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**Getting Started with Your VM1
and VM2 Machining Center**
June, 2003



Getting Started with Your VM1 and VM2 Machining Center

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Installation Checklist

Task	Page
<input type="checkbox"/> Floor capable of supporting machining center weight	1-1
<input type="checkbox"/> Clear route from loading dock to machine location	1-1
<input type="checkbox"/> Doors wide enough for machine to fit through.	1-2
<input type="checkbox"/> Dedicated, grounded 3-phase AC power available for machine.	1-3
<input type="checkbox"/> Power source meets machine voltage requirements	1-4
<input type="checkbox"/> Alternate transformer available, if necessary	1-4
<input type="checkbox"/> Adequate service fusing available for machine	1-4
<input type="checkbox"/> Compressed air available for machine	1-6
<input type="checkbox"/> Ambient temperature within machine limits.	1-6
<input type="checkbox"/> Lubrication available for machine	1-8
<input type="checkbox"/> Machine removed from skid.	2-2
<input type="checkbox"/> Forklift or crane available to move machine	2-3
<input type="checkbox"/> Machine in position on foundation	2-7
<input type="checkbox"/> Machine rough leveled	2-8
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<input type="checkbox"/> Machine operator enrolled in Hurco Ultimax Training class	3-2



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Using This Manual

Standard Text Icons

This manual may contain the following icons:



Caution

The machine may be damaged, or a part ruined, if the described procedure is not followed.



Hints and Tricks

Useful suggestions that show creative uses of the Ultimax features.



Important

Ensures proper operation of the machine and control.



Troubleshooting

Steps that can be taken to solve potential problems.



Warning

The operator may be injured and the machining center severely damaged if the described procedure is not followed.



Where can we go from here?

Lists several possible options the operator can take.



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Site Preparation

Preparing the Site

To avoid problems when the equipment arrives for installation, Hurco recommends that the site be prepared. Specific site preparation information is provided in this manual. Review the following:

- Capacity of the floor to support the machine's weight
- Capacity of forklift or crane
- Use of internal personnel or professional riggers
- Overhead and door clearances
- Plant obstructions on the way to machine location
- Proximity of compressed air and electrical power with a separate disconnect
- Code requirements for utility services
- Space to allow efficient operation, considering full axes travel and future servicing access requirements

Foundation Supporting the Machine

The foundation must be able to support the weight of the machine tool, and should be constructed of continuous concrete (reinforced is best). The thickness and consistency of the concrete must be compatible with industry standards for supporting the machine's weight. Actual requirements will depend upon the physical properties of underlying soil. A local civil engineer should be consulted if soil conditions are questionable.



Machine Weight

Approximate weights for the VM series machines appear below. Shipping weights include the shipping pallet, cover and packaging.

Weight	VM1		VM2	
	kg	lbs	kg	lbs
Shipping	3 400	7,490	4 400	9,700
Operating	3 100	6,800	4 100	9,020

Table 1-1. Approximate Machine Weights

Machine Size

Use the following tables and illustrations as a guide. All dimensions are approximate.

Shipping Dimensions

These dimensions are with the machine under its shipping cover and on its shipping pallet. (The Z axis is retracted fully down.)

Dimension	VM1		VM2	
	mm	in.	mm	in.
Width	1 960.0	77.2	2 950.0	116.1
Depth	2 300.0	90.5	2 416.0	95.1
Height	2 425.0	95.5	2 296.5	90.4

Table 1-2. Approximate Shipping Dimensions



Important

When moving a machine, be sure to allow adequate space for maneuvering. If door and ceiling clearances appear to be close to approximate machine dimensions, measure the machine first before moving it.



Operating Dimensions

Machine operating dimensions are with the enclosure and electrical cabinet doors open, the Z axis fully up, and the console swung out.

Dimension	VM1		VM2	
	mm	in.	mm	in.
Maximum width	2 994.0	117.9	3 860.0	152.0
Height	2 426.0	95.5	2 576.0	101.5
Depth with Max	2 487.0	97.9	2 573.0	101.4
Depth with Ultimax	3 043.0	119.8	3 163.2	124.6

Table 1-3. Width, Height, and Depth Dimensions

Electrical Service Requirements

- On-site wiring must comply with all applicable electrical codes
- Dedicated, grounded 3-phase AC power is required to prevent high/low voltages, spikes, surges, and noise.
- The AC power source must match the voltage specifications on the machine's electrical cabinet.
- Wiring must be capable of supplying continuous amperage, as stated in the latest National Electrical Code Standards.
- Failure to provide the required power parameters may affect safety, machine performance and the warranty.

