UMC Series

Operator's Manual Supplement
96-8250
Revision L
February 2020
English
Original Instructions

Contents

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LIMITED WARRANTY CERTIFICATE

Haas Automation, Inc.

Covering Haas Automation, Inc. CNC Equipment

Effective September 1, 2010

Haas Automation Inc. ("Haas" or "Manufacturer") provides a limited warranty on all new mills, turning centers, and rotary machines (collectively, "CNC Machines") and their components (except those listed below under Limits and Exclusions of Warranty) ("Components") that are manufactured by Haas and sold by Haas or its authorized distributors as set forth in this Certificate. The warranty set forth in this Certificate is a limited warranty, it is the only warranty by Manufacturer, and is subject to the terms and conditions of this Certificate.

Limited Warranty Coverage

Each CNC Machine and its Components (collectively, "Haas Products") are warranted by Manufacturer against defects in material and workmanship. This warranty is provided only to an end-user of the CNC Machine (a "Customer"). The period of this limited warranty is one (1) year. The warranty period commences on the date the CNC Machine is installed at the Customer's facility. Customer may purchase an extension of the warranty period from an authorized Haas distributor (a "Warranty Extension"), any time during the first year of ownership.

Repair or Replacement Only

Manufacturer's sole liability, and Customer's exclusive remedy under this warranty, with respect to any and all Haas products, shall be limited to repairing or replacing, at the discretion of the Manufacturer, the defective Haas product.

Disclaimer of Warranty

This warranty is Manufacturer's sole and exclusive warranty, and is in lieu of all other warranties of whatever kind or nature, express or implied, written or oral, including, but not limited to, any implied warranty of merchantability, implied warranty of fitness for a particular purpose, or other warranty of quality or performance or noninfringement. All such other warranties of whatever kind are hereby disclaimed by Manufacturer and waived by Customer.

Limits and Exclusions of Warranty

Components subject to wear during normal use and over time, including, but not limited to, paint, window finish and condition, light bulbs, seals, wipers, gaskets, chip removal system (e.g., augers, chip chutes), belts, filters, door rollers, tool changer fingers, etc., are excluded from this warranty. Manufacturer's specified maintenance procedures must be adhered to and recorded in order to maintain this warranty. This warranty is void if Manufacturer determines that (i) any Haas Product was subjected to mishandling, misuse, abuse, neglect, accident, improper installation, improper maintenance, improper storage, or improper operation or application, including the use of improper coolants or other fluids, (ii) any Haas Product was improperly repaired or serviced by Customer, an unauthorized service technician, or other unauthorized person, (iii) Customer or any person makes or attempts to make any modification to any Haas Product without the prior written authorization of Manufacturer, and/or (iv) any Haas Product was used for any non-commercial use (such as personal or household use). This warranty does not cover damage or defect due to an external influence or matters beyond the reasonable control of Manufacturer, including, but not limited to, theft, vandalism, fire, weather condition (such as rain, flood, wind, lightning, or earthquake), or acts of war or terrorism.

Without limiting the generality of any of the exclusions or limitations described in this Certificate, this warranty does not include any warranty that any Haas Product will meet any person's production specifications or other requirements, or that operation of any Haas Product will be uninterrupted or error-free. Manufacturer assumes no responsibility with respect to the use of any Haas Product by any person, and Manufacturer shall not incur any liability to any person for any failure in design, production, operation, performance, or otherwise of any Haas Product, other than repair or replacement of same as set forth in the warranty above.

Limitation of Liability and Damages

Manufacturer will not be liable to Customer or any other person for any compensatory, incidental, consequential, punitive, special, or other damage or claim, whether in an action in contract, tort, or other legal or equitable theory, arising out of or related to any Haas product, other products or services provided by Manufacturer or an authorized distributor, service technician, or other authorized representative of Manufacturer (collectively, "authorized representative"), or the failure of parts or products made by using any Haas Product, even if Manufacturer or any authorized representative has been advised of the possibility of such damages, which damage or claim includes, but is not limited to, loss of profits, lost data, lost products, loss of revenue, loss of use, cost of down time, business good will, any damage to equipment, premises, or other property of any person, and any damage that may be caused by a malfunction of any Haas product. All such damages and claims are disclaimed by Manufacturer and waived by Customer. Manufacturer's sole liability, and Customer's exclusive remedy, for damages and claims for any cause whatsoever shall be limited to repair or replacement, at the discretion of Manufacturer, of the defective Haas Product as provided in this warranty.

Customer has accepted the limitations and restrictions set forth in this Certificate, including, but not limited to, the restriction on its right to recover damages, as part of its bargain with Manufacturer or its Authorized Representative. Customer realizes and acknowledges that the price of the Haas Products would be higher if Manufacturer were required to be responsible for damages and claims beyond the scope of this warranty.

Entire Agreement

This Certificate supersedes any and all other agreements, promises, representations, or warranties, either oral or in writing, between the parties or by Manufacturer with respect to subject matter of this Certificate, and contains all of the covenants and agreements between the parties or by Manufacturer with respect to such subject matter. Manufacturer hereby expressly rejects any other agreements, promises, representations, or warranties, either oral or in writing, that are in addition to or inconsistent with any term or condition of this Certificate. No term or condition set forth in this Certificate may be modified or amended, unless by a written agreement signed by both Manufacturer and Customer. Notwithstanding the foregoing, Manufacturer will honor a Warranty Extension only to the extent that it extends the applicable warranty period.

Transferability

This warranty is transferable from the original Customer to another party if the CNC Machine is sold via private sale before the end of the warranty period, provided that written notice thereof is provided to Manufacturer and this warranty is not void at the time of transfer. The transferee of this warranty will be subject to all terms and conditions of this Certificate.

Miscellaneous

This warranty shall be governed by the laws of the State of California without application of rules on conflicts of laws. Any and all disputes arising from this warranty shall be resolved in a court of competent jurisdiction located in Ventura County, Los Angeles County, or Orange County, California. Any term or provision of this Certificate that is invalid or unenforceable in any situation in any jurisdiction shall not affect the validity or enforceability of the remaining terms and provisions hereof, or the validity or enforceability of the offending term or provision in any other situation or in any other jurisdiction.

Customer Feedback

If you have concerns or questions regarding this Operator's Manual, please contact us on our website, www.HaasCNC.com. Use the "Contact Us" link and send your comments to the Customer Advocate.

Join Haas owners online and be a part of the greater CNC community at these sites:

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Product videos and information

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Customer Satisfaction Policy

Dear Haas Customer,

Your complete satisfaction and goodwill are of the utmost importance to both Haas Automation, Inc. and the Haas distributor (HFO) where you purchased your equipment. Normally, your HFO will rapidly resolve any concerns you have about your sales transaction or the operation of your equipment.

However, if your concerns are not resolved to your complete satisfaction, and you have discussed your concerns with a member of the HFO's management, the General Manager, or the HFO's owner directly, please do the following:

Contact Haas Automation's Customer Service Advocate at 805-988-6980. So that we may resolve your concerns as quickly as possible, please have the following information available when you call:

*   Your company name, address, and phone number
*   The machine model and serial number
*   The HFO name, and the name of your latest contact at the HFO
*   The nature of your concern

If you wish to write Haas Automation, please use this address:

Haas Automation, Inc. U.S.A.
2800 Sturgis Road
Oxnard CA 93030
Att: Customer Satisfaction Manager
email: customerservice@HaasCNC.com

Once you contact the Haas Automation Customer Service Center, we will make every effort to work directly with you and your HFO to quickly resolve your concerns. At Haas Automation, we know that a good Customer-Distributor-Manufacturer relationship will help ensure continued success for all concerned.

International:

Haas Automation, Europe
Mercuriusstraat 28, B-1930
Zaventem, Belgium
email: customerservice@HaasCNC.com

Haas Automation, Asia
No. 96 Yi Wei Road 67,
Waigaoqiao FTZ
Shanghai 200131 P.R.C.
email: customerservice@HaasCNC.com

Declaration of Conformity

Product: Mill (Vertical and Horizontal)*

*Including all options factory- or field-installed by a certified Haas Factory Outlet (HFO)

Manufactured By: Haas Automation, Inc.

                          2800 Sturgis Road, Oxnard, CA 93030

                          805-278-1800

We declare, in sole responsibility, that the above-listed products, to which this declaration refers, comply with the regulations as outlined in the CE directive for Machining Centers:

- Machinery Directive 2006/42/EC
- Electromagnetic Compatibility Directive 2014/30/EU
- Additional Standards:
    – EN 60204-1:2006/A1:2009
    – EN 12417:2001+A2:2009
    – EN 614-1:2006+A1:2009
    – EN 894-1:1997+A1:2008
    – EN ISO 13849-1:2015

RoHS2: COMPLIANT (2011/65/EU) by Exemption per producer documentation.

Exempt by:

    a)   Large scale stationary industrial tool.
    b)   Lead as an alloying element in steel, aluminum, and copper.
    c)   Cadmium and its compounds in electrical contacts.

