



OpenCNC Release Notes

What is Covered in this Document

The first portion of this Release Notes describe the changes that have been made to OpenCNC from version 6.2 to 6.3.1.

Since many customers did not upgrade to OpenCNC 6.2, this document contains the entire OpenCNC 6.2 Release Notes at the end of this document. If you are upgrading from OpenCNC 6.1 or earlier, please read the OpenCNC 6.2 Release Notes section before reading the OpenCNC 6.3.1 Release Notes section.

OpenCNC 6.3.1 Release Notes

Upgrade to VenturCom RTX 5.1.1

This RTX upgrade solves several issues that caused startup failures when OpenCNC was run on certain laptops that were used for development. Prior to installing OpenCNC 6.3.1, you must uninstall your previous versions of OpenCNC and RTX.

Documentation Change for Yaskawa Mechatrolink

The maximum distance for an entire Mechatrolink run is 164 ft (50M). Earlier documentation erroneously indicated that the distance could be 50M between each node.

Sensoray 626 Card

Several customers had reported that the Sensoray PCI card did not work with Pentium 4 computers. MDSI worked with Sensoray to solve this problem in 6.3.1. MDSI has also removed support for the digital and analog I/O on the Sensoray board in OpenCNC 6.3.1. Contact the MDSI hotline prior to planning an application for the Sensoray 626 card.



Programming a Rotary Wrapped Axis

Starting with OpenCNC 6.3.1, MDSI added the variable **defRotDirBySign**. This variable lets machine integrators specify how OpenCNC commands motion for a rotary wrapped axis programmed with a G90 absolute endpoint. A rotary wrapped axis is an axis that can be programmed from 0 to 360 degrees and is capable of rotating continuously in the same direction. [Click here for more information about defRotDirBySign.](#)

defRotDirBySign = 0 - G90 commands will always move the rotary table in the direction that results in the shortest move for the rotary axis. This is the setting that will make OpenCNC 6.3.1 compatible with previous versions of OpenCNC.

defRotDirBySign = 1 or 2 - The sign of the G90 command specifies the direction the rotary axis will move.

The microcommand **MC_SETAXISSIGN** has also been added to indicate which axis is to be treated as if programmed with a minus sign.

Rotary Axes Compensation

Added the variable **defRotaryFixUse** to give the user two choices for specifying where compensation values for rotary fixture compensation are stored. This variable supports the use of fixture table values in RTCP calculations.

defRotaryFixUse = 0 - rotary axes compensation offsets are stored in the variable **axRotaryFxOff[]**. This feature is turned on and off when a G43 (Rotary Comp Off) or G44 (Rotary Comp On) code executes. With this configuration, a machine may use both fixture offsets and rotary axes compensation.

defRotaryFixUse = 1 - rotary axes compensations are stored in the fixture offset table. OpenCNC will perform rotary compensations whenever a fixture offset E code is active. G43/G44 are unused and ignored. With this configuration, a machine may not use "normal" fixture offsets.

New Interface Hardware Options

OpenCNC now supports the following interface hardware:

- Bosche-Rexroth SERCOS PCI Card - Part Number PCM-S11.1. This board still requires the use of a separate Watch Dog Timer card.

Note: This board has been recently replaced by Part Number PCM-S11.2. At the time of publication, MDSI was in the process of testing this new board. Please contact the MDSI hotline for current status of this testing.

- Support for the Yaskawa Mechatrolink 64 in/64 out I/O module. The part number for this module is JEPMC-IO350C.

Multiple Gantry Feature Added

Added a multiple gantry feature where all axes in the **defAxisCount** range may be gantry masters simultaneously.

Added the following gantry variables (index is the master axis number):

- **axGantrySlave[]** - slave axis number for the axis.
- **axGantryM2SGain[]** - master to slave cross error correction gain.
- **axGantryS2MGain[]** - slave to master cross error correction gain.
- **axGantryAdd[]** - slave axis adjustment to align with master.

These new variables are backwards compatible with previously used gantry variables. The previous variables will be removed in the next version of OpenCNC.

Allow Subroutines to be Edited with the Program Editor

As of OpenCNC 6.3.1, the **[Buf1]** header no longer needs to be in a part program. If a program that does not contain the **[Buf1]** header is loaded into winProg, the **[Buf1]** header will not automatically be applied when the program is saved. This change lets machine operators edit a subroutine program using **winProg**.

