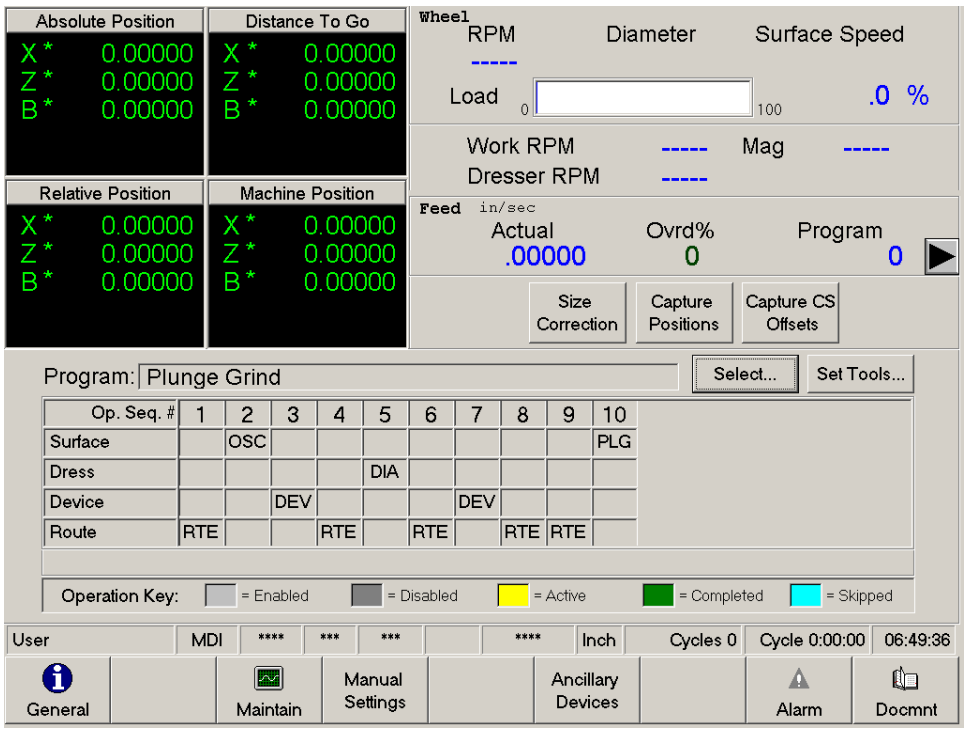
CNC Engineering Inc.
Your FANUC Experts

OPEN VISION™ GRIND

Nearly 20 years ago, CNC Engineering, Inc. created Open Vision™ Grind; the most flexible grinding platform in the industry, designed to make grind programming faster and easier than with conventional controls.

Unlike an OEM control that is tailored for a specific application or machine type, Open Vision™ Grind is a feature-rich grinding package that can be adapted to most grinding machines powered by FANUC controls. All ID, OD, Step, Thread, Surface, and Creep Feed style grinders can be supported with one flexible package! Since Open Vision Grind supports a variety of grinding machine types, Operators can move from machine-to-machine without having to learn multiple OEM packages or machine specific software.



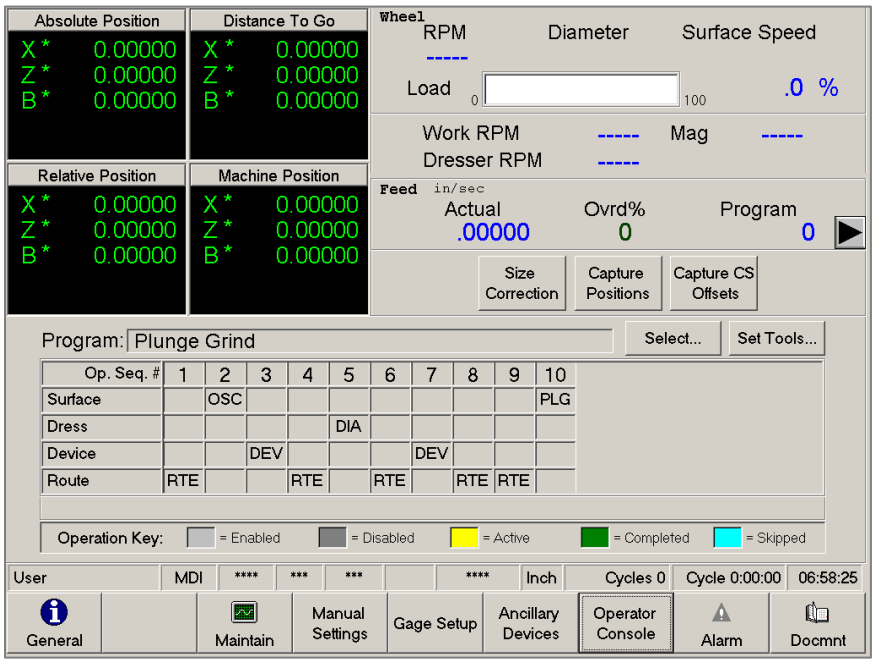
Beyond just the basics of grinding and grind processes, Open Vision™ Grind can support a number of external hardware items including several different configurations of pre-process, in-process, and post-process gauging setups. There are also options for on-machine probing, offsetting, multiple wheels and wheel heads, as well as multiple dresser configurations.

In this overview of CNC Engineering's Open Vision™ Grind software we will briefly cover some of the programming possibilities. There are a nearly unlimited number of possible combinations, so please feel free to contact us to discuss your particular application needs.

