VERICUT®

Right the First Time. Every Time.

CGTECH

The Presentation

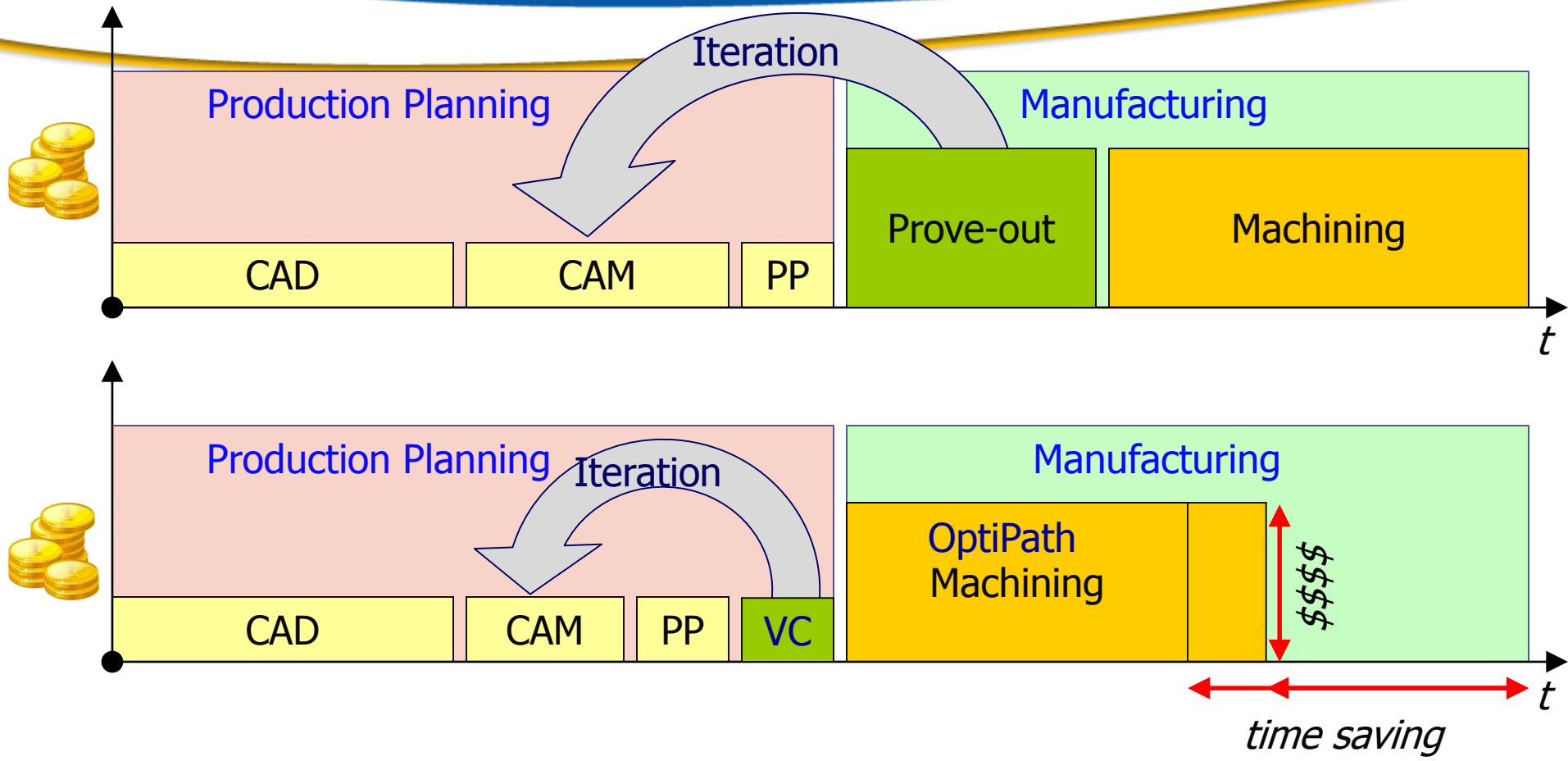
1. Would you benefit from simulation?
2. Why should you use VERICUT?
3. Why CGTech?

Part 1

Would you benefit from simulation?

What is the cost of a mistake on the shop floor?

Improved NC Process Chain



How much are proof parts costing?

- Set up parts
- Scrap parts
- Broken cutters
- Wasted programmer time
- Machine down time
- Fixture problems

One example...machine time!

- 10 machines
- Run 12 hours per day
- $75 per hour for machine time
- 10% of time spent on proof parts

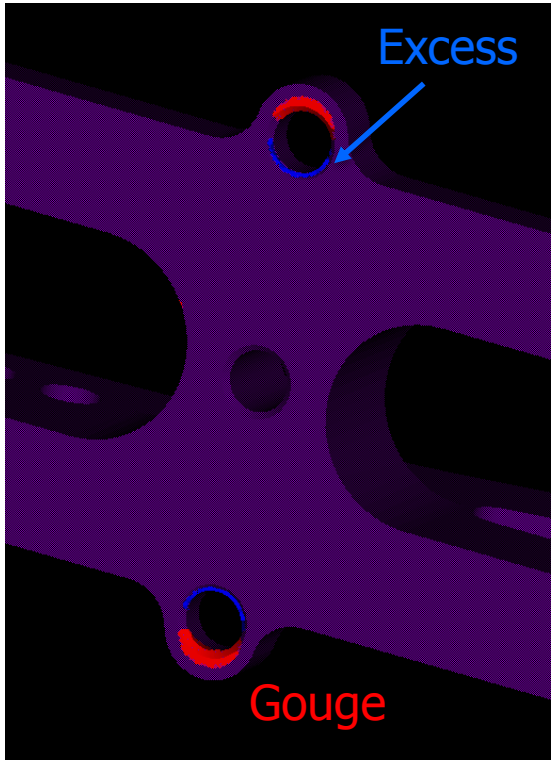
Proof parts are costing this shop $234k a year just in machine time!

Reduce Set-up Time

"Why does it take a week to proof a part that runs in one hour?"

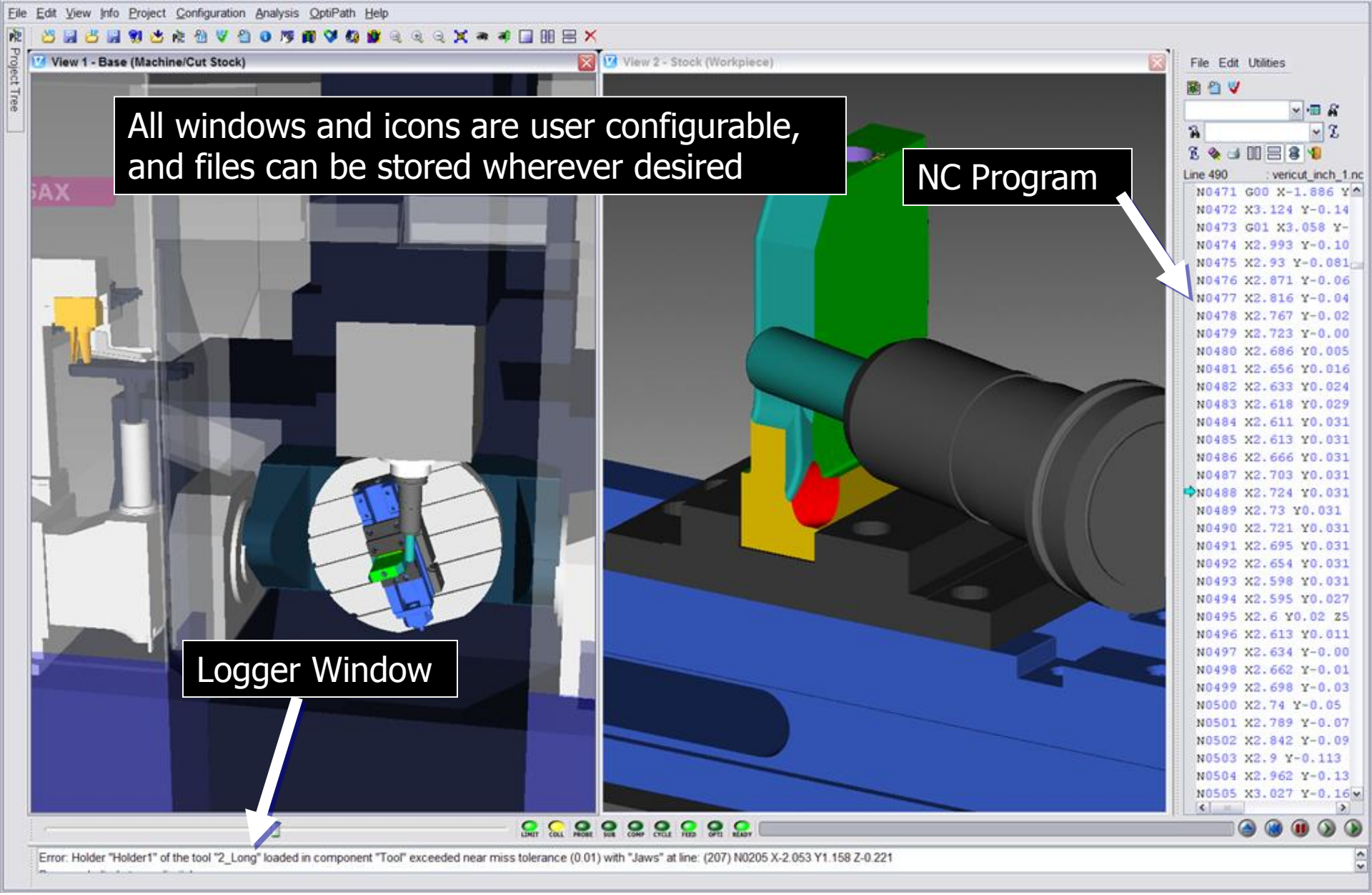
Other Reasons to Simulate

- Verify the NC part meets design model specifications
- Increase operator confidence
  - Less babysitting your NC machine
  - Less reason to turn down the feed rate
- Increase throughput on your NC machines
- Replace existing inefficient processes
  - Single block, feed hold, prove outs, cut air, etc.