Person authorized to compile technical file:

Jens Thing

Address:

Haas Automation Europe
Mercuriusstraat 28
B-1930 Zaventem
Belgium

USA: Haas Automation certifies this machine to be in compliance with the OSHA and ANSI design and manufacturing standards listed below. Operation of this machine will be compliant with the below-listed standards only as long as the owner and operator continue to follow the operation, maintenance, and training requirements of these standards.

- *OSHA 1910.212 - General Requirements for All Machines*
- *ANSI B11.5-1983 (R1994) Drilling, Milling, and Boring Machines*
- *ANSI B11.19-2010 Performance Criteria for Safeguarding*
- *ANSI B11.23-2002 Safety Requirements for Machining Centers and Automatic Numerically Controlled Milling, Drilling, and Boring Machines*
- *ANSI B11.TR3-2000 Risk Assessment and Risk Reduction - A Guideline to Estimate, Evaluate, and Reduce Risks Associated with Machine Tools*

CANADA: As the original equipment manufacturer, we declare that the listed products comply with regulations as outlined in the Pre-Start Health and Safety Reviews Section 7 of Regulation 851 of the Occupational Health and Safety Act Regulations for Industrial Establishments for machine guarding provisions and standards.

Further, this document satisfies the notice-in-writing provision for exemption from Pre-Start inspection for the listed machinery as outlined in the Ontario Health and Safety Guidelines, PSR Guidelines dated November 2016. The PSR Guidelines allow that notice in writing from the original equipment manufacturer declaring conformity to applicable standards is acceptable for the exemption from Pre-Start Health and Safety Review.

ETL LISTED
CONFORMS TO
NFPA STD 79
ANSI/UL STD 508
UL SUBJECT 2011
CERTIFIED TO
CAN/CSA STD C22.2 N O.73
Intertek
9700845

All Haas CNC machine tools carry the ETL Listed mark, certifying that they conform to the NFPA 79 Electrical Standard for Industrial Machinery and the Canadian equivalent, CAN/CSA C22.2 No. 73. The ETL Listed and cETL Listed marks are awarded to products that have successfully undergone testing by Intertek Testing Services (ITS), an alternative to Underwriters' Laboratories.

ISO 9001:2015
CERTIFIED

Haas Automation has been assessed for conformance with the provisions set forth by ISO 9001: 2015. Scope of Registration: Design and Manufacture of CNC Machines Tools and Accessories, Sheet Metal Fabrication. The conditions for maintaining this certificate of registration are set forth in ISA's Registration Policies 5.1. This registration is granted subject to the organization maintaining compliance to the noted stardard. The validity of this certificate is dependent upon ongoing surveillance audits.

Original Instructions

User's Operator Manual and other Online Resources

This manual is the operation and programming manual that applies to all Haas Mills.

An English language version of this manual is supplied to all customers and is marked **"Original Instructions"**.

For many other areas of the world, there is a translation of this manual marked **"Translation of Original Instructions"**.

This manual contains an unsigned version of the EU required **"Declaration Of Conformity"**. European customers are provided a signed English version of the Declaration of Conformity with Model Name and Serial Number.

Besides this manual, there is a tremendous amount of additional information online at: www.haascnc.com under the Service section.

Both this manual and the translations of this manual are available online for machines up to approximately 15 years old.

The CNC control of your machine also contains all of this manual in many languages and can be found by pressing the **[HELP]** button.

Many machine models come with manual supplement that is also available online.

All machine options also have additional information online.

Maintenance and service information is available online.

The online **"Installation Guide"** contains information and check list for Air & Electrical requirements, Optional Mist Extractor, Shipping Dimensions, weight, Lifting Instructions, foundation and placement, etc.

Guidance on proper coolant and Coolant Maintenance is located in the Operators Manual and Online.

Air and Pneumatic diagrams are located on the inside of the lubrication panel door and CNC control door.

Lubrication, grease, oil and hydraulic fluid types are listed on a decal on the machine's lubrication panel.

How to Use This Manual

To get the maximum benefit of your new Haas machine, read this manual thoroughly and refer to it often. The content of this manual is also available on your machine control under the HELP function.

IMPORTANT: Before you operate the machine, read and understand the Operator's Manual Safety chapter.

Declaration of Warnings

Throughout this manual, important statements are set off from the main text with an icon and an associated signal word: "Danger," "Warning," "Caution," or "Note." The icon and signal word indicate the severity of the condition or situation. Be sure to read these statements and take special care to follow the instructions.

Description	Example
Danger means that there is a condition or situation that **will cause death or severe injury** if you do not follow the instructions given.	*DANGER: No step. Risk of electrocution, bodily injury, or machine damage. Do not climb or stand on this area.*
Warning means that there is a condition or situation that **will cause moderate injury** if you do not follow the instructions given.	*WARNING: Never put your hands between the tool changer and the spindle head.*
Caution means that **minor injury or machine damage could occur** if you do not follow the instructions given. You may also have to start a procedure over if you do not follow the instructions in a caution statement.	*CAUTION: Power down the machine before you do maintenance tasks.*
Note means that the text gives **additional information, clarification, or helpful hints.**	*NOTE: Follow these guidelines if the machine is equipped with the optional extended Z-clearance table.*

Text Conventions Used in this Manual

Description	Text Example
Code Block text gives program examples.	`G00 G90 G54 X0. Y0.;`
A **Control Button Reference** gives the name of a control key or button that you are to press.	Press **[CYCLE START]**.
A **File Path** describes a sequence of file system directories.	*Service > Documents and Software >...*
A **Mode Reference** describes a machine mode.	MDI
A **Screen Element** describes an object on the machine's display that you interact with.	Select the **SYSTEM** tab.
System Output describes text that the machine control displays in response to your actions.	`PROGRAM END`
User Input describes text that you should enter into the machine control.	`G04 P1.;`
Variable n indicates a range of non-negative integers from 0 to 9.	`Dnn` represents `D00` through `D99`.

Chapter 1: **Introduction**

1.1 **Overview**

This operator's manual supplement describes the unique features and functions of the UMC series of machines. Refer to your Mill Operator's Manual for control operation, programming, and other general mill information.

You can find specific details about the UMC family, including information that is beyond the scope of this document, at www.HaasCNC.com.

1.2 **UMC Workstations**

F1.1: This diagram illustrates the UMC three operator zones.
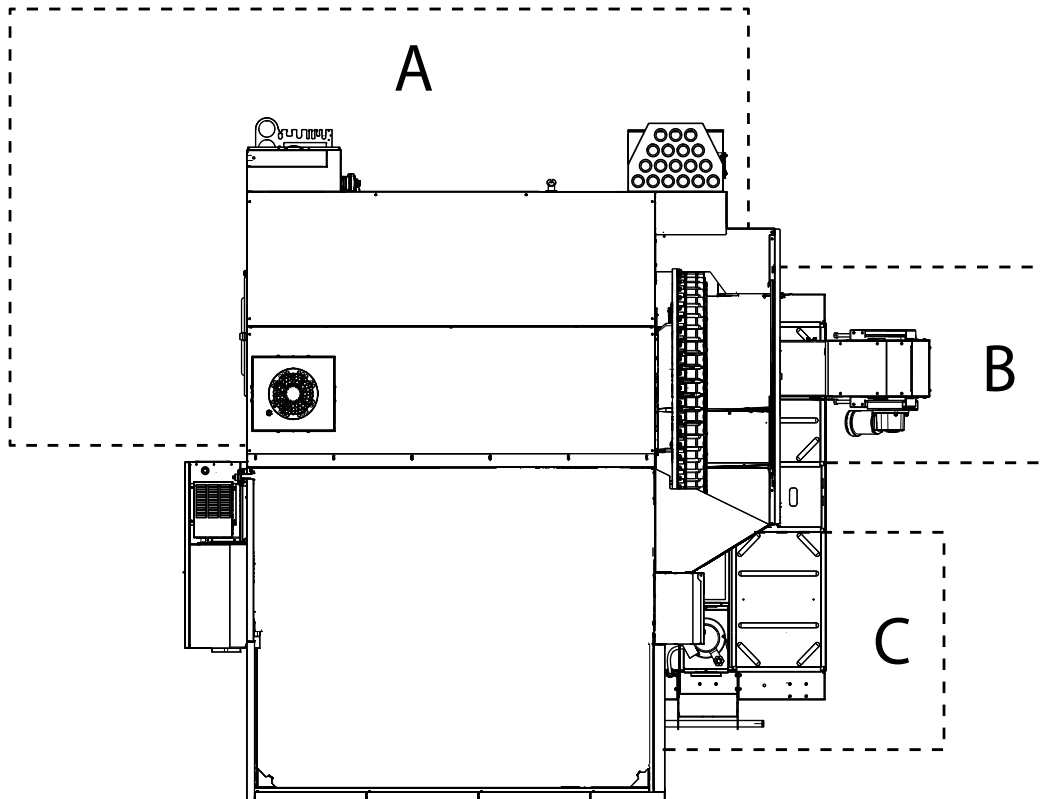
- **A:** Operator Station.
- **B:** Check and Maintain Chip Conveyor.
- **C:** Check and Maintain Coolant, Coolant Pumps and Lubricants.