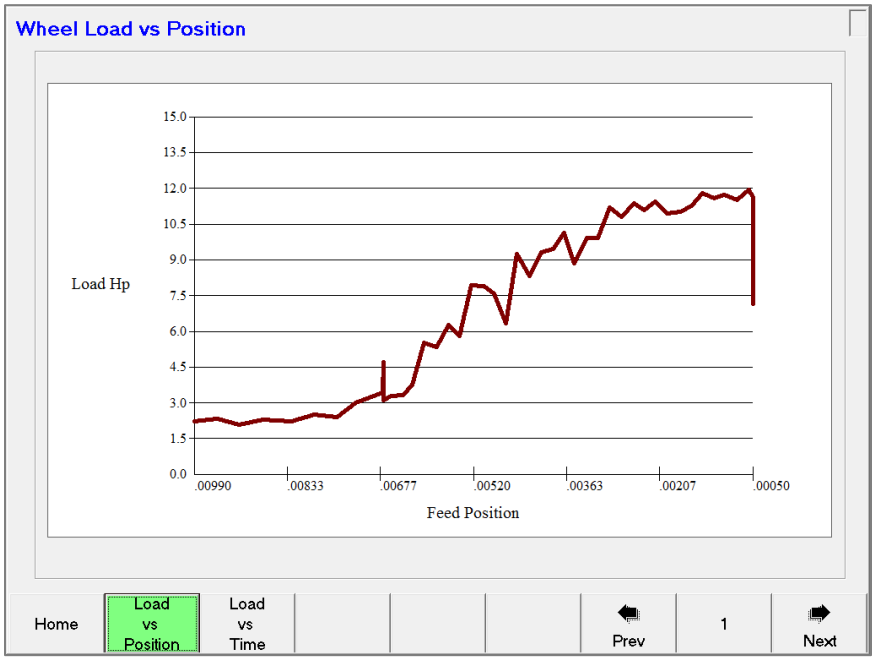
From the Front End

The main operators screen is designed to provide manual functionality as well as information and status of the program cycle currently selected. By making use of a touch screen interface and soft keys, the operator can change the display for easy setup or manual operation of the machine. Various soft keys within the display will link to information like cycle time, cycle logging, parts counters, current offsets, and wheel life data. For example, the load bar will open a bar graph display of wheel load for the last six cycles. This is a great tool for process development and diagnostics. At the bottom of the main operators screen, additional tools to support ancillary devices can also be accessed for set up and operation.