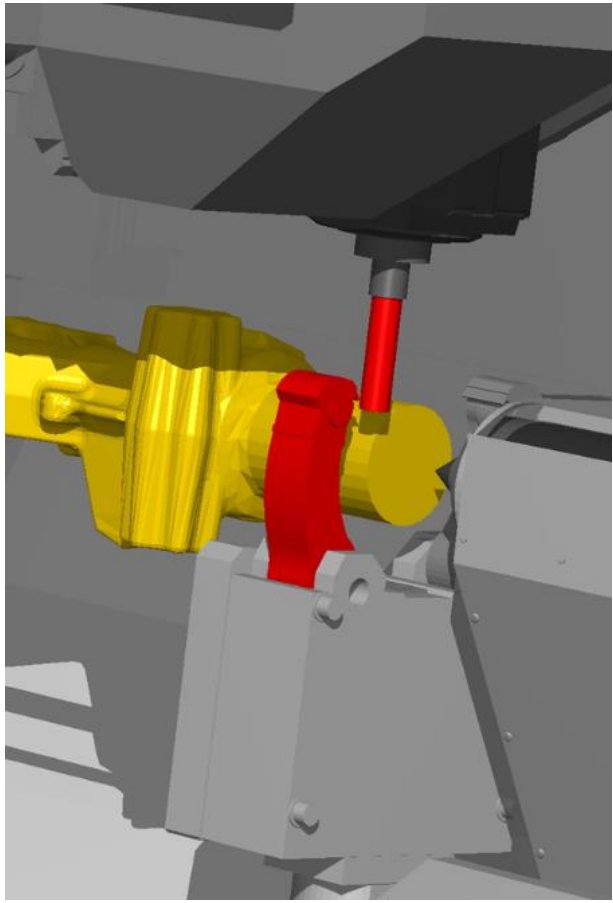
Part 2

Why should you use VERICUT?


File Edit View Info Project Configuration Analysis OptiPath Help
Project Tree
View 1 - Base (Machine/Cut Stock)
View 2 - Stock (Workpiece)
All windows and icons are user configurable, and files can be stored wherever desired
NC Program
Logger Window
File Edit Utilities
Line 490 : vericut_inch_1.nc
N0471 G00 X-1.886 Y
N0472 X3.124 Y-0.14
N0473 G01 X3.058 Y-
N0474 X2.993 Y-0.10
N0475 X2.93 Y-0.081
N0476 X2.871 Y-0.06
N0477 X2.816 Y-0.04
N0478 X2.767 Y-0.02
N0479 X2.723 Y-0.00
N0480 X2.686 Y0.005
N0481 X2.656 Y0.016
N0482 X2.633 Y0.024
N0483 X2.618 Y0.029
N0484 X2.611 Y0.031
N0485 X2.613 Y0.031
N0486 X2.666 Y0.031
N0487 X2.703 Y0.031
N0488 X2.724 Y0.031
N0489 X2.73 Y0.031
N0490 X2.721 Y0.031
N0491 X2.695 Y0.031
N0492 X2.654 Y0.031
N0493 X2.598 Y0.031
N0494 X2.595 Y0.027
N0495 X2.6 Y0.02 Z5
N0496 X2.613 Y0.011
N0497 X2.634 Y-0.00
N0498 X2.662 Y-0.01
N0499 X2.698 Y-0.03
N0500 X2.74 Y-0.05
N0501 X2.789 Y-0.07
N0502 X2.842 Y-0.09
N0503 X2.9 Y-0.113
N0504 X2.962 Y-0.13
N0505 X3.027 Y-0.16
Error: Holder "Holder1" of the tool "2_Long" loaded in component "Tool" exceeded near miss tolerance (0.01) with "Jaws" at line: (207) N0205 X-2.053 Y1.158 Z-0.221

Why use VERICUT?

- **Gain a competitive edge!**
- **Most accurate verification and collision checking available in the world**
  - All technology developed “in-house” by the company that invented NC Simulation
- Verifies the **G-code** data & **macro language**
- **Accurate in-process data**
- **Optimization** of the NC program
- VERICUT **doesn’t “tie up” your cad/cam** system
- Use with multiple CAM systems and/or post-processors
- **Great training tool** for new programmers and machines



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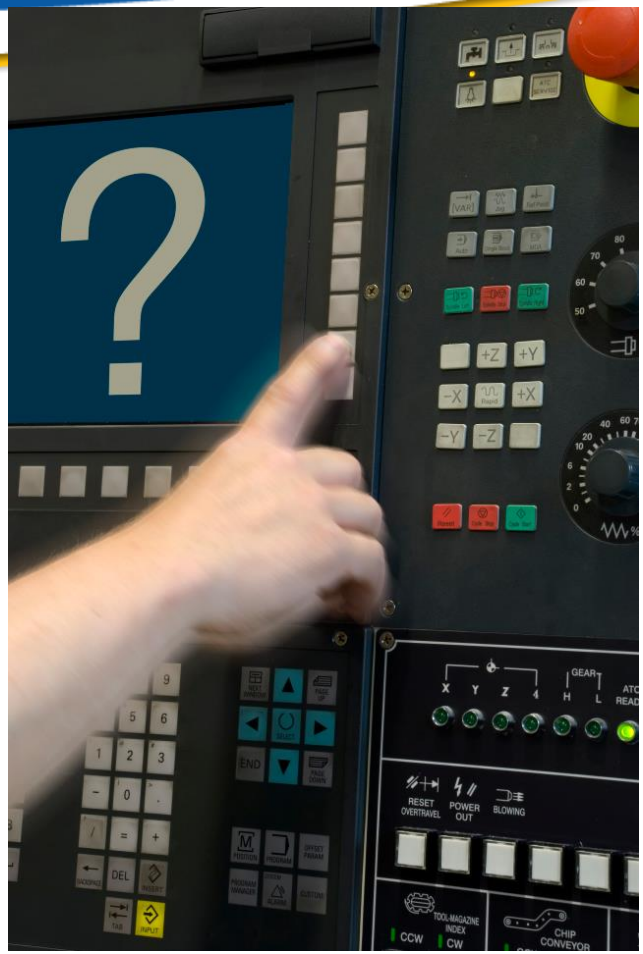
3 VERICUT focus areas

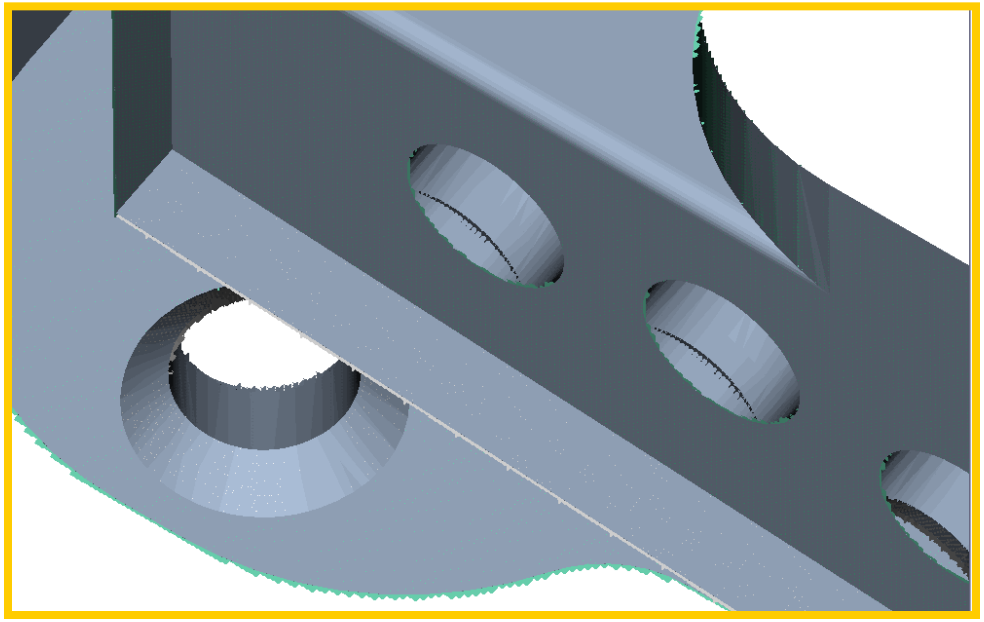
- Verify part program
- Simulate machine tool
- Optimize program feed rates



Interfaces Make Set-up Easy!

