

# MultiCam®

## 3000 Series



### Precision 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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## 3000 Series Standard Features:

No machine offers more standard features than the MultiCam.

- Automatic Tool Calibration
- User-friendly operator interface
- 25 mm linear ball bearing profile rails for maximum stiffness
- 1,700 inches/minute rapid traverse
- Standard Automatic Tool Calibration.
- High Speed 3 axis Motion Controller.
- 12 Megabytes of Memory with unlimited file size transfer capabilities
- Standard Ethernet or RS232 direct connections

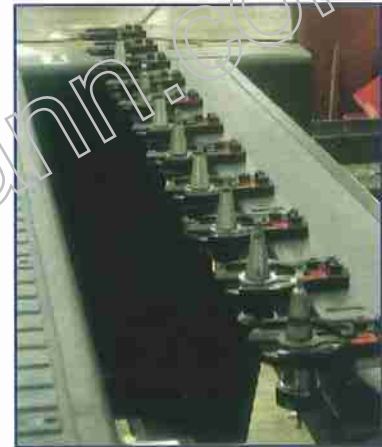


Yes, you do get Ethernet, Automatic Tool Calibration, and one of the easiest to use hand held interfaces for no additional cost!

## 3000 Series Specifications

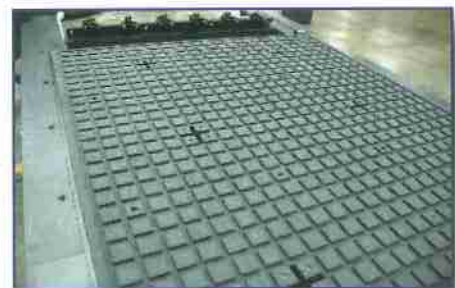
### ATC (Automatic Tool Changer)

The 3000 series machine is available with an optional Linear Automatic Tool changing system. The frame of the table has been extended so that the tool changer does not cut into or reduce the standard working area. The number of tool locations is dependent on the width of the machine. The 100 series has 6 tool locations, the 200 series has 8 locations, and the 300 series has 11. All ATC systems come standard with Automatic Tool Calibration and the tool change routines are built into the controls simplifying integration to your favorite CAM software. An Automatic Tool Change solution will help you reduce job times, improve accuracy, and reduce setup errors.



### Standard Working Surface

The standard working surface is a 1 inch thick 80 - 82 Durometer phenolic with a grid pattern to utilize 1/2 x.250 foam gasket tape. The phenolic is mounted to the top of the steel base frame and then is machined in place. This ensures a flat cutting surface normal to the spindle. Phenolic makes an excellent work surface because of its good mechanical strength & dimensional stability. In addition phenolic has a low moisture absorption, resists heat and wear and can be repaired.



## 3000 Series Specifications (continued)

### Base Frame

The MultiCam 3000 Series base frame is a one piece tubular steel frame that is welded, stress relieved, and machined. One piece construction allows for a very accurate and smooth cutting system. It also greatly reduces the amount of time need for installation and basically removes the possibility for installation errors that could effect the performance and accuracy of the system.

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

25 mm Star ball linear bearing profile rails with stainless spring steel strip cover

- 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
- 30,400 Nm or 22,421 lbf-ft dynamic capacity per pack.





## 3000 Series Specifications (continued)

### Precision Planetary Gearboxes

Alpha Precision Planetary Gearboxes are the top of the line in Gearboxes. 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
- Manufacturers 5 Year 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 12 inches of 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 inches. 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 digital servo drives are high-bandwidth, digital vector servo drive systems. These drives seamlessly integrate position, velocity, and torque loops to provide uncompromised tracking accuracy, smoothness and reliability. The SSt drives used in MultiCam servo driven machines are 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 the motor has reach 100% torque output, that is instantly passed upstream to the servo compensator and the system delivers a coordinated response, maintaining elegant control. You will realize tighter tracking, smooth motion, and faster rapids - all of which yields superior machine throughput and reliability.



### Servo Drive features:

- SSt-1500 is 23A peak, 10 continuous @ 75VDC
- Digital control loops with 800Hz large signal velocity bandwidth.
- 2kHz small signal response!
- 35 micro second total servo phase delay. The SSt 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 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 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.
- Teknic's proprietary Regressive AutoSpline™ (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 (phases-to-phase, phase-to-ground), over temp, over voltage, over current, protected for open windings, fuse, True RMS torque limiting, automatic speed limit, motor jam detection, over temp, 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 SSt drives are sent into the field each year to OEMs, with the first SSt being delivered in 1994. With that field experience and an evolutionary approach, the SSt-U series MultiCam uses is standing on the shoulders of the drives before it, which yields not only robust performance, but also yields MTBF numbers that makes the competition blush. The MTBF of the SSt-1500, for example is 730,609 hours. And those numbers have the volume and time to back it up.

