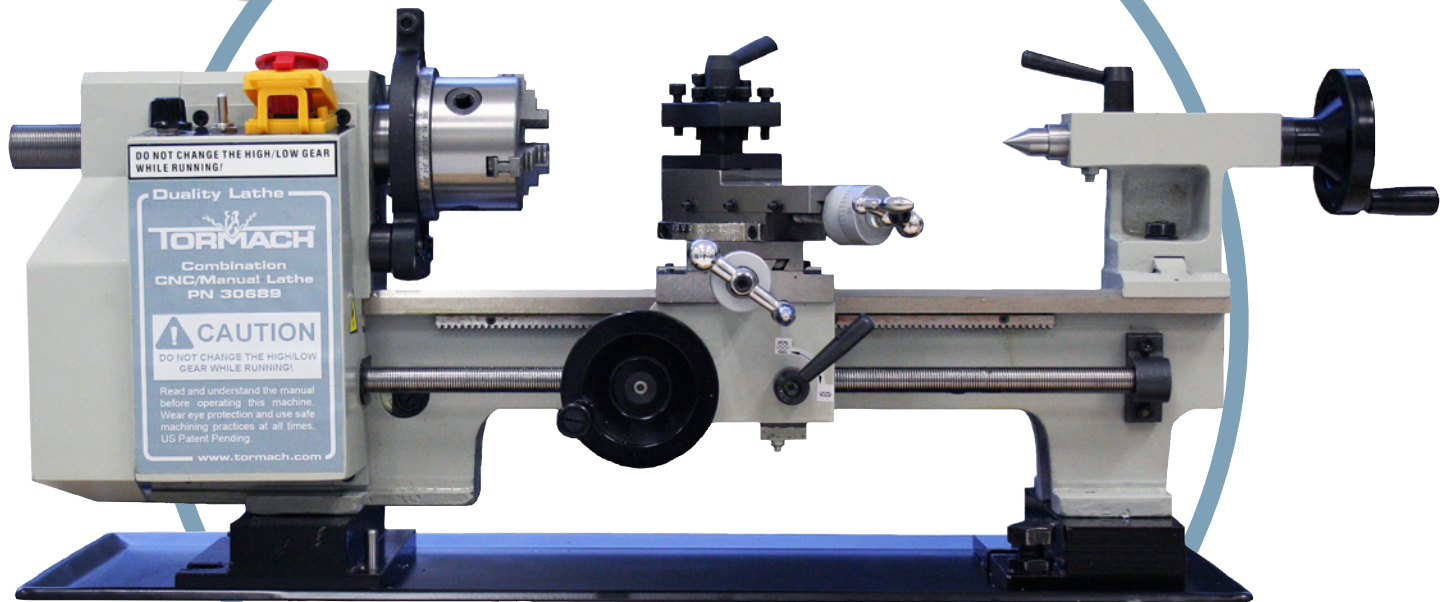


# DUALITY LATHE

## CNC & Manually Operated Lathe

PRODUCT DATASHEET



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### OVERVIEW

The Duality Lathe is a revolutionary concept in machine tools. Used in combination with a PCNC 1100 mill, this integrated machine accessory can be operated in three modes: manual benchtop lathe, CNC lathe, or combination lathe/mill. This is the perfect solution for anyone who has a need for a CNC lathe.

When sitting on a workbench, the Duality Lathe operates as a conventional small lathe. It offers infinitely variable speed with two gear ratios, 4-way tool post, and other accessories.

For CNC operations, the Duality Lathe is mounted to the PCNC 1100. Using a rigid quick change lathe tool post mounted to the spindle cartridge of the PCNC 1100 and applying CNC lathe software (both included), the precision motion of the PCNC 1100 controls lathe operations.

When a manual lathe is in operation the carriage moves left and right, but with the Duality Lathe mounted on the PCNC 1100's table the lathe is actually moving left and right. This concept is in contrast to a traditional lathe.

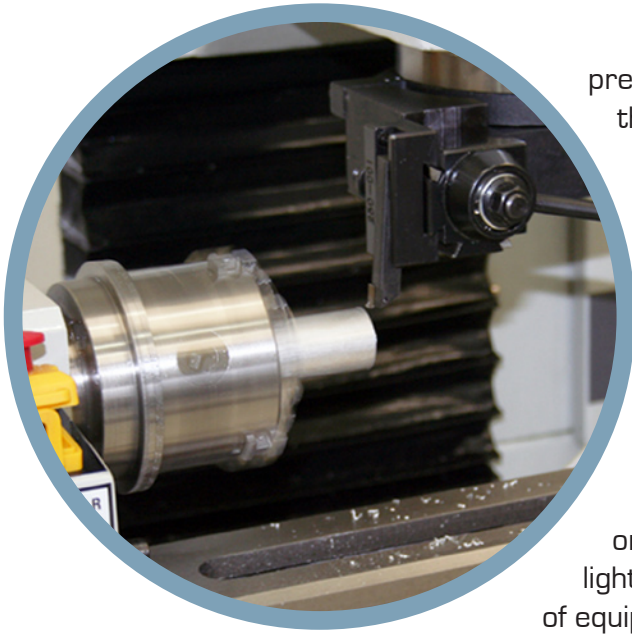
This feature allows the availability of all conventional CNC lathe operations, including turning, cut-off, boring, drilling, even threading! Also, since there is no need for threading gear changes, radius attachments, or taper attachments, it is possible to turn any taper, radius, or curve imaginable with the touch of a button.

