

*Improved productivity for complex machining*

# CINCOM

Sliding Headstock Type CNC Automatic Lathe

## K16



# K

# Cincom Technology, Support and Financing.

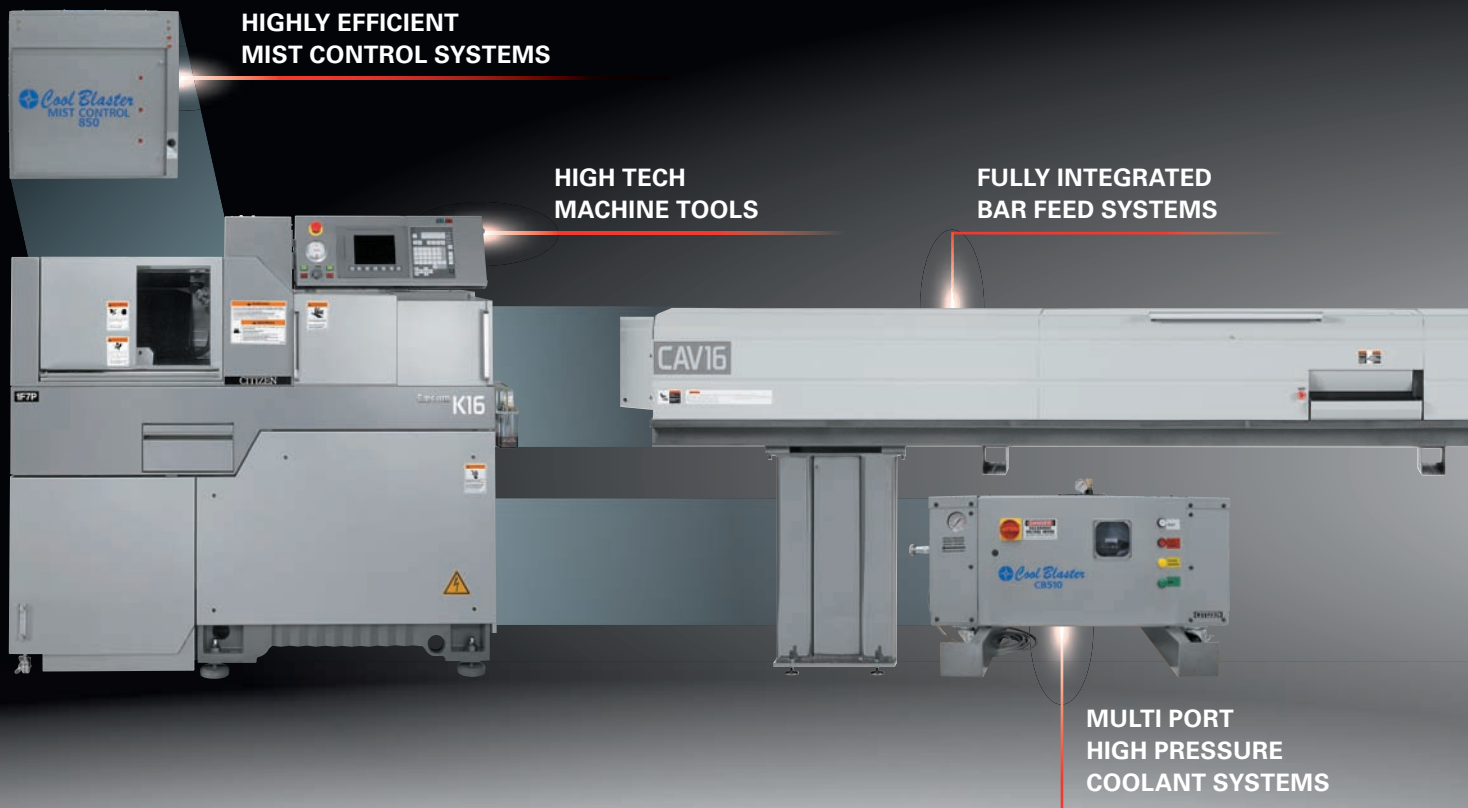
**Marubeni Citizen-Cincom is your single source provider of Swiss type lathes and accessories.**