KVA Requirements

The machining center will function properly if operated within the voltage range specified below.

Specification	VM1	VM2
Full Load	12 KVA	20 KVA
Incoming Service	15 KVA	25 KVA
Incoming Service KVA is specified at 125% of the full load KVA.		

Table 1-4. KVA Requirements



Calculating Service Fusing

Use the KVA Requirements table to calculate the service fusing for your machine. For 3-phase power, the equation is $P_{3\phi} = E \times I \times \sqrt{3}$

To calculate the fuse current for a VMX30 machine, where incoming service KVA ($P_{3\phi}$) is 31 KVA and Input Voltage (E) is 230 VAC:

$$I = \frac{P_{3\phi}}{E \times \sqrt{3}}$$

$$I = \frac{31,000VA}{398V} = 78 \text{ A}$$

Input Voltage



Important

Run electrical power to the machine's location, with adequate length to reach the connections in the power cabinet. Final connections MUST be supervised by a Hurco Certified Field Service Engineer.

Specification	VM1	VM2
230 VAC +/- 5% 60 Hz	30 A	50 A
380 VAC +/- 5% 50 Hz	18 A	30 A
415 VAC +/- 5% 50 Hz	17 A	28 A

Table 1-5. Input Voltage (VAC) Table

Recommended Isolation Transformer Configuration

If a transformer other than the one supplied by Hurco is used, it must meet Hurco's machine operating voltage requirements. Use one of the configurations shown in the figure below. Hurco recommends the Wye system. It is the customer's responsibility to have a qualified electrician connect the transformer to the power source.