Other Improvements

- Fixed problem in the winVar Variable Selection window where array indices larger than ten were displayed incorrectly for lower CRT resolutions (800 x 600 or lower).
- Reversed the sign of the gantry cross error correction gain variables `axGantryM2SGain[]` and `axGantryS2MGain[]`. When the S2M (slave-to-master) gain is positive, and the following error difference (from the slave to the master) is positive, a negative amount is added to the master following error to decelerate it's motion, allowing the slave to catch-up and align itself. When the M2S (master-to-slave) gain is positive, a positive amount is added to the slave following error to accelerate it's motion toward the master in the above example.
- Allowed each instance of the `ioEnetAutodirect` driver to have a separate timing variable.
- Added command line arguments `-retries` and `-timeout` to the `ioEnetAutoDirect` I/O driver to allow the user to set the number of TCP/IP retries and timeout on the command line.
- Allow threading macro X values to be all positive or negative for the given cycle instead of just all positive. Altered the error message.
- Changed the behavior of the load function in the MDSI file browser so that the graphical keyboard does not appear after selecting a file.
- This Demo Installs on Windows 98 and ME - Several customers reported problems installing OpenCNC 6.2 demo on these operating systems. These problems have all been solved.
- Fixed the comment handling of the Mechatrolink parameter file so comments will only be displayed in the diagnostics window if a `-v` setting is used.
- Allow Windows 2000 users to update to Internet Explorer 5.5 using the setup program.
- The OpenCNC setup program now detects that the version of the HAL installed on your PC is not compatible with VenturCom RTX - In the previous release, the customer had to install the latest Service Pack before discovering this problem. This release discovers this problem sooner and instructs the customer how to install the correct HAL.
- Fixed problem when using Constant Surface Speed on a lathe with `defDecimalShift = 1`.
- Fixed incorrectly parsed values that can occur when a second parser is used. This only occurred when the axes in both job streams did not match each other as rotary or linear axes or did not match as diameter types.
- Fixed problems with G90/G91 in the second job stream.
- Fixed problem where `axLimitExceedPos` (and `axFeedInhibitPos`) inhibited both positive and negative motion with a handwheel while `axLimitExceedNeg` (and `axFeedInhibitNeg`) inhibited neither.
- Fixed problem in `plcCpy` which caused a Runtime Error 53 when copying to a floppy or machine folder when the machine files did not already exist.
- Fixed GOTO command to allow it to jump to an N Number that has leading zeros.



- WinVar - fixed several user interface issues.
- Correct the feedrate of the last withdraw return move when a circular move has been interrupted by the withdraw move and the tune variable **jsWithdrawFdLast[]** is zero or undefined in the tune file.
- Modified the Spindle Probe cycle for mills to enter the measured offset in machine coordinates.
- Fixed a problem that caused machining to stop during very specific high speed machining situations.
- Removed the OPC Server from the installation. Contact MDSI if you would require this functionality.
- OpenCNC now responds to a feedhold command during a deep hole tap cycle. If feedhold is requested while the drill axis is below the R-plane, the message "feedhold: pending" will appear and feedhold will be delayed until the position reaches the R-plane. Once feedhold occurs at the R-plane, the message "feedhold: on" will appear. While in a feedhold condition at the R-plane, spindle override is allowed. A cycle start will resume the tap cycle and remove any spindle override.
- OpenCNC now includes the DLL that caused Ethernet I/O **dioInTest** and **dioOutTest** programs to fail in 6.2.
- Fixed problems where DACs on IPack VIP-4ENC DAC were not re-enabled after a WDT re-enable.
- OpenCNC_Module.bas is now included in the install. This module provides several convenient functions to an API developer.
- Added a .REG file to allow user to register the MDSI Macro Wizard that is an add-in to Visual Basic 6.0.
- Added mouse wheel functionality to winVar, winProg, and the winDio programs.
- Modified the positioning of the keyboard to ensure that it does not block the line the user is editing.
- Improved the logic of the withdraw/recover feature to prevent the tool from making the last retract move at the rapid rate if **jsWithdrawFdLast[]** variable was set to 0 or not defined in the Tune file.
- Added logic to allow the automatic withdraw feature to work in multiple job streams.
- Fixed logic that caused the handwheel to be locked out and the software slowdown zone ignored (**axVelMaxSlow** and **axLocAbsMinSlow**) in rare situations.
- Changed the functionality of the GOTO command to work in a subfile subroutine call.
- Improved parsing of GOTO command.
- Fixed problem that caused Yaskawa Mechatrolink outputs to briefly turn on when OpenCNC was started.



