

The ideal machine for socially distant learning



TRAVELS	
X-Axis	8.6 in. (220 mm)
Y-Axis	6.3 in. (160 mm)
Z-Axis	2.4 in. (61 mm)
SPINDLE	
Spindle Power	120 W (0.12 kW) Brushless DC
Maximum Speed	20,000 RPM
Spindle Taper	ER11
Noise Level (No Load Operation)	<66 db(A)
Repositioning Accuracy	0.004 in (0.0018 mm)
POWER	
Power Required	Single-Phase 230 Vac, 50/60 Hz
MACHINE SPECIFICATIONS	
Table Size	12.6 in. x 5.9 in. (320 mm x 150 mm)
Typical System Footprint	15.4 in. x 15.7 in. (391 mm x 399 mm)
Overall System Height	16.7 in. (424 mm)
Typical System Weight	33 lb (14.9 kg)
Maximum Table Load Weight	6.6 lb (3 kg)

HIGHLIGHTED FEATURES
Fully-Enclosed with Safety Door Switch
Tormach PathPilot® Control System with Keyboard, Mouse, Touchscreen, and Tormach Jog Shuttle
ER11 Collet Uses Popular 1/8 inch, 1/4 inch, 4 mm, or 6 mm Tool Shanks
Starter Tooling Set with WER Collets and End Mills
Integrated Tool Setter
Laser Alignment System for XY Positioning
Clamp Kit

xsTECH CNC ROUTER/MILL EDUCATION PACKAGE	EDUCATION
MACHINE	
xsTECH CNC Router/Mill	✓
PathPilot Touchscreen Controller / Keyboard / Mouse / Jog Shuttle / Wi-Fi Module	✓
ACCESSORIES	
Electronic Tool Setter	✓
ER11 Collets	✓
Carbide Cutting Tool Set (16 Pieces)	✓

MACHINE CONTROLLER	
<p>POWERED BY</p> <p>A Better User Experience</p>	User-friendly design
	Support for up to 4-axis continuous machining
<p>PathPilot HUB is a browser-based, full-featured PathPilot simulator, producing usable G-Code.</p>	Intuitive conversational programming
	Usable G-Code Memory: Touchscreen Controller: 8 GB
	Built-in Dropbox™ support for seamlessly transferring programs

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CNC LATHE FOR EDUCATION

8L CNC LATHE



TORMACH® 8L



SPINDLE

Spindle Power	1.5 hp (1.11 kW)
Spindle Speed	Low: 180 to 2,500 rpm High: 350 to 5,000 rpm
Through Spindle Bore	1 in. (25.4mm)
Maximum Workpiece Length	10 in. (254 mm) with tailstock
Maximum Stock Over Bed	8 in. (200 mm)
Maximum Stock Over Carriage	4 in. (100 mm)
Spindle Nose	5C

TAILSTOCK

Taper	MT2
Diameter	0.9 in. (22 mm)
Travel	2.2 in. (55 mm)

TRAVELS

X-Axis	4.5 in. (114 mm)
Z-Axis	10 in. (330 mm) with tailstock

MOTION

X- and Z-Axis Maximum Feed Rate	150 IPM (3.8 m/min)
Axis Drivers (X,Z)	High-Performance Polyphase Stepper Motors with Leadshine® Microstepping Drivers

POWER

Power Requirements	Single-Phase 115 Vac, 50/60 Hz, 15A breaker
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MACHINE SPECIFICATIONS

Carriage Length × Width	7.25 in. × 4 in. (185 mm × 102 mm)
Machine Footprint	50 in. × 26 in. (1.2 m × 0.7 m)
Typical System Weight	838 lbs. (380 kg)
Maximum Swing Over Bed	8 in. (200 mm)
Maximum Swing Over Carriage	4 in. (100 mm)
Maximum System Height with Door Open	66 in. (1.6 m)
Overall System Height	52 in. (1.3 m)

MACHINE CONTROLLER

POWERED BY
PathPilot®
A Better User Experience

PathPilot® HUB

PathPilot HUB is a browser-based, full-featured PathPilot simulator, producing usable G-code.

User-friendly design

Intuitive conversational programming

Features:

- Rigid Tapping
- Threading
- Constant Surface Speed

Usable G-code Memory:
Controller: 80 GB
Operator Console: 40 GB

Built-in Dropbox™ support for seamlessly transferring programs

ABOUT PathPilot HUB

PathPilot is a web-powered, browser-based, full version of PathPilot software interface for any machine in the Tormach CNC lineup.

Teachers use PathPilot HUB to replace expensive CNC simulators. Students can experiment and study before they ever touch the equipment.

Once students prove out their code virtually, they can sign into HUB on the physical Tormach machine and sync their files. Then, they run programs using their PathPilot HUB-generated G-code.



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CNC LATHE FOR EDUCATION

TORMACH®



CNC LATHE PACKAGE COMPARISON



8L CNC LATHE EDUCATION PACKAGES		BASIC	ADVANCED
MACHINE			
8L CNC Lathe with Stand / Enclosure		✓	✓
8L CNC Lathe Owner's Kit	Quick Change Tool Post and Stud (Size 0XA)		
	Operator's Manual		
	All Required Cables	✓	✓
	Machine Lifting Hardware		
	USB 2.0 Hub		
	Coolant Tube		
SYSTEM CONTROL			
8L Lathe PathPilot Operator Console with Jog Pendant Controller / Waterproof Mini Keyboard / Waterproof Mouse			✓
PathPilot Controller with Controller Arm (Adjustable Swing Arm) and Vesa Mount / Standard LCD Monitor / Jog Shuttle Controller / Waterproof Mini Keyboard / Waterproof Mouse / Cable Kit		✓	
PathPilot Software Bootable USB Drive (Recovery Media)		✓	✓
COOLANT SYSTEM			
8L Stand Coolant Kit			✓
WORKHOLDING			
4 in. Precision 3-Jaw Chuck (5C Mount)		✓	✓
4 in. Precision 4-Jaw Chuck (5C Mount)			✓
LATHE TOOL HOLDING			
0XA Tool Holder Kit for 8L		✓	✓
5C Round Collet Set (35 Pieces)		✓	✓
5C Collet Rack (Holds 30 Collets)			✓
Interchangeable Point Live Center Set			✓
TOOLING			
Deluxe Professional Lathe Tool Kit		✓	✓
3-Piece STFCR Boring Bar Set			✓
1/16 in. - 1/2 in. Machine Length Drill Set			✓
MEASUREMENT EQUIPMENT			
Basic 3-Piece Indicator Set		✓	✓
Haimer CENTRO Precision Centring Device			✓
5 mm Bent Probe Tip for Haimer CENTRO			
Digital Micrometer (0 in. - 1 in.) / Digital Caliper (0 in. - 6 in.)		✓	✓
CONSUMABLES			
Machine Way Oil (1 Gallon)		✓	✓

