GEN 2
SUPERCONTROL

- Better, more accurate motion

- Easier to Program and Run

- Advanced Communications

THERMWOOD

GEN 2 SUPERCONTROL

Advancing computer technology is driving the development of a new generation of CNC controls. Thermwood, the only major CNC router manufacturer that designs and builds its own CNC control is a leader in implementing this next generation control technology. As a result, Thermwood has been granted more patents on CNC router technology than all other CNC router manufacturers in the world, combined.

Control manufacturers have reacted in two ways to advances in information and computer technology. One group is now able to offer first generation controls at ever lower prices, since the processors needed for these basic functions are becoming lower and lower cost. First generation controls simply play back CNC programs generated elsewhere, much like a player piano. A second group, which includes Thermwood, has chosen to incorporate advanced next generation features into its CNC controls using the more capable new processors. Thermwood believes this second approach actually results in the lowest OVERALL cost to the customer and substantially higher productivity from the CNC machine.

The lower cost comes from the fact that next generation controls perform functions internally that require separate software packages and additional steps for first generation controls. The additional software and less efficient functioning of the first generation approach are today substantially higher cost than the somewhat higher cost of advanced processors needed for next generation features. Thermwood's Gen2 SuperControl currently incorporates more next generation control features than any other CNC control in the woodworking industry.

Some of the major advantages of this new technology are:

Better, more accurate motion

• More complex motion algorithms
The high speed processors allow more complex motion calculations resulting in smoother machine motions and faster speeds

• Three dimensional axis compensation
Some of the better first generation controls allow for lead screw compensation, that is, they use a table to compensate for position inaccuracy along an axis. The

table is created by measuring precise actual position along an axis using a laser. The only problem is that moving along one axis may cause inaccuracies on the other two perpendicular axes. For example, if the X axis rails are bowed, both the Y and Z axis can shift slightly as you move along the X axis. First generation compensation only corrects the X axis, ignoring any effect on Y and Z. The next generation Gen2 SuperControl compensates all three axes at every position within the working envelope. Every inaccuracy or misalignment, regardless of its source, is automatically corrected.

Easier to Program and Run

Control can accept raw design files in addition to CNC programs

First generation controls are primarily playback devices, much like a player piano. They require that the programmer not only design the part but also perform a series of additional functions including CAM, nesting, and post processing in order to generate a precisely formatted program that the control can execute. Next generation controls such as Thermwood's Gen2 SuperControl can, in addition to standard CNC programs, also accept raw design files directly from design software without the additional processing. It automatically performs any program preparation necessary to machine the part.

- **Control is directly compatible with virtually all design software**
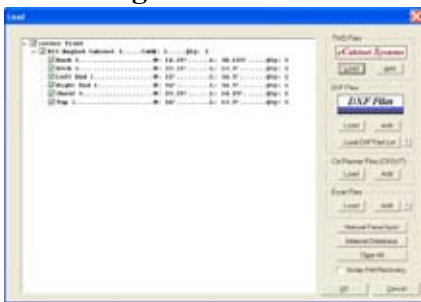
DXF files from any CAD or design software can be sent directly to a Gen2 SuperControl.

- **Combine files from multiple software sources in a nest**

The control creates nests of parts internally and can combine parts from multiple sources in the same nest.

- **A single job file can contain hundreds of parts rather than requiring hundreds of separate CNC programs for a job**
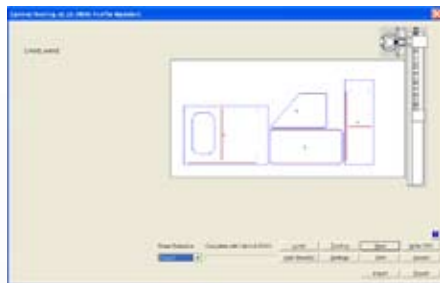
Including all the parts for a job in a single file can dramatically reduce file handling and improve productivity of the machine. The control nests the parts on the appropriate material, tells the operator how many sheets of material are needed for the job and tells him what material to load. In fact, it guides him through the entire process, step by step. This file also contains information for machining the back or flip side of certain parts. It prints a label for each part. Parts that require flip operations have a bar code on the label. When the operator scans the bar code, it identifies the part to the control which automatically retrieves the correct program. From the operator's standpoint the whole process is simple, load one file and follow instructions.