- Fixed winGen problem. winGen would not update the value of certain variables when there was more than 140 variables referenced in the winGen file. Up to 300 variables can now be referenced in a winGen file.
- Improved the spindle look ahead logic to stop the spindle during a rapid move that occurs immediately before an M30 command.
- Added command line arguments to Ethernet I/O to allow the user to increase the number of retries that the driver will attempt before generating a failhold.
- Corrected the fixture calibration feature for mills.
- Added the ability for the variable defIJKLetters to define more than three characters.
- Fixed problems with CSS speeds being off by a power of 10 when **defDecimalShift** value was set to a value other than 0.
- Added support for rotary axes in winAxTune.
- Fixed the occassion jumping of axes when resuming a motion block interrupted by withdraw.
- Fixed sequencer reset problems which could result in incorrect axis positions when using G92.
- Updated the file browser to newer explorer style. This solves the problem of not being able to display extremely long file names.
- Fixed problem in winProg where when a program is loaded, in the MDSI file browser, would cause the program to place the highlight at the end of the program.
- Fixed problem in winVar names window during an Index Search where a matched variable name was not highlighted. This happened when a single letter was entered in the keyboard, removed, and the same letter was re-entered.
- Changed the Save As feature in winProg, winFix, and winOffset, so that files are saved in default folders for that type of file. Previously, it was saved in the Programs folder, and would not be seen from the Load menu.
- Fixed MDSI file browser so that when a file is deleted using the **File > Delete** menu, the file properties box gets cleared. Also, removed the file name from the file list (a problem when the file was at the root level). Now displays the Windows critical symbol in the MsgBox when a file can not be deleted.
- The file properties box is now cleared in the MDSI file browser when another file or drive is selected. Also, if an invalid drive is selected, there is no warning displayed in the file properties box. The warning is now displayed in a popup window.
- Fixed problem in MDSI file browser where the incorrect folder was displayed after picking (but not changing) a folder and then changing drives.
- In MDSI file browser, when the Browse button is selected, the path entered from the graphical keyboard is used as the default when **File > Save As** is used.



- Fixed problem in winVar names window where highlights were not removed from variables during Find Next and when picking variables.
- Change the size of the filename text box in the MDI file browser window to be full width and prevent editing the file path in the box. Improved the vertical resizing of the MDSI file browser to be smooth, instead of changing in steps.
- Increased spacing of offset calibrate labels to prevent clipping at 800 x 600 screen resolution.
- Fixed the Help for the Job Loader and Job Creator to use the new help files, which are now separate for each program.
- Changed the size of the MDSI browser buttons to match the graphical keyboard, and resize the browser to match the screen resolution like the keyboard.
- Fixed the winVar names window so it scales to the screen resolution like the other windows. Now the fonts appear the same at 800 x 600 and 1280 x 1024.

Improved the Mill and Lathe Sample Logic included in the MDSI Software Developer's Kit

- Added logic to disable the servos and switch to manual mode when a failhold is detected.
- Fixed problem that caused the lathe sample to repeatedly output a message during a soft stop operation.
- Improved spindle logic on sample mill logic.
- Modified the `disServo()` routine to switch the control to manual mode.

The following items have been improved for German support

- OpenCNC Installs on computers with German Windows NT - Installation problems that occurred in OpenCNC 6.2 have been solved.
- Messages have been translated to German for German Installation.
- Changed the layout for the German keyboard to reflect correct names on keys, added missing keys, and re-arranged the numeric keypad to match the physical keyboard.
- Increased the width of the MDSI browser buttons in German.
- Fixed winVar buttons so German words are not clipped.
- Added German version of Internet Explorer 5.5 sp2 to the install CD. Enhanced the install program to automatically detect the language of the operating system, and choose the correct language for IE and service pack installs.
- Fixed PowerPoint Preview to work on German OS. Also, determine if PowerPoint viewer is installed, and only enable either the Viewer or Install menu for PowerPoint. Also added German version of PowerPoint Viewer install for German operating systems.



The following items have been added to or improved in the OpenCNC documentation

- Added the winGenerator TOGGLE function
- Added axFErrStopWindow and axFErrStopTime variables
- Added **defRotDirBySign**, **defCRCMinJoin**, and **defRotaryFixUse** variables.
- Many manuals from MDSI hardware partners were inadvertently excluded from the OpenCNC 6.2 documentation. They are now included.
- Lead screw compensation description for a rotary wrapped axes has been modified to clearly state that the last measurement on the rotary axis must occur at 360 degrees.
- The following six oprOff symbols are now documented in the Advanced API Programming manual: WRITE_TLNOSEORIENT, READ_TLNOSEORIENT, WRITE_SPNOVERRIDE, READ_SPNOVERRIDE, WRITE_FEEDOVERRIDE, READ_FEEDOVERRIDE.
- Reformatted all of the documentation images to reduce the size of the documentation files.
- Modified the description of the Withdraw issue in the 6.3.1 Integrator Release Notes below.
- Fixed MDSIHelp to use the correct Application data folder on non-English operating systems.
- Fixed problems with MDSI Help build manual for print, where images and formatting would be missing or incorrect.
- Fixed problem with MDSI Help build manual for print, when the close button was picked and a file name was selected for Save, the file was not actually saved. This happened when the file wasn't previously saved.

