

# **MultiCam<sup>®</sup>**

## **CNC Cutting Solutions**

## **Features & Specifications Guide for MultiCam 3000 Series CNC Router**

### **Maximum Flexibility... ...Made Affordable!**

MultiCam's 3000 Series CNC routers are loaded with standard features normally associated with more expensive machines. The ATC (automatic tool change) option gives the user maximum machining flexibility and the all-steel, moving-gantry design allows machining of large parts while maintaining a small, space-saving footprint.

Designed for a wide range of medium-duty panel processing applications, the 3000 Series machines are the perfect solution for companies looking for both value and high-performance in a CNC router.

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**Innovation. Quality. Performance.**

# 3000 Series Specifications

No machine offers more standard features than the MultiCam.

- All heavy steel gusseted plate frame construction
- 25mm linear ball bearing profile rails for maximum stiffness
- MultiCam EZ Control User-friendly operator interface
- High Speed 3-axis Motion Control
- 12 Megabytes of Memory with unlimited file size transfer capabilities
- Standard Ethernet or RS232 direct connections
- 2 phase digital brushless, synchronous electric motors are standard or Eclipse brushless
- AC servo system is optional
- Automatic Tool Calibration
- EZ Suite software

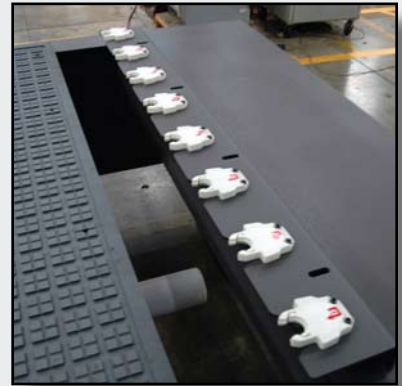


## ATC (Automatic Tool Changer)

The 3000 Series CNC Router is available with two ATC options:

- Linear Automatic Tool changer
- 12 tool rotary turret automatic tool changer

**The Linear ATC** option for the 3000 Series offers a low cost alternative to automatic tool changing. A linear tool rack holder is mounted at the end of the material process area. The 3000 Series has an extended frame design that does not cut into or reduce the standard process area. The number of tool locations is dependent on the width of the process area. The 3100 Series (50 inch wide) has 6 tool locations while the 3200 Series (60 inch wide) has 8 locations and the 3300 Series (80 inch wide) has 11 locations.



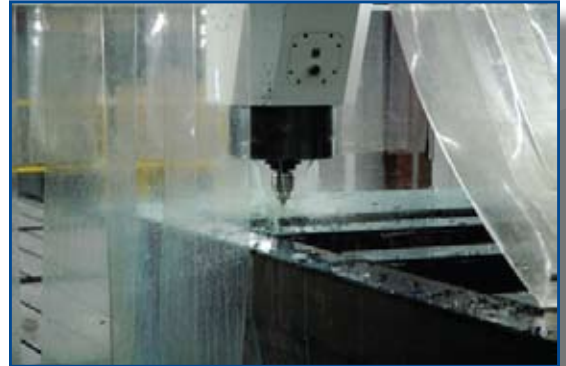
**The 12 tool rotary turret ATC** option mounts to the end of the 3000 Series gantry that moves along the X-axis. The rotary tool changer option is beneficial on dual zone, pendulum processing configurations. It accommodates tool changes without crossing zones during the loading process of the idle cut zone. All ATC options come standard with automatic Tool Calibration. The tool change routines are built into MultiCam EZ Control to simplify integration to your favorite CAM software. An Automatic Tool Changer solution will help reduce job times, improve accuracy, and reduce setup errors.



## Base Frame

The MultiCam 3000 Series base frame is a rigid tubular steel frame that is welded, stress-relieved, and precision machined. This type of construction allows for a very accurate and smooth cutting system. While greatly reducing the amount of time needed for installation and essentially removing the possibility for installation errors that could affect the performance and accuracy of the system.

Dual X-axis – 25mm Linear Rails, AC Brushless Servos, Precision Planetary Gearboxes, Rack and Pinion



## Gantry

The gantry is made of a 3/8"-thick steel tube that is welded, stress-relieved, and precision-machined. The gantry has been engineered to provide a smooth, vibration-free cut.

