



UG/Post and NX Turning Tools for Greater Productivity

- ◆ Dan Putzstuck
- ◆ Dresser-Rand
- ◆ daniel_j_putzstuck@dresser-rand.com
- ◆ (716) 375-3547

Agenda



- ◆ Dresser-Rand Company
- ◆ Change process to NX turning architecture and Postbuilder
- ◆ Demonstration
- ◆ Wrap up - successes, additional benefits
- ◆ Questions

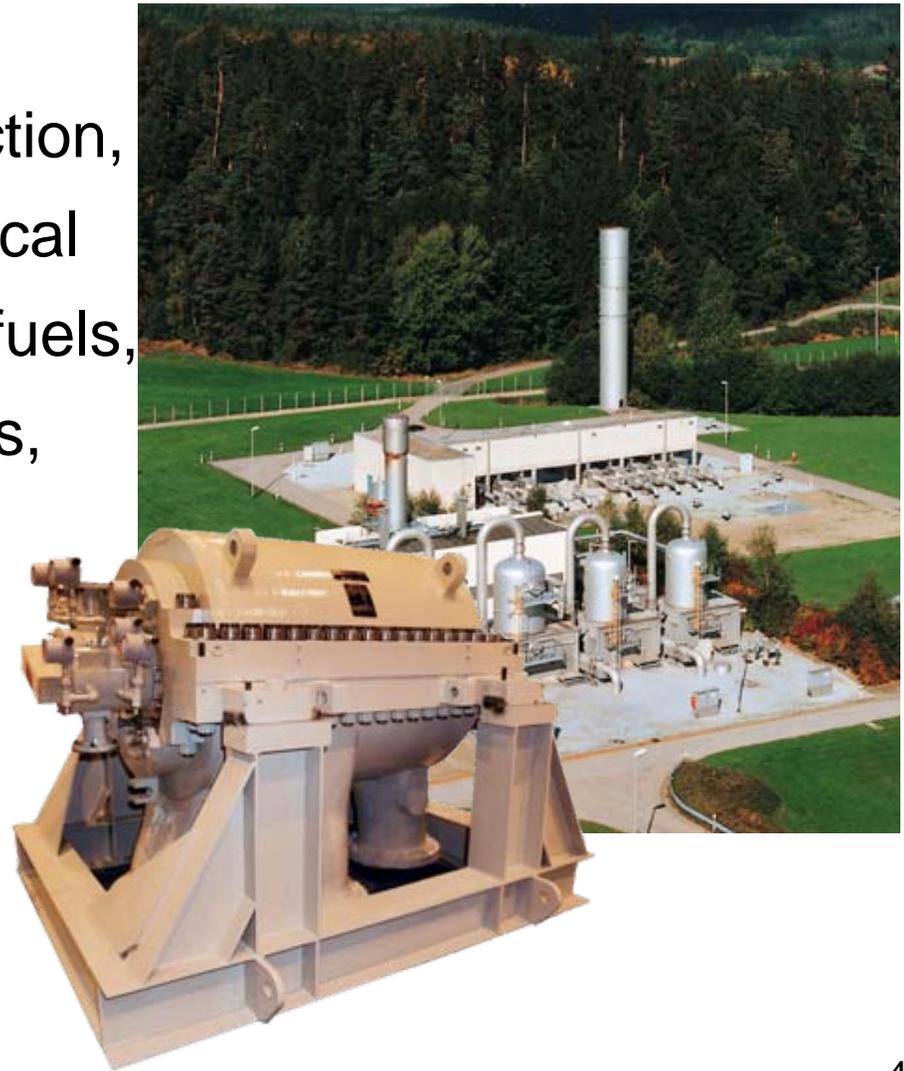
Dresser-Rand



A leader in energy conversion technology, positioned to deliver complete solutions -- from initial concept to equipment retirement -- for the oil and gas, refining, and petrochemical industries.