Integrator Release Notes for OpenCNC 6.2

OpenCNC Product Descriptions

OpenCNC Pro - This version supports 5-10 axes of simultaneous motion. The United States government prohibits export of this product to any country that is not on the approved export list for controlled technology. Violating this law can result in large fines and imprisonment. To ensure compliance with this law, you must obtain prior written approval from MDSI before you can ship this product outside of the United States or Canada. This product cannot be exported to Mexico without first obtaining an Export License.



OpenCNC Plus - This product is limited to four axes of simultaneous motion. Unlike OpenCNC Pro, you may export this product to most, but not all, countries in the world. However, to assure compliance you must obtain prior written approval from MDSI before you can ship this product outside of the United States or Canada.

OpenCNC Demo - This is the demonstration version of OpenCNC. It can run most machine logic, but cannot run an actual machine. The Demo version is not to be used as a development system. It has the following features and limitations.

- **The Demo version** runs on Windows XP, 2000, NT, ME, and 98 Second Edition.
- This product does not require VenturCom RTX or a dongle to run.
- Maximum interrupts are 100 per second.
- Does not support I/O or hardware interrupts.

Operating Systems and Minimum Requirements

- Windows NT - Service Pack 6a or Windows 2000 - Service Pack 2 (or latest)
- 128 megabytes RAM (256 megabytes recommended). Memory chips in the PC must all be the same size (i.e. do not use a 128 meg chip and a 32 meg chip in the same PC). MDSI highly recommends that you only use memory chips from the same vendor. During Windows 2000 testing we discovered several OpenCNC startup problems that were directly related to the memory in the PC.
- Intel Pentium Processor - 300 MHz or above including Celeron, and PII, PIII, and P4 processors.
- Intel manufactured motherboard.
- At least 1 gigabyte hard drive for Windows NT, 5 gigabytes for Windows 2000.
- CD-ROM Drive.

Known Software Limitations

Withdraw/Recover feature - When the machine operator activates a withdraw cycle with deferred offsets pending, the pending deferred offset will be applied during the first recover move requested by the machine operator. This limitation does not occur when immediate offsets are specified for the application.

If immediate tool and fixture offsets are active, the offset is interpolated into the machine position during the first motion command following the activation of a tool and/or fixture offset. If deferred tool and fixture offsets are active, the offset is interpolated into the machine position during the first motion that commands the offset axis following the activation of a tool or fixture offset. This is only a problem when offsets are deferred and at least one of the axes has not been programmed to move to activate its new offset value. In this rare event the first recover move may not be expected by the machine operator.



If the amount of the deferred offset exceeds the maximum offset change allowed during the withdraw cycle, OpenCNC will generate an error.

The withdraw feature does not behave in this manner if the withdraw is requested after the offset is fully interpolated into the machine position. Contact the MDSI hotline if you are uncertain how this issue affects your use of the control's withdraw feature.

Here is an example of this situation. Offsets are deferred for machine. The interrupted part program block includes the selection of a fixture offset code that activated different X and Y fixture offset values. X is programmed to move in this block but Y is not. The motion is interrupted by a withdraw. part of the X change offset has been interpolated into the move by the time that the withdraw mode is selected. None of the Y change has been interpolated since Y was not programmed and the offsets are deferred. In this situation, the deferred Y change in offset is erroneously interpolated into the first withdraw recover block. the remaining change in X fixture offset for the interrupted move will not be interpolated until the interrupted block's motion is resumed.

To set up the withdraw feature to ensure the safest operation, you should set the Tune file variables shown below. These settings will restrict the size of the allowed offset during a withdraw and limit the speed of the recovery moves.

jsRetraceFeed[0]	20 in/min	# Specifies infeed rate for Retrace moves
jsWithdrawRtFeed[0]	25 in/min	# Specifies infeed rate for withdraw return moves
jsWithdrawFdLast[0]	5 in/min	# Specifies infeed rate for last withdraw return move
defTLOffChgMax	0.05 in	# Sets Maximum Tool Offset Change During Retrace/Withdraw
defFixOffChgMax	0.10 in	# Sets Maximum Fixture Offset Change During Retrace/Withdraw
defTILenWrOffMax	0.10 in	# Sets Maximum Tool Length Wear Offset to .1 in
defTIRadWrOffMax	0.10 in	# Sets Maximum Tool Radius Wear Offset to .1 in

Note: `jsWithdrawFdLast[0]` must be programmed as a nonzero value in the Tune file. If it is 0 or not programmed, the last recover move will be made at a rapid rate instead of the programmed block rate.