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CNC LATHE FOR EDUCATION 15L SLANT-PRO CNC LATHE



15L Slant PRO CNC LATHE



SPINDLE

Spindle Power	3 hp (2.24 kW)
Spindle Speed	100 to 3,500 RPM
Spindle Taper	5C (with removable insert)
Spindle Bore Diameter	1.53 in. (38.86 mm) (with 5C insert removed)
Spindle Nose	D1-4 Camlock Mount

MOTION

Max Feed Rate	100 IPM (2.54 m/min) (X) 100 IPM (2.54 m/min) (Z)
Axis Drivers (X,Z)	High-Performance Polyphase Stepper Motors with Leadshine® Microstepping Drivers

POWER

Power Required (Primary)	230 Vac single-phase, 20A breaker
Power Required (Secondary)	115 Vac single-phase, 20A breaker

MACHINE SPECIFICATIONS

Recommended Footprint	72 in. × 42 in. (1829 mm × 1067 mm)
Typical System Weight	1800 lbs. (816 kg)
Swing Over Bed	15 in. (381 mm) Diameter
Swing Over Carriage	6.2 in. (157.5 mm) Diameter
X-Axis Travel	10 in. (254 mm)
Z-Axis Travel	12 in. (305 mm)
Recommended Chuck Size	6 in. (152 mm)

MACHINE CONTROLLER



A Better User Experience

PathPilot HUB is a browser-based, full-featured PathPilot simulator, producing usable G-code.

User-friendly design

Intuitive conversational programming

- Features:
- Rigid Tapping
 - Threading
 - Constant Surface Speed

Usable G-code Memory: Controller: 80 GB

Built-in Dropbox™ support for seamlessly transferring programs

ABOUT PathPilot HUB

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CNC LATHE FOR EDUCATION



CNC LATHE PACKAGE COMPARISON



15L SLANT-PRO EDUCATION PACKAGES	BASIC	INTERMEDIATE	ADVANCED
MACHINE			
15L Slant-Pro™ CNC Lathe with Full Enclosure / Owner's Kit / Lifting Kit / Light Kit	✓	✓	✓
Oil Pump Style	Manual	Automatic	Automatic
CONTROLLER			
PathPilot Controller with Controller Arm (Adjustable Swing Arm) / Vesa Mount / Waterproof Mini Keyboard / Waterproof Mouse / Cable Kit / Jog Shuttle Controller	✓	✓	✓
Monitor & Controller Arm	Touchscreen Monitor	✓	✓
	Standard LCD Monitor	✓	✓
PathPilot Software Bootable USB Drive (Recovery Media)	✓	✓	✓
MEASUREMENT			
Basic 3-Piece Indicator Set	✓	✓	✓
Haimer CENTRO Precision Centring Device with 5 mm Bent Probe Tip for Haimer CENTRO		✓	✓
WORKHOLDING			
3-Jaw Reversible 6 in. Lathe Chuck (D1-Type Direct Mount)	✓	✓	✓
LATHE TOOLHOLDING			
8-Station Turret Kit and 10-Pack Coolant Nozzles		✓	✓
Right-Handed Heavy-Duty Gang Block			✓
5C Round Collet Set (18 Pieces)		✓	
5C Round Collet Set (35 Pieces)			✓
5C Collet Rack (Holds 30 Collets)		✓	✓
15L Manual 5C Drawtube		✓	
Quick Change Tool Post Kit	✓		
TOOLING			
Deluxe Lathe Tool Starter Kit	✓	✓	✓
OD Threading Tool: CER075K16	✓		
Gang Tool Starter Kit	✓	✓	✓
ACCESSORIES & UPGRADES			
California Air Tools 4610S Air Compressor			✓
Automatic Collet Closer			✓
Filter-Regulator-Lubricator			✓
COOLANT SYSTEM ACCESSORIES			
Floating Tramp Oil Collection Pillow			✓
CONSUMABLES			
Machine Way Oil (1 Gallon)	✓	✓	✓
Durakut Full Synthetic Coolant (1 Gallon)	✓	✓	✓
STOCK ADVANCEMENT			
EZ-Puller Self-Adjusting Bar Puller			✓

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CNC ROUTER FOR EDUCATION

24R CNC ROUTER



TRAVELS

X-Axis	24.75 in. (625 mm)
Y-Axis	55.75 in. (1415 mm)
Z-Axis	6.70 in. (170 mm)

SPINDLE

Spindle Power	2 hp (1.5 kW)
Spindle Type	Electrospindle
Minimum Speed	10,000 RPM
Maximum Speed	24,000 RPM
Cooling	Water-Cooled (Chiller Included)
Spindle Taper	ER20
Thread Machining	Thread Mill

MOTION

X-, Y-, and Z-Axis	200 in./min (5.0 m/min)
Axis Drivers (X,Y,Z)	High-Performance Polyphase Stepper Motors with Leadshine® Microstepping Drivers

POWER

Power Required	Single-Phase 115 Vac, 50/60 Hz, 15A breaker
Vacuum Pump Power Requirement	220 Vac, 20A breaker

MACHINE SPECIFICATIONS

Table Type	Integrated Vacuum Table
Table Size	26.7 in. x 65 in. (680 mm x 1650 mm)
Gantry Clearance	6 in. (154 mm)
Machine Footprint	72 in. x 39 in. (1.8 m x 1 m)
Overall System Height	76.5 in. (1.9 m)
Typical System Weight	900 lb (408 kg)

LINEAR MOTION COMPONENTS

Axis Motion	Ballscrew and Stepper Driver
Guideways	Precision Linear Guideway

MACHINE CONSTRUCTION

Stand	Welded Steel (Included)
Machine Base	Cast Iron
Gantry	Aluminum

RESOLUTION AND ACCURACY

Resolution	0.00025 in. (0.006 mm)
Ball Screw Positional Accuracy	±0.002 in./ft. (±0.167 mm/m)
Repeatability	±0.001 in. (±0.02 mm)



MACHINE CONTROLLER

POWERED BY
PathPilot®
A Better User Experience

PathPilot® HUB

PathPilot HUB is a browser-based, full-featured PathPilot simulator, producing usable G-code.