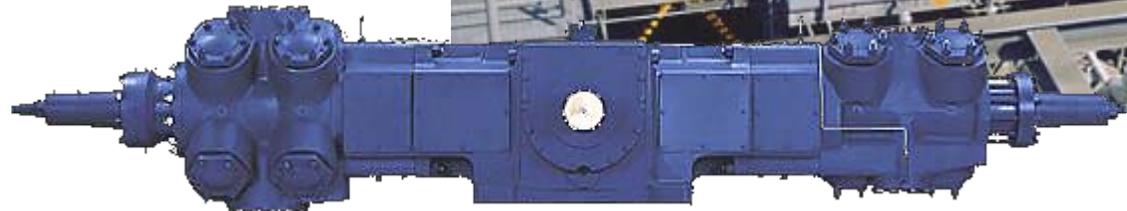
D-R Centrifugal Compressors

- ◆ DATUM[®] compressors
- ◆ Used in oil & gas production, refining, and petrochemical applications to produce fuels, lubricants, plastics, fibers, fertilizer and chemicals
- ◆ Flow rates up to 500,000 acfm
- ◆ Pressure to 10,500 psia



D-R Reciprocating Compressors

- ◆ Process Reciprocating Compressors
- ◆ Used in petroleum and refinery applications, chemical manufacturing and oil & gas production
- ◆ Power ranges to 38,000 HP

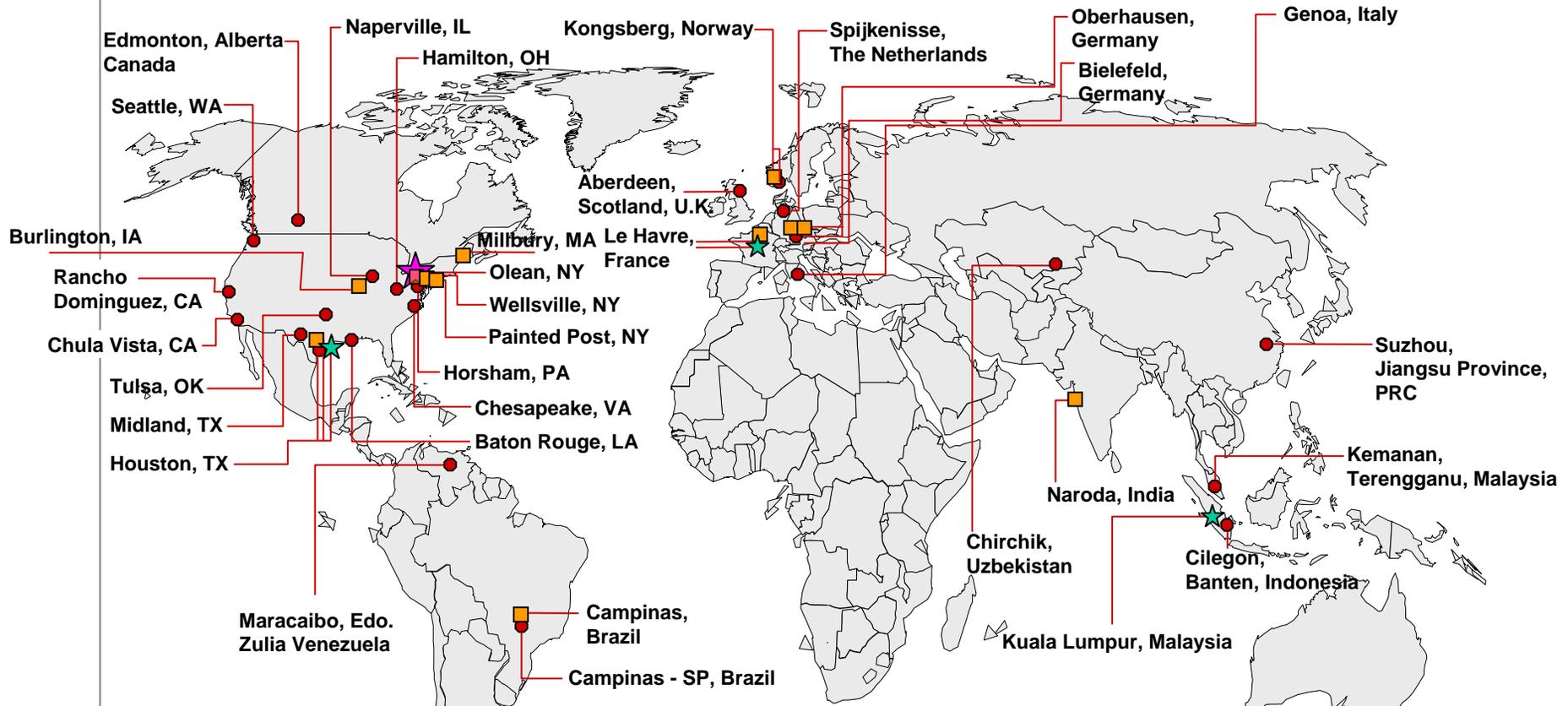


Single & Multi Stage Steam Turbines

- ◆ Single and Multi Stage Steam Turbines
- ◆ Used in process compressor drivers; chiller drivers; pump, fan and mill drives; power generation, naval applications