Y axis – 25mm Linear Rails, AC Brushless Servos, Precision Planetary Gearboxes, Rack and Pinion



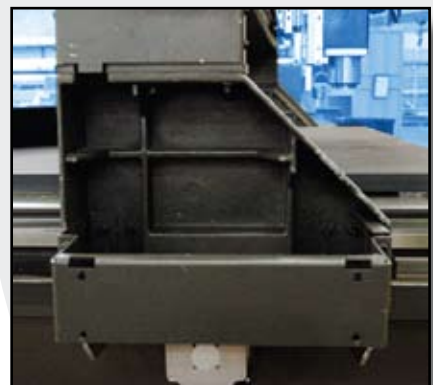
## Gantry Supports

The 3000 Series gantry supports are manufactured from grey iron castings. These cast iron components in conjunction with wide X-axis bearing spacing, help dampen vibration and give the structural tube gantry extremely rigid support.

## Linear Bearings

The 25mm ball linear bearing profile rails with stainless spring steel strip covers are standard in the Y and Z axes. 35 mm bearings are standard in the X axis. Linear bearings feature:

- High rigidity and top load capacities in all load directions
- Lowest possible noise level and best running characteristics
- High torque load capacity
- 4 bearing packs per axis
- 4,000 lb. load capacity for 25 mm bearings and over 9,600 lb. load capacity for 35 mm bearings

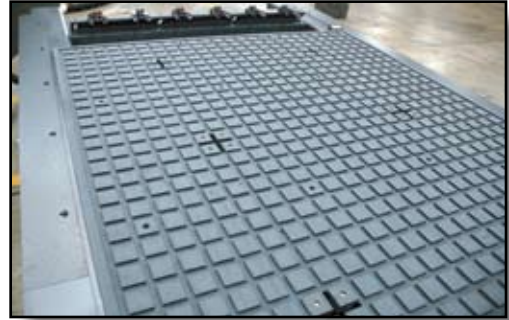




# 3000 Series Specifications

## Standard Working Surface

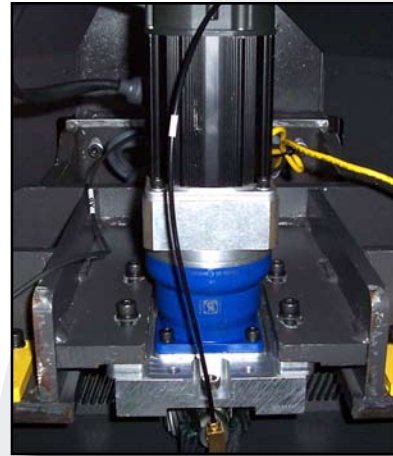
The standard working surface is 1" thick 80 - 82 Durometer phenolic with a grid pattern to utilize 0.5 x 0.250 foam gasket tape. Phenolic makes an excellent work surface because of its dependable mechanical strength and dimensional stability. In addition, phenolic has a low moisture absorption, resists heat and wear, and can be repaired as needed.



## Precision Planetary Gearboxes

Alpha Precision Planetary Gearboxes are the top of the line in the industry. Case hardened and finished ground high carbon alloy steel gears guarantee the lowest backlash and highest service life available. Alpha Gearboxes are one of the many components that make the MultiCam a smooth, accurate, and long-lasting cutting system.

- Single Stage 10:1
- Backlash < 2 arcmin
- Efficiency > 97%
- Low noise level
- Integrated thermal length compensation
- Designed for cyclic and continuous operation
- 5-Year Manufacturer Warranty



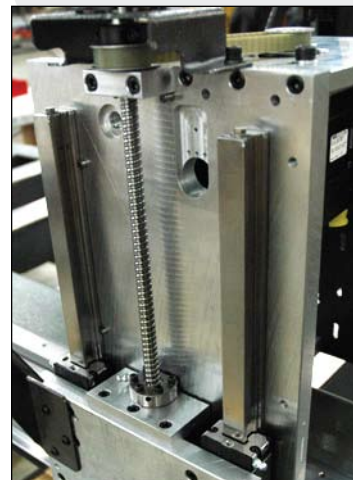
## Regulator Units

Machines equipped with tool changing spindles come standard with SMC filter regulator units that also include an ambient air drier.



## Ball Screw Assembly

The 3000 Series ball screw assembly has an available 12" stroke available for using specialty tools or having the ability to raise the bridge. Gantry riser blocks are available to increase the throat of the machine by 4". The 12mm ball screw is supported by precision dual angular contact ball bearings in a steel housing. The top of the screw is mounted to a spring actuated failsafe brake system.