Common Verification Technology

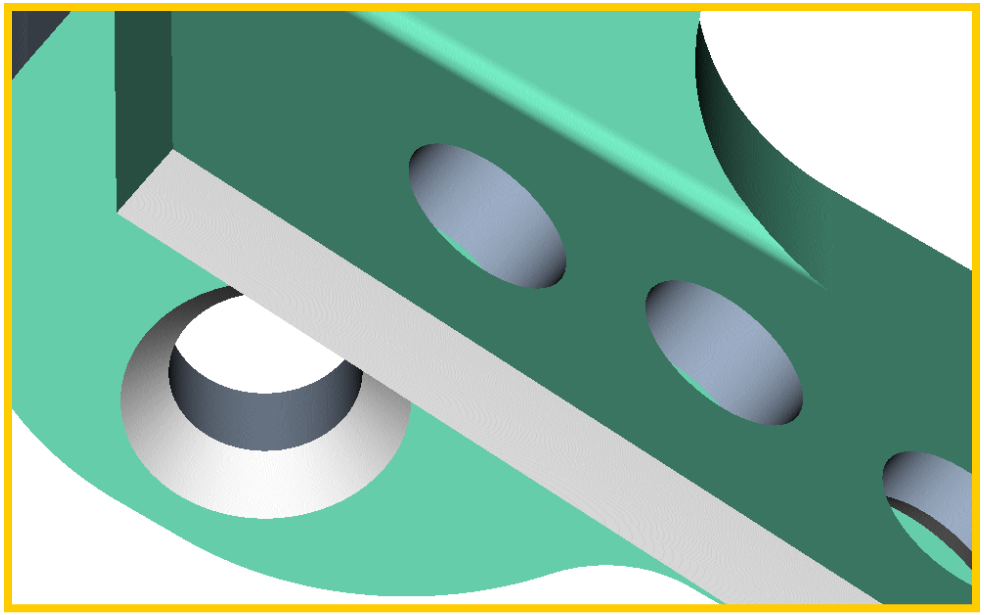
- Faceted “poly-cut”
- Inaccurate model
- Poor image quality zoomed in
- Slows down while cutting
- Number of polygons increases exponentially while simulating
- Prone to failure
- Poor 5-axis trajectory sweep



Millions of triangles

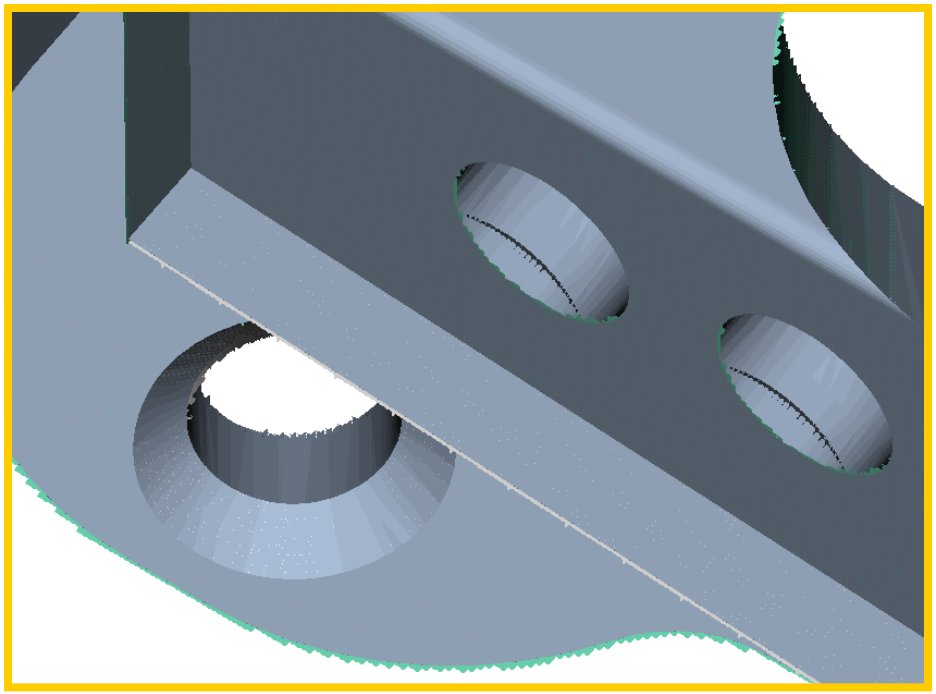
VERICUT Verification Technology

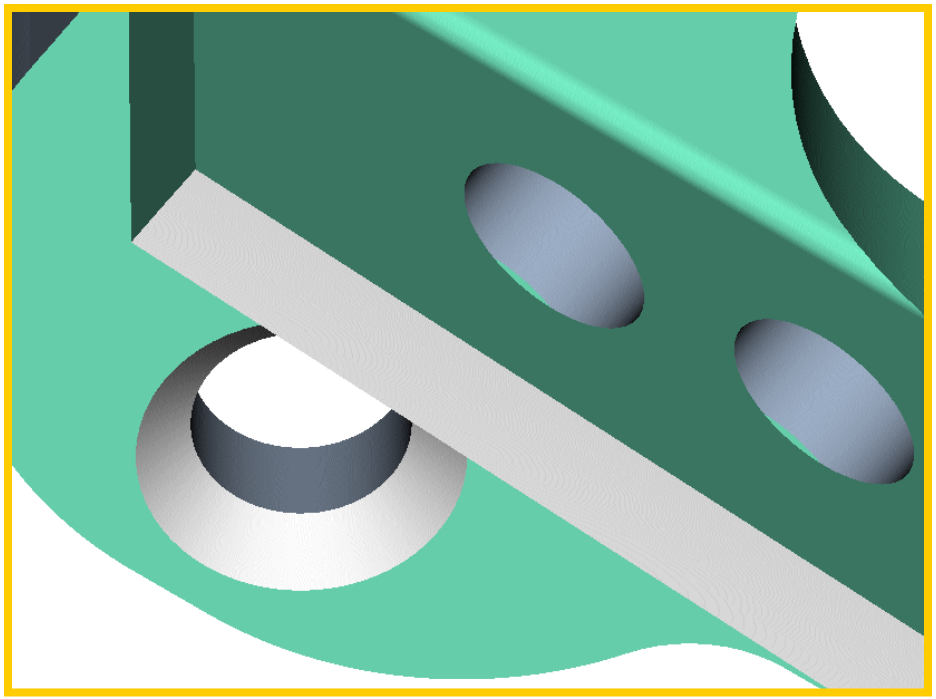
- Feature rich models
- Most Accurate
- One model for all operations
- Fast and consistent processing time



Real Features

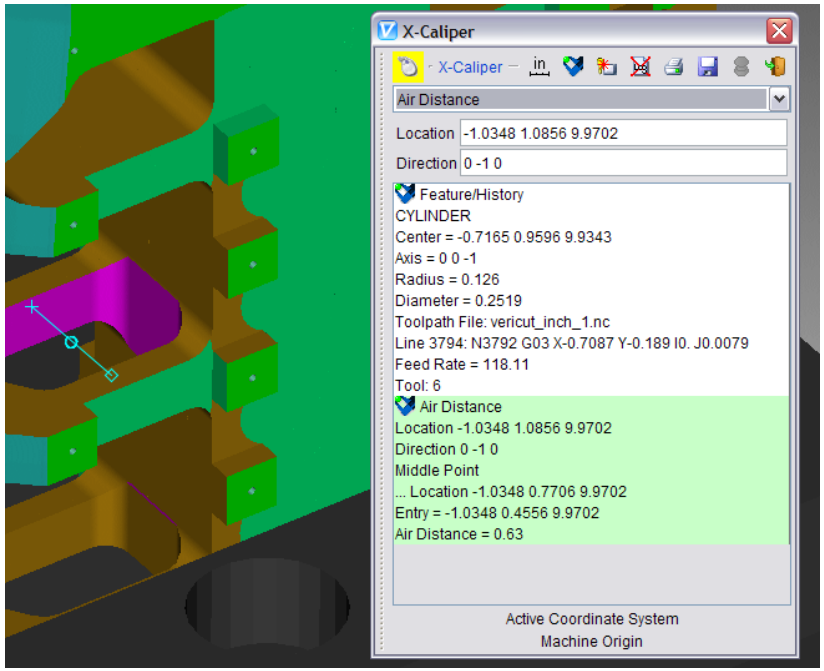
Cut Stocks Compared

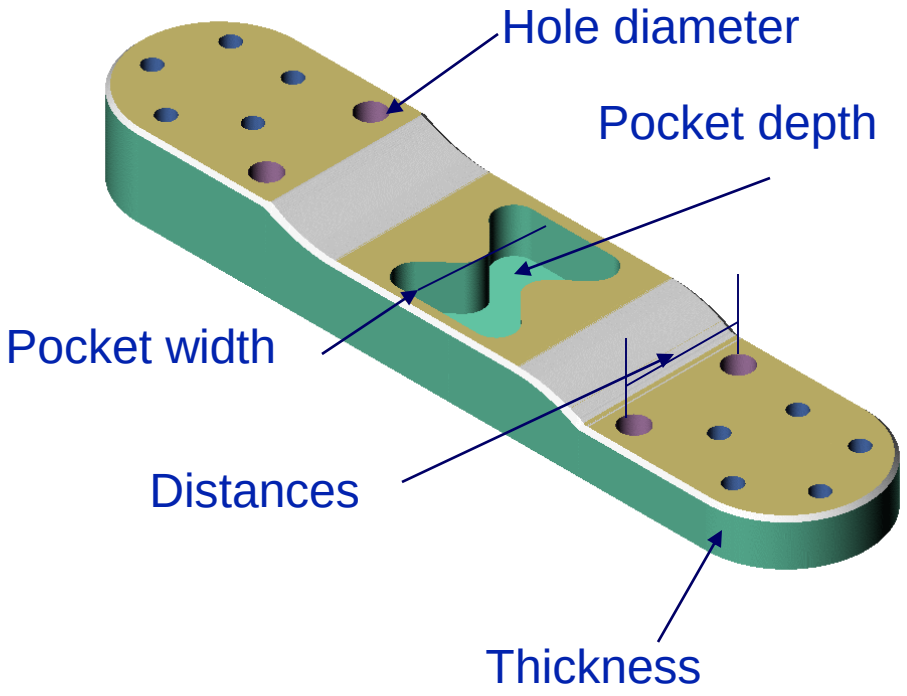




Verification (X-Caliper)

Using ***X-Caliper*** you can chose from a variety of measuring tools to inspect the as-cut model after it is machined in VERICUT.