- User-friendly visual interface
- 3D toolpath preview
- Support for up to 4-axis continuous machining
- Automatic spindle speed control
- Compatible with standard G-Code Usable G-code Memory Controller: 80 GB
- Intuitive conversational programming
- Built-in Dropbox™ support for seamlessly transferring programs

ABOUT PathPilot HUB

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CNC ROUTER FOR EDUCATION

TORMACH® 24R CNC ROUTER PACKAGE COMPARISON



24R ROUTER EDUCATION PACKAGES	BASIC	ADVANCED
MACHINE		
24R Router	✓	✓
Standard Height Adjustable Machine Foot	✓	✓
24R Machine Owners Kit	✓	✓
CONTROLLER		
PathPilot Operator Console / Jog Pendant Controller / Waterproof Mini Keyboard & Mouse		✓
PathPilot Controller / Waterproof Mini Keyboard & Mouse / Jog Shuttle Controller / Standard LCD Monitor / Controller Arm	✓	
DUST COLLECTION		
1 HP Dust Collector with 370 mm Bag and 15 in. Cartridge Filter and Reducer Kit		✓
Dust Collection Hose, 3 in. Inside Diameter x 5 m Long		✓
MEASUREMENTS AND OFFSETS		
Tool Setter for 24R	✓	✓
Essential Metalworking Gauge Kit	✓	✓
WORK HOLDING AND FIXTURING		
Storm Vacuum Pump for 24R		✓
Canister Filter for Storm Vacuum System		✓
Storm Vacuum Adapter Kit for 24R		✓
Gasket, 5/16 in. Vacuum Neoprene Foam (20 Feet)		✓
TOOL HOLDING		
ER20 Collet Set (30 Pcs.)		✓
ER20 Collet Set (15 Pcs.)	✓	
Huot ER20 Collet Rack		✓
CUTTING TOOLS		
Spring-Loaded CNC Drag Knife		✓
24R Starter Cutting Tool Kit by Amana Tools	✓	✓

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CNC MILL FOR EDUCATION 770M CNC MILLING MACHINE



TRAVELS	
X-Axis	14 in. (356 mm)
Y-Axis	7.5 in. (191 mm)
Z-Axis	13.25 in. (337 mm)
SPINDLE	
Spindle Power	1.5 hp (1.12 kW)
Maximum Speed	10,000 RPM
Transmission	Poly-V Belt
Spindle Taper	R8
Thread Machining	<ul style="list-style-type: none"> • Tension/Compression • Auto-Reversing • Thread Mill
MOTION	
X- and Y-Axis	135 IPM (3.43 m/min)
Z-Axis	110 IPM (2.79 m/min)
Axis Drivers (X,Y,Z)	High-Performance Polyphase Stepper Motors with Leadshine® Microstepping Drivers
POWER	
Power Required	Single-Phase 115 Vac, 50/60 Hz, 15A breaker
MACHINE SPECIFICATIONS	
Table Size	26 in. × 8 in. (660 mm × 203 mm)
Table Slots	5/8 in. (15.9 mm) (three slots)
Spindle Nose to Table Max Clearance	13.25 in. (337 mm)
Spindle Centerline to Machine Column	8.6 in. (218 mm)
Typical System Footprint	56 in. × 48.5 in. (1422 mm × 1232 mm)
Overall System Height	88 in. (2235 mm)
Typical System Weight	950 lbs. (431 kg)
Maximum Weight on Table	500 lbs. (227 kg)
Coolant Capacity	12 gal. (45.4 L)
FRAME	
Frame and Table	Cast iron frame and table, with hand-scraped hydrodynamic ways and tapered adjustment gibs
Way Surfaces	Low-friction PTFE-filled, Acetyl-bonded sliding surface. Similar to Rulon® and Turcite®.



MACHINE CONTROLLER	
<p>POWERED BY</p> <p>A Better User Experience</p>	User-friendly design
<p>PathPilot HUB is a browser-based, full-featured PathPilot simulator, producing usable G-code.</p>	Support for up to 4-axis continuous machining
	Intuitive conversational programming
	Usable G-code Memory Controller: 80 GB
	Built-in Dropbox™ support for seamlessly transferring programs

ABOUT PathPilot HUB	
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CNC MILL FOR EDUCATION