## Digital Servo Drives

Teknic's SSt Eclipse E750 digital servo drives are high-bandwidth, digital vector servo drive systems and are standard on all 3000 Series machines. These drives seamlessly integrate position, velocity, and torque loops to provide uncompromised tracking accuracy, smoothness and reliability. The Eclipse drives used in MultiCam servo-driven machines are the latest in a line of high-performance drives that advances the state of the art by utilizing this seamless coordination in such a way to allow all information to be shared in real time so all system functions cooperate in any situation. For example, if the torque loop senses that the motor has reached 100% torque output, it is instantly passed upstream to the servo compensator and the system delivers a coordinated response, maintaining precise control. You will realize tighter tracking, smoother motion, and faster rapid traverse - all of which yield superior machine throughput and reliability.

## Servo Drive Features

- SSt Eclipse E750 servo is 30A peak, 15 continuous @ 330Vdc
- Digital control loops with 800Hz large signal velocity bandwidth
- 2kHz small signal response
- 35 microsecond total servo phase delay. The SSt Eclipse drive is the fastest in the industry
- True, closed-loop, sinewave commutation with vector feed-forward and DQ decoupling provides near-zero torque response time at any speed. This maximizes motor responsiveness and minimizes motor heating
- The SSt Eclipse drive utilizes an adaptive control algorithm (IMT) based on Neural Fuzzy Logic
- The IMT virtually eliminates the concern of inertia matching and allows for loads of large and varying inertia without impacting performance.
- The SSt Eclipse drive uses small-signal, sliding-mode, automatic gain modulation to eliminate hunting even with extreme gains. Axes will be perfectly still and have no loss of tracking or position accuracy.



**Servo Amps**

- Teknic's proprietary Regressive Auto Spline™ (RAS) technology produces ultra-smooth trajectories. The profiles are jerk and jerk-derivative limited, which reduces shock, vibration, noise, and mechanical wear.
- Many safety and protection features including: Short circuit (phase-to-phase, phase-to-ground), over temperature, over voltage, over current, protected for open windings, fuse, True RMS torque limiting, automatic speed limit, motor jam detection, and much more
- Superior tracking accuracy multi-derivative, state feed-forward gains greatly improve tracking performance and do not create the audible noise and torque chatter of traditional implementations

Teknic has been designing and building digital servo drives for nearly two decades. Tens of thousands of drives are sent into the field each year to OEMs, with the first having been delivered in 1994. With that field experience and an evolutionary approach, the SSt-Eclipse Series used by MultiCam is standing on the shoulders of the drives before it, which yields not only robust performance, but also MTBF numbers that make the competition blush. The MTBF of the SSt Eclipse E750, for example, is over 700,000 hours.

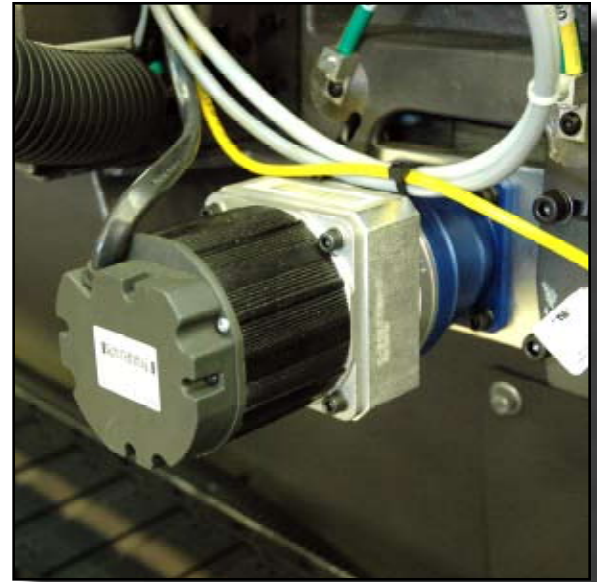
# 3000 Series Specifications

## Brushless AC Servo Motors

After extensive testing, MultiCam has found the Teknic Hudson Brushless AC Servo Motors to be the premier solution on the market today. Teknic has an extensive history in motors and controls dating back to its founding in 1985. With a long history of providing critical components to military and aerospace applications and a leading supplier to commercial and industrial applications, Teknic creates servo motors that give MultiCam machines a competitive edge in the market.