Get accurate dimensions from the G-code model!

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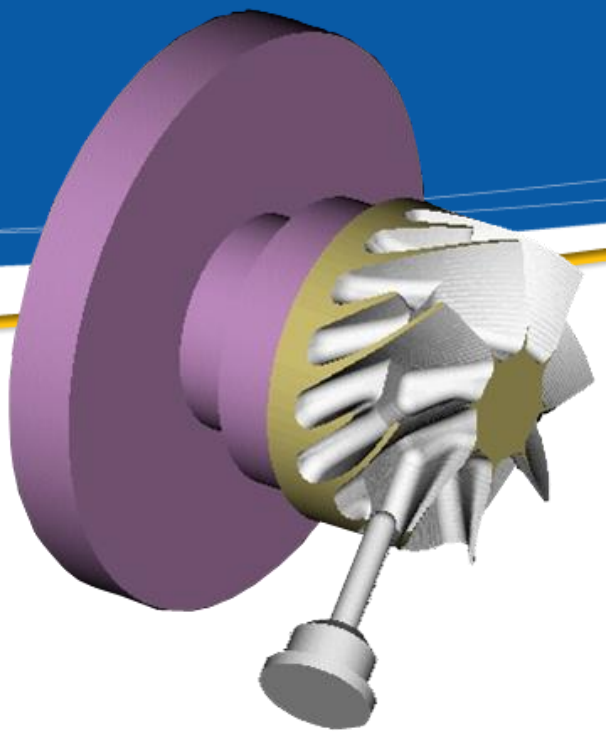
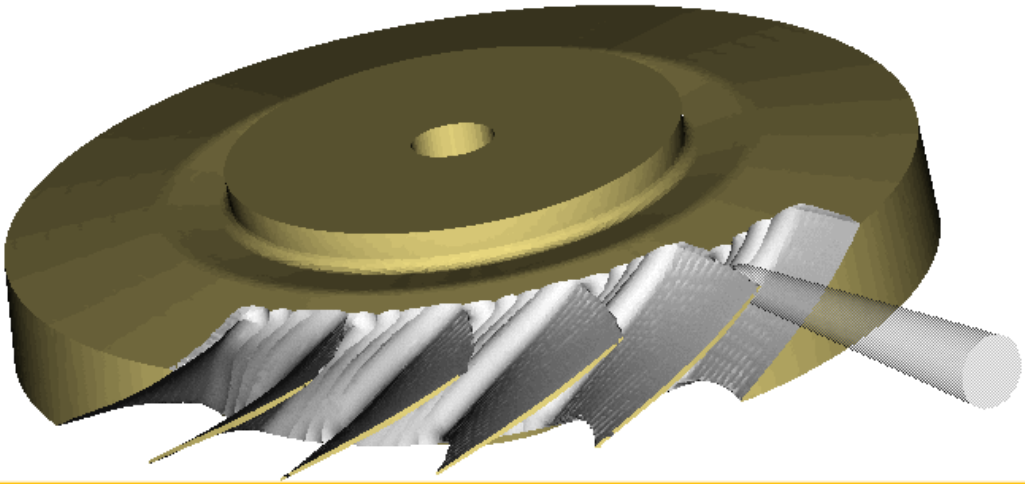
Multi-Axis



Verifies multi-axis material removal

Can be used with:

- Milling
- Turning
- Wire EDM
- Mill/Turn



Requires the Verification module

Auto-Diff

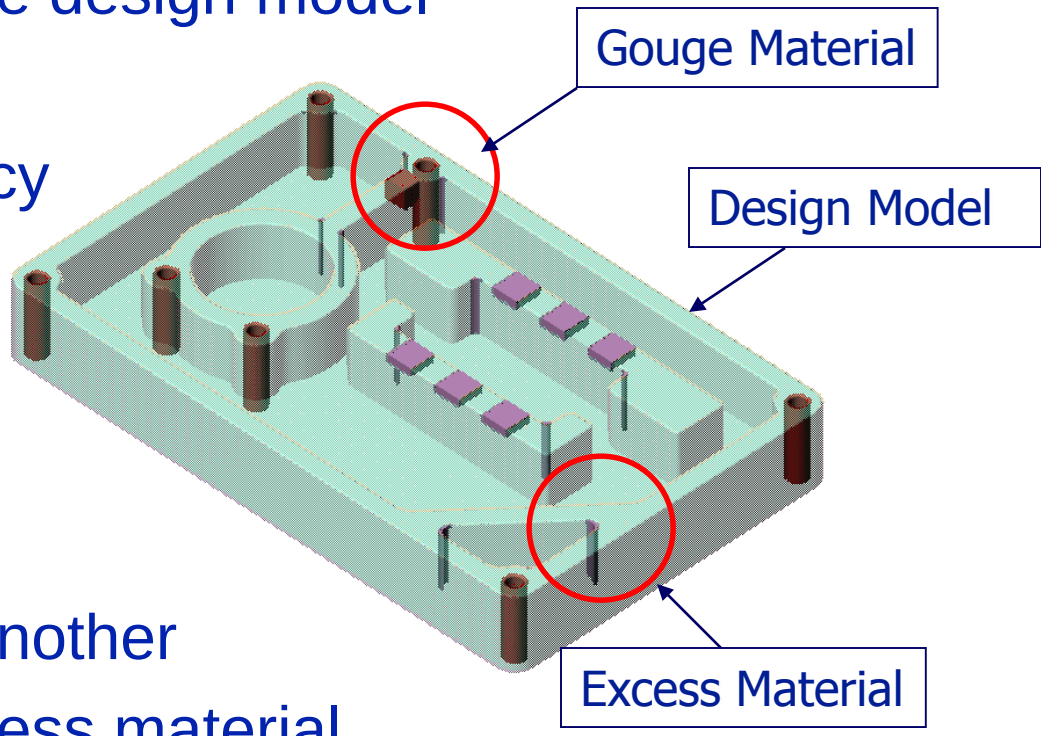
Compare the cut part to the design model

Verify dimensional accuracy

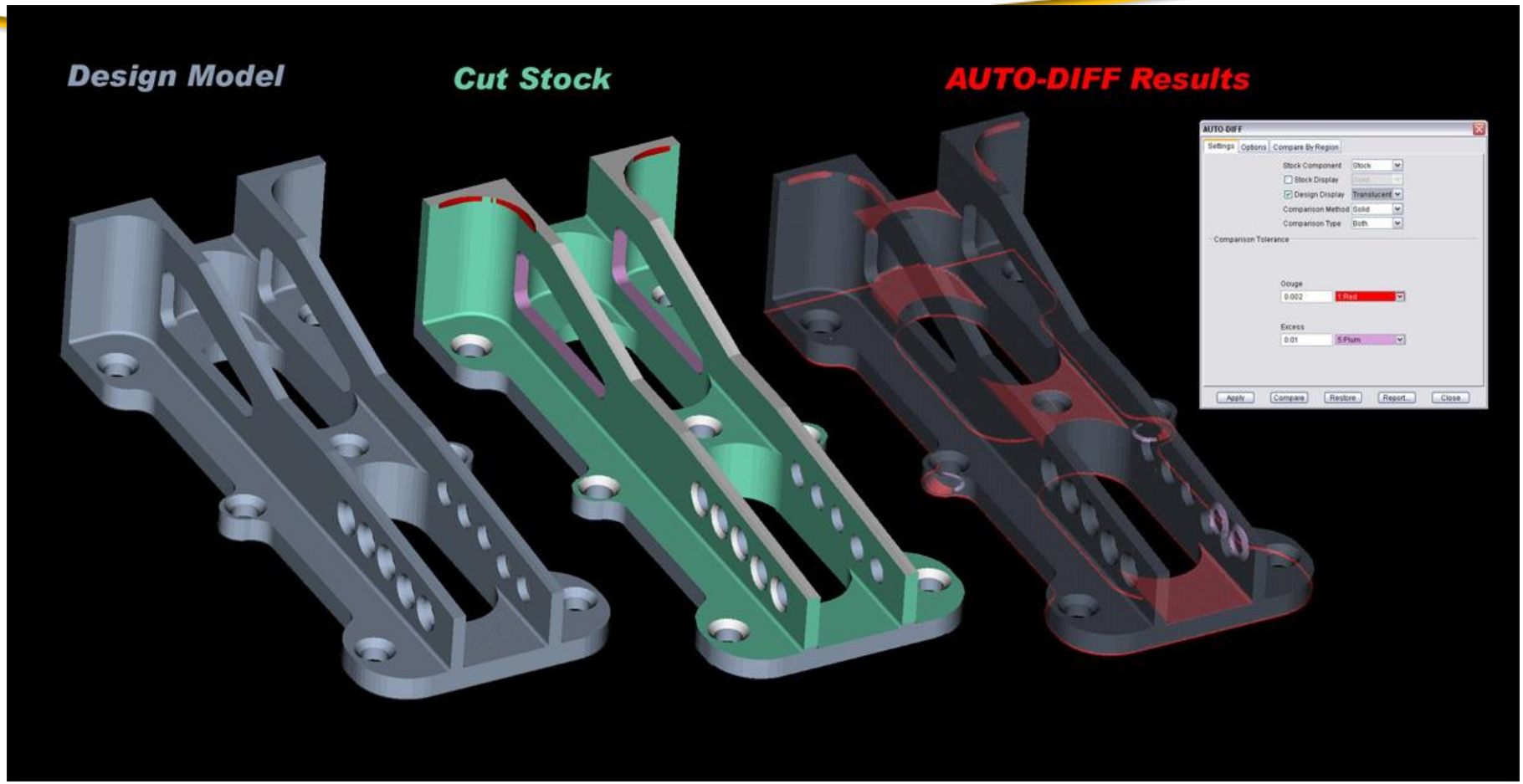
- Solid data
- Surface data
- Point data