Upgrading from Windows NT to Windows 2000

Users upgrading an OpenCNC system from Windows NT to Windows 2000 have three options. Only the first is totally supported by MDSI and Microsoft.



- The recommended option is to add a new hard drive to the computer and do a clean install of Windows 2000 on the new hard drive.
- The second option is to install Windows 2000 on a blank partition of the current hard drive. This option is discouraged since having an NT and 2000 partition on a single hard drive is not fully supported by Microsoft and MDSI did experience some failures during installation testing.
- Upgrading a partition from NT to 2000 is not supported by MDSI due to the inconsistencies in the Windows directory structure after the upgrade has occurred.

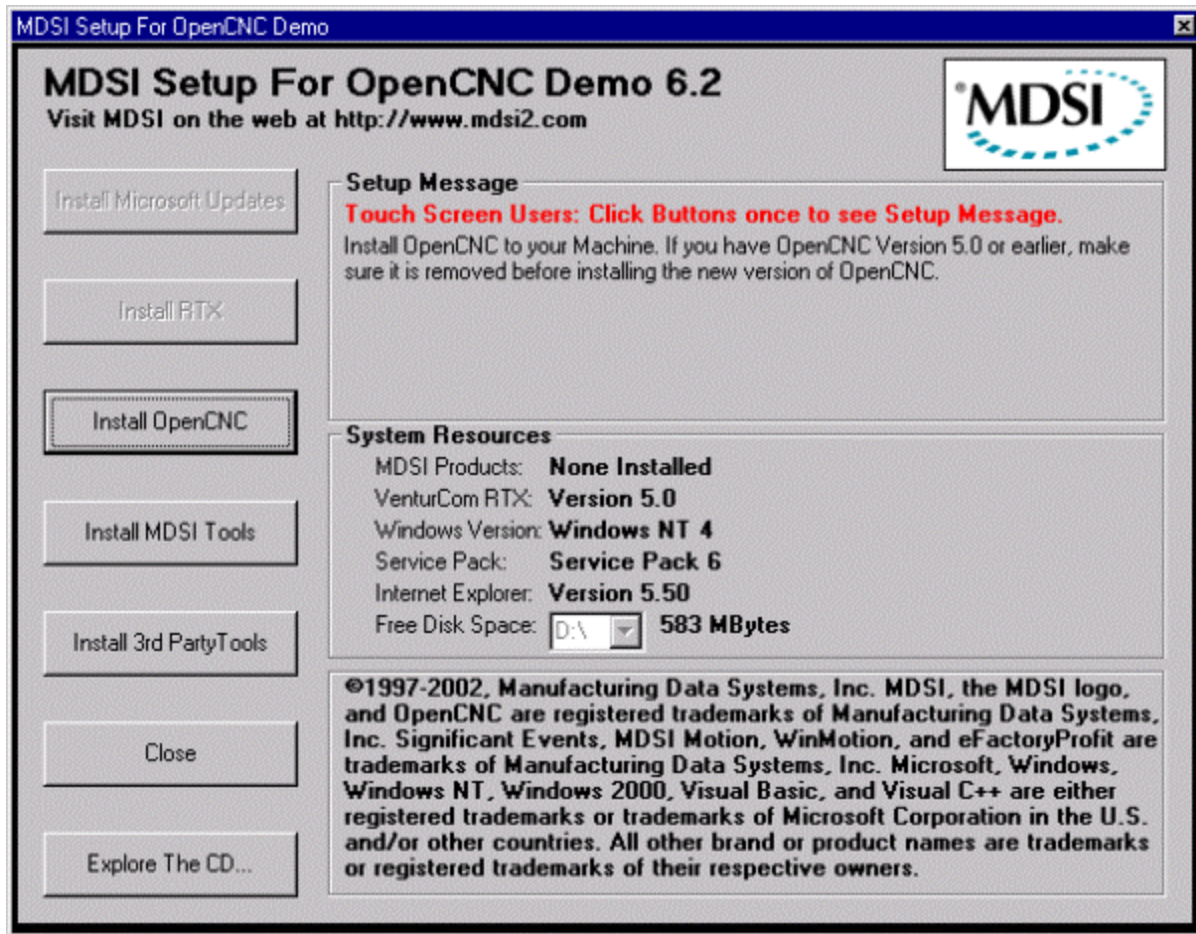
MDSI Installation Wizard

The MDSI Installation Wizard automatically runs when you insert the OpenCNC CD in your computer. This wizard will guide you through the installation process by making sure you install the software in the proper order. The general installation order is listed below.

