Process automation
For programming productivity

Knowledge driven manufacturing
For reuse of proven methods
Intelligent Tool Paths

High speed milling
• Quickly remove material to reduce the machining cycle.

Superior surface finish
• Create smooth toolpaths to produce high quality parts.

Full control of machining
• Precisely control cutting strategies to reduce risk.

Flexible machining with 5-axis operations
• Machine complete molds in one setup.
Siemens Solutions

Synchronize the manufacturing process
Drive the process with a single model

Maximize efficiency of machining
Program any job

Achieve production targets
Connect planning to production
Connect planning to production

Complete shop documentation
• For machining right first time

Shop floor connectivity
• For efficient collaboration between engineering and production

Integrated solution
• For optimized CAD-CAM-CMM-CNC process chain
NX Demo “Connector”

Background information
• Thickness of product: 0.7~1.0 mm
• Length: 55 mm
• Width: 5 mm
• Height: 15 mm
• Thickness of Frame: 0.35 mm

Materials
• PA \ CAE \ CSL-2

Process Conditions
• Filling time: 0.21 Sec
• Melt temperature: 295°C
• Mold temperature: 70°C

• Result data
  • Melt front distribution
The combination of NX CAD, NX CAE, NX CAM, and the SINUMERIK controller from Siemens helps us stay ahead of our competition.

Pascal Lachance
Mechanical Engineer
Moules Mirplex Inc.
A Complete Tool Manufacturing Solution

Product Design

Knowledge Automation

Productivity Tools

Design

NX

Manufacturing

Tool / Fixture Design

NC Programming and Simulation

Validation and Machining
Jean-Luc Emery  
CAE Portfolio Development  

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