Compare one cut part to another

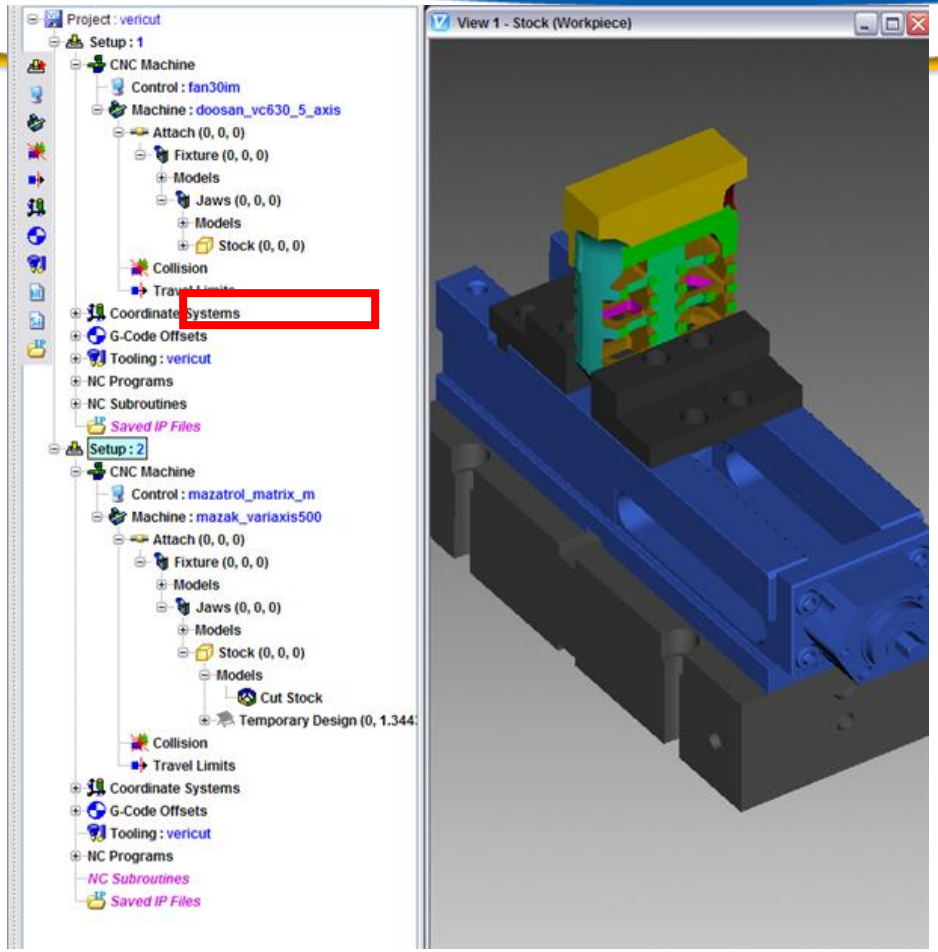
Check for gouges and excess material



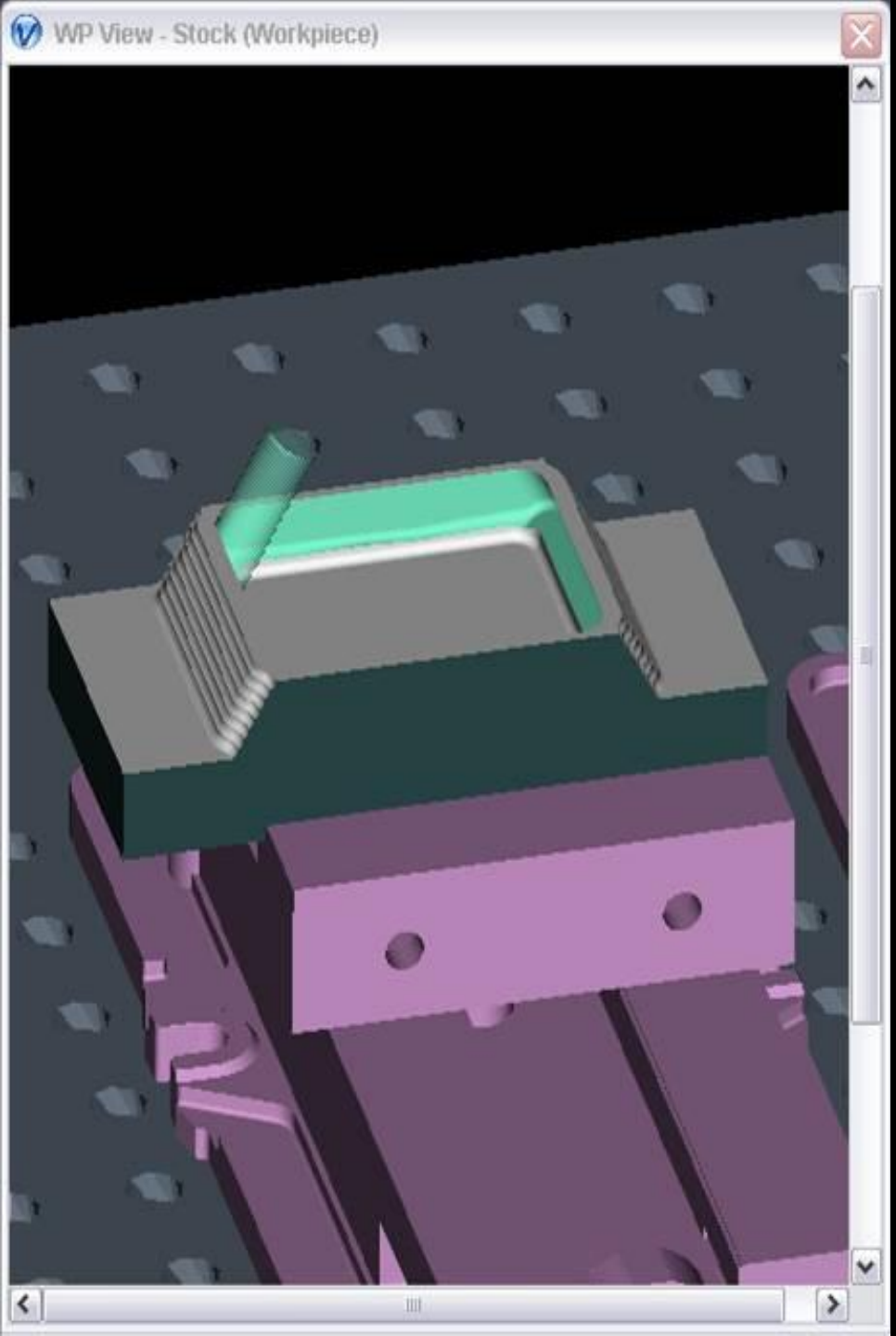
Compare the cut model to the design



Multiple Setups? No problem!



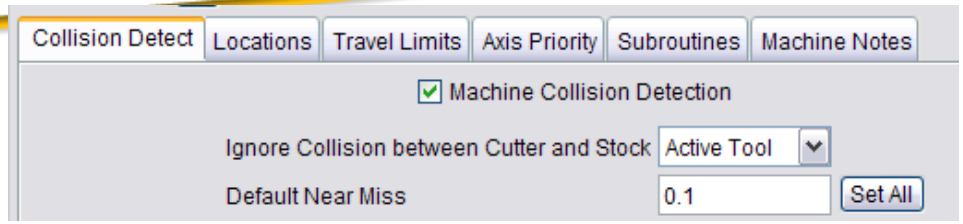
- Cut stock automatically transfers between set-ups in the proper orientation
- All cut history is maintained

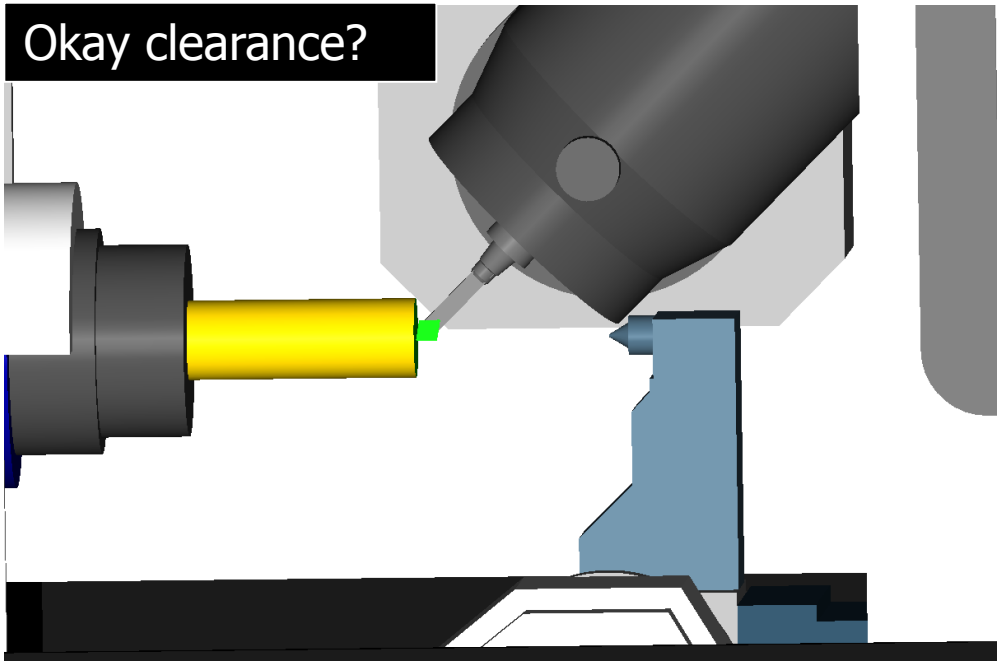


Do I really need to simulate the entire machine?