TORMACH® 770M

CNC MILL PACKAGE COMPARISON



770M EDUCATION PACKAGES	BASIC	INTERMEDIATE	ADVANCED
MACHINE			
770M Mill with 770M/MX Stand / Chip Tray / Lifting Bar Kit / Owner's Kit	✓	✓	✓
Oiling System Type	Manual Pump	Automatic Pump	Automatic Pump
Oiling Skimmer Kit			✓
ENCLOSURE			
770M Enclosure Kit with Door Lock Switch Kit	✓	✓	✓
CONTROLLER			
PathPilot Controller / Waterproof Mini Keyboard & Mouse / Jog Shuttle Controller / Standard LCD Monitor / Controller Arm	✓		
PathPilot Operator Console / Jog Pendant Controller / Waterproof Mini Keyboard & Mouse		✓	✓
PathPilot Software Bootable USB Drive (Recovery Media)	✓	✓	✓
TOOL CHANGING			
Automatic 10-Tool Changer Kit for the 770M/MX			✓
Power Drawbar Kit		✓	✓
Drawbar Wrench / Hammer	✓		
COOLANT SYSTEM			
Flood Coolant Kit		✓	✓
MEASUREMENTS			
Passive Probe Kit			✓
HAIMER 3D-Sensor New Generation Kit (metric) with Ball Replacement Tip		✓	
Essential Metalworking Gauge Kit			✓
Electronic Tool Setter			✓
Basic 3-Piece Indicator Set	✓	✓	
3/8 in. (9 mm) Shank Edge Finder	✓	✓	
WORKHOLDING			
5 in. (127 mm) CNC Vise / 5 in (127 mm) Parallel Set	✓	✓	✓
5 in. (127 mm) Aluminum Soft Jaw Set			✓
Clamp Kit for 5/8 in. T-Slots	✓	✓	✓
TOOL HOLDING			
TTST™ CNC Operator Set with Tormach Tool Assistant		✓	✓
ER20 Collet Set (15 Pieces)		✓	
ER20 Collet Set (30 Pieces)			✓
ER20 Collet Rack (Holds 36 Collets)			✓
Modular Tension/Compression Tapping Head Kit		✓	✓
Manual Operator Set (Inch)	✓	✓	
TOOLING			
End Mill Kit for Aluminum #1	✓	✓	✓
End Mill Kit for Steel #1		✓	✓
1/16 inch - 1/2 inch Machine-Length Drill Set	✓	✓	✓
TTST™ MiniShear (0.75 in) (20 mm) with XDET 2.52 Insert (10-Pack)			✓
TTST™ Diamond Drag Engraver Kit		✓	✓
CONSUMABLES			
Machine Way Oil (1 Gal.)	✓	✓	✓
QualiChem XTREME CUT 251C Semi-Synthetic Coolant		✓	✓

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CNC MILL FOR EDUCATION 1100M CNC MILLING MACHINE



TRAVELS	
X-Axis	18 in. (457 mm)
Y-Axis	11 in. (279 mm)
Z-Axis	16.25 in. (413 mm)
SPINDLE	
Spindle Power	2 hp (1.49 kW)
Maximum Speed	7,500 RPM
Transmission	Poly-V Belt
Spindle Taper	R8
Thread Machining	<ul style="list-style-type: none"> • Tension/Compression • Auto-Reversing • Thread Mill
MOTION	
X- and Y-Axis	110 IPM (2.79 m/min)
Z-Axis	90 IPM (2.29 m/min)
Axis Drivers (X,Y,Z)	High-Performance Polyphase Stepper Motors with Leadshine® Microstepping Drivers
POWER	
Power Required	Single-Phase 230 Vac, 50/60 Hz, 20A breaker
MACHINE SPECIFICATIONS	
Table Size	34 in. x 9.5 in. (863 mm x 241 mm)
Table Slots	5/8 in. (15.9 mm) (three slots)
Spindle Nose to Table Max Clearance	17 in. (432 mm)
Spindle Centerline to Machine Column	11 in. (279 mm)
Typical System Footprint	69 in. x 56.5 in. (1753 mm x 1435 mm)
Overall System Height	96 in. (2439 mm)
Typical System Weight	1600 lbs. (726 kg)
Maximum Weight on Table	500 lbs. (227 kg)
Coolant Capacity	12 gal. (45.4 L)
FRAME	
Frame and Table	Cast iron frame and table, with hand-scraped hydrodynamic ways and tapered adjustment gibs
Way Surfaces	Low-friction PTFE-filled, Acetyl-bonded sliding surface. Similar to Rulon® and Turcite®.



MACHINE CONTROLLER

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User-friendly design

Support for up to 4-axis continuous machining

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CNC MILL FOR EDUCATION

TORMACH® 1100M CNC MILL PACKAGE COMPARISON



1100M EDUCATION PACKAGES	BASIC	INTERMEDIATE	ADVANCED
MACHINE			
1100M Mill with 1100M/MX Stand / Chip Tray / Lifting Bar Kit / Owner's Kit	✓	✓	✓
Oiling System Type	Manual Pump	Automatic Pump	Automatic Pump
Oiling Skimmer Kit			✓
ENCLOSURE			
1100M Enclosure Kit with Door Lock Switch Kit	✓	✓	✓
CONTROLLER			
PathPilot Operator Console / Jog Pendant Controller / Waterproof Mini Keyboard & Mouse		✓	✓
PathPilot Controller / Waterproof Mini Keyboard & Mouse / Jog Shuttle Controller / Standard LCD Monitor / Controller Arm	✓		
PathPilot Software Bootable USB Drive (Recovery Media)	✓	✓	✓
TOOL CHANGING			
Automatic 12-Tool Changer Kit for the 1100M/MX			✓
Power Drawbar Kit		✓	✓
Drawbar Wrench / Hammer	✓		
COOLANT SYSTEM			
Flood Coolant Kit		✓	✓
Portable Refractometer (Coolant Tester)			✓
MEASUREMENTS			
Passive Probe			✓
HAIMER 3D-Sensor New Generation Kit (metric) with Ball Replacement Tip		✓	
Essential Metalworking Gauge Kit	✓	✓	✓
Electronic Tool Setter			✓
1/2 in. (12 mm) Shank Edge Finder	✓		
3/8 in. (9 mm) Shank Edge Finder	✓		
WORKHOLDING			
5 in. (127 mm) CNC Vise / 5 in (127 mm) Parallel Set	✓	✓	✓
5 in. (127 mm) Aluminum Soft Jaw Set			✓
Clamp Kit for 5/8 in. T-Slots	✓	✓	✓
TOOL HOLDING			
TTST™ CNC Operator Set with Tormach Tool Assistant	✓	✓	✓
ER20 Collet Set (30 Pieces)		✓	✓
ER20 Collet Set (15 Pieces)	✓		
ER20 Collet Rack (Holds 36 Collets)			✓
TTST™ ER20 Collet Tap Holder		✓	✓
TOOLING			
End Mill Kit for Aluminum #1	✓	✓	✓
End Mill Kit for Steel #1		✓	✓
Compact TTST™ Tool Tightening Fixture	✓	✓	✓
1/16 inch - 1/2 inch Machine-Length Drill Set	✓	✓	✓
TTST™ MiniShear (0.75 in) (20 mm) with XDET 2.52 Insert (10-Pack)			✓
CONSUMABLES			
Machine Way Oil (1 Gal.)	✓	✓	✓
QualiChem XTREME CUT 251C Semi-Synthetic Coolant		✓	✓