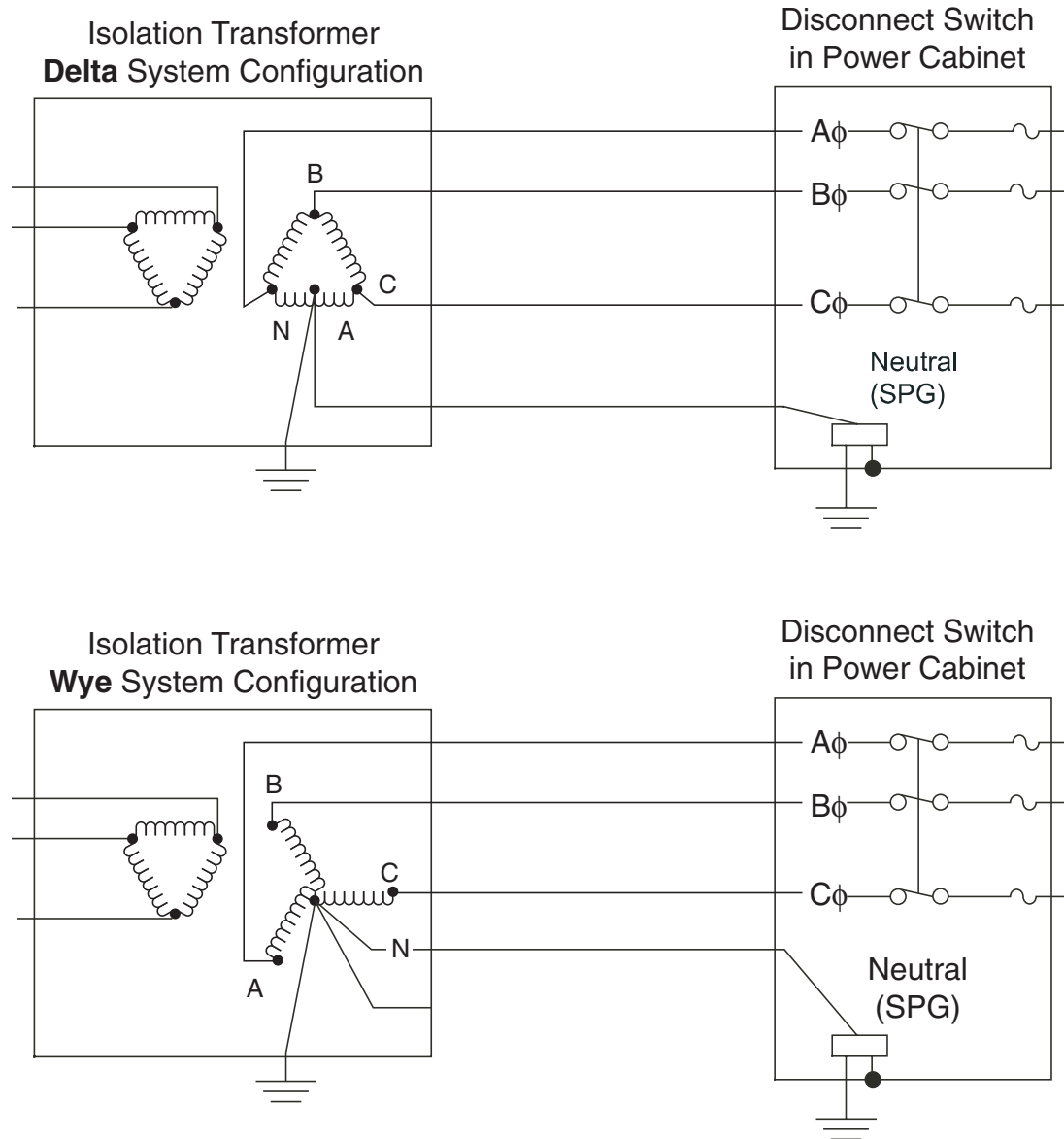


Figure 1-1. Delta and Wye Transformer Configurations

Grounding Equipment

The machine's electrical and electronic control systems are interconnected, terminating at the single point ground (SPG) terminal. This terminal, which is located inside of the machine's power cabinet, must be properly connected to the ground circuit of the AC power source. The grounding conductor must be sized to conform to ALL applicable electrical codes. However, Hurco recommends that the size of the neutral conductor (when applicable) be at least the size of the phase (current carrying) conductors.



Compressed Air Requirements

A continuous supply of clean and dry air is essential for proper machine operation, and must be connected to the machine as described here.

Compressed Air Specification

Compressed air for use by the machine tool must conform to this specification: 5 CFM (0.14 M³/min.) at 80–100 PSI (6–8 bar).

- Use a minimum 1/2 in. (13 mm) diameter (trade size) pipe, or an equivalent 3/4 in. (19 mm) diameter air hose supply line to the machine. This will provide the required air volume.
- Install a drip leg in the line ahead of the FRL Unit. The drip leg will help remove moisture in the air supply, making the filter last longer.
- Do not use quick coupler type fittings at the connection to the FRL Unit, or in the supply line to the machine. These fittings restrict the air supply.

Recommended Operating Temperature

Hurco Machining Centers that are not equipped with the air conditioning option may be operated in ambient temperatures up to 95°F (35°C), and in relative humidity (non-condensing) up to 95%. Set up your machining center away from external heat sources, such as direct sunlight and heating vents.



Important

Linear positioning accuracy of the machining center was set at the factory for an ambient temperature of 68°F (20°C). Continual operation at higher or lower temperatures may necessitate adjustment of the leadscrew map.



Machine Coolant System

A flood coolant system is optional on each machining center. A washdown hose and nozzle to clean chips from the inside of the enclosure are also included with the option.

Specification	VM1		VM2	
Tank capacity	62.0 l	16.3 gal.	122.0 l	32.0 gal
Flood pump rating	60 l/min	15.8 gal/min	60 l/min	15.8 gal/min
Flood pump size	0.19 kW	0.25 hp	0.19 kW	0.25 hp

Table 1-6. Coolant Capacity, Cooling Pump Rating, and Cooling Pump Size

Selecting Coolant

Use a coolant to prevent damage to the machine's guideways, precision ballscrews, and painted surfaces. Use a non-synthetic water soluble oil, such as METSOL 525, or equivalent. See the *Maintenance and Safety Manual* for more coolant information.



Machine Lubrication VM1 and VM2

Lubrication points and recommended lubricants appear in the table below. This list is not exhaustive. Lubricants that meet the same specifications as those listed below may be substituted.