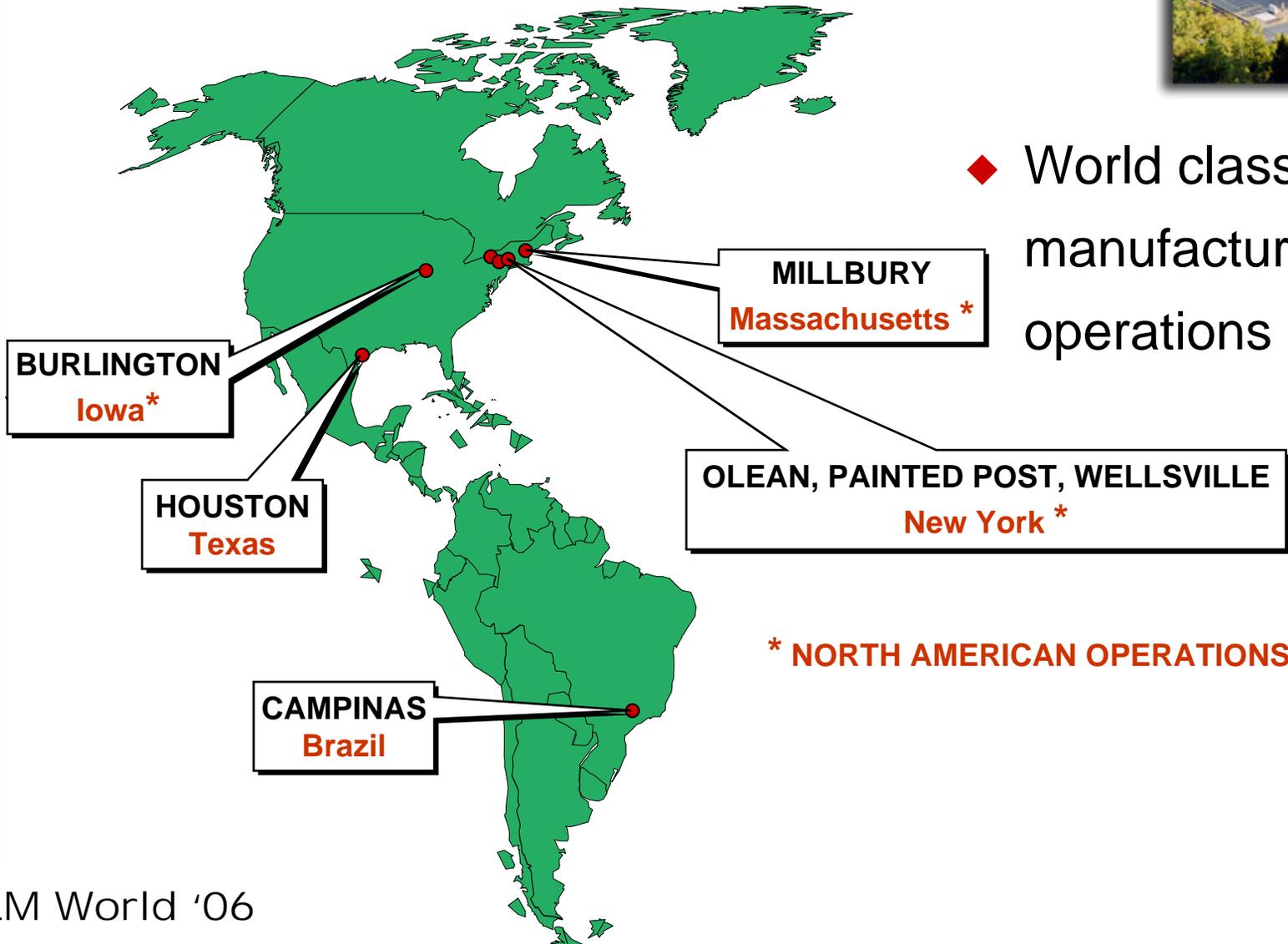


Dresser-Rand's Global Presence



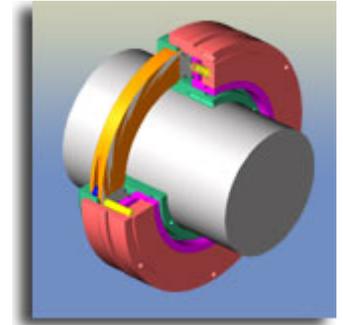
<p>★ WW Corporate Center Houston, TX</p> <p>★ Regional Centers Kuala Lumpur, Malaysia Houston, Texas Le Havre, France</p> <p>● Service Centers (24)</p>	<p>■ Global Operations Olean, Wellsville, Painted Post, New York Millbury, Massachusetts Burlington, Iowa Houston, Texas Oberhausen, Germany Bielefeld, Germany Le Havre, France Kongsberg, Norway Campinas, Brazil Naroda, India</p>
--	--