Main Operator Screen



Wheel Load Screen



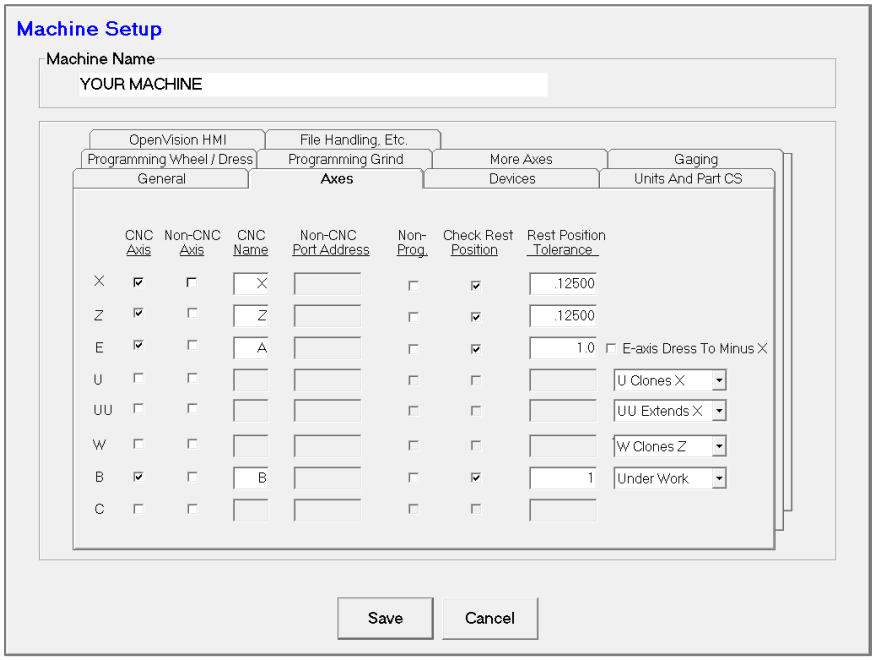
Machine Configurations

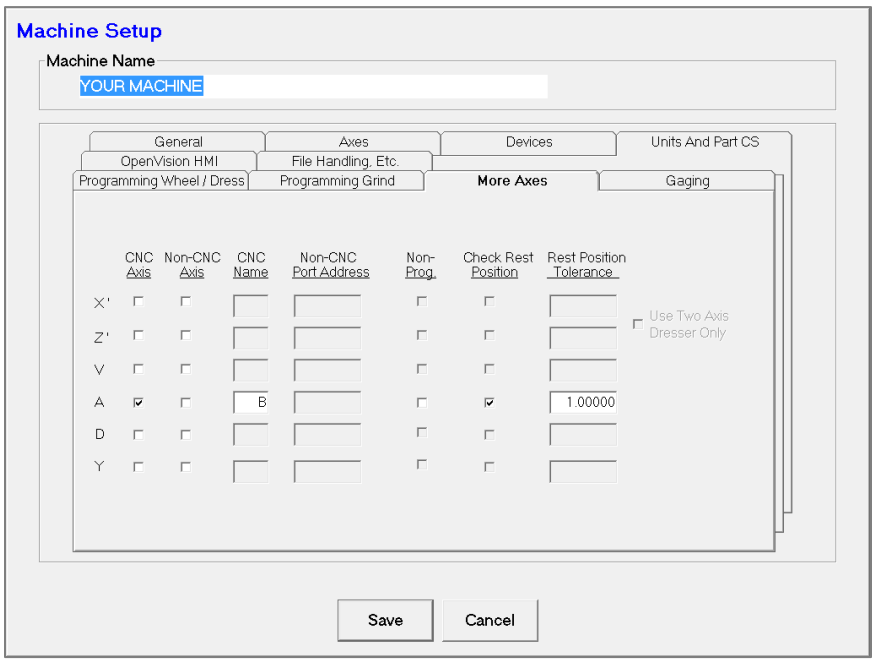
Axes

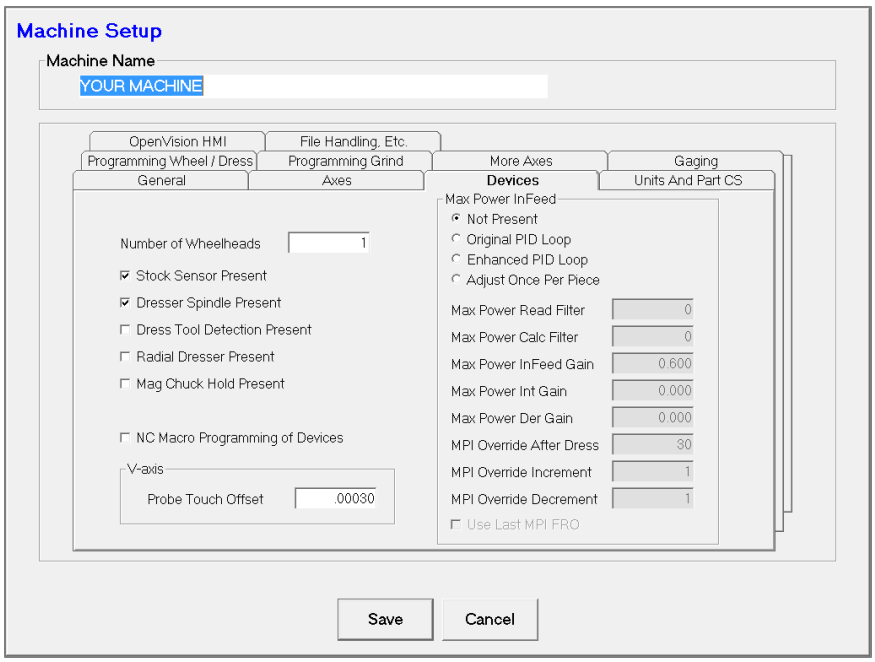
Standard machine axes such as X, Z, U, W, B, and Y are all supported and configurable per the application. Additional axes such as Z', X',C, A, E, as well as ancillary axes for loaders, probing, gauging, and other functionality can be integrated depending on the machine configuration and manufacturing requirements.

Many axes have different functions based on their orientation. For example, a swivel axis under the chuck has a much different function than the swivel under the wheel. Multiple designations are just part of the versatility of Open Vision™ Grind.

Dual path applications are also supported giving you the equivalent of 2 independent machines and capabilities running in the same environment.







Spindles

An unlimited number of Spindles can be programmed and called up at any time. Up to 4 programmable wheel heads and 2 programmable dresser spindles can be in use and running at any one time.

Work Holding

Open Vision™ Grind can be configured for a variety of work holding options. Magnetic chucks can be set for multi-step or programmable percent as well as variable between course, rough, and finish grinds as needed. Other work holding devices can be configured per your requirements and include feedback and part verification.

Stock sensor (Gap Eliminator)

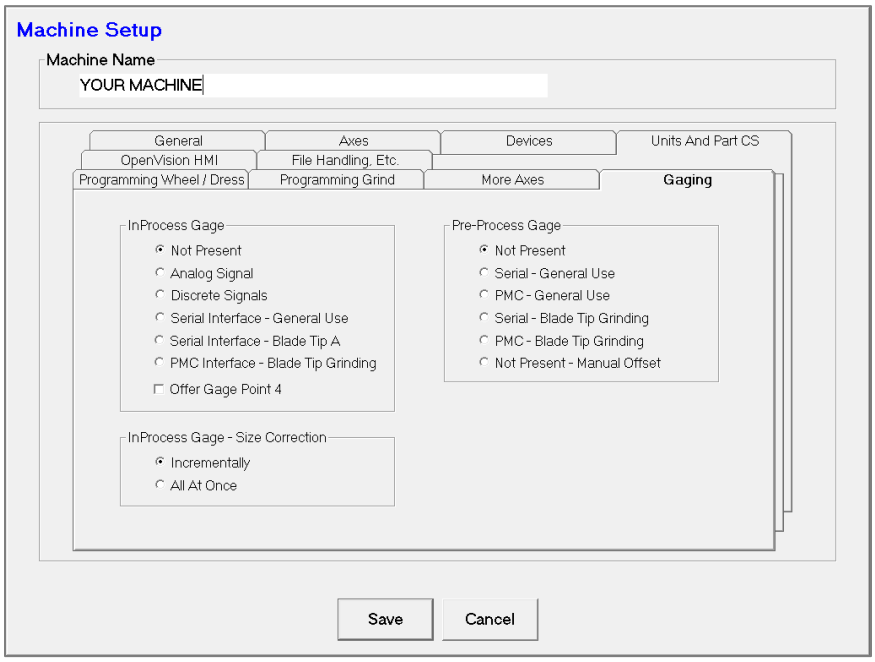
Stock sensor can be used to reduce cycle time. The method is selectable, per the surface being ground. It may be based on wheel load or an input from an external source. Acoustic emission sensors such as Dittle or SBS are commonly used. These sensors can also be used for dress detection and verification.