Why Simulate the Machine?

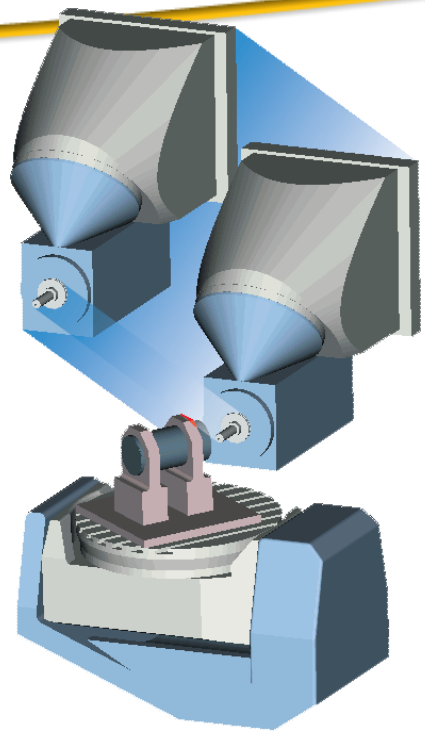
- Detects **collisions** and **near-misses** between machine components
- Eliminate costly machine repairs and delays
- Increase shop safety
- Improve process efficiency
- Reduce the time it takes to implement a new machine



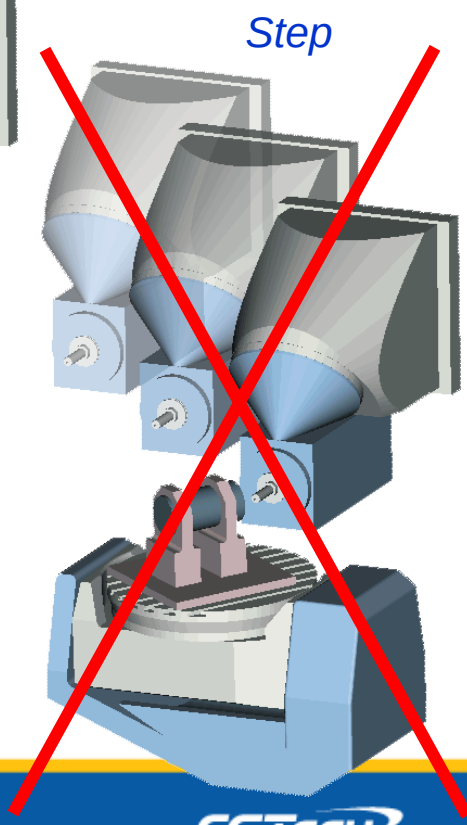


Machine Simulation Technology

- Continuous collision checking
  - All moving components swept through space
- Emulation of complex control features
- Accurate & configurable machine and control models
- Easy job setup and use
  - Logical separation between machine configuration and job-specific information

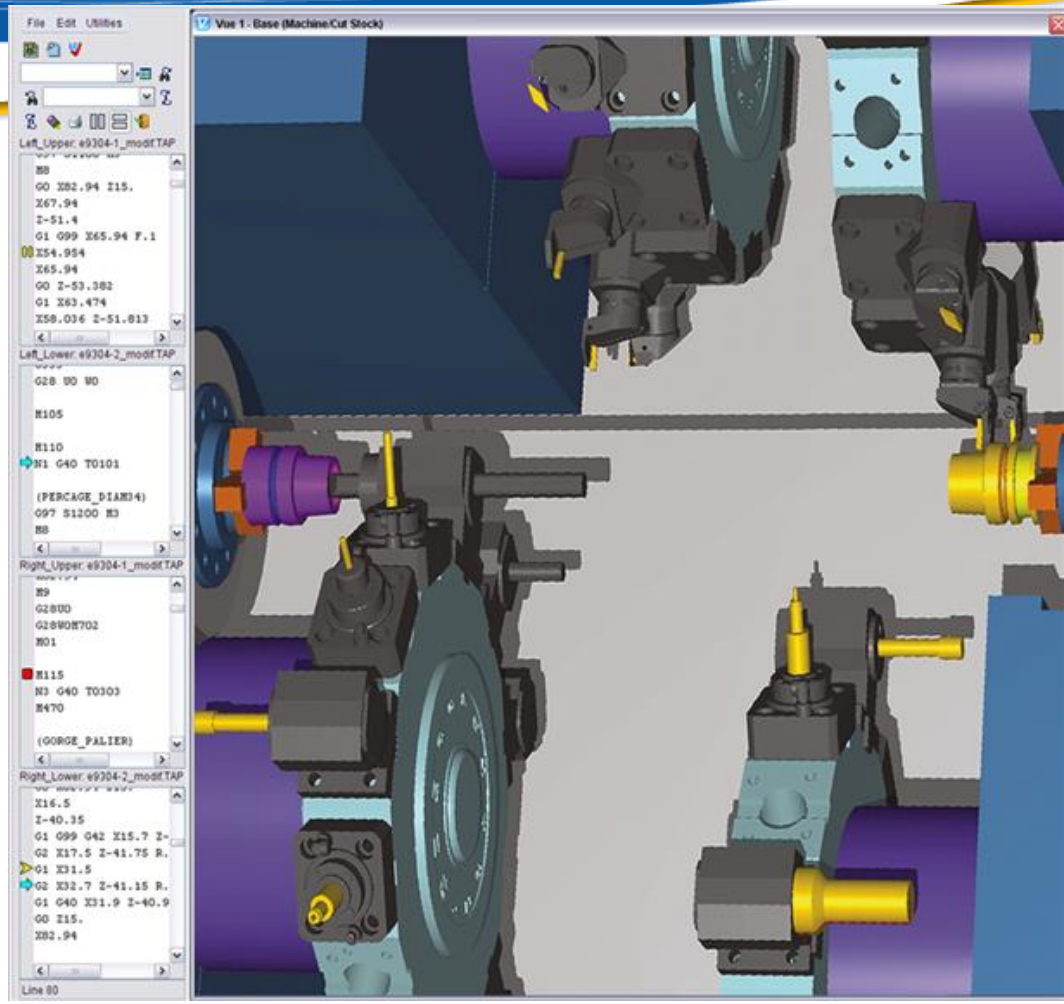


Continuous



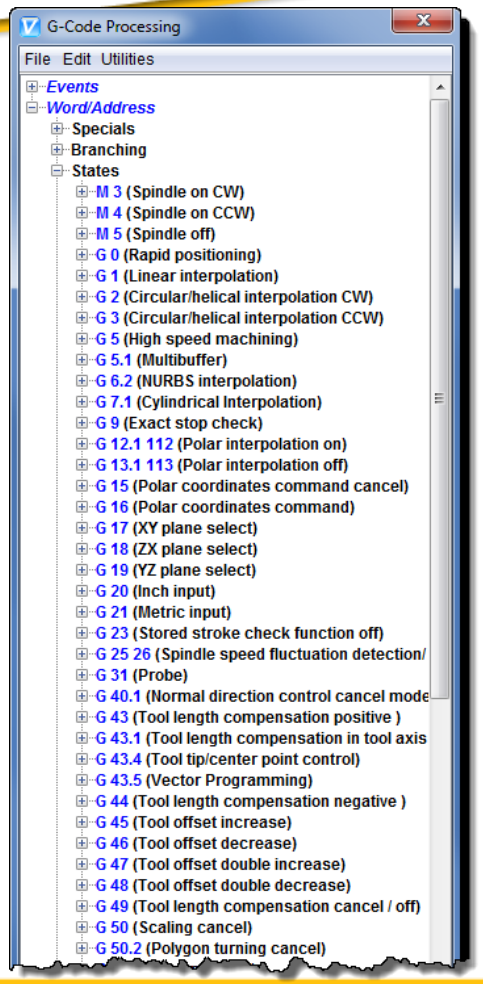
Machine Simulation

- Supports multi channel processing
- Parallel kinematics
- Unlimited number of axis
- Auxiliary attachments: tail stock, steady rests, part catchers, bar pullers, etc.
- Automatic workpiece transfer to pick-off or sub-spindles