- Install the OpenCNC Integrator Documentation on your development computer. To install the documentation, press the MDSI Tools button and select the MDSI Integrator Documentation. Once the documentation is installed, select **Programs>MDSI OpenCNC>MDSI Documentation** from the Windows Start menu to view the documentation.
- Make sure you have the latest Service Pack for the installed operating system.
- Install the RTX software and then install OpenCNC.
- Install any of the MDSI or 3rd Party Tools that your application requires.

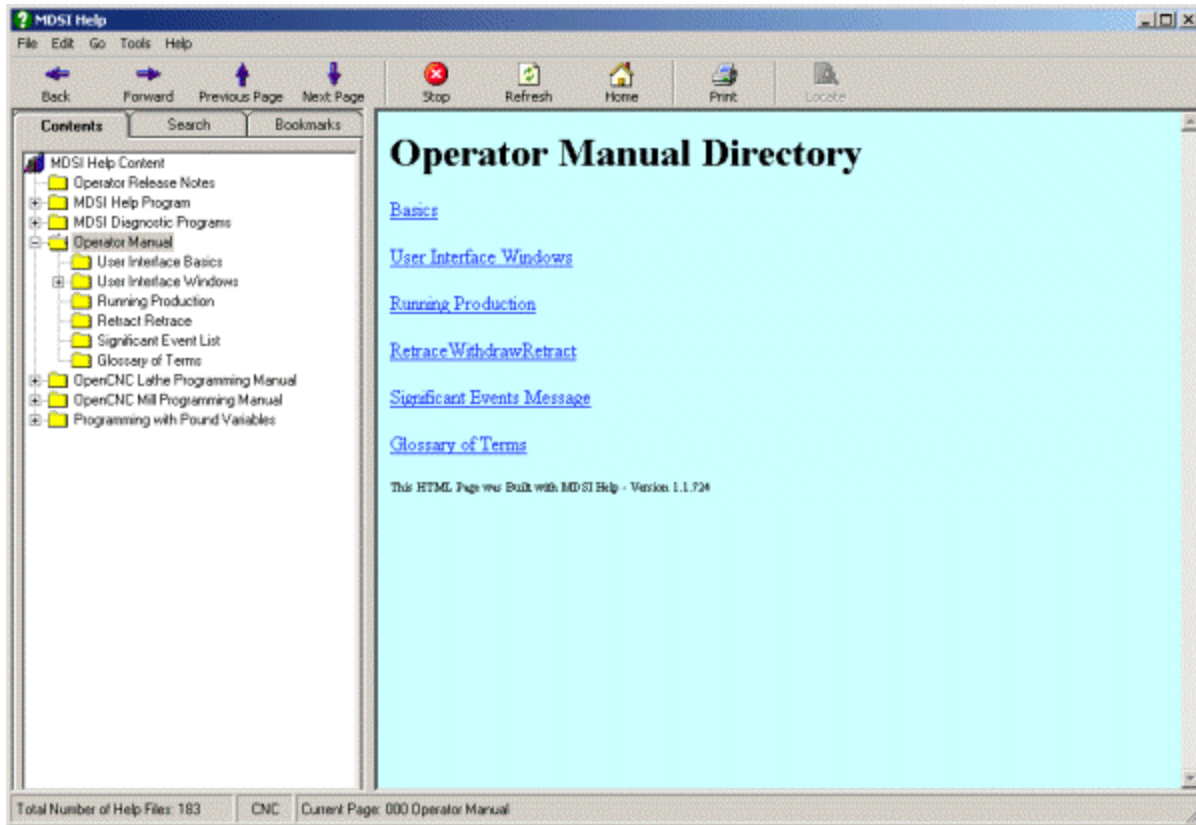


Documentation and Online Help Improvements



- VARs, OEMs, and End-users can add their own HTML based documentation that can be viewed from MDSI Help.
- MDSI documentation has been converted to HTML and has been reorganized and split into small sections to make it easy to locate and search for topics.
- MDSI has developed a documentation browser called MDSI Help. This program provides searching and browsing capabilities that will help you find information about the MDSI software quickly.
- Printed manuals will no longer be available from MDSI.
- The MDSI documentation now supports both OpenCNC and WinMotion (MDSI's motion control software product). Some topics in the documentation describe both products.

- Users of Windows NT must install Internet Explorer 5.0 or later to use MDSI Help. IE 5.5 is included on the MDSI CD. Users of Windows 2000 will not have to install IE 5.5 since it is a standard part of the operating system.