Swing Over Bed: 7" (180mm)  
Swing Over Saddle: 4.3" (110mm)  
Distance Between Centers: 11.8" (300mm)  
Spindle Hole: 0.63" (16mm)  
Spindle Motor: 250 Watt  
Range of Threads: 4-100 TPI (0.25-5mm)  
Spindle Taper: #3 Morse Taper  
Tailstock Taper: #2 Morse Taper  
Low Range Spindle Speed: 50-1100 RPM  
High Range Spindle Speed: 100-2500 RPM  
Voltage: 115 VAC (+/- 10%)  
Weight: 85 lbs (38 kgs)  
Shipping Dimensions: 32" x 15" x 20"  
Shipping Weight: 123 lbs (56 kgs)



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When done with turning, be sure to take full advantage of the fact the turned work piece happens to be mounted on a mill. The Duality Lathe includes an integrated lathe spindle clamp, allowing the lathe to be used as a fixture while milling. Just tighten the spindle clamp and the work is now ready for milling flats or slots, drilling, or other finishing operations using the PCNC 1100. The spindle clamp includes a 360 degree index wheel allowing easy indexing for opposing flats, square heads, hex heads, or any other indexing operation.

If there is a need for more sophistication in coordinated motion, it is possible to add the Duality Lathe's 4th Axis. This is a precision motor drive system allowing the lathe spindle to be used as a synchronized 4th axis offering

precision coordination of both the lathe spindle and the X, Y, and Z motion of the mill. Engraving on a cylinder, creating cams, or spiral fluting are common procedures with this type of attachment.

### DESIGN DETAILS

- **Easy Mounting and Alignment Pins:** Not only is the Duality Lathe a lightweight, portable piece of equipment, but it is also easy to mount with precision to the PCNC 1100's table. The Duality Lathe's mounting pads include two alignment pins, one fixed and one eccentric, allowing simple mounting to the mill.
- **E-Stop Integration:** When operating together, the control systems of the Duality Lathe and the PCNC 1100 mill are integrated for safe operation with emergency stopping devices.
- **Spindle Speed Integration:** A sensor mounted inside the headstock of the Duality Lathe connects to the accessory port of the PCNC 1100 to allow the machine control software to monitor the Duality Lathe's spindle speed.
- **Spindle Clamp & Index Wheel:** A rigid spindle clamp allows fixing the Duality Lathe's spindle in position while milling on work held in

the chuck. The 360 degree index wheel allows accurate positioning at any angle.

- **Tool Post Mount:** The CNC tool post mount is a sturdy two part assembly clamping on the spindle of the PCNC 1100 mill.
- **Quick Change Tooling:** The five quick change CNC tool holders are held in a precision ground, steel tool post mounted to the mill's spindle. Tool holders are included for turning/facing, cut off, turning/boring, boring bar, and morse taper #2.
- **Manual Tool Holder:** The cross slide for manual operation includes a 4-way indexing tool post. This can be replaced with an optional quick change tool post allowing the same tool holders to be used in both CNC and manual operations.

### SOFTWARE DETAILS

The control software is uniquely designed to support special features of the Duality Lathe, yet follows standard CNC lathe conventions. This makes the Duality Lathe compatible with standard lathe CAM programs and allows it to be used in a teaching environment.

- **Threading is accomplished** through slave synchronization of the X and Z axis. The lathe spindle

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speed is manually controlled, but the software will use the lathe spindle sensor as a master, slaving exact speed and position of the X and Z axis to the spindle in order to maintain accurate threading.

- A load meter monitors average spindle speed and provides a bar graph for speed deviations.
- Wizard operations generating G code programs for 15 different common functions are available.
- Semi-automatic operations available on the exclusive VisiCycle control screen. Six of the most common functions are available on an interactive screen, including facing, parting off, turning to size, threading and chamfering.
- Built in G & M code cheat sheets allow quick reference while editing codes online or entering codes directly.
- Users requiring 230 V operation will need to supply an appropriate transformer.

