



MAKINO Technical Training Course Catalog

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Our Mission

At Makino, our primary goal has always been to consistently provide high-quality products and services that far exceed our customers' expectations. This is accomplished daily through our **INTEGRITY** and commitment to nothing less than **EXCELLENCE**.

It's our employees' **DEDICATION** and **DETERMINATION** that enable us to achieve this goal. Our collective efforts continually focus on **INNOVATION** and ongoing improvements to meet the advancing needs of our customers.

We measure our success by the satisfaction of those who produce, sell, and use our products daily. We achieve this **SUCCESS** through **RELIABILITY** and **ACCURACY**.

Makino Training Terms and Conditions

The following terms and conditions apply to all technical training courses conducted by Makino. Any additional terms/conditions shall be submitted in writing; such additions shall not be effective until agreed to by Makino. Any attempt to substitute or add terms/conditions will be rejected and shall be of no effect.

Makino offers our customers many formal training opportunities on selected topics and products. Content is based on specific skill sets and objectives and is designed to transfer a working knowledge and understanding of the specific machine tool systems and related processes.

Makino Training Credits may be provided with machine purchases based on machine type and/or machine purchase agreements. These credits must be used during the first year after purchase. Training for additional personnel or after the standard first-year period has elapsed must be purchased separately.

Training credits for EDM and Milling Machines are determined by the terms of the purchase proposal. Customers wishing to enroll in Makino Technical Training Courses should refer to their purchase proposal for Training Credit details. Additional training must be purchased separately.

Table of Contents

Table of Contents is clickable

Training with Makino

<u>About Our Program</u>	07
<u>General Overview</u>	
<u>On-Demand Courses & Customization</u>	08
<u>On-Demand Maintenance & Operations Course Structure</u>	

Standard Course Descriptions

<u>Milling Courses</u>	10
<u>Operations</u>	
<u>Pro5 Control Operations</u>	
<u>Pro6 Control Operations</u>	
<u>High Performance Machining</u>	
<u>MMC2 & MAS-A5 Software Operations</u>	
<u>Maintenance</u>	12
<u>MMC2 Recovery & Maintenance</u>	
<u>NX Basic Maintenance w/ Pro5/6 Control</u>	
<u>NX Advanced Maintenance w/ Pro5/6 Control</u>	
<u>Programming</u>	14
<u>Manual Part Programming</u>	
<u>Macro Programming</u>	
<u>EDM Courses</u>	15
<u>Operations</u>	
<u>Sinker EDM (Hyper-i Control) Operations</u>	
<u>Wire EDM (Hyper-i Control) Operations</u>	
<u>Maintenance</u>	16
<u>Sinker EDM (Hyper-i Control) Maintenance</u>	
<u>Wire EDM (Hyper-i Control) Maintenance</u>	
<u>BX3 Maintenance</u>	
<u>Wire</u>	17
<u>Small Wire Diameter (HyperDrive/HyperDrive Extreme)</u>	

Courses by Machine

<u>Milling Machines</u>	19
<u>G-Series: G5, G7</u>	
<u>G5/G7 Maintenance & Recoveries</u>	
<u>a40 HMC</u>	
<u>a40 Maintenance & Recoveries</u>	
<u>J-Series: J3, J5, J6</u>	
<u>J-Series Maintenance & Recoveries</u>	
<u>ProL Control Operations</u>	
<u>1-Series NX: a51nx, a61nx, a71nx, a81nx, a91nx, a120nx</u>	
<u>NX Basic Maintenance w/ Pro5/6 Control</u>	
<u>NX Advanced Maintenance w/ Pro5/6 Control</u>	
<u>1-Series: a500iR, a500Z, a800Z, a900Z</u>	
<u>a500iR/a500Z Maintenance & Recoveries</u>	
<u>a800Z/a900Z Maintenance & Recoveries</u>	
<u>MAG Series: MAG1, MAG3</u>	
<u>MAG1/3 Maintenance & Recoveries</u>	
<u>N-Series: N2-5XA</u>	
<u>N2-5XA w/ ProF Maintenance & Recoveries</u>	
<u>T-Series: T1, T2</u>	
<u>T1 Maintenance & Recoveries</u>	
<u>T2 Maintenance & Recoveries</u>	
<u>F-Series: F3, F5, F8</u>	20
<u>F-Series Maintenance & Recoveries</u>	
<u>L2-Series: L2 APC, L2 TABLE</u>	
<u>L2-Series w/ ProL Maintenance & Recoveries</u>	
<u>ProL Control Operations</u>	
<u>PS-Series: PS65, PS105</u>	
<u>PS-Series Maintenance & Recoveries</u>	
<u>ProP Control Operations</u>	
<u>Slim-Series: Slim3n, Slim5n, Slim5n 4+1</u>	
<u>ProS Control Operations</u>	
<u>Slim3/5n Maintenance & Recoveries</u>	
<u>D-Series: D200Z, D300, D500, DA300, DA500</u>	
<u>D200Z Maintenance & Recoveries</u>	
<u>DA300/500 Maintenance & Recoveries</u>	
<u>V-Series: V80S, V90S, V100S</u>	
<u>V-Series 5-Axis Maintenance & Recoveries</u>	