## Brushless AC Servo Motor Features

- 50 lb. indefinite radial load limit 1" from face
- Brushless, maintenance-free sinewave servo motors with oversized, high precision, deep groove radial bearings being the only wear point
- Neodymium-Iron-Boron magnets providing high power density and fade-free performance
- High power-to-rotor inertia ratio
- Direct winding on electrostatically powder-coated stators gives high thermal conductivity for better RMS ratings.
- Windings are rated to 155°C, improving thermal range.
- Extremely low electrical time constants increase motor responsiveness, which provides superior tracking accuracy to competitive units.
- Low distortion, sinusoidal back EMF combined with low detent torque improves motor smoothness and lowers audible noise.
- Precision bearings both reduce viscous friction and motor noise at high speed and help smooth motion. The high precision bearings are mechanically captivated and chemically bonded to maintain proper preload and alignment under all rated load conditions and accidental impacts. The drive shaft is made of stainless steel.
- The stators are glued and mechanically locked to prevent slippage regardless of use conditions.
- Finite element analysis is utilized to reduce stress concentration on machined areas of the shaft. This allows the use of oversized bearings without sacrificing shaft strength.



**Servo Motor**

- The stainless steel encoder disk is a floating differential, and the read head has a multiple-aperture grating for reliable operation even when dusty or dirty. It will not break like glass encoder disks. The read head is also fully encapsulated for increased reliability and ruggedness. Combined with the triple redundant reading/voting circuits in the drive, this provides incredibly robust encoder capability.
- The encoder housing is integral to the shaft automatically compensating for thermal expansion.
- The 4000-line encoder with quadrature sampling produces 16,000 counts per revolution.



# 3000 Series Specifications

## Standard Features



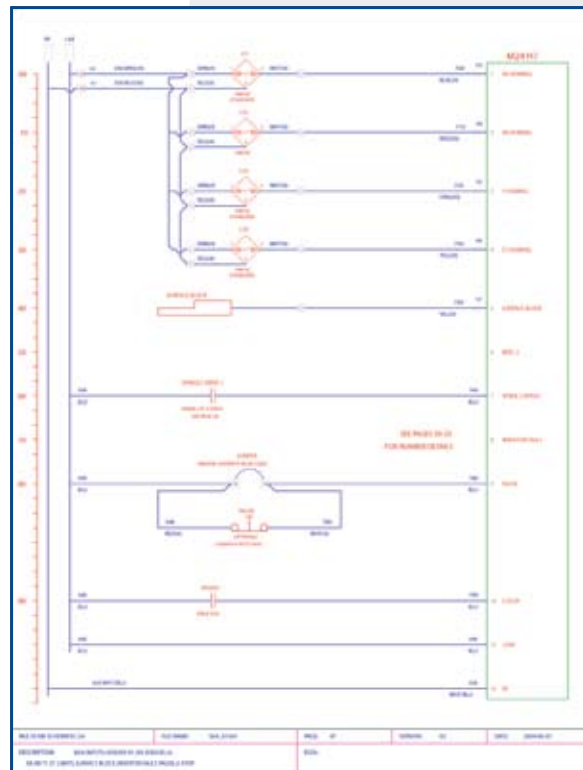
Leveling Feet



Tool Box

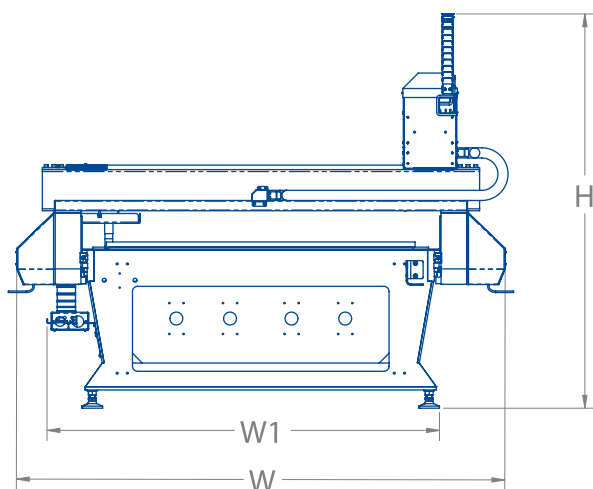
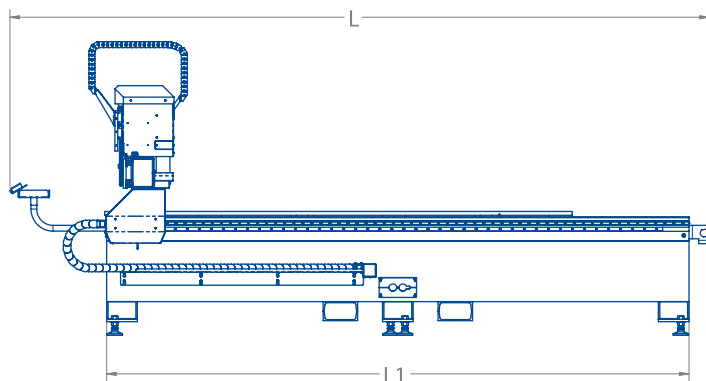
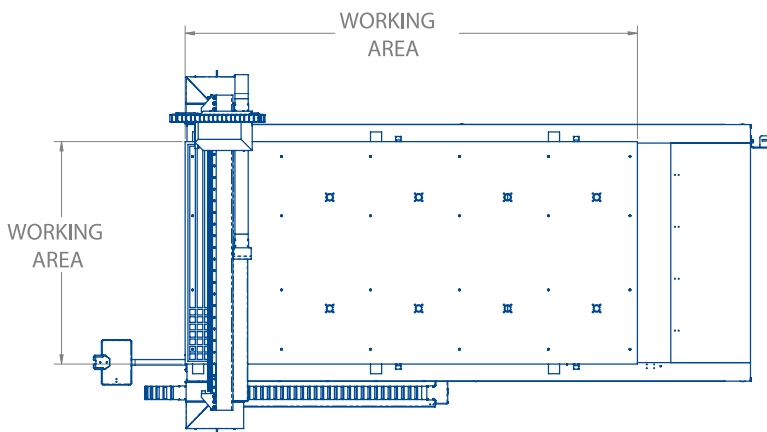