## Brushless AC Servo Motors

After extensive testing, MultiCam has found the MCG Brushless AC Servo Motors to be one of the best solutions on the market today. MCG has an extensive history in motors and controls dating back to its founding in 1961. With a long history of providing critical components to military and aerospace applications and a leading supplier to commercial and industrial applications, MultiCam has found that the MCG servo motors give its CNC machines a competitive edge in the market.

### Brushless AC Servo Motor features:

- 100 LB Radial Load 1" from front Face.
  - Brushless, maintenance free sinewave servomotors. The only wear point is the bearings, and those are oversized, high precision, deep groove radial bearings.
  - Neodymium-Iron-Boron magnets provide high power density and fade-free performance.
  - Direct winding on electrostatically powder-coated stators gives high thermal conductivity for better RMS ratings.
  - Windings are rated to 135°C, improving thermal range.
  - Low electrical time constant increases motor responsiveness, improving tracking accuracy.
  - High power to rotor inertia ratio.
  - Low distortion, sinusoidal back EMF combined with low detent torque improves motor smoothness and lowers audible noise.
  - Precision bearings reduce viscous friction, reduce motor noise at high speed, and helps 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 stators are glued and mechanically locked to prevent slippage regardless of use conditions.
  - Finite element analysis was utilized to reduce stress concentration on machined areas of the shaft. This allows the use of oversized bearings without sacrificing shaft strength.
  - The encoder disk is floating differential and the read head has a multiple-aperture grating for reliable operation even when dusty or dirty. The read head is fully encapsulated for increased reliability and ruggedness. Combined with the triple redundant reading/voting circuits in the drive, this provides incredibly robust encoder capability.
- High Precision, floating mount differential encoder reduces cyclical run-out giving more repeatable positioning performance and makes the encoder resistant to high-speed shaft-impact damage.
  - 2000 line encoder with quadrature sampling producing 8000 counts per rev





## Standard Accessories



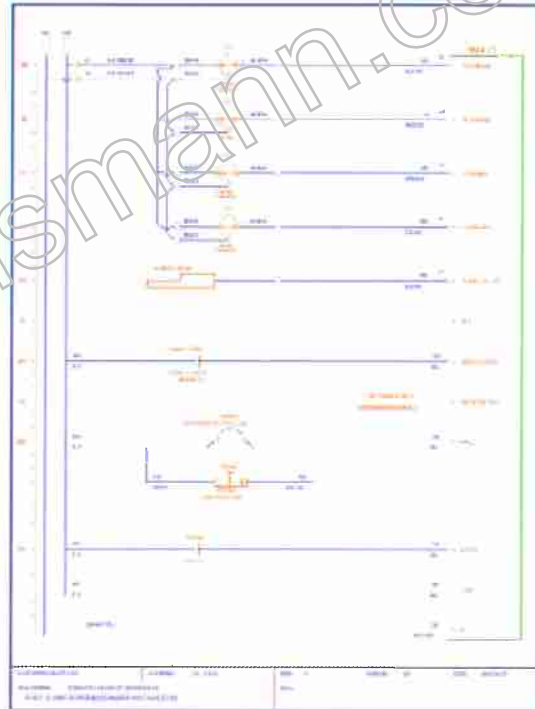
Leveling Feet



Tool Box



Operation Manual



Electrical Schematics

### 3000 Series Specs (inches)

- Z-Axis Clearance: 6" - Optional 10"
- Z-Axis Travel: 12"
- Repeatability: +/- .001"
- Positional Displacement Accuracy: +/- 0.005" over 10 feet
- Cutting Speed: 1,000 ipm \*
- Rapid Traverse: 1,700 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	W	W1	H	WORKING AREA	WEIGHT LBS.
3-101R	100	85	60	77	50 x 50	2970
3-103R	150	85	60	77	50 x 100	4150
3-202R	110	95	70	77	60 x 60	3260
3-204R	172	95	70	77	60 x 122	5170
3-304R	172	115	90	77	80 x 122	5920
3-305R	194	115	90	77	80 x 144	6310

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: +/- .025 mm
- Positional Displacement Accuracy: +/- 0.125 mm over 3 meters
- Cutting Speed: 25.4 m/min (423 mm/sec) \*
- Rapid Traverse: 43.2 m/min (720 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	W	W1	H	WORKING AREA	WEIGHT Kg
3-101R	2540	2159	1524	1956	1270 x 1270	1350
3-103R	3810	2159	1524	1956	1270 x 2540	1886
3-202R	2794	2413	1778	1956	1524 x 1524	1481
3-204R	4369	2413	1778	1956	1524 x 3099	2350
3-304R	4369	2921	2286	1956	2032 x 3099	2690
3-305R	4928	2921	2286	1956	2032 x 3658	2868

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

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