EDM Machines	21
<u>BX-Series: BX3</u>	
<u>BX3 Maintenance</u>	
<u>EDAF Series: EDAF2, EDAF3</u>	
<u>Sinker EDM (Hyper-i Control) Maintenance</u>	
<u>Sinker EDM (Hyper-i Control) Operations</u>	
<u>EDGE-Series: EDGE2i, EDGE3i</u>	
<u>Sinker EDM (Hyper-i Control) Maintenance</u>	
<u>Sinker EDM (Hyper-i Control) Operations</u>	
<u>EDNC-Series: EDNC6, EDNC8, EDNC10, EDNC15, EDNC17, EDNC20, EDNC22</u>	
<u>Sinker EDM (Hyper-i Control) Maintenance</u>	
<u>Sinker EDM (Hyper-i Control) Operations</u>	
<u>U3-Series: U3, U3i, UX3, UX3i</u>	
<u>Wire EDM (Hyper-i Control) Maintenance</u>	
<u>Wire EDM (Hyper-i Control) Operations</u>	
<u>U6-Series: U6, U6i, UX6, UX6i</u>	
<u>Wire EDM (Hyper-i Control) Maintenance</u>	
<u>Wire EDM (Hyper-i Control) Operations</u>	
<u>Uj-Series: U32j, U53j</u>	
<u>Wire EDM (Hyper-i Control) Maintenance</u>	
<u>Wire EDM (Hyper-i Control) Operations</u>	
<u>U-Series: U86, U1310</u>	
<u>Wire EDM (Hyper-i Control) Maintenance</u>	
<u>Wire EDM (Hyper-i Control) Operations</u>	
<u>UPV-Series: UPV-3, UPV-5</u>	
<u>Wire EDM (Hyper-i Control) Maintenance</u>	
<u>Wire EDM (Hyper-i Control) Operations</u>	

Ready to Enroll?

<u>SME Training Program</u>	23
<u>Registration Information</u>	24
<u>Policies & Facility Expectations</u>	25
<u>Makino Training Facility Rules and Expectations</u>	
<u>Cancellation Policy</u>	
<u>Drug-Free Workplace</u>	



Training with Makino

About Our Program

Be **Prepared** with Makino Training

Our team is dedicated to improving every student's **understanding and confidence**, so they can perform their job effectively.

Enhance your team's skills with classes for **all skill levels** from beginner to advanced. Our course offerings cover a wide range of **machines and topics**, including:

- Vertical Machines
- Horizontal Machines
- Electrical Discharge Machines (EDM)
- Control Operations
- Maintenance
- Programming

General Overview

We offer a **standard rotation of courses** in Electrical Discharge Machines (EDM), Milling Machines, and Programming. All classes are taught in a hybrid classroom environment, combining traditional classroom instruction with hands-on training. All courses, including those regularly offered, can be customized to suit your team's needs.

No matter which Makino Machine you have, students can expect to learn:

- **Operations Courses:**
 - The terminology, procedures, and functions needed to operate the machine control panel
- **Maintenance Courses:**
 - How to perform basic and advanced maintenance procedures on the major machine components
- **Programming Courses:**
 - Knowledge of the code, formatting, and processes necessary to write more efficient programs

Training Locations

Makino has two U.S.-based training facilities: **Makino Mason** and **Makino Auburn Hills**. The bulk of our standard classes are held at our Makino Mason facility (Mason, Ohio). Our EDM classes are taught at our Makino Auburn Hills facility (Auburn Hills, Michigan).