Dresser-Rand's Global Presence



◆ World class manufacturing operations

NAO NC support



- ◆ 160 NC machines
- ◆ 2-axis through 5-axis
- ◆ Approx. 23,000 new NC programs / year
- ◆ 30 NC programmers
- ◆ Approx. half of NC machines involve turning
- ◆ 70% of programs are turning programs

Why change?



- ◆ Legacy lathe inefficiencies
- ◆ Tcl Posts - developed in V15
- ◆ Built in traps - such as bad notes
- ◆ Safety issues - tool probing
- ◆ Lack of consistency in tape output format
- ◆ Most importantly - support improvement initiatives

Direction



- ◆ NX turning architecture
- ◆ Postbuilder - version control
- ◆ Eliminate as many “traps” as possible
- ◆ Safer
- ◆ Consistency in tape format output
- ◆ Get the most out of the software

Main areas of understanding

- ◆ NX turning architecture
- ◆ Tcl language
- ◆ UG/Post Postbuilder
- ◆ NC machine requirements



NX Turning Architecture



- ◆ Parent / Child structure
- ◆ In-process Workpiece (IPW)
- ◆ Great material removal animation
- ◆ There is a learning curve
- ◆ It is worth it

Tcl Language



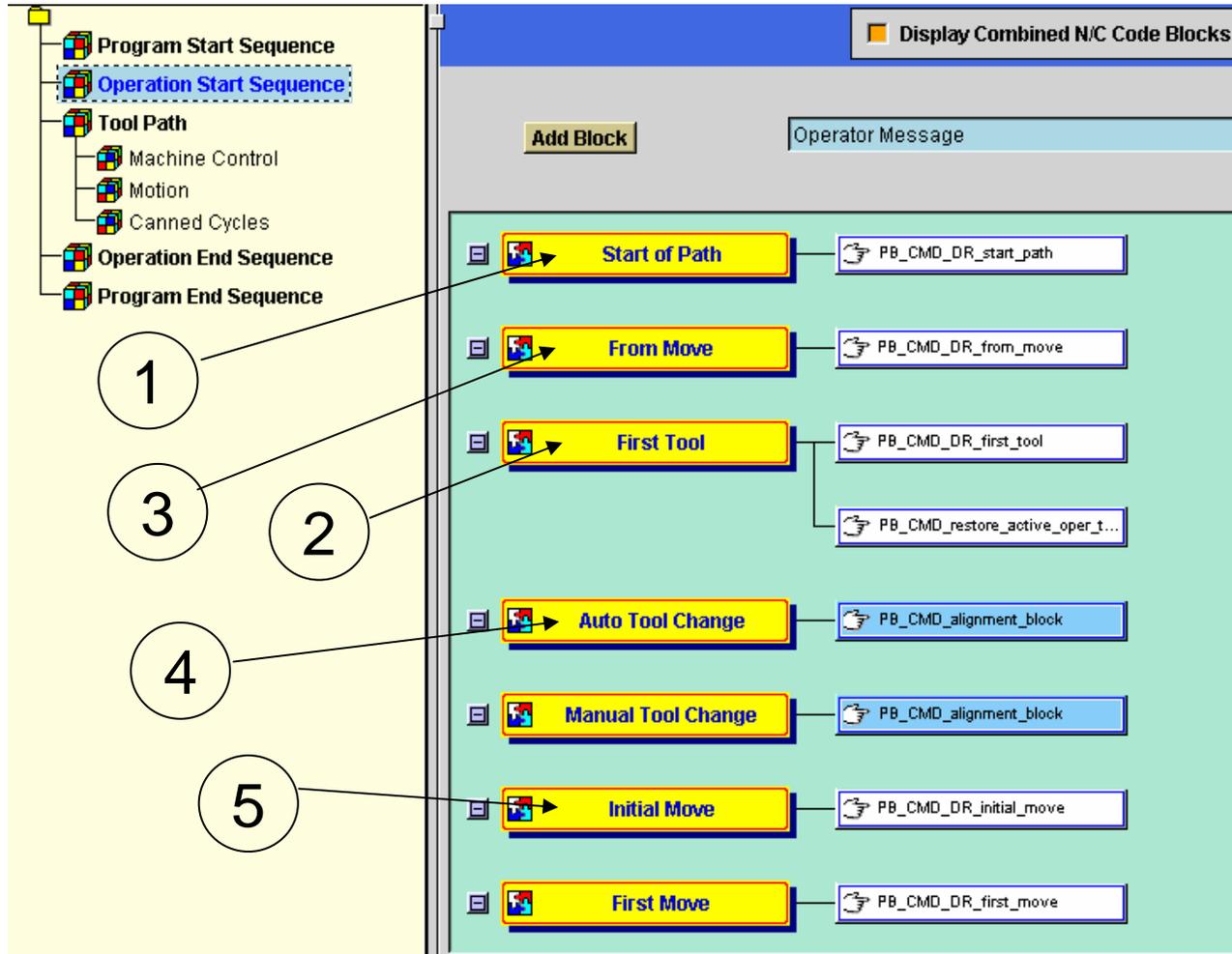
- ◆ Rapid development - get job done faster
- ◆ Cross platform applications - tcl 8.0.4 for windows
- ◆ Easy to learn
- ◆ Easy to deploy
- ◆ It's free