SAVE TIME with the "CINCOM ADVANTAGE," an exceptional opportunity for US manufacturers to obtain a turning center with all related accessories from one contact:

- High tech Citizen Swiss turning machines
- CAV Integrated Bar Feed Systems
- Cool Blaster Multi Port High Pressure Coolant Systems
- Cool Blaster Mist Control 850 mist and smoke control system

And there's no need to let financing hold you back—we also offer a leasing program that's fast and easy.

Valuable production time can be wasted while you wait for financing or while trying to coordinate support for your machine and all its accessories. With the Cincom Advantage you only need one contact for all your requirements—from purchasing to financing to support!



## HIGHLY EFFICIENT MIST CONTROL SYSTEMS

## HIGH TECH MACHINE TOOLS

## FULLY INTEGRATED BAR FEED SYSTEMS

## MULTI PORT HIGH PRESSURE COOLANT SYSTEMS

### CAV Bar Feeders

- Fully enclosed system
- Quick change separation system
- Space saving pusher design
- Automatic remnant retraction
- Integrated hydraulic tank, oil pump, oil-level indicator
- Shares same CNC controller and electrical system with Cincom machines

### Cool Blaster High Pressure Coolant System

- Up to 10 independent high pressure output lines
- Heat exchanger (standard on 10 line system)
- System control monitoring
- Clogged filter alarm with auto drain
- 5 micron filter system
- Space saving low profile design

### Cool Blaster Mist Control 850

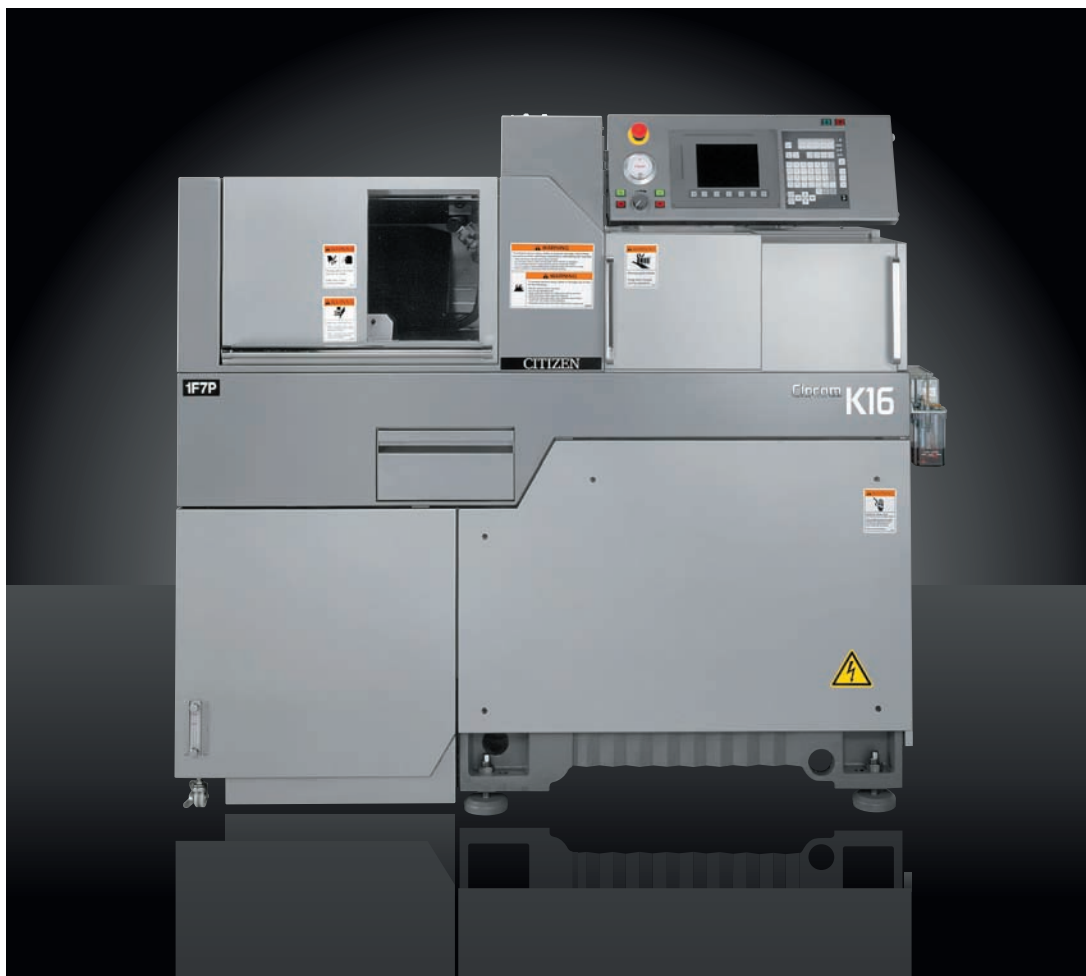
- Triple Pass ESP Filtration Technology
- Variable Speed Controller
- Fused overload protection
- E stop interlock system
- Mounting hardware