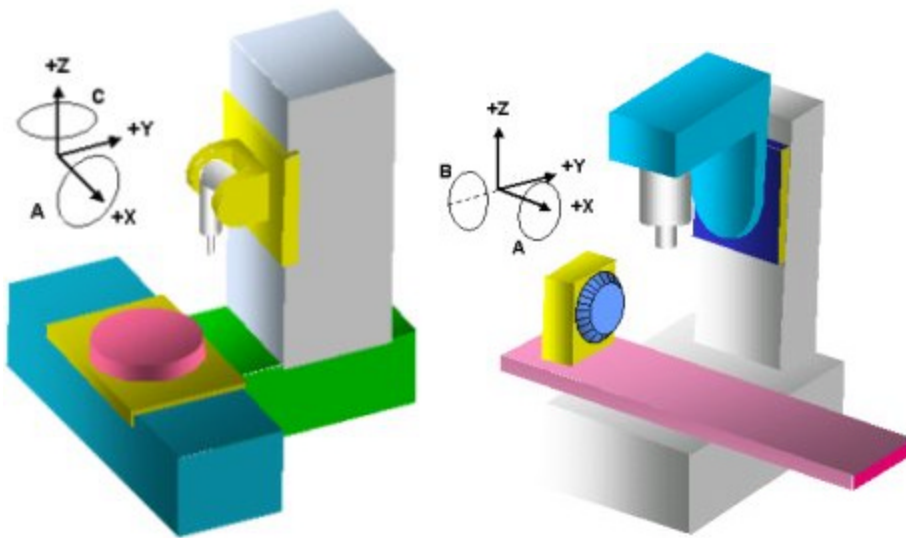


New Hardware Support in OpenCNC 6.2

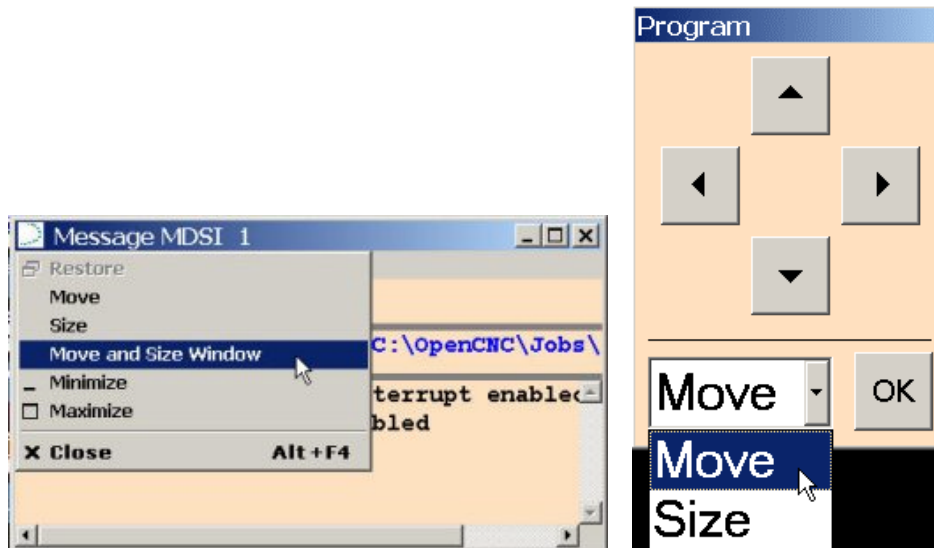
- Ethernet I/O - Support for Automation Direct 205 and Terminator I/O and Opto22 Ethernet I/O.
- Yaskawa Mechatrolink digital network
- Support for Acces I/O Watchdog Timer Card with Sensoray 626 board

New Software Features

- Improved winVar program.
- Improved support for 5 axes machines by separating the rotary axis fixture compensation and RTCP (rotary tool compensation) features. This allows machines which use RTCP to also use fixture offsets. This release also expands the number of 5 axes machine configurations that are supported by OpenCNC. MDSI supports three 5 axis configurations. Case 3 below right has been added to OpenCNC 6.2.



- Move and Size control added to all user interface windows. This tool helps touch screen users easily move and resize windows when no mouse is available. This window can be selected from the MDSI icon in every OpenCNC window.



- Added option to winProg, winOff, and winFix to allow the use of the standard Windows NT/2000 file browser in the part program, tool offset and fixture offset windows. Also added ability for the file browsers to specify which file extensions to display in winProg, winOff, and winFix.
- Added feature that automatically deletes old Significant Event files after a specified number of days.
- Added capability of creating new MDSI variables by reading an ASCII text file at startup. This feature lets an API programmer add variables to the system without having to add them into the ISaGRAF project.
- New ISaGRAF C-functions strRead() and strWrite() to allow the PLC to read and write to a new OpenCNC string variable array mStrVariables[]. There are 100 elements in this array.