1.3   **UMC-500/750 Axis Definitions**

F1.2:   This diagram illustrates the (5) axes available on the UMC-500/750.
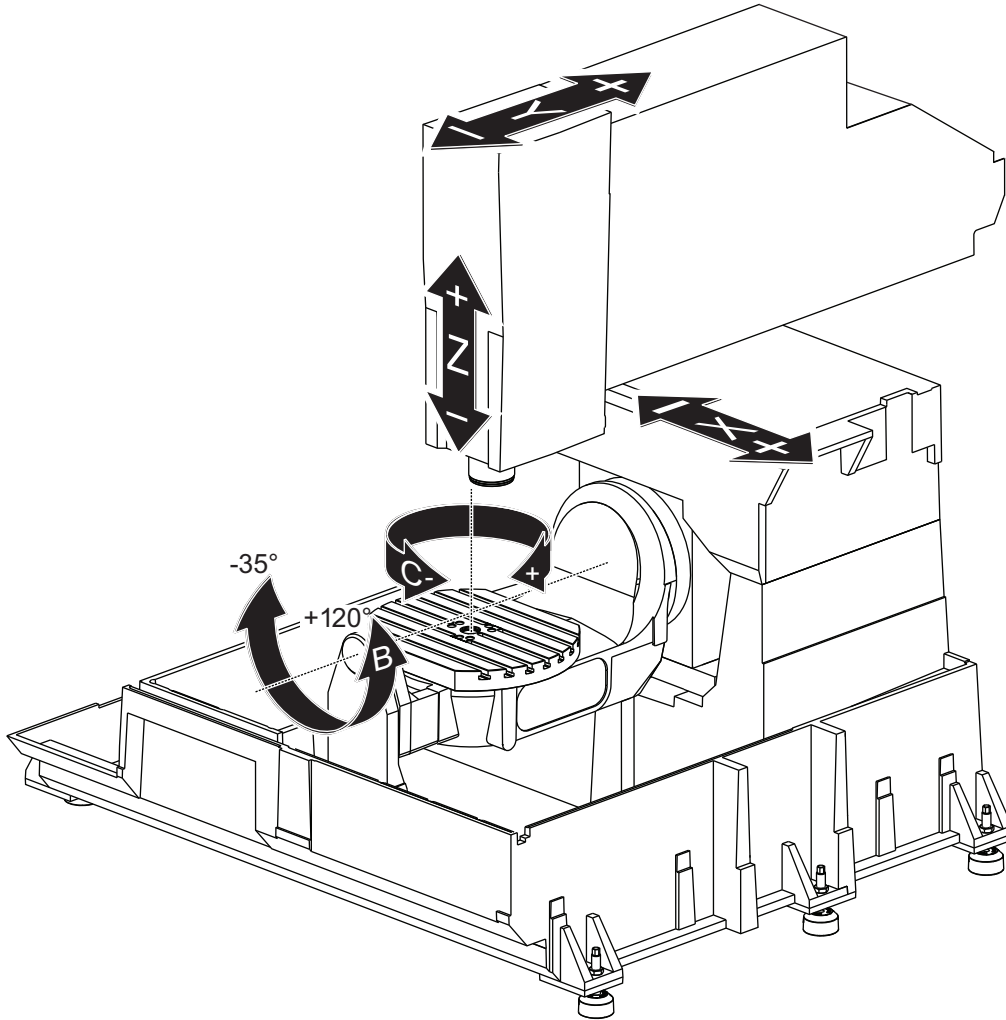
F1.3:   This diagram illustrates the (5) axes available on the UMC-750P.
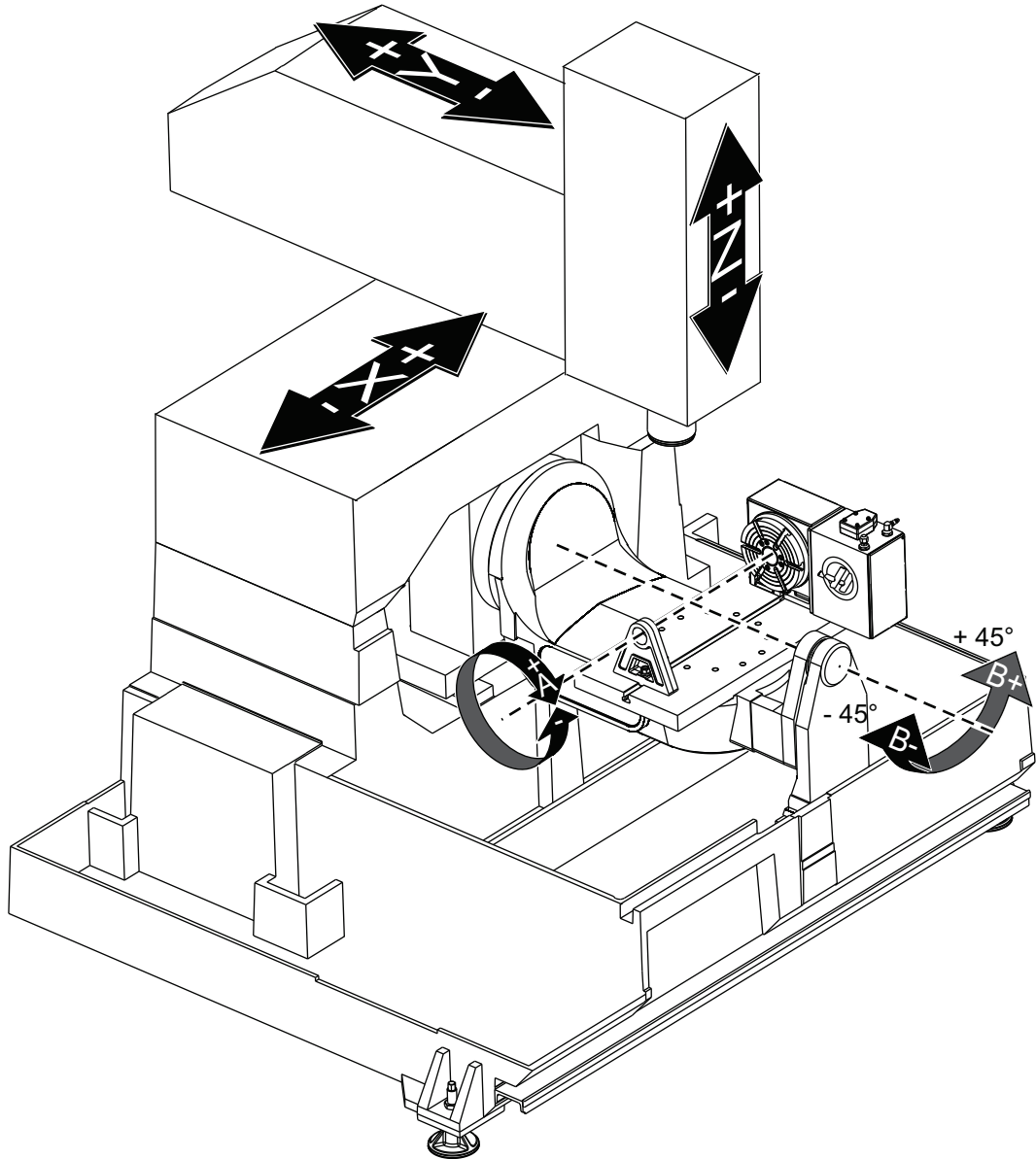
1.4 UMC-1000 Axis Definitions

F1.4: This diagram illustrates the (5) axes available on the UMC-1000.
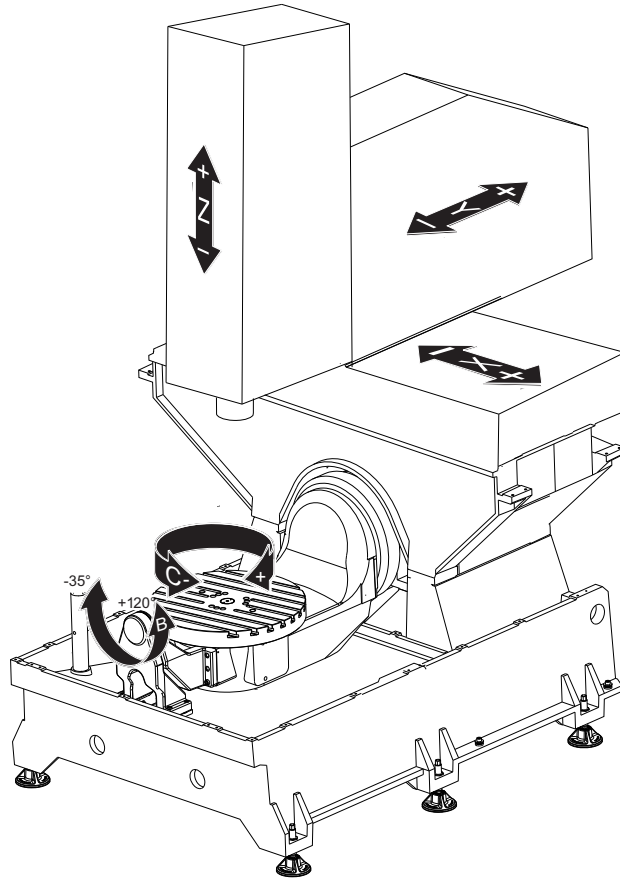
1.5 UMC-500 Specifications

T1.1: UMC-500 Specifications

Travels		
	S.A.E	**Metric**
X Axis	24"	610 mm
Y Axis	16"	406 mm
Z Axis	16"	406 mm

Travels		
	S.A.E	**Metric**
C-Axis Rotation	360° Rotation	
B-Axis Tilt	-35° to +120°	
Spindle Nose to Table (~ min.)	4"	102 mm
Spindle Nose to Table (~ max.)	20"	508 mm
For detailed machine dimensions, including work envelope information, refer to the UMC-500 Machine Layout Drawing on www.haascnc.com.		