Special NC Programming

Open Vision™ Grind allows for an NC program to be called from within the grind software to perform any extraordinary function you wish and then return to the grind software seamlessly. This can be used for hard turn operations or any function your application requires.

Gauging

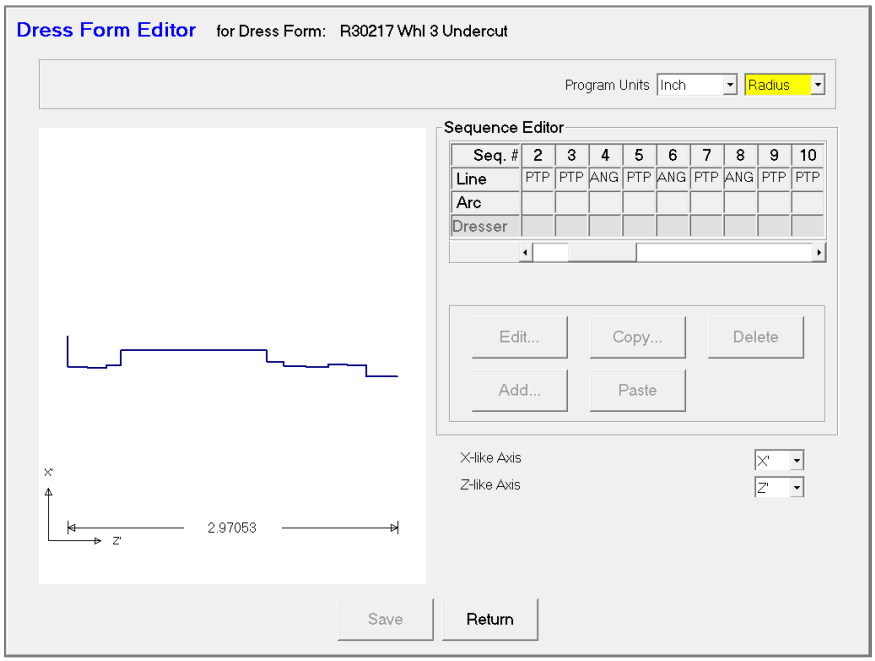
Open Vision™ Grind can be configured to support pre, post, and in-process gauging. Digital, analog, and serial interfaces are all supported and selectable. Open Vision™ Grind also has its own built-in amplifier software that allows you more options for your choice of hardware. The options for placement and operation of your gauge are completely configurable per machine.



Dressing

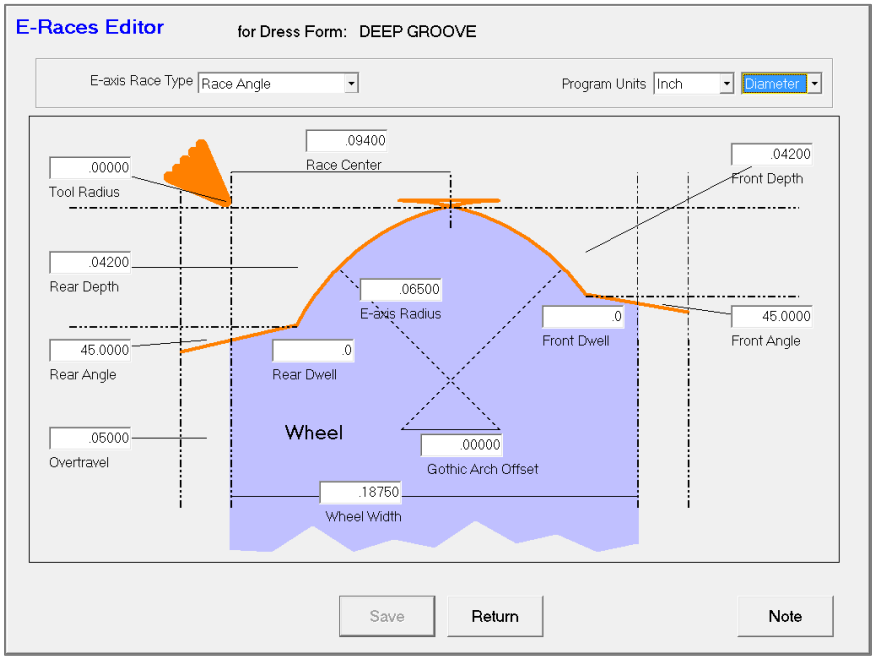
The Dress Form Editor within Open Vision™ Grind is an incremental segment editor that allows you to program step-by-step contours without the need for G code. Built in tools can automatically assist with Trigonometry functions. If you program incremental endpoints, the programmer will automatically display the resulting angle. If you program an angle and a length, the software will display the resulting end points. The arcs and radius editor has additional functions to assist and there are no limits to the number of steps in your profile.