Lube Point	Fill Level or Condition	Lubricant Type	Lubricant and Manufacturer
ATC Oil Unit 40-Taper 16- station Swing Arm ATC	Maintain reservoir at 1/3 full.	I.S.O. V.G. 32	Teresso 32 (Esso), DTE Oil Light (Mobil), Tellus Oil 32 (Shell), Turbo 32 (Shell), Magnus Oil 32 (Phillips), Hyken Golden (Kendall)
FRL Unit	Between the high and low marks on the plastic bowl.		
Optional High Speed Machining Spindle Oil Cooler	Midway on the sight gauge.		
Tool Release Cylinder	Maintain at 1/3 full, not to exceed 1/2 full. Otherwise, oil will flow out during pumping of cylinder.	I.S.O. V.G. 32	Teresso 32 (Esso), DTE Oil Light (Mobil), Tellus Oil 32 (Shell), Turbo 32 (Shell), Magnus Oil 32 (Phillips), Hyken Golden (Kendall)
Autolube Linear Way Ballscrew	Between the high and low marks on the reservoir. Include a rust prevention additive in the lubrication system prior to shutdown, if the machine will be idle for 30 days or more.	I.S.O. V.G. 68	Febis K68 (Esso), Vactra No. 2 (Mobil), Tonna Oil T68 (Shell)

Table 1-7. Lubrication for VM1 and VM2 Machines

Machine Arrival

Inspecting for Damage Before Unloading

All Hurco equipment must pass a quality control inspection before being shipped. However, damage may occur during shipment. Hurco strongly recommends that the machine equipment be inspected for damage before unloading.

- Before unloading the machine from the shipping carrier, check whether the shock meter sensor is tripped. This sensor is located to the left of the machine column. If the sensor is tripped, the ball bearings will be dislodged from the spring. Check the shock meter sensor again after the machine is rigged onto its foundation.
- Examine the machining center for structural damage.
- Note any damage to the machine on the shipper's bill of lading. File a "hidden damage" claim.
- Photograph any equipment damage for your records.

Note

Hurco Certified Field Service personnel can help determine the cost of repairing any damages that occurred during shipment.



Unloading the Machine

Unload the machine and position it as described below. If the recommended method is not workable, use a professional rigger who has experience moving machining centers.

Unloading the Machine from Shipping Carrier

Unload the machine:

1. Use a forklift at the front or rear of the machine to remove it from the shipping pallet. If possible, position the forklift under the heaviest part of the machine. The load center is normally toward the rear, where the column is located.
2. Move the machine on its shipping pallet to a location next to the final installation site.