UG/Post Postbuilder



- ◆ GUI
- ◆ Many helpful tools
 - Debugger
 - MOM Variables Browser
- ◆ Event flow
 - Initial Move and First Move logic

First Tool



Continuation with Same Tool

The screenshot displays a CNC programming software interface. On the left, a tree view shows the program structure:

- Program Start Sequence
- Operation Start Sequence** (highlighted with a dashed blue border)
- Tool Path
 - Machine Control
 - Motion
 - Canned Cycles
- Operation End Sequence
- Program End Sequence

Callout 1 points to the 'Start of Path' block in the main workspace. Callout 2 points to the 'First Move' block.

The main workspace shows a list of blocks with their corresponding N/C code blocks:

Block Name	N/C Code Block
Start of Path	PB_CMD_DR_start_path
From Move	PB_CMD_DR_from_move
First Tool	PB_CMD_DR_first_tool PB_CMD_restore_active_oper_t...
Auto Tool Change	PB_CMD_alignment_block
Manual Tool Change	PB_CMD_alignment_block
Initial Move	PB_CMD_DR_initial_move
First Move	PB_CMD_DR_first_move

Additional interface elements include a 'Display Combined N/C Code Blocks' checkbox, an 'Add Block' button, and an 'Operator Message' field.

Change to New Tool

The screenshot displays a software interface for editing a CNC program. On the left, a tree view shows the program structure with 'Operation Start Sequence' selected. The main workspace shows a list of blocks and their associated N/C code:

Block Name	Associated N/C Code
Start of Path	PB_CMD_DR_start_path
From Move	PB_CMD_DR_from_move
First Tool	PB_CMD_DR_first_tool PB_CMD_restore_active_oper_t...
Auto Tool Change	PB_CMD_alignment_block
Manual Tool Change	PB_CMD_alignment_block
Initial Move	PB_CMD_DR_initial_move
First Move	PB_CMD_DR_first_move

Annotations 1, 2, and 3 point to the 'Start of Path', 'Auto Tool Change', and 'Initial Move' blocks respectively.

Machine Requirements



- ◆ G&L twin vtl parts and processes - G&L 8000 control
- ◆ Tool probe capability
- ◆ Spindle control
 - Must be near the workpiece before turning on
 - Machining across center requirements
- ◆ Grooving tools - each offset has corresponding tool number
- ◆ Established tape format requirements

G&L Twin Vertical Lathes



Objectives



- ◆ Automate tool list at top of tape file
- ◆ Automate operator notes
 - operation sequence descriptions and tooling notes
- ◆ Automate tool probe cycles
- ◆ Automate Crossing-Center process
- ◆ Eliminate need for any startup and end commands
- ◆ Maintain tape output format requirements

Demo

Legacy Lathe inefficiencies

NX architecture

Tape format requirements

HEADER Operation(before posting and after)

Automated Tool List

Automated operator notes

Tool Probing

Tool pre-selects (caveat issue)

Tool continuation

Tool definitions & naming considerations

Automated tool notes

From & Gohome point usage

Crossing center

Cross-Posting to Bert's

How we structure out posts

Spindle considerations

Summary



- ◆ Accomplished 99%
 - Stock notes
- ◆ Programmers use it
- ◆ 20% increase in programmer efficiency
- ◆ Cross-posting benefit
- ◆ Works in NX4 (from tests so far)