M and G code programming is available for those that prefer this method. Open Vision™ Grind also offers several specialized editors for more specific applications.



E-axis Dressing

The E-axis dress editor works like a CAD system to calculate the profile endpoints based on operator input of print data



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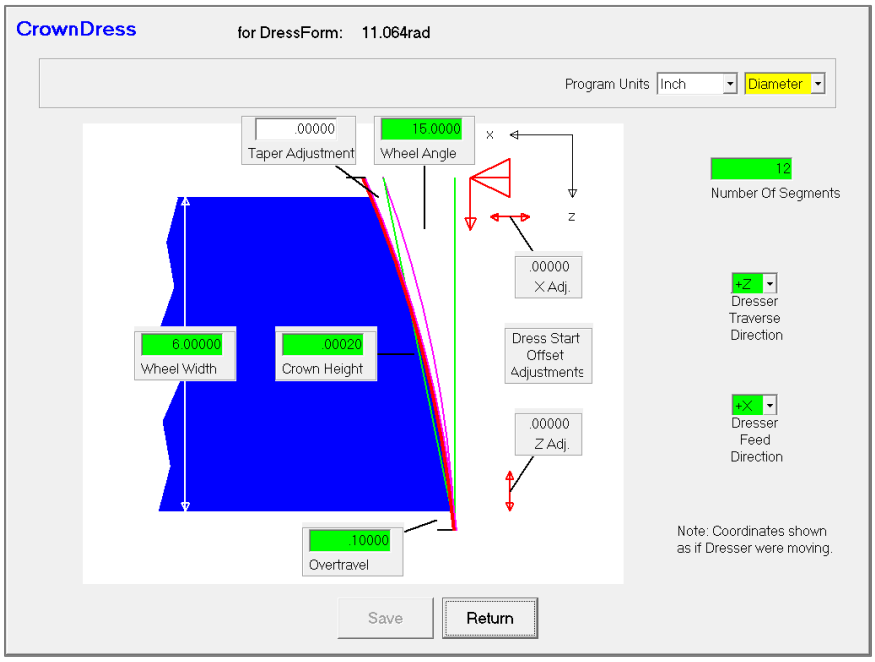
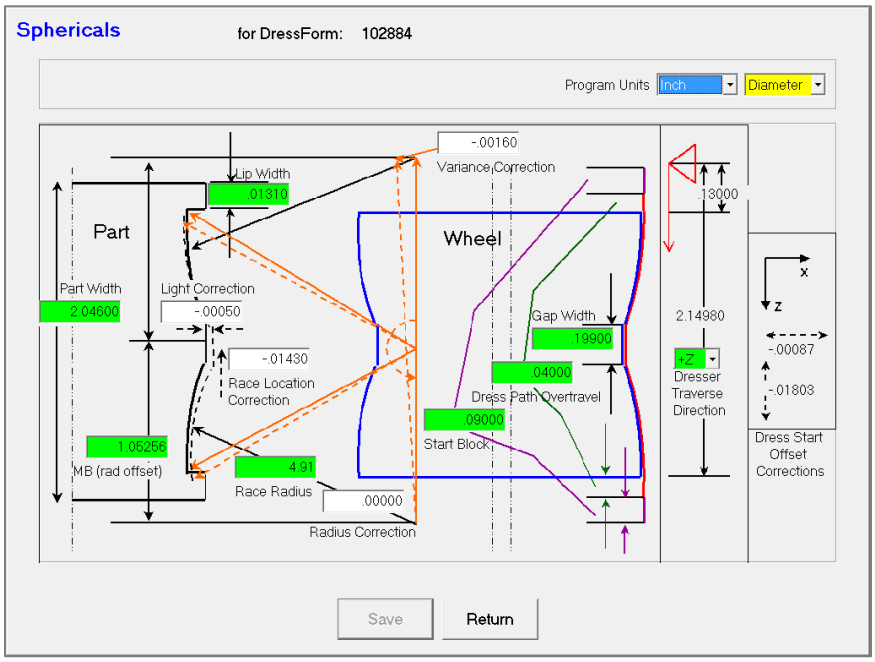
Crown Dress

The custom crown feature was created because the FANUC control will only allow a 9-digit radius input. If the wheel is long and your crown is only .0002 high, then the programmed radius may be in the thousands of millimeters or inches. Open Vision™ Grinds crown editor will break the radius into a programmable number of straight line segments to simulate the desired radius within the constraints of the FANUC control.