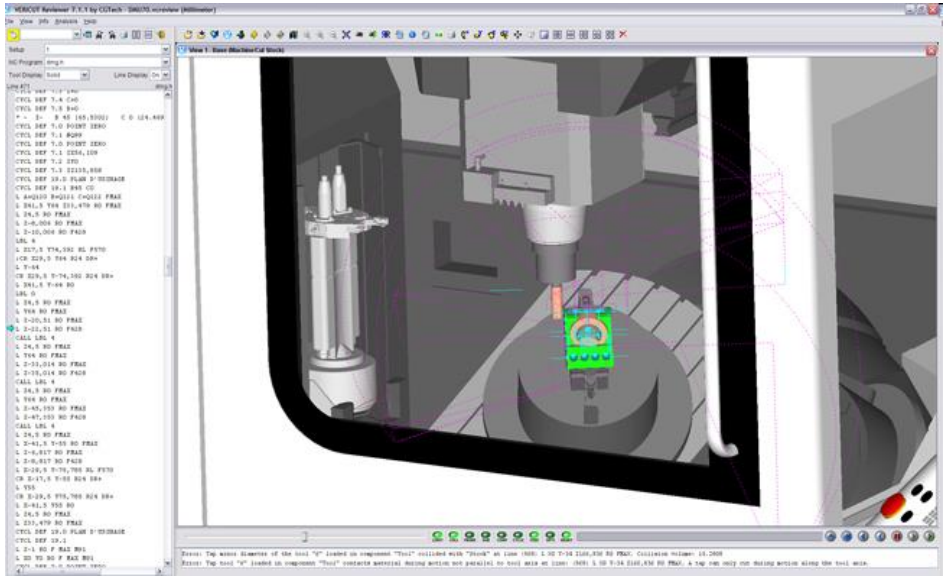


Special NC Program Features

- ☑ Variables, Subprograms, Macros
- ☑ Subroutines, Looping and branching log
- ☑ Multiple synchronized CNC controls
- ☑ Look-ahead or 3D cutter compensation
- ☑ Tool tip programming & tool length compensation
- ☑ Gage length reference point programming
- ☑ Canned cycles and fixture offsets
- ☑ Rotary axis pivot points



VERICUT Reviewer



- Stand-alone VERICUT session viewer
- Share simulations with shop floor, suppliers, etc.
- Free, and does not require a license

Part 3

Why CGTech?

Who is CGTech?

- **Worldwide leader in CNC machine simulation and NC program optimization software with VERICUT®**

Why CGTech?

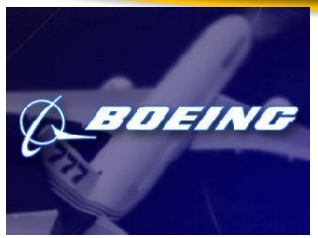
Worldwide Simulation Standard

CGTech's products are **developed in-house**. This allows for quick changes and specific customization by the original product engineers.

VERICUT is used by companies of all sizes, including most Fortune 500 companies

There is a large pool of trained VERICUT users in over 55 countries

Worldwide diverse customer base



SUKHOI

IRKUT
ИРКУТ

КНААЗ

CHRYSLER

United Technologies

AIRBUS

HUSKY

GM

CATERPILLAR

Ford

NASA

SPIRIT AEROSYSTEMS

Pratt & Whitney
A United Technologies Company

Solar Turbines

MOTOR HARLEY-DAVIDSON CYCLES

NORTHROP GRUMMAN

JOHN DEERE

CAMERON

LOCKHEED MARTIN

ALSTOM

CGTECH

Machine Tools Partnerships

Controls Partners: FANUC SIEMENS HEIDENHAIN

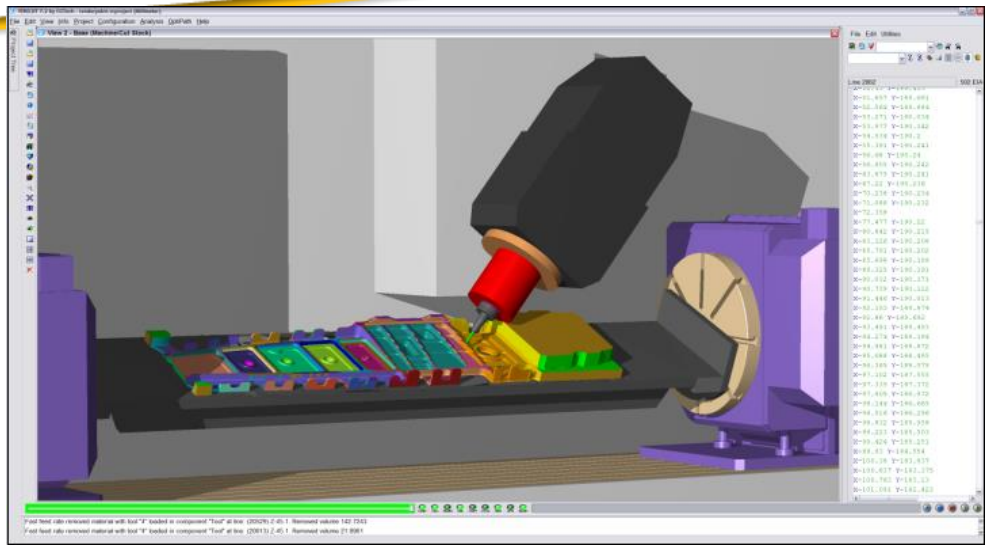
CAD/CAM and Tooling Partnerships

20,000+ Projects Delivered

- CGTech has seen most of the challenges manufacturers face and is constantly exposed to new manufacturing methods and technologies used around the world

Development Direction

- Constantly refine VERICUT to make it faster and easier
- Seek out enhancements that benefit the greatest number of users
- Direct development from customer feedback
- Develop (100% by CGTech staff) the most accurate NC simulation in the world



New display technology

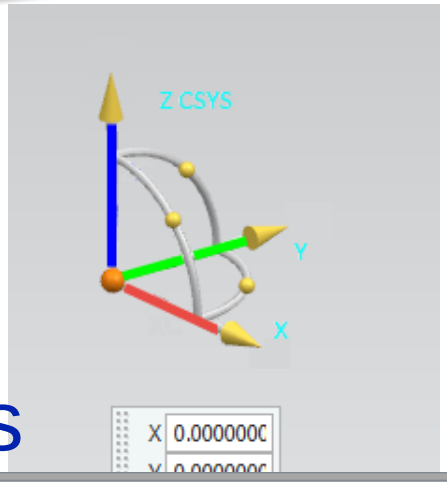
- New display technology for cut stock in machine view.
- Maintain functionality of Vericut's Cut Stock Model with Feature History etc
- Display a better looking model

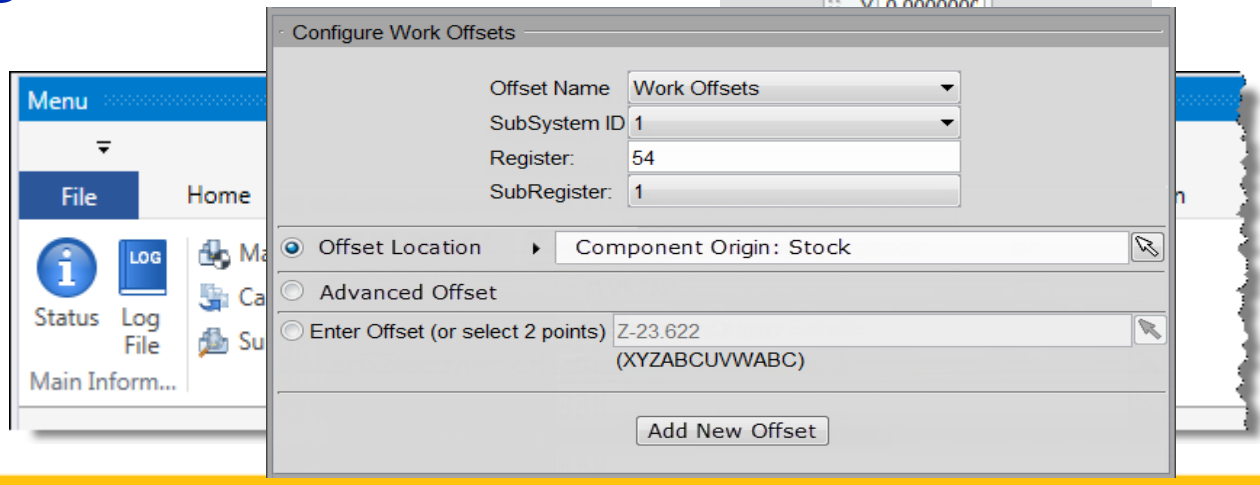
More updates for Force

- Variable helix/rake/tooth insert milling cutters
- More graph integration
- Integrate cutter comp graphical display in main desktop
- Drilling, then Turning to be added next in Force

Some things for the future

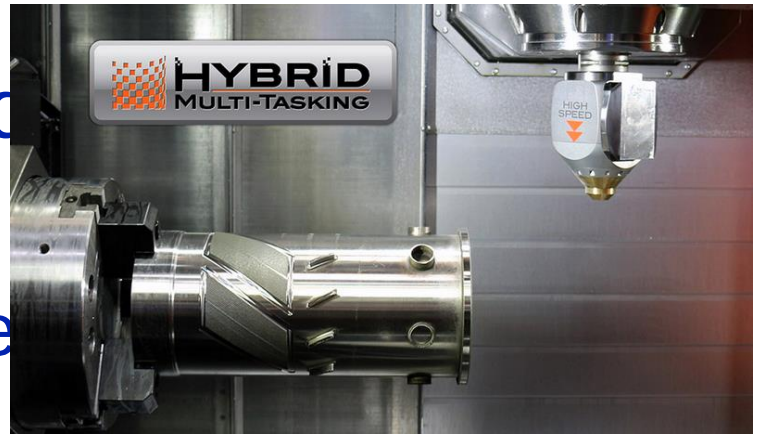
- Coordinate system UI
- Simulation Analysis
- Report generator
- Program origin and work offsets
- NX interface