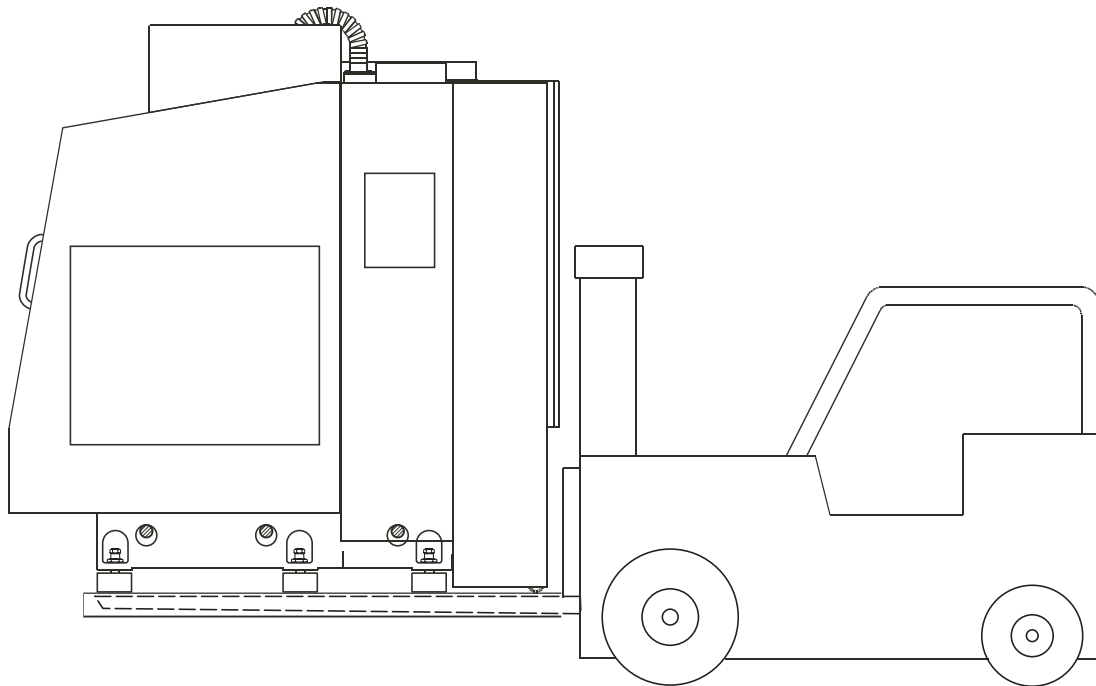


Figure 2-1. Lifting Machine on Pallet from Rear

3. Set the machine down, allowing enough space around the machine to later lift it away from the shipping pallet.
4. Verify that all equipment has arrived and is unloaded.



Forklift Capacities

Before lifting a machine, make sure the forklift is rated to handle the machine's weight, with fork tines long enough to fully support the machine. See the recommendations below.

Specification	VM1		VM2	
	mm	in.	mm	in.
Fork Tine Length	1 829.0	72.0	2 438.0	96.0

Table 2-1. Fork Tines Length



Warning

The forklift must be rated to handle the machine's weight, and the machine must be correctly positioned on the fork tines before lifting.



Unpacking the Machine Equipment

After placing the machine and its shipping pallet next to the final installation site, inventory your shipment.



Important

Do not remove the shipping supports from under the machine head or the tool changer at this time. If you discover any damage, contact your Hurco representative and the freight company immediately.

Do not unpack the Ultimax console from its box. The console will be unpacked and installed by the Certified Field Service Engineer.

Unpack equipment as follows:

1. Remove the outer covering and all boxes attached to the pallet.
2. Remove all items from the chip enclosure.
3. Remove the flood coolant tank, tubing, pump motor and all other packaged items from the shipping pallet.
4. Remove the nuts and washers that attach the machine and electrical cabinet to the shipping pallet.
5. If the machine model includes a separate transformer, remove the transformer from the pallet and move it to the rear of where the machine will rest.
6. Use one of the procedures in the next section to lift the machine for final installation.



Moving the Machine into Final Position

After unpacking the equipment, lift the machine from its shipping pallet for final installation.

Lifting the Machine

VM series machines may be lifted using a forklift or an overhead crane or hoist. You may position the forklift at the machine's front, rear, or tool changer side.

Using Forklift at Front or ATC Side of the Machine



Warning

The forklift must be rated to handle the machine's weight. See the "Machine Weight" table in this manual for the weight of Hurco VM series machines.

To lift a VM series machine from the front or ATC side:

1. Guide the forklift tines under the machine base or machine base casting.
2. Keep adequate clearance between the machine and the front of the forklift by placing wood spacers on top of the forks.

Using Forklift at Rear of the Machine

Because the power cabinet is located at the machine's rear, longer fork tines are also required when lifting at the rear of the machine. Contact a professional rigger to determine the necessary fork tine length.



To lift a VM series machine from the rear:

1. The holes toward the rear of the machine are used to route coolant hoses. Re-route these hoses temporarily, to get them out of the way. After the machine is set in place, the coolant hoses must be returned through the holes as originally routed.
2. Carefully guide the forklift tines.
3. Place wood spacers on top of the forks to keep clearance between the machine and the forklift.

Using a Crane to Lift the Machine



Important

A special lifting bracket is required when using a crane or hoist. This bracket may have been included during shipment. If not, contact your full service dealer or Hurco to obtain the bracket.



Warning

The crane or hoist must be rated to handle the machine's weight.

To lift a VM1 and VM2 machine using a crane or hoist:

1. Secure the lifting bracket to the top of the machine.
2. Attach the crane to the machine at the connecting point indicated below.