In a first generation control, the CNC programs are developed outside the control, so there is a program f i l e f o r

each sheet of material in the job and yet another program file for each flip operation. These files are normally processed into individual CNC programs. A single job may require a hundred files or more that must be sent individually to the machine. Some really limited controls may only allow one, or maybe a couple of programs to be loaded at a time. An operator then needs to sort through, identify, handle and load hundreds of files each day. This takes time and reduces productivity of a major investment, the CNC router. Also, this approach is more prone to error.
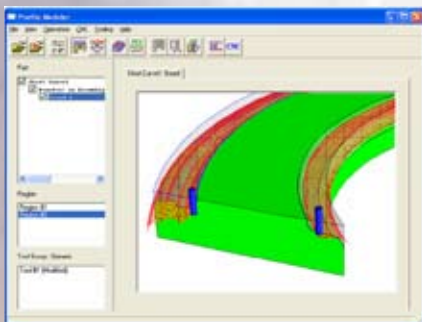
• React to problems at the machine

For example, if you have a damaged sheet or a partial sheet of material, it is easy to tell the control what you have and it will nest on it. If the partial sheet is from a previous job, it is not even necessary to provide a description to the control. The control prints a bar code label for any material left from a job and all you need to do is scan that label. Theoretically this is possible with a first generation approach but from a practical standpoint, most times you don't know exactly what you have until you are ready to run the job. Changes are easy at the control with little delay to the job but that's usually not a good time to stop everything, go back to the office to re-program.

### • Create modeling program to produce almost any profile without custom tooling

When you have a design with a profile edge, there are two ways to cut the profile. The most common way is to have a cutting tool made with the desired profile. A second, less known meth-od is to model the profile. Modeling is a technique commonly used to make prototypes or patterns from CAD designs. It uses a series of standard tools. The process begins by moving a ball nose tool back and forth over the surface, incrementing a small distance each pass. This creates the base surface of the part. Then a second and perhaps third tool are used which machines away those areas that the first tool could not reach. With the higher speeds of today's CNC routers, modeling is practical for short run production parts but does require a modeling program. Most CAD systems can create modeling programs but seldom are used for this purpose. Thermwood's Gen 2 SuperControl has the ability to create these modeling programs, automatically right in the control. If you send a part with a profile edge to a Gen 2 control, it asks if you have a tool for the profile. If you say no, it automatically creates a modeling program to machine the edge. This simple feature can be incredibly useful. It can be used to machine custom profiles on parts or machine moldings, even large complex or curved moldings without special tooling.

• Design files can be exchanged between machines without post processing

Just like fingerprints, no two CNC machines are the same. Sometimes differences are major, like different table sizes. Sometimes differences are subtle, like different head spacing. Regardless, no two machines are exactly the same so the CNC program needs to be tailored to the particular machine it will be run on. If you want to run the exact same part on different machines using a first generation control, you need to create a different program tailored to EACH machine. With first generation controls, you cannot freely exchange programs between machines. Next generation controls, however, accept design files and automatically taylor the program to produce the correct part. You can freely exchange
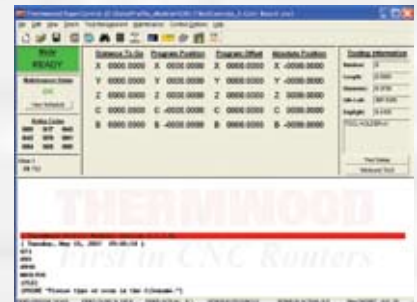
these files between machines with next generation controls regardless of the physical differences in the machine. This is the basis for an entire Production Sharing program under which Thermwood machine owners make parts for other shops.