NOTE: S DE R.L. DE C.V. location classes are held in Querétaro and Monterrey, Mexico

We can send an instructor to your shop by request.



On-Demand Courses & Customization

Your Machine, Your Training

The Makino Training Program offers **on-demand courses** in addition to our regularly offered course rotation. We have an **extensive** list of on-demand courses **available by request**. Some of our **most requested classes include:**

Machine Specific:

- a40 Maintenance & Recoveries
- a500iR/a500Z Maintenance & Recoveries
- DA300/500 Maintenance & Recoveries
- F8 Maintenance & Recoveries
- G5/G7 Maintenance & Recoveries
- L2 Maintenance & Recoveries

General Topics:

- Audit & Preventative Maintenance
- Electrical Troubleshooting
- Metrology
- Preventative Maintenance

On-Demand Maintenance & Operations Course Structure

Our on-demand maintenance and operations courses maintain a **consistent structure across all machines and control types** and **are tailored to the specific machine and control**.

Operations Course Structure:

Students learn machine safety features, operator control stations, and machine components and functions. The class covers the control's functions and screens, setup procedures, and automatic recovery operations.

Topics:

- Explanation of Safety Functions
- Machine Components & Functions
- Basic Screen Navigation
- Control & FANUC backup
- Coordinate Systems
- Setting Work Offsets
- Tools & Tool Offsets
- Program Management & Editing
- Malfunction Prevention & Recovery
- Tool Monitoring
- Random Mode Operation

Maintenance Course Structure:

Students learn how to determine the cause of a machine fault and recover from it. The course covers basic electrical and mechanical adjustments, general and periodic maintenance procedures, and machine recovery.

Topics:

- Machine Component Overview
- Screen Navigation & Control Overview
- Control Backup
- Fanuc Book Overview
- Spindle Overview
- Feed Axis Drive Mechanisms Overview
- Gridshift
- Automatic Tool Changer Overview
- ATC Signal History
- Table Overview (if applicable)
- Automatic Pallet Changer Overview
- Electrical Schematic Overview
- Electrical Troubleshooting



Standard Course Descriptions

Milling Courses: Operations

Course Name	Expertise Level	Course Description & Outline	Applicable Machines	Length	Location
Pro5 Control Operations	Beginner to Intermediate	Students learn machine safety features, operator control stations, and machine components and functions. The class covers the control's functions and screens, setup procedures, and automatic recovery operations. Day 1: • Explanation of Safety Functions • Machine Components & Functions • Basic Pro5/6 Screen Navigation Day 2: • Pro5/6 Control & FANUC backup • Coordinate Systems • Setting Work Offsets • Tools & Tool Offsets • Program Management & Editing Day 3: • Malfunction Prevention & Program Recovery • Tool Monitoring • Random Mode Operation	• Any machine with a Pro5 Control Panel	2.5 Days	Makino Mason
Pro6 Control Operations			• Any Machine with a Pro6 Control Panel		
High Performance Machining	Intermediate to Advanced	Students learn to make appropriate decisions about tooling and programming of part geometry to support high-performance machining applications. The class covers essential Pro6 Control operations and tool measurement probing operations training. Day 1-3: • Tool Holders & Cutting Tools Suitable for HPM • Applications of Tools to Real-Life Machining • SGI, Machine Communications, & Transfer • HPM Feeds & Speed Calculations Day 4: • Basic Pro6 Screen Navigation & Coordinate Systems • Setting Work Coordinate Offsets, Tools, & Tool Offsets • Program Management & Editing • Malfunction Prevention & Program Recovery Day 5: • Calibration • Bull Nose/Ball Nose Checks		4.5 Days	Makino Auburn Hills