Platter		
	S.A.E	**Metric**
Platter Diameter	15.7"	400 mm
T-Slot Width	5/8"	16 mm
T-Slot Center Distance	2.48"	63 mm
Number of Standard T-Slots	5	
Max. Weight on Table (evenly distributed)	500 lb	226.8 kg

T1.2: General Requirements

General Requirements		
	S.A.E	**Metric**
Air Required	4 scfm, 100 psi	113 L/min, 6.9 bar
Coolant Capacity	55 gal	208 L
Power Requirement, Low Voltage	195-260 VAC / 100A	

General Requirements		
	S.A.E	**Metric**
Power Requirement, High Voltage	354-488 VAC / 50A	
Machine Weight	11900 lb	5400 kg

T1.3: Standard Features

Standard Features
Tool Center Point Control (TCPC), Dynamic Work Offsets (DWO), Remote Jog Handle*, Second Home*, Macros*, Spindle Orientation (SO)*, Coordinate Rotation and Scaling (COORD)*, Wireless Intuitive Probing System (WIPS)   *Refer to the Mill Operator's Manual (96-8210) for information on these features.

1.6   UMC-750 Specifications

T1.4: UMC-750 Specifications

Travels		
	S.A.E	**Metric**
X Axis	30"	762 mm
Y Axis	20"	508 mm
Z Axis	20"	508 mm
C-Axis Rotation	360° Rotation	
B-Axis Tilt	-35° to +120°	
Spindle Nose to Table (~ min.)	4"	102 mm
Spindle Nose to Table (~ max.)	24"	610 mm
For detailed machine dimensions, including work envelope information, refer to the UMC-750 Machine Layout Drawing on www.haascnc.com.		

Platter		
	S.A.E	**Metric**
Platter Diameter	19.7"	500 mm
T-Slot Width	5/8"	16 mm
T-Slot Center Distance	2.48"	63 mm
Number of Standard T-Slots	7	
Max. Weight on Table (evenly distributed)	660 lb	300 kg

T1.5: General Requirements

General Requirements		
	S.A.E	**Metric**
Air Required	4 scfm, 100 psi	113 L/min, 6.9 bar
Coolant Capacity	75 gal	284 L
Power Requirement, Low Voltage	195-260 VAC / 100A	
Power Requirement, High Voltage	354-488 VAC / 50A	
Machine Weight	18,000 lb	8165 kg

T1.6: Standard Features

Standard Features
Tool Center Point Control (TCPC), Dynamic Work Offsets (DWO), Remote Jog Handle*, Second Home*, Macros*, Spindle Orientation (SO)*, Coordinate Rotation and Scaling (COORD)*, TSC-Ready, Wireless Intuitive Probing System (WIPS)   *Refer to the Mill Operator's Manual (96-8210) for information on these features.

1.7 UMC-750P Specifications

T1.7: UMC-750P Specifications

Travels		
	S.A.E	**Metric**
X Axis	30"	762 mm
Y Axis	20"	508 mm
Z Axis	20"	508 mm
A-Axis Rotation	360° Rotation	
B-Axis Tilt	-45° to +45°	
Spindle Nose to Table (max.)	25"	635 mm
Spindle Nose to Table (min.)	5"	127 mm
For detailed machine dimensions, including work envelope information, refer to the UMC-750 Machine Layout Drawing on www.haascnc.com.		

Table		
	S.A.E	**Metric**
Length	40.0"	1016 mm
Width	15.0"	381 mm
T-Slot Width	5/8"	16 mm
Number of Standard T-Slots	1	
Max. Weight on Table (evenly distributed)	660 lb	300 kg

T1.8: General Requirements

General Requirements		
	S.A.E	**Metric**
Air Required	4 scfm, 100 psi	113 L/min, 6.9 bar
Coolant Capacity	75 gal	284 L
Power Requirement, Low Voltage	195-260 VAC / 100A	
Power Requirement, High Voltage	354-488 VAC / 50A	
Machine Weight	18,000 lb	8165 kg

T1.9: Standard Features

Standard Features
Tool Center Point Control (TCPC), Dynamic Work Offsets (DWO), Remote Jog Handle*, Second Home*, Macros*, Spindle Orientation (SO)*, Coordinate Rotation and Scaling (COORD)*, TSC-Ready, Wireless Intuitive Probing System (WIPS) *Refer to the Mill Operator's Manual (96-8210) for information on these features.

1.8   UMC-1000 Specifications

T1.10: UMC-1000 Specifications

Travels		
	S.A.E	**Metric**
X Axis	40"	1016 mm
Y Axis	25"	635 mm
Z Axis	25"	635 mm
C-Axis Rotation	360° Rotation	
B-Axis Tilt	-35° to +120°	
Spindle Nose to Table (~ min.)	4"	102 mm

Travels		
	S.A.E	**Metric**
Spindle Nose to Table (~ max.)	29"	737 mm
For detailed machine dimensions, including work envelope information, refer to the UMC-1000 Machine Layout Drawing on www.haascnc.com.		

Table		
Platter Diameter	25"	635 mm
T-Slot Width	5/8"	16 mm
T-Slot Center Distance	4.92"	125 mm
Number of Standard T-Slots	5	
Max. Weight on Table (evenly distributed)	1000 lb	454 kg

T1.11: General Requirements

General Requirements		
Air Required	4 scfm, 100 psi	113 L/min, 6.9 bar
Coolant Capacity	55 gal	208 L
Power Requirement, Low Voltage	195-260 VAC / 100A	
Power Requirement, High Voltage	354-488 VAC / 50A	
Machine Weight	17,000 lb	7711 kg

Chapter 2: UMC Installation

2.1   UMC Installation

The UMC installation procedures are located on the Haas Service site. You can also scan the code below with your mobile device to go directly to the procedure.

F2.1:   UMC-500 Installation

F2.2:   UMC-750 Installation

F2.3:   UMC-1000 Installation

Chapter 3: Wireless Intuitive Probing System (WIPS)

3.1 UMC WIPS Basics

The Wireless Intuitive Probing System (WIPS) comes standard with the UMC series. This system can perform all of the standard probe routines found in the WIPS templates, and also includes special probe routines specifically for the UMC. These special probe routines use a tooling ball on a magnetic base to automatically find the machine's centers of rotation. Refer to page **5** for more information on this process.

Normally, you use WIPS to set tool and work offsets, but the UMC includes a master gauge length tool in case you need to set offsets manually (if, for example, a probe stylus breaks or the batteries lose power). The gage length tool included with your machine has a unique length that is etched on the tool.

NOTE: *If you set the tool length offsets manually, you must also set the Z-Axis work offset manually.*

3.2 UMC VPS Basics

The Visual Programing System (VPS) (which contains Wireless Intuitive Probing (WIPS)) comes standard with the UMC series. This system can perform all of the standard probe routines found in the WIPS templates, and also includes special probe routines specifically for the UMC. These special probe routines use a tooling ball to automatically find the machine's centers of rotation. Refer to page **5** for more information on this process.

Normally, you use WIPS to set tool and work offsets, but the UMC includes a master gauge length tool in case you need to set offsets manually (if, for example, a probe stylus breaks or the batteries lose power). The gage length tool included with your machine has a unique length that is etched on the tool.

NOTE: *If you set the tool length offsets manually, you must also set the Z-Axis work offset manually.*

3.3   Machine Rotary Zero Point (MRZP) Offsets

The Machine Rotary Zero Point (MRZP) Offsets are control settings that define the location of the centers of rotation for the rotary table relative to the linear axes home position. Settings 255, 256, and 257 define the following:

255 – MRZP X Offset

Location of the B Axis rotary center point relative to the X Axis home position.

256 – MRZP Y Offset

Location of the C Axis rotary center point relative to the Y Axis home position.

257 – MRZP Z Offset

Location of the B Axis rotary center point relative to the Z Axis home position.

The value stored in these settings is the distance from the home position of a linear axis to the center of rotation of a rotary axis. Setting 9 determines if the values are shown in inches or millimeters.

The Machine Rotary Zero Point (MRZP) Offsets are set at the factory.