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CNC MILL FOR EDUCATION 1100MX CNC MILLING MACHINE



TRAVELS	
X-Axis	18 in. (457 mm)
Y-Axis	11 in. (279 mm)
Z-Axis	16.25 in. (413 mm)
SPINDLE	
Spindle Power	2 hp (1.49 kW)
Maximum Speed	10,000 RPM
Transmission	Poly-V Belt
Spindle Taper	BT30
Thread Machining	<ul style="list-style-type: none"> • Rigid Tapping • Tension/Compression • Thread Mill
MOTION	
X- and Y-Axis	300 IPM (7.62 m/min)
Z-Axis	230 IPM (5.84 m/min)
Axis Drivers (X,Y,Z)	Servo Motors
POWER	
Power Required	Single-Phase 230 Vac, 50/60 Hz, 20A breaker
MACHINE SPECIFICATIONS	
Table Size	34 in. x 9.5 in. (863 mm x 241 mm)
Table Slots	5/8 in. (15.9 mm) (three slots)
Spindle Nose to Table Max Clearance	16.5 in. (419 mm)
Spindle Centerline to Machine Column	11 in. (279 mm)
Typical System Footprint	69 in. x 56.5 in. (1753 mm x 1435 mm)
Overall System Height	96 in. (2439 mm)
Typical System Weight	1600 lbs. (726 kg)
Maximum Weight on Table	500 lbs. (227 kg)
Coolant Capacity	12 gal. (45.4 L)
FRAME	
Frame and Table	Cast iron frame and table, with hand-scraped hydrodynamic ways and tapered adjustment gibs
Way Surfaces	Low-friction PTFE-filled, Acetyl-bonded sliding surface. Similar to Rulon® and Turcite®.



MACHINE CONTROLLER	
<p>POWERED BY</p> <p>A Better User Experience</p> <p>PathPilot HUB is a browser-based, full-featured PathPilot simulator, producing usable G-code.</p>	User-friendly design
	Support for up to 4-axis continuous machining
	Intuitive conversational programming
	Usable G-code Memory Controller: 80 GB Operator Console: 40 GB
	Built-in Dropbox™ support for seamlessly transferring programs

ABOUT PathPilot HUB	
PathPilot is a web-powered, browser-based, full version of PathPilot software interface for any machine in the Tormach CNC lineup.	
Teachers use PathPilot HUB to replace expensive CNC simulators. Students can experiment and study before they ever touch the equipment.	
Once students prove out their code virtually, they can sign into HUB on the physical Tormach machine and sync their files. Then, they run programs using their PathPilot HUB-generated G-code.	



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CNC MILL FOR EDUCATION

TORMACH® 1100MX[®] CNC MILL PACKAGE COMPARISON



1100MX EDUCATION PACKAGES	BASIC	ADVANCED
MACHINE		
1100MX Mill with 1100M/MX Stand / Chip Tray / Lifting Bar Kit / Owner's Kit	✓	✓
Oiling System Type	Automatic	Automatic
ENCLOSURE		
1100MX Enclosure Kit with Door Lock Switch Kit	✓	✓
CONTROLLER		
PathPilot Operator Console / Jog Pendant Controller / Waterproof Mini Keyboard & Mouse		✓
PathPilot Controller / Waterproof Mini Keyboard & Mouse / Jog Shuttle Controller / Touch Screen LCD Monitor / Controller Arm	✓	
PathPilot Software Bootable USB Drive (Recovery Media)	✓	✓
TOOL CHANGING		
Automatic 12-Tool Changer Kit for the 1100MX (BT30)		✓
COOLANT SYSTEM		
Flood Coolant Kit		✓
Oil Skimmer Kit		✓
Portable Refractometer (Coolant Tester)		✓
MEASUREMENTS		
Passive Probe (BT30) with Replacement Probe Tip		✓
HAIMER 3D-Sensor New Generation Kit (metric) with Ball Replacement Tip	✓	
Electronic Tool Setter		✓
Essential Metalworking Gauge Kit	✓	✓
WORKHOLDING		
5 in. (127 mm) CNC Vise / 5 in (127 mm) Parallel Set	✓	✓
5 in. (127 mm) Aluminum Soft Jaw Set		✓
Clamp Kit for 5/8 in. T-Slots	✓	✓
TOOL HOLDING		
BT30 Operator's Set (Inch)	✓	✓
ER20 Collet Set (30 Pieces)		✓
ER20 Collet Rack (Holds 30 Collets)		✓
TOOLING		
End Mill Kit for Aluminum #1	✓	✓
End Mill Kit for Steel #1		✓
1/16 inch - 1/2 inch Machine-Length Drill Set	✓	✓
CONSUMABLES		
Machine Way Oil (1 Gal.)	✓	✓
QualiChem XTREME CUT 251C Semi-Synthetic Coolant		✓

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tormach.com | 1100MX EDU Spec_Pkg Comparison (0921)