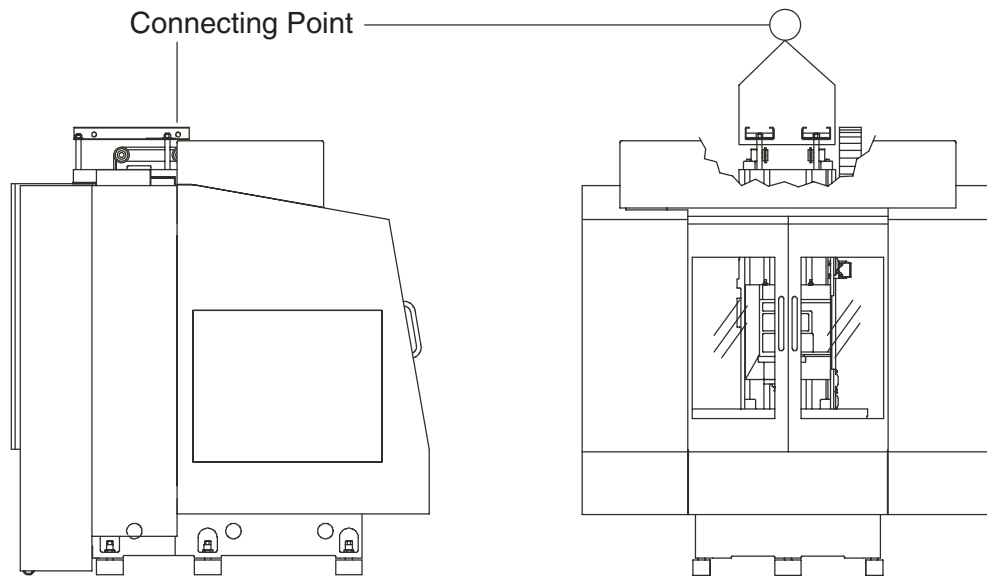


Figure 2-2. Lifting a VM Series Machine with Crane

Lowering the Machine onto its Foundation

After lifting the machine from its shipping pallet, position the machine over the spot where the machine will be installed.

1. Lower the machine to within 6–10 inches (150–200 mm) of the floor. Do **not** set the machine down.
2. Insert leveling bolts into the machine base and position foot pads directly beneath the bolts. Leveling bolts and foot pads are provided. **Do not forget the center bolts.**
3. Lower the machine onto the footpads.
4. Adjust EVERY leveling bolt down until it presses into the indentation of the underlying footpad. The machine is now rough leveled.



Leveling the Machine

Once the machine is rough leveled, contact your full service distributor or Hurco to have a Field Service Engineer visit and finish the leveling.

After the service engineer has leveled the machine, it is the customer's responsibility to check and maintain this level (using the initial leveling specifications obtained at installation). Check machine level each month for the first six (6) months after installation, and then once every six (6) months.



Important

ALL leveling bolts — including the center ones — MUST be used in rough leveling to evenly support the machine.

Rough level the machine following these guidelines:

1. Torque ALL bolts evenly so that the machine does not teeter.
2. Adjust the leveling bolts all the way down (this will raise the machine).
3. Once the machine is resting on all foot pads, remove the forklift (or crane).
4. Do not remove the shipping support from beneath the Automatic Tool Changer or the machine head.
5. Place the flood coolant tank, tubing and pump motor near the machine base for installation by a Hurco Certified Field Service Engineer.

Start-up Preparation

Meeting Requirements Before the Service Visit

- All machine equipment located at the final installation site.
- Machine positioned for installation, on a suitable foundation that can bear its weight.
- Machine rough leveled.
- Utilities made available.
- All lubrication levels checked.
- Flood coolant tank, tubing and coolant pump motor placed near the machine base.

After you have completed the requirements above, contact your full service distributor or Hurco's customer service department. When you call, give the date that you completed pre-installation, and your machine's serial number (stamped on the data plate attached to the electrical cabinet door).

A Hurco Certified Service Engineer will visit your site and prepare the machine for start-up.

The customer agrees to furnish, at no charge to Hurco, the materials and personnel necessary to assist the Hurco Service Engineer in testing and inspecting the machine. It is the customer's responsibility to provide tooling and coolant.



Ultimax Programming Training

Learn how to create part programs in minutes on the easy-to-use Ultimax control. Hurco offers hands-on training classes to demonstrate the powerful programming capabilities of Ultimax. Every customer will gain an advantage by attending Ultimax training classes.

For additional information or to register for an Ultimax Program Training class, call (800) 638-1849.