3.3.1   Check MRZP Offsets with VPS

The MRZP offsets can change over time. To make sure the UMC-500/750/1000 MRZP Offsets are correct do the following:

1. Place the tooling ball in the center of the X axis.

IMPORTANT: *Make sure that the tooling ball is tightly attached to the calibration assembly. Do not over tighten the tooling ball.*

F3.1:   Calibration Tooling Ball
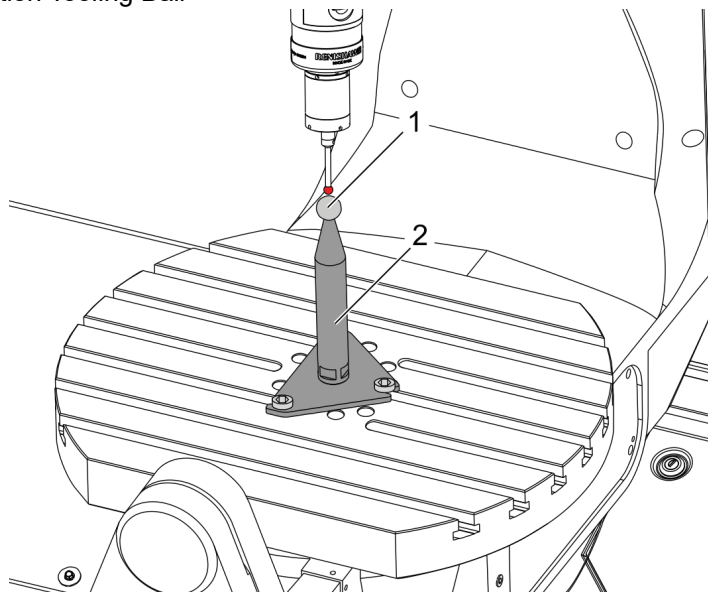
2. Place the work probe in the spindle.

3. Position the work probe over the tooling ball.

4. Navigate to **[EDIT]**>VPS>PROBING>CALIBRATION>MRZP and select B-Axis Tilt C-Axis Rotary Finish Set and press **[ENTER]**.

5. Type gage ball diameter and press **[ENTER]**.

6. Follow the prompts to generate the probe program. Enter MDI mode and press **[CYCLE START]**.

    The program generates the G-code and runs the program.

F3.2:   B-Axis Tilt C-Axis Rotary MRZP Finish Set Generated Program

7. The program automatically places values in macro variables #10121 through #10123. These variables show the machine rotary zero point axis travel distance from the home position in the X, Y, and Z Axes.

8. If the MRZP locations have changed, enter the values from macro variables #10121, #10122, and #10123 into Settings 255, 256, and 257.

Chapter 4: G234 - Tool Center Point Control (TCPC)

4.1 G234 - Tool Center Point Control (TCPC) (Group 08)

G234 Tool Center Point Control (TCPC) is a software feature in the Haas CNC control that allows a machine to correctly run a contouring 4- or 5-axis program when the workpiece is not located in the exact location specified by a CAM-generated program. This eliminates the need to repost a program from the CAM system when the programmed and the actual workpiece locations are different.

The Haas CNC control combines the known centers of rotation for the rotary table (MRZP) and the location of the workpiece (e.g., active work offset G54) into a coordinate system. TCPC makes sure that this coordinate system remains fixed relative to the table; when the rotary axes rotate, the linear coordinate system rotates with them. Like any other work setup, the workpiece must have a work offset applied to it. This tells the Haas CNC control where the workpiece is located on the machine table.

The conceptual example and illustrations in this section represent a line segment from a full 4- or 5-axis program.

NOTE: *For clarity, the illustrations in this section do not depict workholding. Also, as conceptual, representative drawings, they are not to scale and may not depict the exact axis motion described in the text.*

The straight line edge highlighted in Figure **F4.1** is defined by point (X0, Y0, Z0) and point (X0, Y-1., Z0). Movement along the Y Axis is all that is required for the machine to create this edge. The location of the workpiece is defined by work offset G54.

**F4.1:**   Location of Workpiece Defined by G54
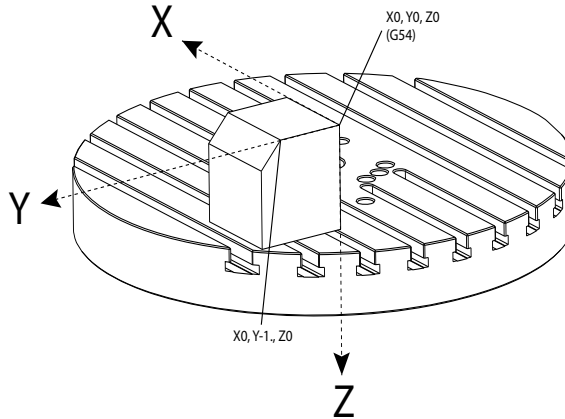
In Figure **F4.2**, the B and C Axes have been rotated 15 degrees each. To create the same edge, the machine needs to make an interpolated move with the X, Y, and Z Axes. Without TCPC, you would need to repost the CAM program for the machine to correctly create this edge.

F4.2:   G234 (TCPC) Off and the B and C Axes Rotated
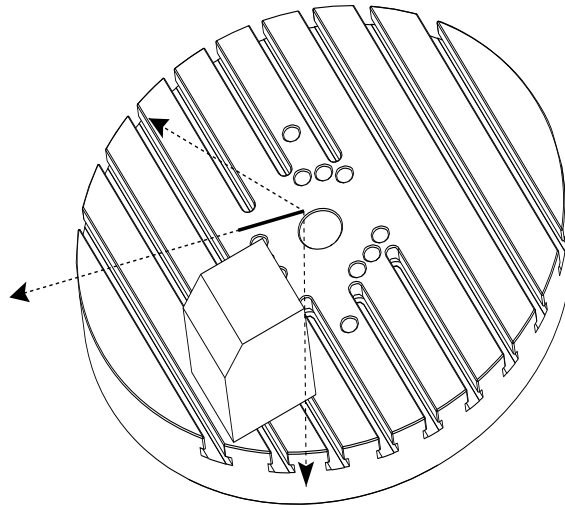
TCPC is invoked in Figure **F4.3**. The Haas CNC control knows the centers of rotation for the rotary table (MRZP), and the location of the workpiece (active work offset G54). This data is used to produce the desired machine motion from the original CAM-generated program. The machine follows an interpolated X-Y-Z path to create this edge, even though the program simply commands a single-axis move along the Y Axis.

F4.3: G234 (TCPC) On and the B and C Axes Rotated
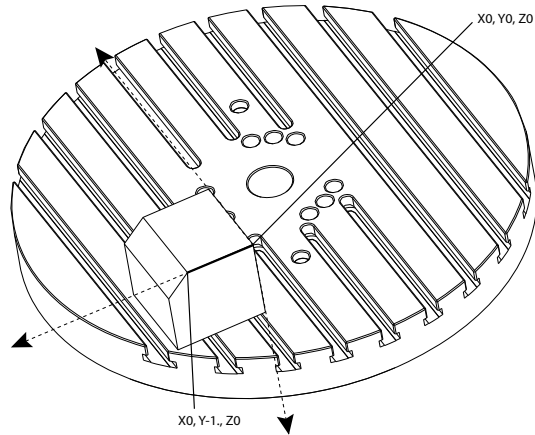
G234 Program Example

```
%O00003 (TCPC SAMPLE)
G20
G00 G17 G40 G80 G90 G94 G98
G53 Z0.
T1 M06
G00 G90 G54 B47.137 C116.354 (POSITION ROTARY AXES)
G00 G90 X-0.9762 Y1.9704 S10000 M03 (POSITION LINEAR AXES)
G234 H01 Z1.0907 (TCPC ON WITH LENGTH OFFSET 1, APPROACH IN
Z-AXIS)
G01 X-0.5688 Y1.1481 Z0.2391 F40.
X-0.4386 Y0.8854 Z-0.033
X-0.3085 Y0.6227 Z-0.3051
X-0.307 Y0.6189 Z-0.3009 B46.784 C116.382
X-0.3055 Y0.6152 Z-0.2966 B46.43 C116.411
X-0.304 Y0.6114 Z-0.2924 B46.076 C116.44
X-0.6202 Y0.5827 Z-0.5321 B63.846 C136.786
X-0.6194 Y0.5798 Z-0.5271 B63.504 C136.891
X-0.8807 Y0.8245 Z-0.3486
X-1.1421 Y1.0691 Z-0.1701
X-1.9601 Y1.8348 Z0.3884
G49 (TCPC OFF)
G00 G53 Z0.
G53 B0. C0.
G53 Y0.
M30%
```

G234 Programmer's Notes

These key presses and program codes cancel G234:

- **[EMERGENCY STOP]**
- **[RESET]**
- **[HANDLE JOG]**
- **[LIST PROGRAM]**
- M02 – Program End
- M30 – Program End and Reset
- G43 – Tool Length Compensation +
- G44 – Tool Length Compensation -
- G49 – G43 / G44 / G143 Cancel

These codes will NOT cancel G234:

- M00 – Program Stop
- M01 – Optional Stop

These key presses and program codes impact G234:

- G234 invokes TCPC and cancels G43.
- When using tool length compensation, either G43 or G234 must be active. G43 and G234 cannot be active at the same time.
- G234 cancels the previous H-code. An H-code must therefore be placed on the same block as G234.
- G234 cannot be used at the same time as G254 (DWO).