OpenCNC Update Program:

- The OpenCNC update program will update the paths for non-OpenCNC applications as long as the application is found in the Machines directory.
- If a user drags a machine shortcut over the update program, the shortcut will be updated in addition to the machine files. Note that the user still has to select a .men file since the program won't know where the machine files are located from the shortcut alone.
- The update program will automatically copy winGen.exe to winGen2 (3, 4,etc).exe and winProg.exe to winProg2 (3, 4,etc).exe if they appear in the .men file. This is a convenience for the user who has multiple versions of winGen or winProg running.

Probe Cycle: Additions and Enhancements:

- New cycles:
 - Automatically locate datum block center. User does not have to indicate a datum block every time it is mounted on table. This cycle can also determine the radius of the probe stylus.
 - Find Center between Two Parallel Lines in XY Cycle (S7): New cycle created to touch in XY plane at programmed angle and distance on either side of the start point.
 - Probe sphere (S6) and report radius and center coordinates.
 - Added spindle probe macro to allow 5 axis machines to probe with rotary axis A at 90 degrees (case 1) or -90 degrees (case 2). In OpenCNC 6.2 there is no spindle probe macro that supports case 3 with B at 90 degrees. The standard spindle probe macro is available for all mill application with X, Y, Z being the first three axes and the rotary axis that affects the Z axis at 0 degrees.

- Datum Cycle (S0): Added Significant Event of auxiliary axes positions for each datum touch. XYZ positions were already recorded.
- Probe Find Surface Edge Cycle (Fixture Offset; S1-S6): Altered cycle so that if no offset code (e.g. E0 or no E) is programmed in macro call, the position of the probing axis is recorded in machine and part coordinates while the other axes are recorded in part coordinates only.
- Improved probe cycles to output probing results as Significant Events. Added Tune file variables to specify whether the Significant Events are output.

Improved Functionality

- Separated peck drill (G83) and peck drill with chip break (G73) into unique G code cycles.
- Modified OpenCNC's threading algorithm to improve threading performance at low spindle speeds.
- The MDSI software now flags an error if a duplicate symbol appears in the Symbols file.
- The dwell time specified by a P value for a tap cycle is now always specified in seconds, even during IPR mode.
- Items in the .men file's Shutdown group are no longer run if the machine is already stopped. (They are still executed when stopping the machine, but not exiting winMenu.)
- winJobAdmin now disables the File>Load menu in Run mode.
- Added following error plot to winFeShow. This allows the following error trace to be graphed by itself. (As opposed to just appearing as an envelope around position or velocity.) Added a -noferr argument to remove this feature.
- The DIOS_STOPS message will now be sent to the PLC (if enabled by **defDiosStops**) before the Sequencer stops the spindle by zeroing **spRPMValue[]**. This allows the PLC to capture the current RPM and stop the spindle before the Sequencer clears **spRPMValue[]**, sets the **SEQR_RPMZ** bit and waits for it to clear.
- Changed the software to output a **CSCHECK** (Cycle Start Check) message when Cycle Start is pressed while MDI, withdraw, or retrace modes are active.
- Improved MDI mode to eliminate errors when OpenCNC is shut down.
- Renamed microcommand **MC_SETIPRMODE** to **MC_SETFEEDMODE**.
- Renamed variable **jsIprMode[]** to **jsFeedMode[]**.
- Allow user to program a spindle speed of 0. Previous versions generated an error when S0 was programmed.

- Allow winGen commands NOSELECTONFLAG, ONLYSELECTONFLAG, NOSELECTONSEQ, CMP, NOCMP, CONFIRM and AXISUNLOCK to display multi-line messages. All lines appear in one text message in the command, but multiple lines are separated by "\n". If the "\" character is required in the message, it must be entered as "\\". The following command will display a 2 line message:

```
NOSELECTONFLAG(mRunMode,
```

```
"CANNOT CHANGE TOOL WHILE RUNNING\nSELECT MANUAL MODE  
FIRST");
```

The lines displayed in the message window are:

```
CANNOT CHANGE TOOL WHILE RUNNING
```

```
SELECT MANUAL MODE FIRST
```

Documentation: New Topics and Improvements

- Added PID loop documentation including Integrator (I gain) documentation.
- Improved compensation capabilities for 5 axes machines.
- Improved part program probing descriptions for mills and lathes.
- Hardware documentation - each hardware board and fieldbus supported by MDSI has its own complete section in the documentation.
- New online help using the MDSI Help program.