Machine and Software Options

UltiPocket Option

The UltiPocket programming option adds special milling routines for machining pocket boundaries with islands. This option provides complete clean out of odd-shaped pockets, leaving islands untouched. Automatic software calculation eliminates the arduous task of plotting tool paths around an unlimited number of islands. Rotate, scale and repeat islands for even more part programming flexibility.

UltiDraw DXF Option

The UltiDraw Data Exchange Format (DXF) File option allows you to rapidly create Conversational part programs from 2D CAD drawings. Selected geometric data from a 2D CAD drawing is automatically loaded into Conversational data blocks — use Ultimax to add part and tool setup information to complete the part program.

3D Part Programming Option

The Ultimax 3D part programming option creates three-dimensional parts from two-dimensional open contours. Define the surface as a two-dimensional profile in either the XY or XZ plane. The two-dimensional profile is then repeated along a straight line (translated) or around a centerline (revolved) to produce the final three-dimensional shape.

Conversational Rotary Option

The Ultimax Conversational Rotary option provides five-axis machining for larger parts. Machine complex parts with a single setup, increasing productivity and minimizing incorrect part alignment. The rotary/tilt table helps maintain accuracy and uniformity when drilling angle holes around a cylinder, and is effective for tall work pieces.



UltiNet Option

The UltiNet option expands your Ultimax operation by providing connection to a Local Area Network (LAN). Use UltiNet to communicate with other CNCs, PCs or file servers using standard TCP/IP and FTP protocols. With UltiNet, ten megabyte files can be transferred in less than 40 seconds.

AVC/ASF Options

The Advanced Velocity Control (AVC) option provides a continuous 400 block look ahead algorithm through a 225 block sliding window. Jerk and Stiction Compensation parameters allow the system to decelerate and accelerate during tool path direction changes — improving the surface quality of parts with complex geometries. Data Smoothing, Additional Surface Finish Quality parameters obtain required surface finish quality with optimum execution speed.

The Adaptive Surface Finishing (ASF) option supplies a continuous 600 block look ahead algorithm through a 600 block window. Advanced Data Smoothing, Additional Surface Finish Quality parameters obtain the required surface finish quality with optimum execution speed. Data processing speed is greatly enhanced with the option's 566 MHz processor, 128 MB RAM memory and Octavia 80 MHz motion card.

Cutter Inserts Option

The Cutter Inserts option is used by cutter insert manufacturers to mill pockets in triangular, diamond and hexagon shapes. Ultimax's part programming is so easy, a Cutter Insert routine can be created in one data block.



Probing Option

With the Ultimax Probing option, you can probe parts and tools within a Conversational part program. Purchase either the Part Probing package, or Part and Tool Probing package. Each probing package requires both software and equipment to function.

The Part Probing package allows you to create Conversational data blocks for hands-free part positioning and inspection. Probe a part in either Manual or Auto mode during part programming. With Part Probing:

- Find part location more precisely.
- Use Skew Probing to align the machine with the part, instead of aligning the part with the machine – ideal for irregularly-shaped parts or parts misaligned on the table surface.
- Inspect work piece geometry while the part is fixtured on the machining center table.
- Export date and time stamped part programs as text or spreadsheet files.
- The Ultimax Tool Probing package allows you to accurately measure tools with your stylus touch or laser probe. The tool probe can be operated manually or automatically within Conversational part programming to:
 - Precisely measure tool length and diameter.
 - Monitor tools for wear and breakage.
 - Set up a “spare” tool to automatically replace a worn or broken tool during the machining process.

ISNC Option

Ultimax’s Industry Standard Numerical Control (ISNC) option supports the most popular and widely accepted language protocol. The ISNC option provides a Fanuc® level of M and G code compatibility.



N CPP Option

The Ultimax Numerical Control Productivity Package (N CPP) option provides features that enhance productivity and aid in producing smaller, more powerful, and easier to maintain NC programs. N CPP features include variables, subprogram calls, macros, user-defined codes, mathematical equations and address expressions. The N CPP option requires the ISNC option to operate.

Helical Plunge Option

With the additional Helical Ramp Entry Conversational programming capabilities, a helical ramp entry plunge can be selected as an alternative machining strategy to the standard straight Z-axis plunge. Straight or helical ramp plunges can be used for separate roughing and finish passes. Helical Plunge significantly reduces machining cycle time by using higher feedrates in the X and Y axes, while plunging slowly in the Z axis.



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