• Run panel saw programs

Thermwood's control accepts either Excel or CPOUT files commonly used to send size information to a panel saw optimizer. It then nests the panels and cuts them. Since panels do not need to be lined up along common cut lines, as they do in a panel saw, they can be true shape nested, often resulting in better yield. If you just want rectangular panels, you can also just type a list of sizes at the control and it will nest and cut them.

• Rent CNC programs through the control and
produce intricate carvings

Thermwood has a large and growing library of CNC programs for carvings, carved posts and legs that you can rent through your Thermwood Gen2 SuperControl. Rental costs are low, typically $1 to $5 a part. Programs are available from Thermwood on CD, loaded into the control and then a license to run is purchased directly through the control. Part size can be scaled up or down as needed. Carvings can be resized and added to parts in eCabinet Systems in which case they will be machined in the nest during normal program execution. With this feature you can add custom carvings and detail to your product without programming every part.

• Produce cabinet and furniture doors

The Gen2 SuperControl has the ability to take door definition files from eCabinet Systems and create machine programs to make either MDF or traditional solid wood raised panel doors.

• Reconfigure control operation for special applications

Thermwood's Gen2 SuperControl includes the ability to read imbedded Advanced Function Language commands in the CNC program and reconfigure control operation based on those commands. The Advanced Function Language is a programming language, similar to Microsoft Basic that can be included in a CNC program to make it into an intelligent computer program, capable of reacting to its environment or operator input. This feature, which is intended for sophisticated users, will allow the control to address complex or sophisticated applications for which the control was not originally intended.

Advanced Communication

• Machine communication to the operator

• Tool management

The Gen2 SuperControl has a tool management system used to define and manage tools. With the advent of automatic tool changers and random use of tools, this makes management of tooling easier and tracks tool use, informing the operator when tool life has expired for a particular tool. It can even automatically switch to a back-up tool when life expires.

• Maintenance tracking

The Gen2 SuperControl tracks routine maintenance, alerting the operator when maintenance such as lubrication or filter cleaning is required.
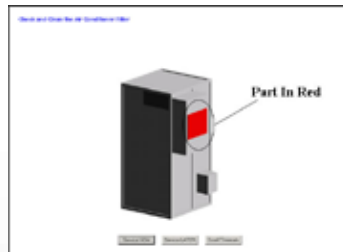
• Error reporting
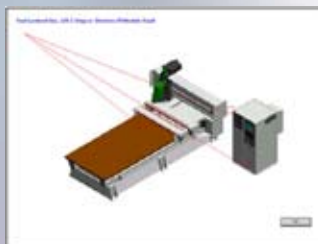
When an error occurs, the control displays a diagram of the machine pointing out possible causes for the error and suggesting solutions.

• Electronic searchable operator's manual

The Gen2 SuperControl includes a complete operator's manual that can be displayed on the screen including the ability to search for words or phrases.

• Maintenance videos

The Gen2 SuperControl will display videos that detail common maintenance adjustment or repair procedures, allowing users to perform many of these functions without outside technical assistance.

• Dynamic exploded assembly drawings
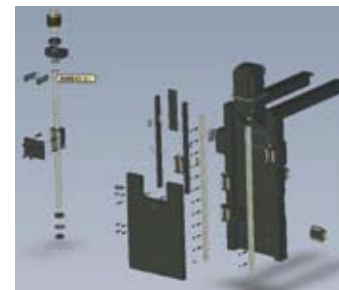
The Gen2 SuperControl can display three-dimensional images of all machine assemblies which can be rotated and exploded on the screen. This shows customer maintenance people the assembly sequence for all components and, by placing the cursor over any part it displays the part number making it easy to order replacement parts.

• Job guide

When a job containing a large number of parts is sent to the Gen2 SuperControl, it nests the parts, tells the operator the number of sheets of each material needed for the job and guides him through the job step by step.