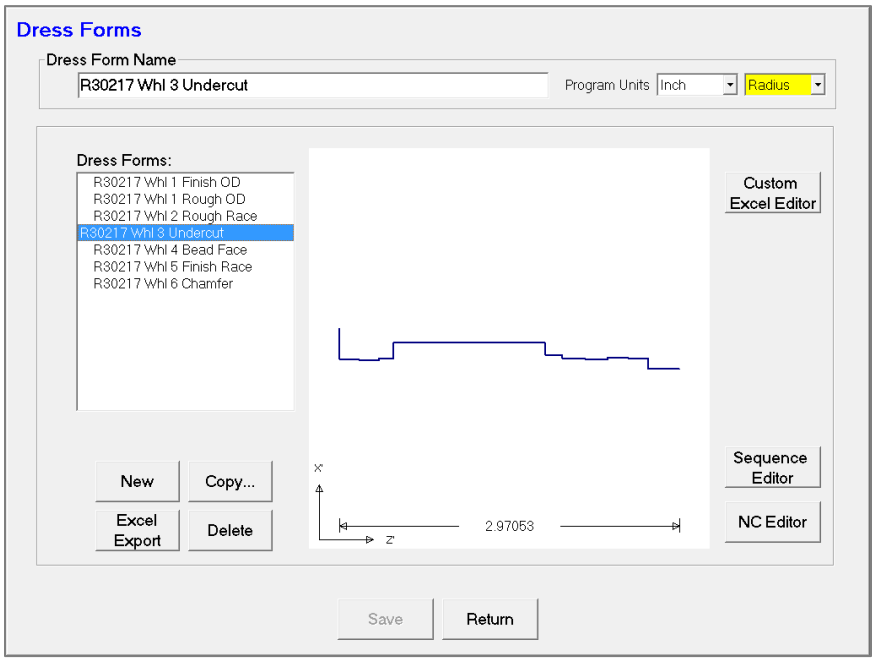
Spherical Editor

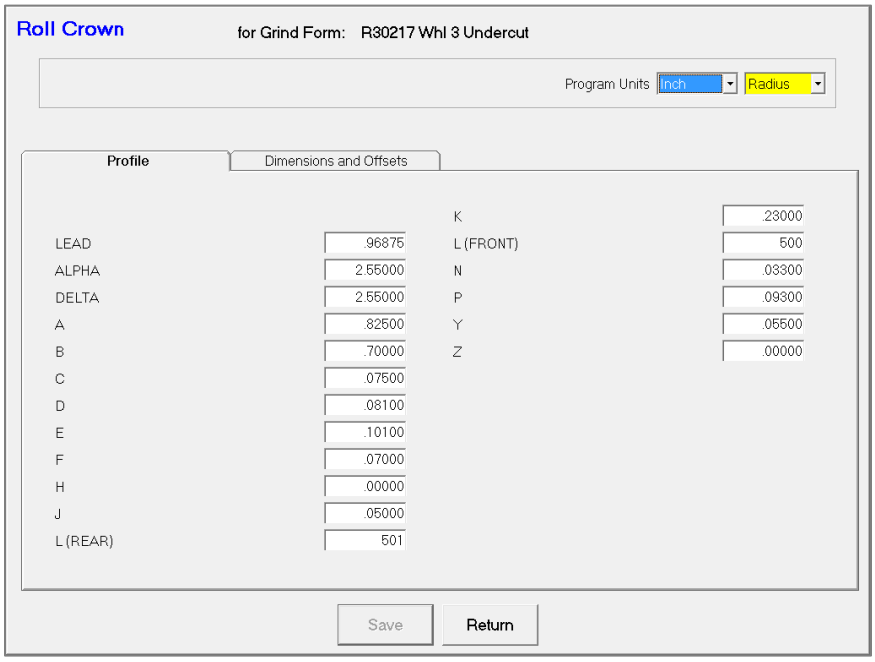
The double spherical editor is designed to allow the Operator to input the print data, dress the profile into the wheel, then offset for deviation based on first article inspection reports.



Excel Interface

The Custom Excel Interface allows the user to create their own Excel spread sheets, for complex profiles or proprietary calculations, and link them to Open Vision Grind. The Excel Interface provides ease of programming while maintaining flexibility and control over your process.