Milling Courses: Operations

Course Name	Expertise Level	Course Description & Outline	Applicable Machines	Length	Location
MAS-A5 Software Operations	Beginner to Intermediate	Prerequisite: • Familiarity with the basics of MMC systems, machining, and machine tools Students learn to effectively define, input, control, and operate the MAS-A5 System Software. Emphasis is placed on software data entry and system operation. Day 1: • Introduction to MAS-A5 Operations & Safety • MMC2 Cell & Components Overview • Basic Cell & MAS-A5 Operations & Navigation • How to Start/Stop Cell Controller/Client • MAS-A5 Data Entry & Steps • Data Removal Process • Operator Work Set Station Interface Day 2: • Diagnostic Tools including Pallet & Process Diagnosis • Tool Set, Tool Data Comparison & Process Assigned to Machine • Manual Pallet Moves Using: ◦ MAS-A5 Pallet IN/Pallet OUT ◦ Remote Handy & Handy Terminal Controller ◦ Manual Moves for Part Prove-Out • MMC2 Cell Recovery: Machine, WorkSetStation, Vehicle & Pallet Recovery • MAS-A5 Reports & Export Formats Day 3: • Customer-Specific Topics & Questions • Final Review & Wrap-up	• MMC2	2.5 Days	Makino Mason or Remote

Milling Courses: Maintenance

Course Name	Expertise Level	Course Description & Outline	Applicable Machines	Length	Location
MMC2 Recovery & Maintenance	Beginner to Intermediate	Students learn the function, location, and maintenance requirements for major machine units. The class covers using the diagnostic functions available on the machine and control to troubleshoot machine faults. Day 1: • MMC2 Overview of Functions & Components • MAS-A5 Cell Controller Overview • Manual Pallet Transport & High-Level Maintenance Day 2-3: • Manual & Maintenance Modes • SRM Remote Operations • Teaching Pallet Locations • Recovery & Switches Overview • Troubleshooting Activities on MMC2 Day 4-5: • Preventive Maintenance Overview & Activities	• MMC2	4.5 Days	Makino Mason
NX Basic Maintenance w/ Pro5/6 Control		Students learn how to determine a machine fault and its probable causes. The course covers how to perform basic electrical and mechanical adjustments, general and periodic maintenance procedures, and machine recovery. Day 1: • Machine Component Overview • Screen Navigation & Control Overview Day 2: • Control Backup • Fanuc Book Overview • Spindle Overview • Feed Axis Overview Day 3: • Gridshift • Automatic Tool Changer Overview Day 4-5: • ATC Signal History • Table Overview • Automatic Pallet Changer Overview • Electrical Schematic & troubleshooting Overview	• a51nx • a61nx • a71nx • a81nx • a91nx • a120nx		

Milling Courses: Maintenance

Course Name	Expertise Level	Course Description & Outline	Applicable Machines	Length	Location
NX Advanced Maintenance w/ Pro5/6 Control	Advanced	Prerequisite: - Completion of the NX Basic Maintenance w/ Pro5/6 Control Students learn how to perform advanced machine maintenance. The course covers the function, location, and principle of operation of the major machine components, and their teardown and rebuilding. Day 1: - Machine Walkaround & Component Overview - Pro6 Control & FANUC Backup Day 2: - Spindle Overview & Replacement - Spindle Checks & Alignments Day 3: - Feed Axis Overview - Linear Motion Guides Replacement - Ballscrew Replacement Day 4: - Rotary Table Overview - Rotary Table Disassembly & Reassembly Day 5: - Electrical Troubleshooting	- a51nx - a61nx - a71nx - a81nx - a91nx - a120nx	4.5 Days	Makino Mason

Milling Courses: Programming

Course Name	Expertise Level	Course Description & Outline	Length	Location
Manual Part Programming	Beginner to Advanced	Students learn codes, formatting, and processes necessary to write part programs in CNC language and develop part programs for Makino Machining Centers. The class covers Part Boundary Programming (using print dimensions) and working with the formats and codes to produce a program. Day 1: • G & M Codes • Format Program Sheets • Create a Program Template in Notepad • Cover Radius (G02 & G03), I & J Arcs • Cutter Comp (G41 & G42), Feeds & Speed Calculations • Basic CAM Theories & Techniques Day 2: • Review Canned Cycles • Write Advanced Programs & Part Program Final (Consisting of tool changes, canned cycles, etc.) Day 3-4: • Start Last Personal Program • Write a Complete Program with Tool Changes & Correct Format • Set up Work Offset & Run Part on a51nx Pro5 Machine Day 5: • Finish Programming & Machine Time • Complete Written Test	4.5 Days	Makino Mason
Macro Programming	Intermediate to Advanced	Prerequisites: • Completion of Makino's Manual Part Programming course or at least three months of programming experience on a FANUC controller • Ability to read part prints and use algebra, geometry, and right-angle trigonometry Students learn macro programming techniques and capabilities. Each day will conclude with a customer discussion on techniques for addressing and effectively teaching customer-specific needs. Day 1: • Basic Macros • Local & Common Variables • Arithmetic Commands Day 2: • Macro Calls • Logic, System Variables & Error Traps Day 3: • Advanced Macro Discussions (including Makino-Specific Macros)	3 Days	Makino Auburn Hills