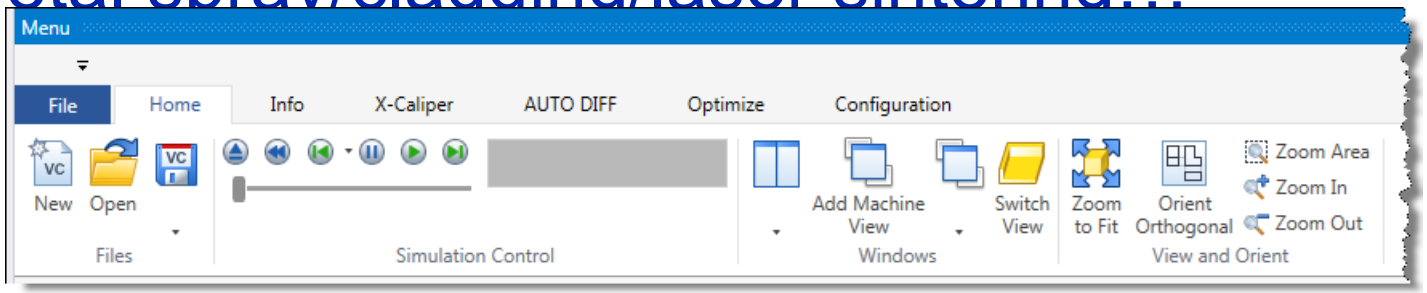




More things for the future

- VERICUT desktop red
  - Ribbon-ish
  - Remove pull-down me
- Material addition
  - Metal spray/cladding/laser sintering…



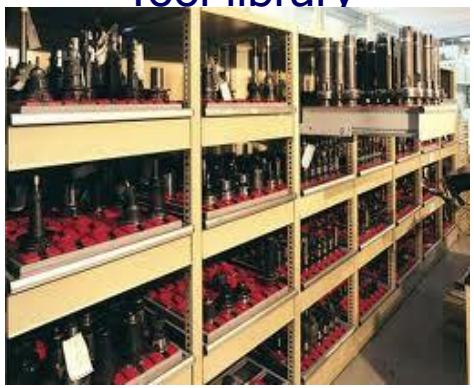


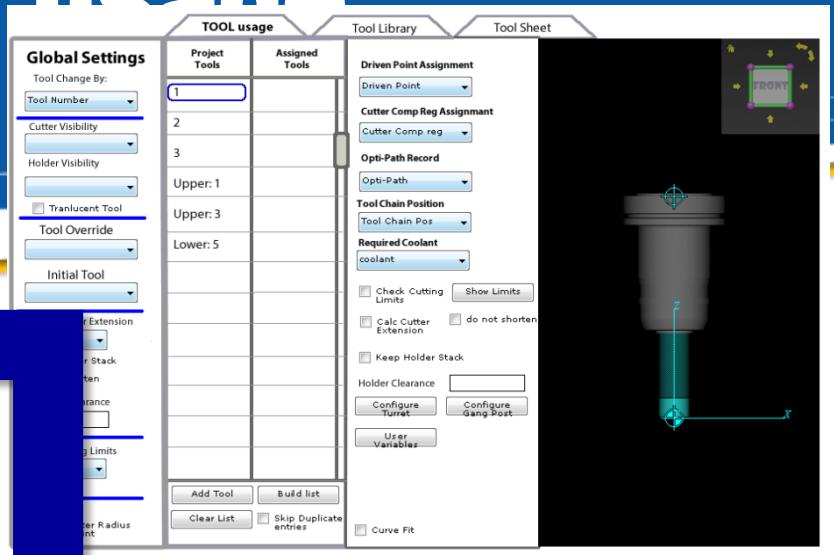
More things for the future

- Machines
  - Origin-independent construction
  - Replace location tables with graphical objects
  - Add machine parameter information to control file (time for a demo ?)

Separates a tool's intrinsic properties from its usage properties.

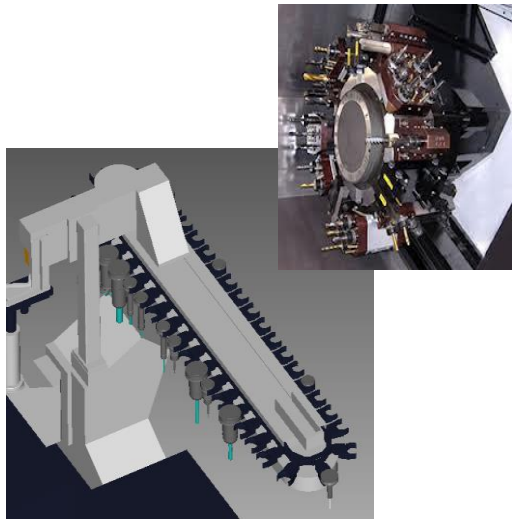
Tool library





- Tool ID
- Cutter and holders assembly
- Gage points, driven points, compensation values
- Cutting settings
- Tool report

Project's Tool List



- **Tool station**
- **Orientations & positions**
- **Adaptors**
- **Driven point & compensation**
- **Optimize**

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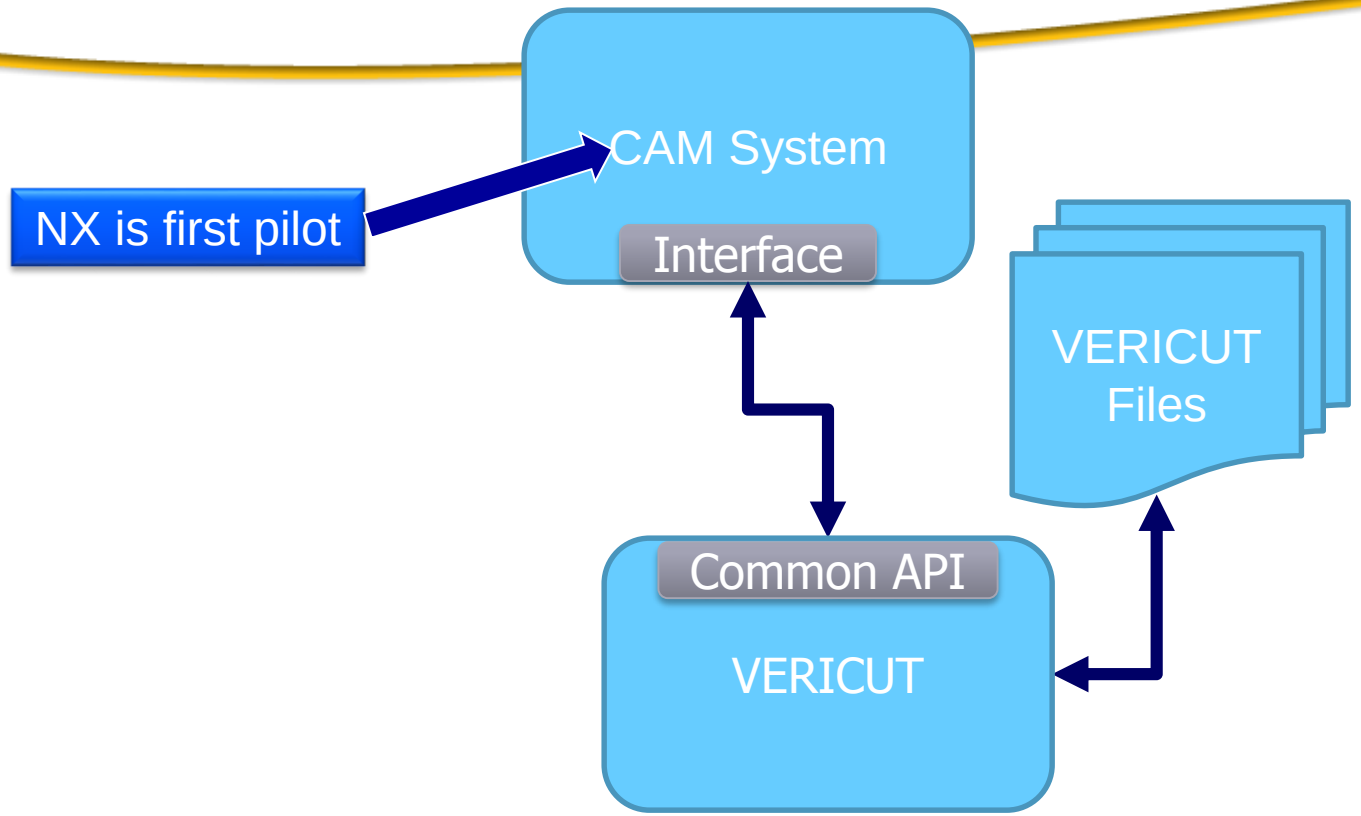
Develop a common interface method for all CAM systems.



Any Questions?

VERICUT®

We are here to work for you!

- World Class Support
- Reliable software releases
- Customer Driven Enhancements
- Large Customer Base
- Support of new technology as it happens – not after