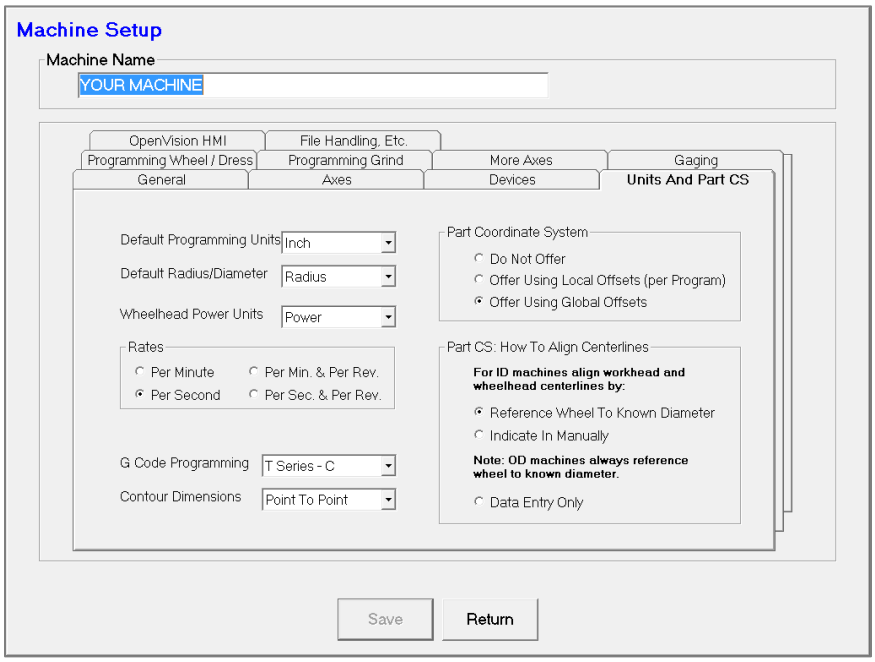


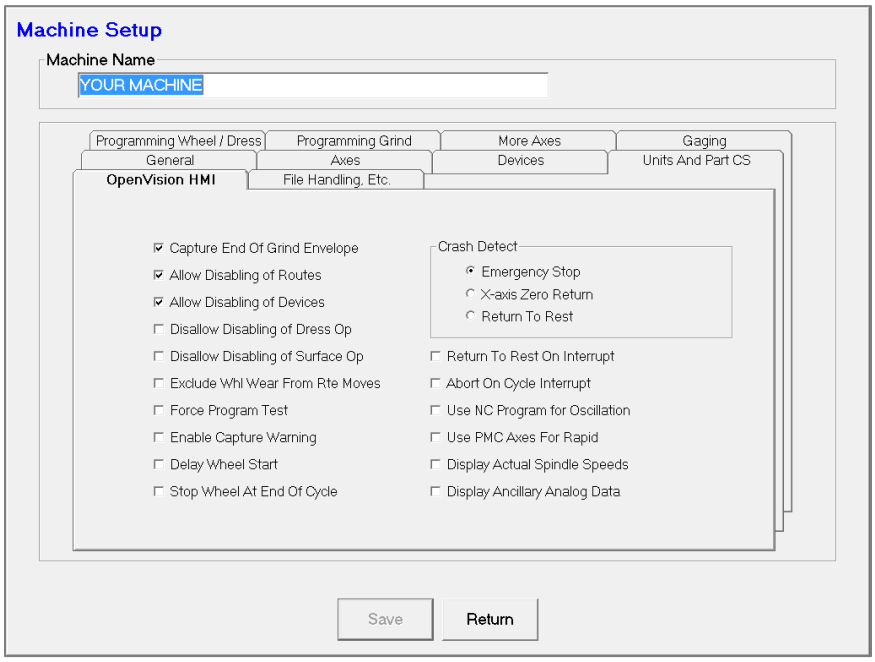
Additional Machine Configuration Options

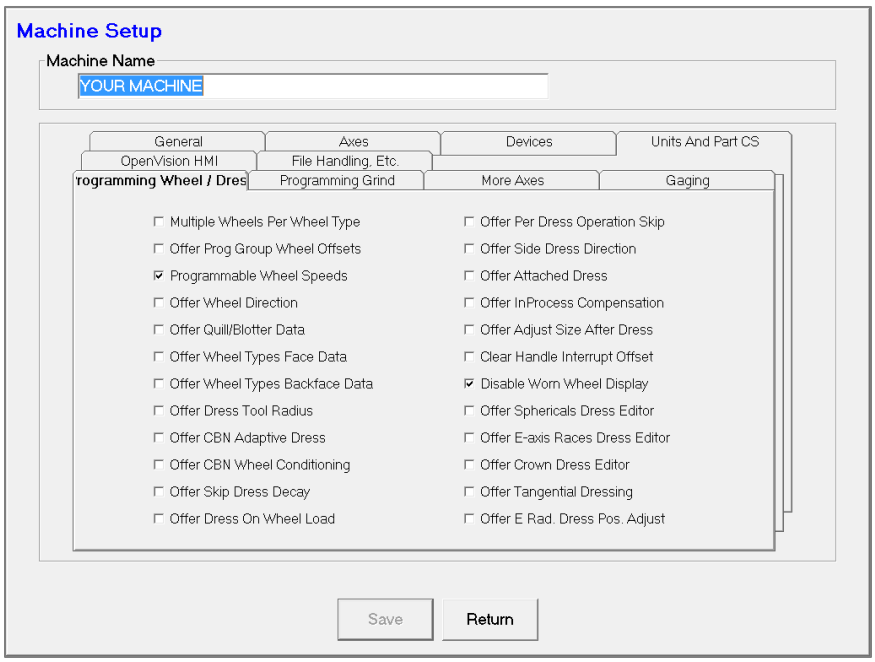
Because every operator seems to have their own preference for how a machine should be set up and programmed, CNC Engineering has tried to provide as many options as possible. Inch-to-metric and radius-to-diameter are switchable at any time, but the default unit when using a given screen is selectable. Rates, like per-minute and per-second, are also selectable according to an Operators preference.

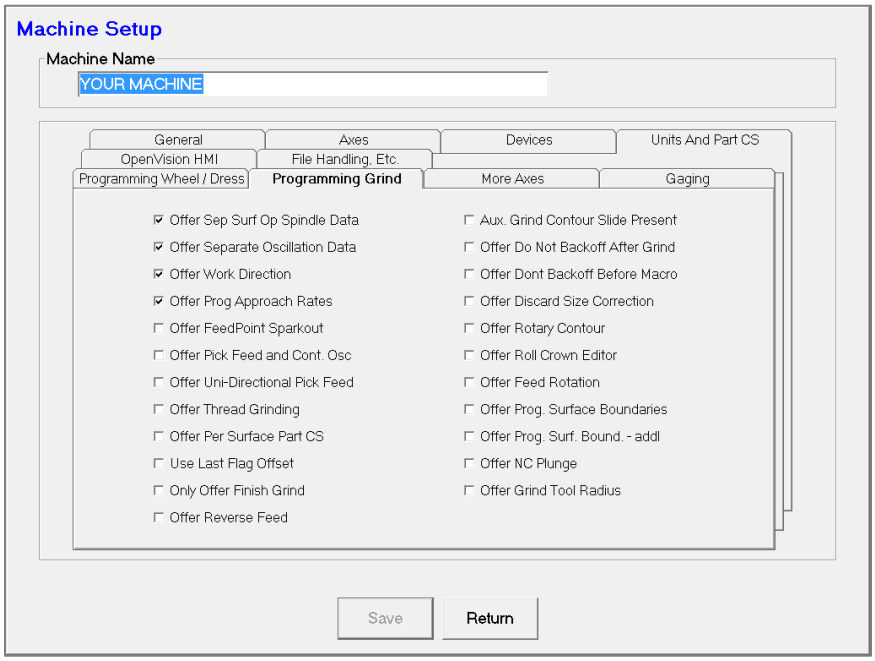
Operators can also switch between Part Coordinate programming and Machine Coordinate programming, on a per-program basis.