These codes ignore 234:

- G28 – Return to Machine Zero Through Optional Reference Point
- G29 – Move to Location Thru G29 Reference Point
- G53 – Non-Modal Machine Coordinate Selection
- M06 – Tool Change

Invoking G234 (TCPC) rotates the work envelope. If the position is close to the travel limits, the rotation can put the current work position outside of travel limits and cause an over travel alarm. To solve this, command the machine to the center of the work offset (or near the center of the table on a UMC), and then invoke G234 (TCPC).

G234 (TCPC) is intended for simultaneous 4- and 5-axis contouring programs. An active work offset (G54, G55, etc.) is required to use G234.

Chapter 5: G254 - Dynamic Work Offset (DWO)

5.1 G254 - Dynamic Work Offset (DWO) (Group 23)

G254 Dynamic Work Offset (DWO) is similar to TCPC, except that it is designed for use with 3+1 or 3+2 positioning, not for simultaneous 4- or 5-axis machining. If the program does not make use of the tilt and rotary Axes, there is no need to use DWO.

⚠️

CAUTION: *The B-Axis value of the work offset you use with G254 MUST be zero.*

With DWO, you no longer need to set the workpiece in the exact position as programmed in the CAM system. DWO applies the appropriate offsets to account for the differences between the programmed workpiece location and the actual workpiece location. This eliminates the need to repost a program from the CAM system when the programmed and actual workpiece locations are different.

The control knows the centers of rotation for the rotary table (MRZP) and the location of the workpiece (active work offset). This data is used to produce the desired machine motion from the original CAM-generated program. Therefore, it is recommended that G254 be invoked after the desired work offset is commanded, and after any rotational command to position the 4th and 5th axes.

After G254 is invoked, you must specify an X, Y, and Z Axis position before a cutting command, even if it recalls the current position. The program should specify the X- and Y Axis position in one block and the Z Axis in a separate block.

⚠️

CAUTION: *Before rotary motion, use a G53 Non-Modal Machine Coordinate motion command to safely retract the tool from the workpiece and allow clearance for the rotary motion. After the rotary motion finishes, specify an X-, Y-, and Z-Axis position before a cutting command, even if it recalls the current position. The program should specify the X- and Y-Axis position in one block and the Z-Axis position in a separate block.*

⚠️

CAUTION: *Be sure to cancel G254 with G255 when your program does simultaneous 4- or 5-axis machining.*
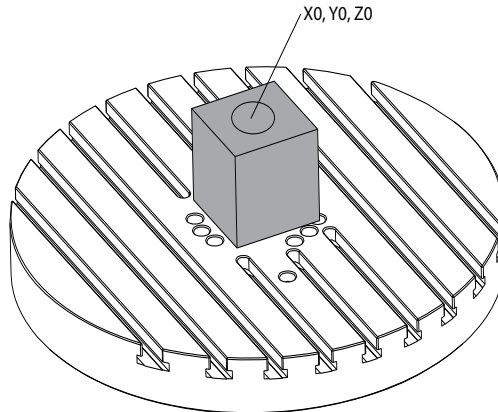
NOTE: *For clarity, the illustrations in this section do not depict workholding.*

The block in the figure below was programmed in the CAM system with the top center hole located at the center of the pallet and defined as X0, Y0, Z0.

F5.1: Original Programmed Position

In the figure below, the actual workpiece is not located in this programmed position. The center of the workpiece is actually located at X3, Y-2, Z0, and is defined as G54.

F5.2: Center at G54, DWO Off
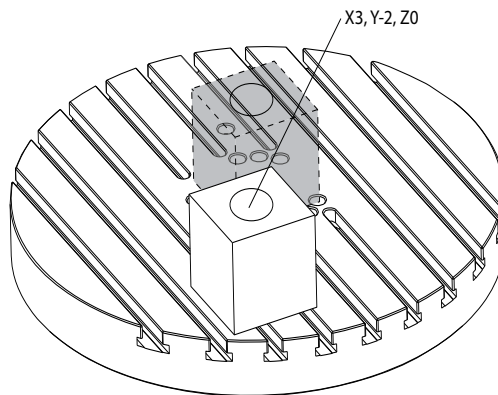
DWO is invoked in the figure below. The control knows the centers of rotation for the rotary table (MRZP), and the location of the workpiece (active work offset G54). The control uses this data to apply the appropriate offset adjustments to make sure that the proper toolpath is applied to the workpiece, as intended by the CAM-generated program. This eliminates the need to repost a program from the CAM system when the programmed and actual workpiece locations are different.

F5.3:   Center with DWO On
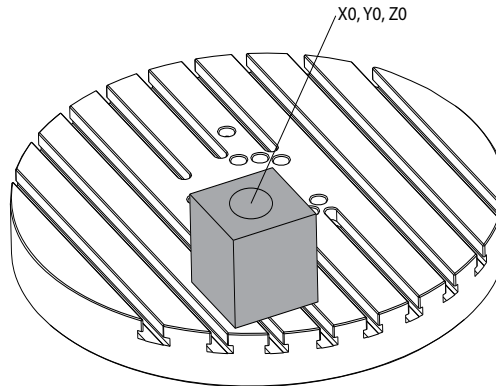
G254 Program Example

```
%
O00004 (DWO SAMPLE) ;
G20 ;
G00 G17 G40 G80 G90 G94 G98 ;
G53 Z0. ;
T1 M06 ;
G00 G90 G54 X0. Y0. B0. C0. (G54 is the active work offset
for) ;
(the actual workpiece location) ;
S1000 M03 ;
G43 H01 Z1. (Start position 1.0 above face of part Z0.) ;
G01 Z-1.0 F20. (Feed into part 1.0) ;
G00 G53 Z0. (Retract Z with G53) ;
B90. C0. (ROTARY POSITIONING) ;
G254 (INVOKE DWO) ;
X1. Y0. (X and Y position command) ;
Z2. (Start position 1.0 above face of part Z1.0) ;
G01 Z0. F20. (Feed into part 1.0 ) ;
G00 G53 Z0. (Retract Z with G53) ;
B90. C-90. (ROTARY POSITIONING) ;
X1. Y0. (X and Y position command) ;
Z2. (Start position 1.0 above face of part Z1.0) ;
G01 Z0. F20. (Feed into part 1.0 ) ;
G255 (CANCEL DWO) ;
B0. C0. ;
M30 ;
%
```

G254 Programmer's Notes

These key presses and program codes will cancel G254:

*   **[EMERGENCY STOP]**
*   **[RESET]**
*   **[HANDLE JOG]**
*   **[LIST PROGRAM]**
*   `G255` – Cancel DWO
*   `M02` – Program End
*   `M30` – Program End and Reset

These codes will NOT cancel G254:

*   `M00` – Program Stop
*   `M01` – Optional Stop

Some codes ignore `G254`. These codes will not apply rotational deltas:

*   `*G28` – Return to Machine Zero Through Optional Reference Point
*   `*G29` – Move to Location Through G29 Reference Point
*   `G53` – Non-Modal Machine Coordinate Selection
*   `M06`– Tool Change

*It is strongly recommended that you not use `G28` or `G29` while `G254` is active, nor when the B and C Axes are not at zero.

1. `G254` (DWO) is intended for 3+1 and 3+2 machining, where the B and C Axes are used to position only.
2. An active work offset (`G54`, `G55`, etc.) must be applied before `G254` is commanded.
3. All rotary motion must be complete before `G254` is commanded.
4. After `G254` is invoked, you must specify an X-, Y-, and Z-Axis position prior to any cutting command, even if it recalls the current position. It is recommended to specify the X and Y Axes in one block, and the Z Axis in a separate block.
5. Cancel `G254` with `G255` immediately after use and before ANY rotary motion.
6. Cancel `G254` with `G255`any time simultaneous 4- or 5-axis machining is performed.
7. Cancel `G254` with `G255` and retract the cutting tool to a safe location before the workpiece is repositioned.

Chapter 6: Setting Work and Tool Offsets

6.1   Set the B-Axis Work Offset

If the fixture or workpiece requires you to adjust the B Axis to achieve the proper alignment for machining, use this procedure to adjust and record the B-Axis work offset.

CAUTION: *Do not use a B-Axis offset if your program uses Dynamic Work Offsets (G254). The B-Axis offset value must be zero.*

1.   Adjust the B Axis until the workpiece is positioned to the same orientation established in the program. Typically, the top surface of the fixture or workpiece is perpendicular to the Z Axis.