CNC PLASMA TABLE FOR EDUCATION

1300PL CNC PLASMA TABLE



TRAVELS	
X-Axis	50 in. (1270 mm)
Y-Axis	51.5 in. (1308 mm)
Z-Axis	3.9 in. (100 mm)
MAXIMUM FEED RATE	
X- and Y-Axis	1,000 IPM (25.4 m/min)
Z-Axis	120 IPM (3.0 m/min)
TABLE SPECIFICATIONS	
Table Size	51.2 in. × 51.2 in. (1.3 m × 1.3 m)
Table Type	Water Table
Material Weight Capacity	750 lbs. (340 kg)
Liquid Capacity	59 US Gallons (223 liters)
MACHINE SPECIFICATIONS	
Machine Footprint	78 in. × 70 in. (1.95 m × 1.7 m)
Overall System Height	55 in. (1.4 m)
Typical System Weight	1,232 lbs. (559 kg)
LINEAR MOTION COMPONENTS	
X- and Y-Axis Motor	Servo-Driven
Z-Axis Motor	NEMA-23 Stepper
Guideways	Precision Linear Guideway
Power Transmission	Planetary Gear (X-Axis) 5 mm HTD Belt (Y-Axis)
MACHINE CONSTRUCTION	
Water Table	Welded Steel
Machine Base	Welded Steel
Gantry Bridge	Aluminum
Gantry Supports	Steel
SHOP REQUIREMENTS	
Power Required (Table)	Single-Phase 230 Vac, 50/60 Hz, 20A breaker
Compressed Air (Clean, Dry Air)	Between 90 - 120 psi (620 kPa - 825 kPa). If air supply is greater than 120 psi (825 kPa), you must use a regulator.
RESOLUTION AND ACCURACY	
Resolution	0.0005" (0.0127 mm)
Repeatability	±0.001 in. (±0.0254 mm)
Positional Accuracy	0.005 in. / ft (130 micron / 300mm)

MACHINE CONTROLLER	
<p>POWERED BY PathPilot[®]</p> <p>A Better User Experience</p>	User-friendly design
	Cloud-based simulator via PathPilot HUB
<p>PathPilot HUB is a browser-based, full-featured PathPilot simulator, producing usable G-code.</p>	Intuitive conversational programming
	DXF import capability
	Auto Cut Feeds & Speeds Calculator built in
	Usable G-code Memory Controller: 80 GB
	Built-in Dropbox™ support for seamlessly transferring programs

ABOUT PathPilot HUB	
<p>PathPilot is a web-powered, browser-based, full version of PathPilot software interface for any machine in the Tormach CNC lineup.</p> <p>Teachers use PathPilot HUB to replace expensive CNC simulators. Students can experiment and study before they ever touch the equipment.</p> <p>Once students prove out their code virtually, they can sign into HUB on the physical Tormach machine and sync their files. Then, they run programs using their PathPilot HUB-generated G-code.</p>	

TORCH	
Plasma Source Options	Hypertherm <ul style="list-style-type: none"> • Powermax45 XP • Powermax65 • Powermax85
Torch Type	Floating head with digital torch height control (THC)
Torch Features	Breakaway torch with collision detection
DELIVERY NOTES AND WARRANTY	
Liftgate-Ready?	Yes, it's liftgate-ready — Forklift not required
Required Equipment	Pallet jack and an engine hoist or gantry crane
Warranty	2 Years



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CNC PLASMA TABLE FOR EDUCATION

TORMACH® 1300PL® CNC PLASMA TABLE PACKAGE COMPARISON



1300PL CNC PLASMA TABLE EDUCATION PACKAGES		BASIC	INTERMEDIATE	ADVANCED
BASE MACHINE PRICE*		\$13,950	\$13,950	\$13,950
PACKAGE BUILD OPTIONS		\$4,579	\$5,832	\$6,753
MACHINE				
1300PL CNC Plasma Table		✓	✓	✓
1300PL CNC Plasma Table Owner's Kit		✓	✓	✓
SYSTEM CONTROL				
PathPilot Controller with Controller Arm / Vesa Mount / Waterproof Mini Keyboard / Waterproof Mouse / Cable Kit / Jog Shuttle Controller		✓	✓	✓
Monitor & Controller Arm	Touchscreen Monitor		✓	✓
	Standard LCD Monitor	✓		
PathPilot Software Bootable USB Drive (Recovery Media)		✓	✓	✓
PLASMA CUTTING SYSTEMS				
Hypertherm Powermax45 Plasma System		✓		
Hypertherm Powermax65 Plasma System			✓	
Hypertherm Powermax85 Plasma System				✓
CONSUMABLES				
Hypertherm Essential Consumable Kit for 45 Amp Torch		✓		
Hypertherm Essential Consumable Kit for 65 Amp Torch			✓	
Hypertherm Essential Consumable Kit for 85 Amp Torch				✓
ACCESSORIES				
Hypertherm Shade 5 Goggles		✓		
Hypertherm Shade 8 Face Shield			✓	✓

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MACHINE TOOLS FOR EDUCATION

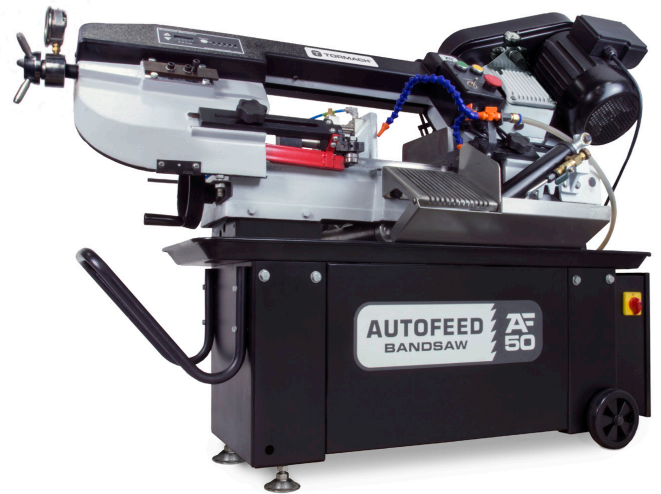
AF50 AUTOFEED BANDSAW



MACHINE REQUIREMENTS	
Footprint (Width x Depth x Height)	60 in. x 36 in x 67 in. (1.53 m x 0.91 m x 1.71 m)
Power	Single-Phase 115 Vac, 15A breaker
Compressed Air Source	90 psi to 120 psi (620 kPa to 827 kPa)
MAXIMUM CAPACITY	
Rectangular Stock: 6 in. tall x 8 in. wide (152 mm tall x 203 mm wide)	
Round Stock: 7 in. (178 mm) diameter	
BLADE SPEEDS	
60 Hz: 135, 161, 226, 394 ft/min (41-49-69-120 m/min)	
50 Hz: 112, 135, 194, 322 ft/min (34-41-59-98 m/min)	
BLADE SIZE	
Length	93 in. (2362 mm)
Width	0.75 in. (19 mm)
Thickness	0.035 in. (0.9 mm)