EDM Courses: Operations

Course Name	Expertise Level	Course Description & Outline	Applicable Machines	Length	Location
Sinker EDM (Hyper-i Control) Operations	Beginner to Advanced	Prerequisites: • Familiarity with G/M-code programming • Basic machine hand tools operation (calipers, micrometers, indicators, etc.) Students learn the necessary knowledge to understand and operate the Hyper-i Control for their Makino Sinker EDM Machine. The class covers machine parts, movements, controls, and maintenance. Day 1: • Machine Parts, Movements, & Controls • Part Setup, Detailed Pick-up Cycles & Setting Work Coordinates Day 2: • Project Programming Day 3: • Operator Maintenance • Special Machine Option Functions • Select & Run Sample Programs • Location & Navigation of Onboard Manuals	• EDAF series ◦ EDAF2, 3 • EDGE series ◦ EDGE2i, 3i • EDNC series ◦ EDNC6, 8, 10, 15, 17, 20, 22	3 Days	Makino Auburn Hills
Wire EDM (Hyper-i Control) Operations		Students learn the necessary knowledge to understand and operate the Hyper-i Control for their Makino Wire EDM Machine. The class covers machine parts, movements, controls, and maintenance. Day 1: • Machine Introduction • Operator Maintenance • Machine Controls & Vertical Alignment Day 2: • Programming Basics • G & M Code • Taper • Selecting Machine Conditions • Program, Setup & Run Screens • Loading & Editing Programs • Picking up Work Piece & Setting Work Coordinates • Selecting a Program & Starting a Job Day 3: • Complete Leftover Training • Onboard Manuals • Run Sample Programs	• U3 Series ◦ U3, 3i, X3, X3i • U6 Series ◦ U6, 6i, X6, X6i • Uj Series ◦ U32j, 53j • U-Series ◦ U86, 1310 • UPV Series ◦ UPV-3, 5		

EDM Courses: Maintenance

Course Name	Expertise Level	Course Description & Outline	Applicable Machines	Length	Location
Sinker EDM (Hyper-i Control) Maintenance	Beginner to Advanced	Students learn to effectively maintain their Makino Sinker EDM, from navigating diagnostic controls to performing common mechanical adjustments. The class covers basic EDM Theory, machine construction, and control navigation with a focus on diagnostic functions. Students also learn manual use and maintenance practices, culminating in data backups and basic troubleshooting. Day 1: • Introduction to EDM • Machine Layout & Control Navigation Day 2: • Basic Manual Navigation & Maintenance • Common Mechanical Adjustments • Wire EDM Only ◦ Wire Path Maintenance & Adjustment ◦ Machine Calibrations from Preparation Page ◦ Taper/Granite Jig & Vertical Alignment Cut Day 3: • Basic Diagnostics & Troubleshooting • Parameter & Data Back-ups	• EDAF series ◦ EDAF2, 3 • EDGE series ◦ EDGE2i, 3i • EDNC series ◦ EDNC6, 8, 10, 15, 17, 20, 22	3 Days	Makino Auburn Hills
Wire EDM (Hyper-i Control) Maintenance			• U Series ◦ U86, 1310 • U3 Series ◦ U3, 3i, X3, X3i • U6 Series ◦ U6, 6i, X6, X6i • Uj Series ◦ U32j, 53j • UPV Series ◦ UPV-3, 5		
BX3 Maintenance		Prerequisites: • Familiarity with basic Hyper-i control navigation and indicator use in geometric adjustments Students learn the basics needed to maintain their Makino BX3 Fast Hole EDM machine effectively. The course covers control features and machine construction, control navigation, and diagnostic functions. Day 1: • Machine, Plumbing & Pneumatic layout • Tooling & Guide Plate Assembly • Control Navigation Day 2: • Basic Manual Navigation & Spindle Alignment Checks • W Axis Maintenance • Guide Plate & ATC/AGC Alignments Day 3: • Basic Rotary Table Maintenance • Center of Rotation (G501G54) • Tool Bore/Half Ball (G500G54) • Renishaw RMP400 Probe Pairing & Adjustment	• BX3		