2.   Navigate to **[OFFSET]**>Work. Scroll to the work offset value used in the program (`G54` in this example).

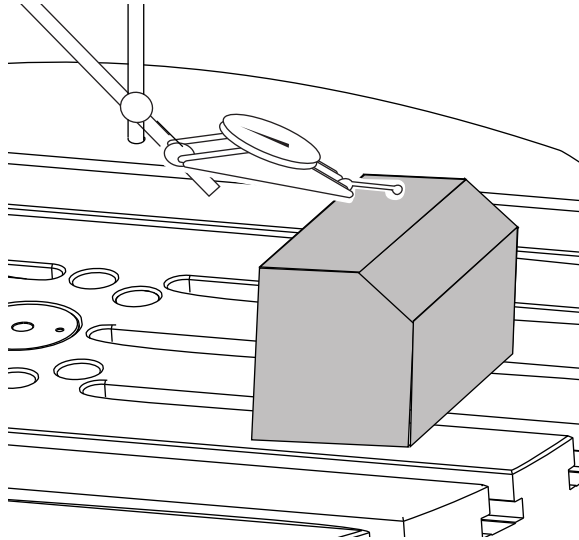3.   Highlight the value in the `B Axis` column. Press **[PART ZERO SET]** to record the offset.

6.2   Set the C-Axis Work Offset

NOTE: *If the fixture or workpiece requires you to adjust the C Axis to achieve the proper alignment for machining, use the following procedure to adjust and record the C-Axis work offset.*

F6.1:   Setting the C-Axis Workpiece Orientation

1.   Place the workpiece on the platter (workholding not shown). Adjust the C Axis until the workpiece is positioned to the same orientation established in the program. Typically, a reference feature on the fixture or workpiece is parallel to the X or Y Axis.

2.   Navigate to **[OFFSET]**>Work. Scroll to the work offset value used in the program (G54 in this example).

3.   Highlight the value in the **C Axis** column. Press **[PART ZERO SET]** to record the offset.

6.3   Set the X-, Y-, and Z-Axis Work Offsets Manually

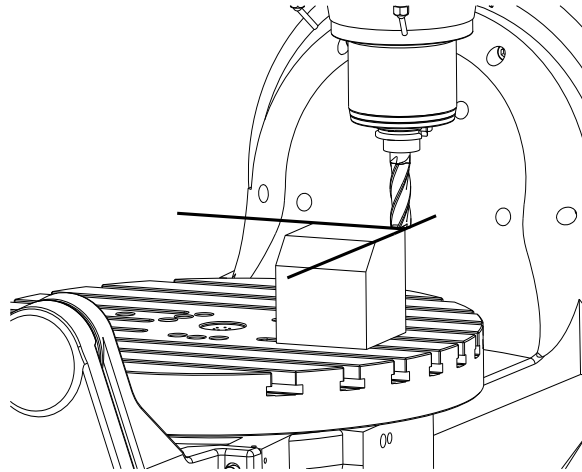*NOTE:*   *Use this procedure if the WIPS probe is disabled.*

NOTE: *Refer to the Haas Mill Operator's Manual for basic offset and toolsetting methods.*

1. Jog the X and Y Axes to the zero position established in the program.

F6.2: UMC-1000 X- and Y-Axis Zero Position

2. Navigate to **[OFFSET]**>Work. Scroll to the work offset value used in the program (G54 in this example).

3. Select the **X Axis** column of your work coordinate offset and press **[PART ZERO SET]** to set the X-Axis zero position.

4. Press **[PART ZERO SET]** again to set the Y-Axis zero position.

**F6.3:** X-Axis Zero Position Set and Y-Axis Zero Position Set

G Code	X Axis	Y Axis	Z Axis	B Axis	C Axis
G52	0.	0.	0.	0.	0.
G54	-14.0000	-11.0000	0.	0.500	2.000
G55	0.	0.	0.	0.	0.
G56	0.	0.	0.	0.	0.
G57	0.	0.	0.	0.	0.
G58	0.	0.	0.	0.	0.
G59	0.	0.	0.	0.	0.
G154 P1	0.	0.	0.	0.	0.
G154 P2	0.	0.	0.	0.	0.
G154 P3	0.	0.	0.	0.	0.
G154 P4	0.	0.	0.	0.	0.
G154 P5	0.	0.	0.	0.	0.
G154 P6	0.	0.	0.	0.	0.
G154 P7	0.	0.	0.	0.	0.
G154 P8	0.	0.	0.	0.	0.
G154 P9	0.	0.	0.	0.	0.
G154 P10	0.	0.	0.	0.	0.
G154 P11	0.	0.	0.	0.	0.
G154 P12	0.	0.	0.	0.	0.

F1 Set Value **ENTER** Add To Value **F4** Tool Offsets
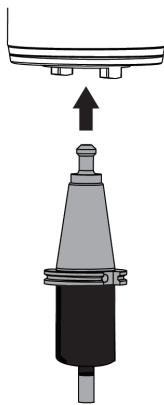
Enter A Value

5. Determine a tool set plane to be used for setting all tool length offsets; for example, use the top surface of the workpiece.

F6.4:   Example Tool Set Plane (Top of the Part)
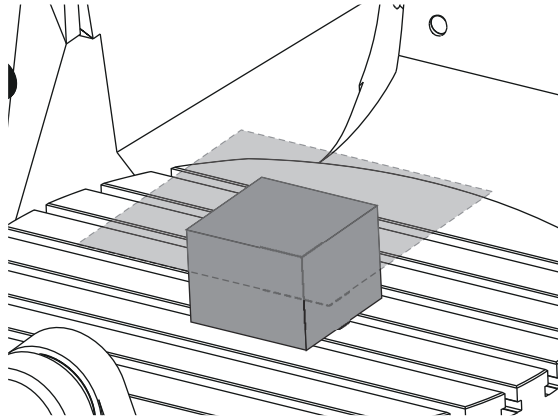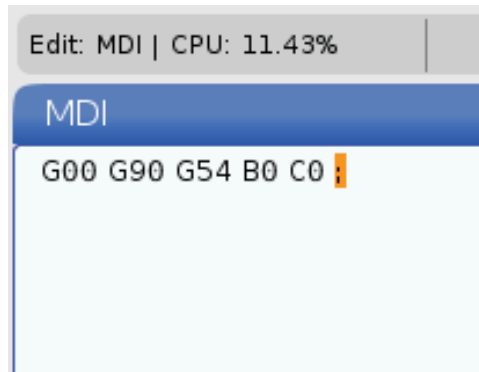

6.   Load the master gage tool included with WIPS into the spindle.
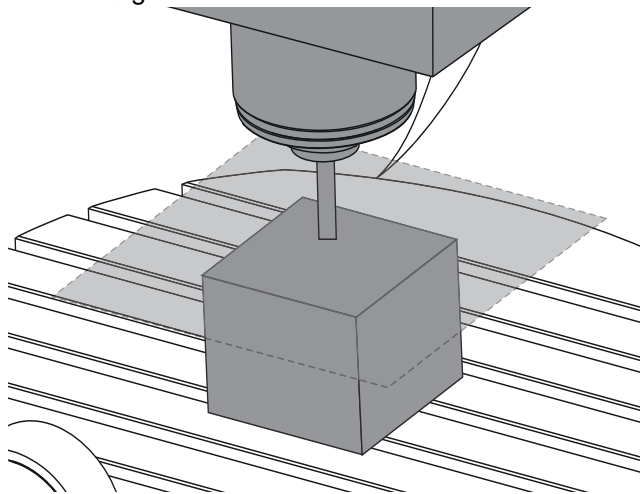
F6.5:   Master Gage Tool

7.   Make sure that the B and C Axes are at the same work zero point set earlier.
(`G00 G90 G54  B0 C0`)

Edit: MDI | CPU: 11.43%

MDI

G00 G90 G54 B0 C0

8. Select the **Z AXIS** column of your work coordinate offset.

9. Jog the Z Axis to the tool set plane. Make sure that the end of the gage tool you are using just touches the tool set plane. You will touch-off all of your tools on this surface.

F6.6:   Jog the End of the Gage Tool to the Tool Set Plane

10. With the Z Axis column of the work offset used in the program highlighted (G54 in this example), press **[PART ZERO SET]**.

11. Subtract the length of the master gage tool supplied with the machine from the value shown in the Z Axis column. Enter this value as the offset in the Z Axis column.

     For example, if the Z-Axis work offset is -7.0000 and the master gage tool length is 5.0000, the new Z-Axis work offset is -12.0000.