By selecting the features you need and leaving out the options you don't, manufacturers have the power to truly customize the software for each machine tool.






Machine Setup
Machine Name
YOUR MACHINE
General
Axes
Devices
Units And Part CS
OpenVision HMI
File Handling, Etc.
rogramming Wheel / Dres
Programming Grind
More Axes
Gaging
Multiple Wheels Per Wheel Type
Offer Prog Group Wheel Offsets
Programmable Wheel Speeds
Offer Wheel Direction
Offer Quill/Blotter Data
Offer Wheel Types Face Data
Offer Wheel Types Backface Data
Offer Dress Tool Radius
Offer CBN Adaptive Dress
Offer CBN Wheel Conditioning
Offer Skip Dress Decay
Offer Dress On Wheel Load
Offer Per Dress Operation Skip
Offer Side Dress Direction
Offer Attached Dress
Offer InProcess Compensation
Offer Adjust Size After Dress
Clear Handle Interrupt Offset
Disable Worn Wheel Display
Offer Sphericals Dress Editor
Offer E-axis Races Dress Editor
Offer Crown Dress Editor
Offer Tangential Dressing
Offer E Rad. Dress Pos. Adjust
Save
Return


Machine Setup
Machine Name
YOUR MACHINE
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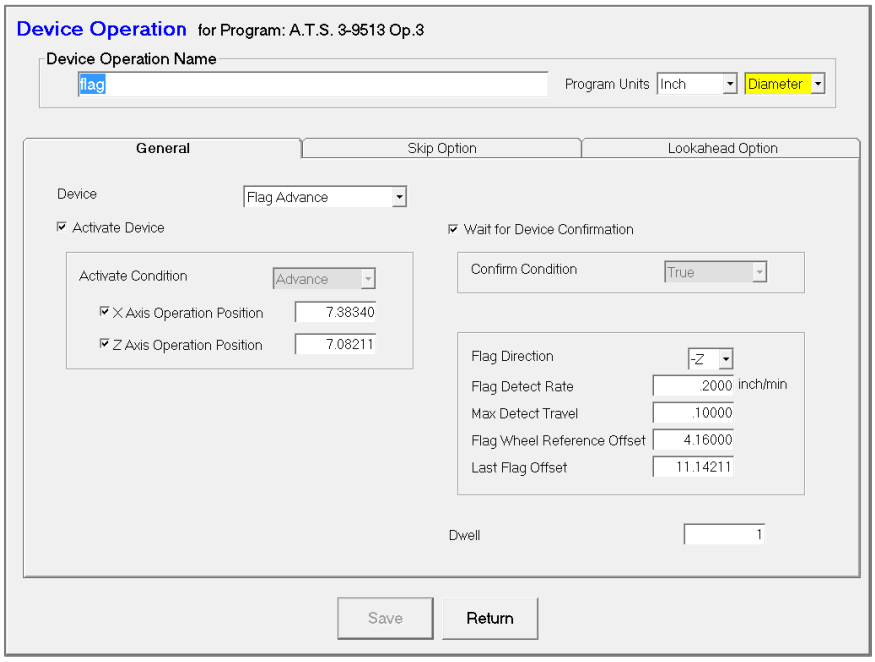
OpenVision HMI
File Handling, Etc.
Programming Wheel / Dress
Programming Grind
More Axes
Gaging
Offer Sep Surf Op Spindle Data
Offer Separate Oscillation Data
Offer Work Direction
Offer Prog Approach Rates
Offer FeedPoint Sparkout
Offer Pick Feed and Cont. Osc
Offer Uni-Directional Pick Feed
Offer Thread Grinding
Offer Per Surface Part CS
Use Last Flag Offset
Only Offer Finish Grind
Offer Reverse Feed
Aux. Grind Contour Slide Present
Offer Do Not Backoff After Grind
Offer Dont Backoff Before Macro
Offer Discard Size Correction
Offer Rotary Contour
Offer Roll Crown Editor
Offer Feed Rotation
Offer Prog. Surface Boundaries
Offer Prog. Surf. Bound. - addl
Offer NC Plunge
Offer Grind Tool Radius
Save
Return

Custom Open Vision™ Grind Add-Ons

Beyond the standard grinding software itself, there are many add-ons available. Custom pages for Auto loaders, probe cycles, robot integration, and other ancillary devices can be configured. Custom plant automation and integration systems can also be supported.



Solutions for Manufacturers & OEMs

Open Vision™ Grind is already used on hundreds of grinding machines throughout the world. Some manufacturers, like a leading bearing manufacturer in New York, have installed Open Vision™ Grind on all of their grinders, thereby ensuring Operators and Programmers can easily support all of their machines. While most of the existing Open Vision™ Grind systems have also been retrofitted with new FANUC controls by CNC Engineering, Inc., almost any grinder supported by a FANUC CNC can be improved with Open Vision™ Grind.

A number of grinding machine OEMs, including Campbell, MRSE, CNC North, and EDAC also offer Open Vision™ Grind on their new grinding machines.

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