EDM Courses: Wire

Course Name	Expertise Level	Course Description & Outline	Length	Location
Small Wire Diameter (HyperDrive/ HyperDrive Extreme)	Advanced	Students learn the necessary adjustments to the wire path on a HyperDrive/HyperDrive Extreme Machine to consistently run wire diameters, .008' to .004'. The course covers proper thermal cutter settings and a troubleshooting index to address wire breaks and threading difficulties throughout the wire path. Day 1: • Small Wire Uses & Preparation • Wire Path Adjustment Overview • Tension Roller, Guide & K Roller Adjustments Day 2: • Thermal Cutter Adjustments • Functional Verifications Day 3: • Basic Diagnostics & Troubleshooting	3 Days	Makino Auburn Hills



Courses by Machine Type

Courses by Machine: Milling

***The Pro5 and Pro6 Operation Courses are applicable to any machine with a Pro5 or Pro6 Control.

Machine Series	Machine Name	Applicable Courses	Course Availability
1-Series NX	a51nx	• NX Basic Maintenance & Recoveries • NX Advanced Maintenance & Recoveries	Standard Milling
	a61nx		
	a71nx		
	a81nx		
	a91nx		
	a120nx		
MAG Series	MAG1	• MAG1/3 Maintenance & Recoveries	On-Demand
	MAG3		
T Series	T1	• T1 Maintenance & Recoveries	On-Demand
	T2	• T2 Maintenance & Recoveries	
D-Series	D200Z	• D200Z Maintenance & Recoveries	On-Demand
	D300	• DA300/500 Maintenance & Recoveries	
	D500		
	DA300		
	DA500		
F-Series	F3	• F Series Maintenance & Recoveries	On-Demand
	F5		
	F8		
G-Series	G5	• G5/G7 Maintenance & Recoveries	On-Demand
	G7		

Courses by Machine: Milling

***The Pro5 and Pro6 Operation Courses are applicable to any machine with a Pro5 or Pro6 Control.

Machine Series	Machine Name	Applicable Courses	Course Availability
	a40 HMC	a40 Maintenance & Recoveries	<u>On-Demand</u>
1-Series	a500iR	a500iR/a500Z Maintenance & Recoveries	<u>On-Demand</u>
	a500Z		
	a800Z	a800Z/a900Z Maintenance & Recoveries	
	a900Z		
J-Series	J3	- J-Series Maintenance & Recoveries - ProL Control Operations	<u>On-Demand</u>
	J5		
	J6		
L2-Series	L2 APC	- L2-Series w/ ProL Maintenance & Recoveries - ProL Control Operations	<u>On-Demand</u>
	L2 TABLE		
N-Series	N2-5XA	N2-5XA w/ ProF Maintenance & Recoveries	<u>On-Demand</u>
PS-Series	PS65	- PS-Series Maintenance & Recoveries - ProP Control Operations	<u>On-Demand</u>
	PS105		
Slim-Series	Slim3n	- ProS Control Operations - Slim3n/5n Maintenance & Recoveries	<u>On-Demand</u>
	Slim5n		
	Slim5n 4+1		
V-Series	V80S	V-Series 5-Axis Maintenance & Recoveries	<u>On-Demand</u>
	V90S		
	V100S		

Courses by Machine: EDM

Machine Series	Machine Name	Applicable Courses	Course Type
BX-Series	BX3	• <u>BX3 Maintenance</u>	Standard EDM
EDAF-Series	EDAF2		Standard EDM
	EDAF3		
EDGE-Series	EDGE2i		
	EDGE3i		
EDNC-Series	EDNC6		
	EDNC8		
	EDNC10		
	EDNC15		
	EDNC17		
	EDNC20		
	EDNC22	• <u>Sinker EDM (Hyper-i Control) Maintenance</u> • <u>Sinker EDM (Hyper-i Control) Operations</u>	
U3-Series	U3		Standard EDM
	U3i		
	UX3		
	UX3i		
U6-Series	U6		
	U6i		
	UX6		
	UX6i		
Uj-Series	U32j		
	U53j		
U-Series	U86		
	U1310		
UPV-Series	UPV-3		
	UPV-5		
		• <u>Wire EDM (Hyper-i Control) Maintenance</u> • <u>Wire EDM (Hyper-i Control) Operations</u>	



Ready to Enroll?