12. Touch-off each of the tools in your program to the Z set plane to establish their length offsets.

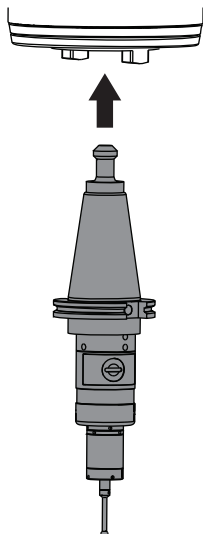# 6.4   Set the X-, Y-, and Z-Axis Work Offsets with WIPS

If you are not using the WIPS system, go to the Set the X-, Y-, and Z-Axis Work Offsets Manually section, starting on page **25**.
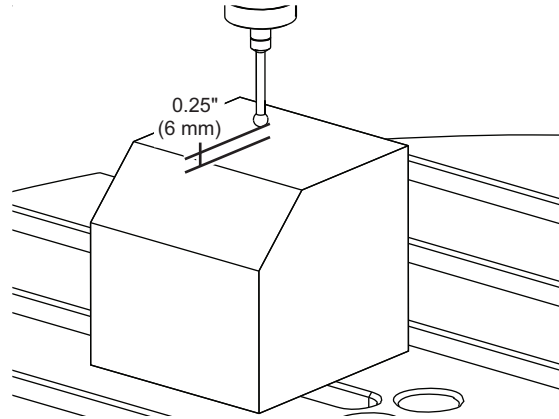
NOTE: *Make sure that the tool setting probe and the work probe are calibrated. Refer to the Haas WIPS manual (96-10002) for the calibration procedure.*

**F6.7:**   UMC-750 Work Offset with WIPS

F6.8:   UMC Z-Axis Work Zero Offset Start

1. Load the work probe into the spindle.

2. Make sure that the B and C Axes are at the same work zero point set earlier. (`G00 G90 G54 B0 C0`). Refer to the Set the B-Axis Work Offset and Set the C-Axis Work Offset sections if these values are not correct.

3. Set the X- and Y-Axis offsets using the standard WIPS templates as appropriate. Refer to the WIPS manual for more information.

4. Position the work probe tip approximately 0.25" (6 mm) above the Z-Axis zero surface.

5. Navigate to **[OFFSET]** `Work`. Scroll to the work offset value used in the program (`G54` in this example).

6. Press the **[RIGHT]** cursor arrow until you reach the `Probe Action` sub-menu.

7. Type `11`, and then press **[ENTER]** to assign the `Single Surface Probe Action` to the offset.

8. Press **[PART ZERO SET]** to move to `VPS`.

9. Select the Z Variable.

F6.9:   VPS 11. Single Surface Probe
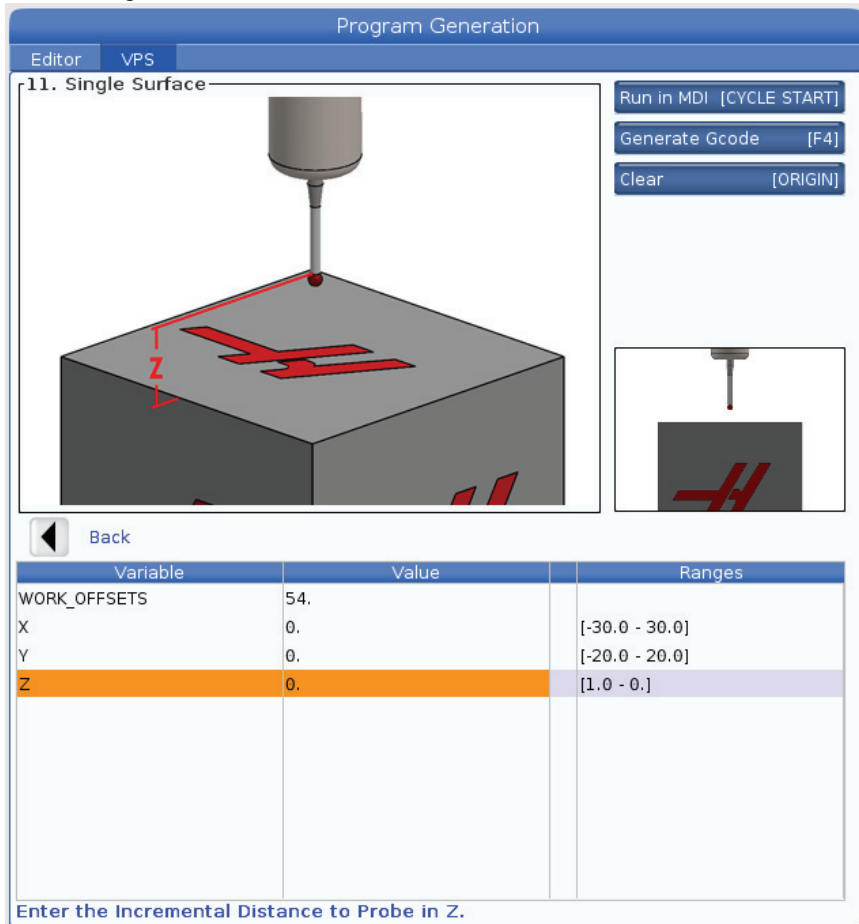
10.   Type -.5 (or -12 if the control is set to metric measurements), and then press **[ENTER]**.

11.   Press **[CYCLE START]**. The probe measures the distance to the top of the part and records the value in the Z Axis column work offset for G54.

12.   Use the tool setting probe to set each of your tool length offsets.

Chapter 7: Rotary Unwind and Setting 247

7.1 Quick Rotary G28 (Home)

This feature lets you to return the rotary axis to zero within 359.99 degrees, saving time and motion. The rotary axis will need to have rotated at least 360 degrees for the unwind feature to be a benefit.

For example, if the rotary axis has rotated a total of 960 degrees through the course of a program, a rotary axis zero return command without the unwind feature will cause the axis to rotate back through all 960 degrees of rotation before the Haas CNC control considers the axis at home.

With Quick Rotary G28 enabled, the rotary axis rotates toward zero just enough to reach its home position; the control ignores all previous revolutions. In the example of 960 degrees of rotation, the rotary axis rotates a negative 240 degrees and stops at the machine home position.

To use this feature, Setting 108 must be set to ON. The unwind command must be an incremental (G91) Home command (G28).

For example:

```
G54 G01 F100. C960. (rotary axis TURNS 960 DEGREES CLOCKWISE)


G28 G91 C0. (rotary axis ROTATES 240 DEGREES COUNTER-CLOCKWISE
TO HOME)
```

7.2 247 - Simultaneous XYZ Motion in Tool Change

Setting 247 defines how the axes move during a tool change. If Setting 247 is OFF, the Z Axis retracts first, followed by X- and Y-Axis motion. This feature can be useful in avoiding tool collisions for some fixture configurations. If Setting 247 is ON, the axes move simultaneously. This may cause collisions between the tool and the workpiece, due to B- and C-Axis rotations. It is strongly recommended that this setting remain OFF on the UMC-750, due to the high potential for collisions.

Chapter 8: **Maintenance**

8.1 Introduction

Regular maintenance is important to make sure that your machine has a long and productive life with minimal downtime. The most common maintenance tasks are simple and you can do them yourself. You can also ask your HFO about their comprehensive preventive maintenance program for complex maintenance tasks.

8.2 UMC Maintenance Schedule

T8.1: Maintenance Schedule Table

Maintenance Item	Interval
Automatic Tool Changer - SMTC	
Clean the chips from the tool changer.	Weekly
Inspect the arm plunger and adjuster assembly.	Six Months
Grease the tool changer cams.	Annually
Auxiliary Filter	
Replace the filter bag.	Check the Gauge
Inspect the hoses for cracking.	Six Months
Axis Lubrication	
Inspect grease reservoir level.	Monthly
Inspect the hoses for cracking.	Six Months
Electrical Cabinet	
Clean vector drive air vents / filter.	Monthly
Enclosure	
Inspect windows for damage.	Daily
Inspect the door interlock operation.	Daily

Maintenance Item	Interval
Inspect way covers and lubricate.	Monthly
Minimum Quantity Lubrication	
Clean the filter inside the oil reservoir.	Annually
Oil Skimmer	
Inspect the oil skimmer pickup tube.	Six Months
Pneumatics	
Inspect the spindle air regulator pressure.	Weekly
Inspect the hoses for cracking.	Six Months
Clean the Air Purge Solenoid.	Annually
Pneumatics	
Inspect the spindle air regulator pressure.	Weekly
Inspect the hoses for cracking.	Six Months
Clean the air purge solenoid	Annually
Probe System	
Check the probe batteries.	Six Months
Check the probe calibration.	Six Months
Rotary Axes	
Inspect the oil.	Annually
Replace the oil.	Two Years
Replace the A-Axis counterbalance cylinder.	Two Years
Standard Flood Coolant System	
Clean the filter screen.	As required
Inspect the coolant level.	Weekly

Maintenance Item	Interval
Inspect the coolant concentration.	Weekly
Completely clean the coolant tank and replace the coolant.	Six Months
Clean the standard coolant filter.	Six Months
Verify the coolant refill is operating correctly.	Six Months
Spindle	
Clean and lubricate the spindle taper.	As required.
Check the spindle drawbar force.	Annually
HSK Spindle	
Scan QR code to get the latest HSK Spindle maintenance information.	
Spindle Lubrication	
Inspect lubrication tank level.	Monthly
Tooling	
Grease the pull studs.	As required.
Through Spindle Coolant (TSC)	
Clean the TSC filter.	Six Months
Inspect the hoses for cracking.	Six Months
Verify that the auto-clean feature is operating correctly.	Six Months

8.3   More Information Online

For updated and supplemental information, including tips, tricks, maintenance procedures, and more, visit the Haas Service page at www.HaasCNC.com. You can also scan the code below with your mobile device to go directly to the Haas Service page:

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