FEATURES	
Pneumatic Clamping System	
Hydraulic Feed Control	
Programmable Automatic Workpiece Positioning	<ul style="list-style-type: none"> • Cut lengths between 0.157 in. to 50 in. (4 mm to 1270 mm) • Up to 10 in. (254 mm) per stroke • Maximum 5 strokes per part • Maximum 999 parts per program • Part countdown display
Integrated Coolant System — 2.3 gal (8.7 L) capacity	
Movable	
Blade tension indicator for fast and easy tension adjustment after a blade change	

AF50 AUTOFEED BANDSAW EDUCATION PACKAGE	EDUCATION
MACHINE	
AF50 Autofeed Bandsaw with Integrated Coolant System	✓
Owner's Kit and 15 Amp Fuse	✓
ACCESSORIES	
Heavy-Dut Flexible Roller Table	✓
Portable Refractometer (Coolant Tester)	✓
Blade Serpent Snakebite Metalworking Blade Coolant	✓
Blade Brush for AF50	✓



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CNC MILL FOR EDUCATION PCNC 440 CNC MILLING MACHINE



TRAVELS	
X-Axis	10 in. (254 mm)
Y-Axis	6.25 in. (159 mm)
Z-Axis	10 in. (254 mm)
SPINDLE	
Spindle Power	0.75 hp (0.56 kW)
Maximum Speed	10,000 RPM
Transmission	Poly-V Belt
Spindle Taper	R8
Thread Machining	Thread Mill
MOTION	
X- and Y-Axis	135 IPM (3.43 m/min)
Z-Axis	110 IPM (2.79 m/min)
Axis Drivers (X,Y,Z)	High-Performance Polyphase Stepper Motors with Leadshine® Microstepping Drivers
POWER	
Power Required	Single-Phase 115 Vac, 50/60 Hz, 15A breaker
MACHINE SPECIFICATIONS	
Table Size	18 in. × 6.3 in. (457 mm × 160 mm)
Table Slots	3/8 in. (9.5 mm) (three slots)
Spindle Nose to Table Max Clearance	11 in. (279 mm)
Spindle Centerline to Machine Column	6.5 in. (165 mm)
Typical System Footprint	42 in. × 36 in. (1067 mm × 914 mm)
Overall System Height	72 in. (1829 mm)
Typical System Weight	600 lbs. (272 kg)
Maximum Weight on Table	150 lbs. (68 kg)
FRAME	
Frame and Table	Cast iron frame and table, with hand-scraped hydrodynamic ways and tapered adjustment gibs
Way Surfaces	Low-friction PTFE-filled, Acetyl-bonded sliding surface. Similar to Rulon® and Turcite®

MACHINE CONTROLLER

POWERED BY
PathPilot®
A Better User Experience

PathPilot® HUB

PathPilot HUB is a browser-based, full-featured PathPilot simulator, producing usable G-code.

- User-friendly design
- Support for up to 4-axis continuous machining
- Intuitive conversational programming
- Usable G-code Memory Controller: 80 GB
- Built-in Dropbox™ support for seamlessly transferring programs

ABOUT PathPilot HUB

PathPilot is a web-powered, browser-based, full version of PathPilot software interface for any machine in the Tormach CNC lineup.

Teachers use PathPilot HUB to replace expensive CNC simulators. Students can experiment and study before they ever touch the equipment.

Once students prove out their code virtually, they can sign into HUB on the physical Tormach machine and sync their files. Then, they run programs using their PathPilot HUB-generated G-code.



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CNC MILL FOR EDUCATION



CNC MILL PACKAGE COMPARISON



PCNC 440 EDUCATION PACKAGES		BASIC	INTERMEDIATE	ADVANCED
MACHINE				
PCNC 440 Mill with Stand/Chip Pan		✓	✓	✓
Machine Owner's Kit for PCNC 440		✓	✓	✓
ENCLOSURE				
PCNC 440 Enclosure Kit with Enclosure Door Lock Switch Kit		✓	✓	✓
CONTROLLER				
PathPilot Controller with Jog Shuttle Controller		✓	✓	✓
Monitor	Touchscreen Monitor with Controller Arm			✓
	Standard LCD Monitor with Controller Arm	✓	✓	
Waterproof Mini Keyboard & Mouse			✓	✓
PathPilot Software Bootable USB Drive (Recovery Media)			✓	✓
Cable Kit for Tormach PCNC Mills			✓	✓
TOOL CHANGING				
Power Drawbar Kit			✓	✓
Automatic 8-Tool Changer Kit for PCNC 440				✓
ATC Pressure Sensor				✓
Pneumatic Hose Kit for Power Drawbar/ATC				✓
COOLANT SYSTEMS				
PCNC 440 Flood Coolant Kit			✓	✓
Portable Refractometer (Coolant Tester)				✓
MEASUREMENTS				
Passive Probe				✓
Essential Metalworking Gauge Kit				✓
HAIMER 3D-Sensor New Generation Kit (Metric)			✓	
Metric Ball Replacement Tip for Haimer Zero Master/ 3D Sensor			✓	
Basic 3-Piece Indicator Set		✓		✓
1-2-3 Block Set				✓
1/2 in. Shank Edge Finder		✓		
WORKHOLDING				
4 in. (102 mm) CNC Vise		✓	✓	✓
4 in. (102 mm) Parallel Set			✓	✓
Clamp Kit for 3/8 in. T-Slots		✓	✓	✓
TOOL HOLDING				
TTS™ CNC Operator Set with Tormach Tool Assistant			✓	✓
Manual Operator Set (Inch)		✓		
ER20 Collet Set (15 Pieces)			✓	✓
TOOLING				
End Mill Kit for Aluminum #1			✓	✓
Cutting Tool Starter Set #1		✓		
Compact TTS™ Tool Tightening Fixture		✓	✓	✓
1/16 inch - 1/2 inch Machine-Length Drill Set			✓	✓
TTS™ MiniShear (0.75 in) (20 mm) with XDET 2.52 Insert (10-Pack)				✓
TTS™ Diamond Drag Engraver Kit				✓
CONSUMABLES				
Machine Way Oil (1 Gallon)		✓	✓	✓
QualiChem XTREME CUT 251C Semi-Synthetic Coolant			✓	✓

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Tormach has developed an industrial robot arm to add to our line of CNC mills, lathes, plasma tables, and routers. The robot is controlled via PathPilot, Tormach's award-winning CNC user interface. The underlying trajectory planning and motion control is handled by ROS, an open-source robot operating system with tens of thousands of active developers worldwide. Access to the underlying code is provided to all customers, allowing participation in the range of research opportunities offered by the ROS ecosystem.