SME Training Program Overview

Become the Expert

The **Makino Subject Matter Expert Training Program** prepares maintenance technicians to be their shop's Makino Machine expert.

Maintenance technicians receive the same hands-on training as Makino Field Service Engineers, learning **complex maintenance** and **machine troubleshooting**.

Upon course completion, technicians will be able to:

- Support their Makino machines at a high skill level
- Maintain their machines to run at optimal efficiency
- Inspect and diagnose Makino machines after a collision or alarm

The program consists of six one-week classes. There is one class a month for six months.



SME Program Courses

Course Name	Course Description & Outline	Location
Machine Operations	The Operations course covers the functions, terminology, procedures, and programming of the Pro5 and Pro6 control panel, including FANUC control maintenance.	Makino Mason
Machine Maintenance	The Maintenance course covers basic maintenance and troubleshooting for machine elements like the spindle and ball screw.	
Advanced Maintenance	The Advanced Maintenance course builds on the Maintenance course, covering more in-depth maintenance procedures, including spindle and linear guide replacement.	
Machine Metrology	The Metrology course covers foundations for precision machining, including geometry inspection, leveling and adjustment, and post-crash evaluations.	
Machine Audit & PM Training	The Audit and PM course covers preventative maintenance planning, spindle health evaluation, and machine performance.	
Electrical Print Reading & Troubleshooting	The Electrical Troubleshooting course covers reading Makino electrical prints and performing basic electrical maintenance on a Makino machine.	

Ready to Take Your Skills to the Next Level?

You Can Sign Up for Classes **Today!**

Visit our website to register for classes: <https://www.makino.com/en-us/support/training>

1. **Select the type of training you want to sign up for**
 - a. Classroom Training
 - b. On-Site CNC Training (at the customer facility)
 - c. Subject Matter Expert Technical Training
2. **Click the "SIGN UP" button**
3. **Complete the registration form for the training type you selected**
 - a. The Classroom and SME Training registration forms will prompt you to scan a QR code to upload a picture of your driver's license (or alternate approved ID)
 - b. Please return to the form after uploading photos of your ID to complete the form
4. **Click Submit**
 - a. You will receive an email confirming your submission was successful

Our Team will reach out to you within **1-2 business days** to confirm your registration. **Students are not officially enrolled in a course until they receive confirmation from the Makino Training Team.**

Details on pricing, payment terms, travel, and accommodation will be shared once registration is complete.



Don't See What You're Looking For?

Contact us if you have questions about our training program, the courses we offer, or **need help determining what kind of training your team needs**. Our team will respond to your message within **1-2 business days**.

You can reach us at:

training@makino.com | 1-888-MAKINO4

Policies & Facility Expectations

Makino Training Facility Rules and Expectations

- Makino is a **non-smoking** facility
- Students are **required** to wear a security badge when attending courses held at any Makino facility
- **Safety glasses with side shields** and **steel-toed safety shoes that meet ANSI standards** are required during course time spent in the shop
 - Students without these items will **NOT** be allowed on the shop floor and must reschedule their attendance
 - We recommend that you bring your own safety glasses to your course
- Business casual attire is requested
 - We ask that **NO** shorts, sweatpants, sleeveless shirts, T-shirts with writing, or sandals be worn to training courses

Cancellation Policy

Makino reserves the right to cancel a course at any time. If a course should be cancelled, registrants will be notified before the scheduled course start date. Students registered for a cancelled course will be given priority for rescheduling for future courses or placed on a waiting list if no other course is available.

Attendees should make **refundable** travel arrangements for courses. Due to possible course cancellations, it is recommended that only refundable tickets be purchased for transportation to training courses. Makino is **not** responsible for travel arrangements made for training courses.

Please do not hesitate to contact our Training Department for assistance with registration.

Drug-Free Workplace

It is the policy of Makino that the use, sale, transfer, or possession of alcohol and/or drugs on premises, work sites, or in any private vehicles parked on Makino's property is prohibited. Additionally, Makino prohibits individuals from attending any training class under the influence of alcohol and/or drugs. If a Makino instructor determines that an individual attending a training course is under the influence of alcohol and/or drugs, the individual will be asked to leave the premises immediately.



[Ready to Register?](#)