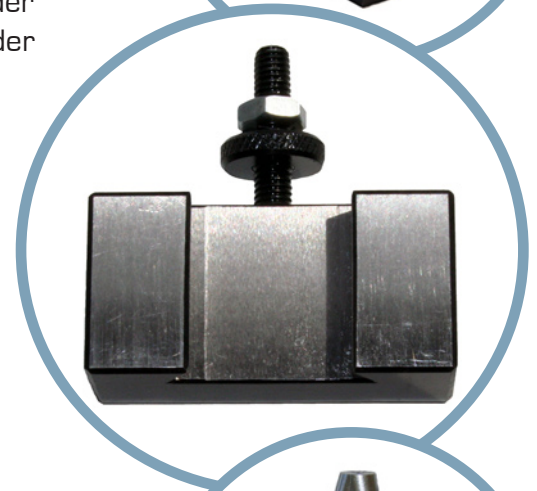
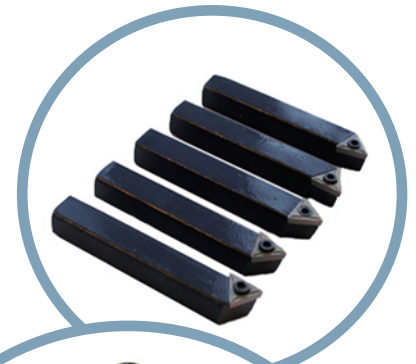
### INCLUDED ACCESSORIES

- Quick Change Tool Post for CNC
- 4-way Tool Post for Manual Use
- Mill Spindle Tool Post Mount w/ Alignment Clamp
- 5 Piece Quick Change Tool Holder Set

- E-stop Integration Kit
- Spindle Integration cable
- Software CD

### OPTIONAL ACCESSORIES

- 4th Axis drive integration kit
- Deluxe Tooling Set
- Cut-off Blades
- Lathe Cutting Tool Set *(top photo)*
- Turning & Facing Tool Holder
- Turning & Boring Tool Holder *(middle photo)*
- C-2 Inserts - 0.15" Radius
- C-6 Inserts - 0.15" Radius
- C-2 Inserts - 0.32" Radius
- C-6 Inserts - 0.32" Radius
- Quick Change Tool Post *(for manual use)*
- Point Live Center Sets
- Boring Bar Holder
- Morse Taper #2 Holder
- Cut-off Tool Holder
- Arbor Adaptor - JT1
- Drill Chuck 1/4" - JT1 *(bottom photo)*
- Arbor Adaptor - JT2
- Drill Chuck 3/8" - JT2
- Arbor Adaptor - JT6
- Drill Chuck 1/2" - JT6
- Extended Guard
- SprutCAM *(includes both lathe & 3D mill CAM)*
- TurboCADCAM *(CAD plus lathe & 2D mill CAM)*



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## Accessories PRODUCT DATASHEET

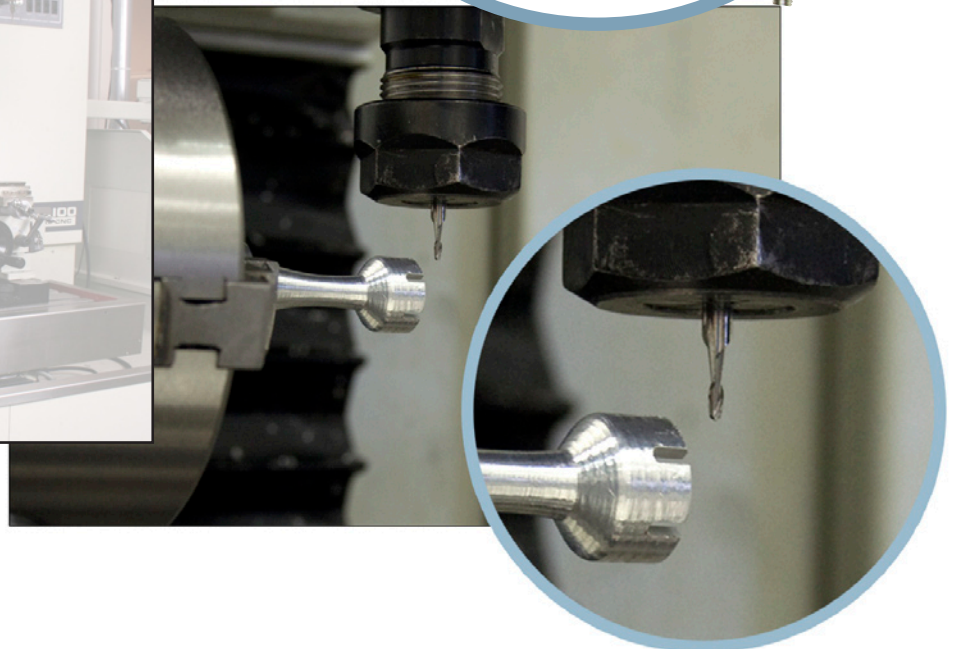
### DUALITY LATHE 4TH AXIS

The Duality Lathe 4th Axis kit provides the capability to quickly switch between lathe and 4th axis operations in a single setup, saving time and improving precision for operations like engraving, pocketing, etc. on a turned part.

The 4th axis kit attaches to the mill bed, next to the headstock of the Duality Lathe, and engages the lathe spindle with a zero backlash harmonic gear drive. It swings into or out of engagement with the release of a simple locking pin.

It features the same gear reduction as our 6" and 8" rotary tables and seamlessly integrates with existing PCNC control software. It also shares the same motor driver as the existing 4th axis kits, so there's no need to purchase an integration kit if you already own a 4th axis kit for the mill.

NEMA 34 640 oz inch Stepper Motor  
Zero backlash Harmonic drive system  
Machined Aluminum Base  
Mounting hardware & adjustment wrench



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