KEY FEATURES

PathPilot user interface

- PathPilot is user-friendly, making programming easier and faster to learn. Learn how to create robot programs with minimal effort.
- Similar layout to PathPilot interface on other Tormach CNC machines. Familiarity with PathPilot on one piece of equipment allows users to go between Tormach CNC equipment even more intuitively.

Powered by ROS (Robot Operating System)

- The most popular platform for robotics research (over 4,000 academic papers cite "ROS: an opensource Robot Operating System" (Quigley et al., 2009))
- Vibrant community development effort
(For detailed statistics, see <http://download.ros.org/downloads/metrics/metrics-report-2018-07.pdf>)

Robust industrial hardware

- The Tormach robot is an industrial tool that's been made exceptionally easy to use. It utilizes solid metal casting, servo motors and drives, and harmonic gear reducers.

Robot programs are written in Python

- Programs are easily created in 'conversational' fashion via the user interface
- For users familiar with Python, robot programs are easy to understand and modify
- Python users can easily extend robot programs to interact with the file system or the outside world
- For example:
 - Import time, time.sleep(.5) to delay an action 0.5 seconds
 - Import csv, with open('eggs.csv', 'rb') as csv file to read in position values from a csv file, or write out values to a csv file
 - Import usb.core, usb.util, more complex python code here to read data from a USB scale to use the robot to measure the weight of an object

TECHNICAL SUPPORT

Tormach offers remote technical support via email, phone, and video chat.

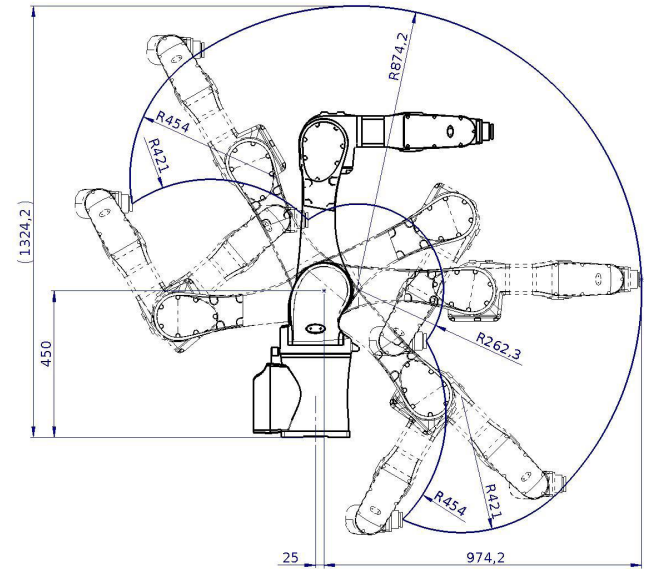
Support is limited to mechanical issues and software issues when the machine is controlled via the default software installation. Customers are free to modify the source code in a sandbox, but ROS research and code modification is outside the scope of Tormach's free technical support. We are happy to consult with customers that require ROS support or training, although we won't do consulting engineering or software development.



*Table not included.

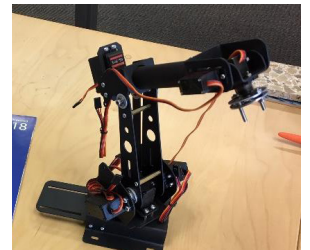
SPECIFICATIONS

WEIGHT	145 lbs. (65 kg)		
PAYLOAD	13 lbs. (6 kg) (combined weight of payload + end effector)		
REACH	38 in. (975 mm)		
JOINT RANGES		JOINT SPEEDS	
JOINT 1	± 170°	JOINT 1	150° s-1
JOINT 2	+135° to -100°	JOINT 2	112.5° s-1
JOINT 3	+155° to -120°	JOINT 3	150° s-1
JOINT 4	± 150°	JOINT 4	204.5° s-1
JOINT 5	± 120°	JOINT 5	225° s-1
JOINT 6	± 360°	JOINT 6	360° s-1
REPEATABILITY	± 0.020" / 0.5 mm		
FLANGE BOLT	6 bolts (M4)		
CONTROL BOX SIZE (W × H × D)	26" × 32" × 14" (650 mm × 820 mm × 360 mm)		
DIGITAL INPUTS	16 (14 user inputs, 2 dedicated safety inputs)		
DIGITAL OUTPUTS	16		
I/O POWER SUPPLY	24 Volt 20 Amp		
PROGRAMMING	Teachmode programming through PathPilot GUI, Python		
NOISE	Comparatively noiseless		
IP CLASSIFICATION	IP65 Dust tight and protected against jets of water		
POWER SUPPLY	200 - 240 Vac, 50 - 60 Hz, Single-Phase Power		



PRODUCT ROADMAP

Tormach has historically offered software upgrades at no cost when they become available. While there is not a formal completion date on the calendar, Tormach is currently working on developing the following items and will make them available after the initial product release:



- Computer vision/visual servoing
- Integration with Mimic/Maya/Blender animation software for robot programming
- ZA2, a small trainer robot for under \$5,000 that will work on the same user interface/operating system
- Web-based user interface simulator (like hub.pathpilot.com, but for the robot user interface)

VIDEOS

ZA6 Robot QuickTips Python Programming:
youtu.be/xPSEzN2nErg

Uncrating and Demo of ZA6 Robot by Big T's Chop Shop:
youtu.be/hdVduR-IRj0



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tormach.com | ZA6 Spec Sheet (0322)