Operation Manual



Electrical Schematics

# 3000 Series Specifications



## 3000 Series Specs (inches)

- Z-Axis Clearance: 6" - Optional 10"
  - Z-Axis Travel: 12"
  - Repeatability:  $\pm .001$ "
  - Positional Displacement Accuracy:  $\pm 0.005$ " over 10 feet
  - Maximum Cutting Speed: 1,400 ipm \*
  - Maximum Rapid Traverse: 2,500 ipm \*
  - Drive System X and Y axis: Rack and Pinion
  - Drive System Z axis: Ball Screw
  - Standard Work Surface: 1" Phenolic
- \*600 ipm cutting and rapid traverse for stepper systems

## Size Chart (inches)

MODEL	L	L1	W	W1	H	WORKING AREA	WEIGHT LBS.
3-101R	107	76	85	65	77	50 x 50	2970
3-103R	157	126	85	65	77	50 x 100	4150
3-202R	117	86	95	75	77	60.5 x 60	3260
3-204R	183	152	95	75	77	60.5 x 122	5170
3-205R	201	170	95	75	77	60.5 x 145	5630
3-304R	183	152	115	95	77	80 x 122	5920
3-305R	201	170	115	95	77	80 x 145	6310
3-306R	224	193	115	95	77	80 x 168	6520

Increase (W) by 13 inches for the optional second carriage or wide gantry.

## 3000 Series Specs (metric)

- Z-Axis Clearance: 152 mm - Optional 254 mm
  - Z-Axis Travel: 304 mm
  - Repeatability:  $\pm .025$  mm
  - Positional Displacement Accuracy:  $\pm 0.125$  mm over 3 meters
  - Maximum Cutting Speed: 35.5 m/min (592 mm/sec) \*
  - Maximum Rapid Traverse: 63.5 m/min (1050 mm/sec) \*
  - Drive System X and Y axis: Rack and Pinion
  - Drive System Z axis: Ball Screw
  - Standard Work Surface: 25 mm Phenolic
- \*15.2 m/min (254 mm/sec) cutting and rapid traverse for stepper systems

## Size Chart (metric)

MODEL	L	L1	W	W1	H	WORKING AREA	WEIGHT Kg
3-101R	2717	1930	2159	1651	1956	1270 x 1270	1350
3-103R	3987	3200	2159	1651	1956	1270 x 2540	1886
3-202R	2971	2184	2413	1905	1956	1524 x 1524	1481
3-204R	4648	3860	2413	1905	1956	1524 x 3099	2350
3-205R	5105	4318	2413	1905	1956	1524 x 3657	2553
3-304R	4369	3860	2921	2413	1956	2032 x 3099	2690
3-305R	5105	4318	2921	2413	1956	2032 x 3658	2868
3-306R	5689	4902	2921	2413	1956	2032 x 4267	2957

Increase (W) by 330 mm for the optional second carriage or wide gantry.

**MultiCam®**  
**3000 Series**

Specifications subject to change.