GEN 2

• Operator communication to technical help and resources

• Direct audio/visual/data link to Thermwood technical assistance

The Gen2 SuperControl can quickly connect to Thermwood technical service through a Virtual Service communication link. This audio visual link allows the machine operator to see and hear the Thermwood technician and allows the Thermwood technician to see and hear the machine operator. The link also provides in-depth data sharing allowing the following:

• Purchase tooling or spare parts
Using the Virtual service communication link a customer can purchase spare or replacement part right through the Gen2 SuperControl.

• Complex data and diagnostics
Using the Virtual Service communications link allows a Thermwood technician to access all the data, error logs and configuration files that he could access if he were actually at the machine.

• Remote machine configuration and tuning
Using the Virtual Service communication link the Thermwood technician can evaluate machine performance, then adjust and reconfigure the machine as required, all remotely.

• Program debugging assistance
Most machine problems are caused by programming errors. The Virtual Service communication link allows a Thermwood technician to review, and if necessary modify programs working directly with the customer.

Other features of the Gen2 SuperControl

• Hand Held Programmer

Thermwood offers a hand held programming device that is used to move the machine around. It is used to quickly, easily and intuitively create programs without having to deal with cryptic CNC code. This is a great tool for those not familiar with CNC.

• Toggle program display between EIA and English

You can toggle the program display on all Thermwood controls from the cryptic "M" and "G" code, EIA designators to an English language description of each line in the program. This greatly simplifies operation and learning for people not familiar with CNC code.

• Depth oscillation increases tool life
Certain materials such as high pressure laminates and certain types of plywood with abrasive adhesive between layers will quickly dull tooling at the point or points where the tool contacts the abrasive layer or layers. The Gen2 SuperControl has a feature which oscillates the tool up and down as it cuts to move this abrasive contact point over a larger area of the tool increasing tool life dramatically.

• Full color display

A full size, full color flat panel display makes information easier to read and understand, allows display of more information, including graphics and pictures and generally makes the control simpler and easier to use.

• Huge program storage

The Gen2 SuperControl has, as standard, a 250 Gigabyte hard disk drive allowing storage at the control of tens or hundreds of thousands of part programs and allows the storage of very large programs such as those used for carving. The control can easily, efficiently and without pausing, process programs that are many gigabytes in size, and can process blocks of data at unequaled speeds, resulting in faster execution of these types of programs.
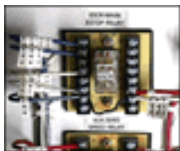
• Sealed air-conditioned cabinet

Thermwood encloses its controls, including power supplies and servo drives, in a sealed, air conditioned cabinet keeping them cool, free from contamination which substantially improves reliability.

• Proper wire and component labeling

Thermwood uses professional wiring practices in its control, labels and color codes all wires, labels major components inside the control cabinet to make finding them easy for service (changing a fuse for example), and supplies complete blueprints of wiring inside the control.

• Easy update and upgrade

Advanced Support Program - Since Thermwood designs its own control, it can tailor new features so that they can be easily added to existing controls. This keeps you competitive as control technology advances. Thermwood offers an Advanced Support Program which provides automatic software updates each year, continuing Virtual Service and discounts on hardware upgrades and other service products.

• Upgrade Existing Controls to Next Generation

Most existing Thermwood CNC controls can be upgraded to the new Gen2 SuperControl. This allows existing Thermwood CNC routers to benefit from advancing next generation technology at a relatively low cost without requiring that the entire control be replaced. 91000 SuperControls and early Gen2 SuperControls can generally be updated rather quickly and easily. Older controls, even those using DC servo drives can also be updated to a full Gen2 SuperControl with the addition of certain electronic hardware. This upgrade does not generally require that the servo motors be replaced resulting in much lower upgrade cost.

Please check with Thermwood's Technical Service for more information on upgrading your existing Thermwood machine.

• Single source responsibility

Thermwood builds both the machine and the control. Should you have a problem it is Thermwood and no one else responsible for fixing it.

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