# New-generation K-series CNC Automatic Lathes

Higher accuracy, cost reduction and quick delivery are important aspects for the efficient machining of precision parts. The K series new generation type CNC automatic lathe was developed to help satisfy such demands.

- Streamline Control drastically reduces cycle time
- Productivity is 1.5 times higher than conventional models
- Stable machining operation over longer periods of time
- Tool spindle for secondary machining improves performance of complex machining

Although the machine is compact in size, it is equipped with up to four quill spindles or end-face drilling spindle (option) to support various types of complex machining. In addition, a variety of designs and devices have been adopted in the K16 for extended, stable machining operation and prolonging the life of the machine.



## Significant increase of productivity Drastic reduction of idle time

### Use of latest NC

Faster mathematical processing reduces interpolation period. Half of NC scanning time reduces NC processing time. Speed-up of ladder processing and macro processing reduces program manipulation time. Flexible and faster machining is achieved by faster calculation and multi-axes, multi-line control system.

### Significant increase of the rapid feed rate

Z1 axis, Z2 axis, and X2 axis: The rapid feed rate is increased to 32 m/min. X1 axis and Y1 axis (gang tool post): The rapid feed rate is increased to 34 m/min on the virtual axis. Increases of rapid feed rate and acceleration minimizes idle time.



# Efficient Machining—Longer Operation

## K16 Type VII

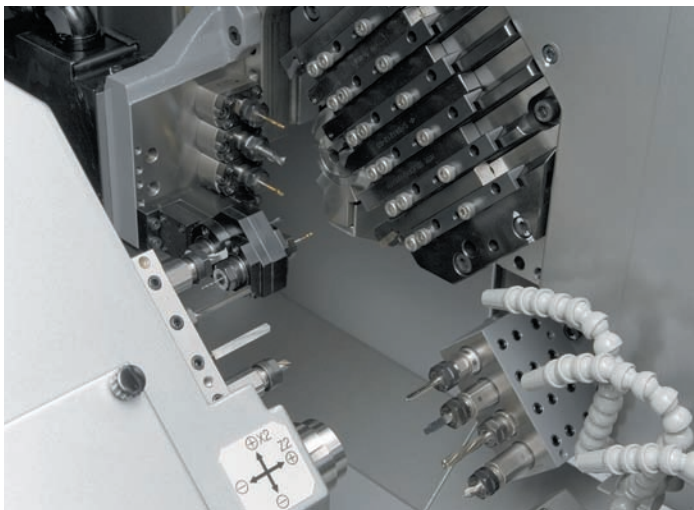
The high end K16 Type VII with X2-axis control module allows simultaneous front-back machining. The cycle time can be reduced by full use of streamline control.

Turning tools: 6 (□12) or 7 (□10)

Rotary gang tools: 4

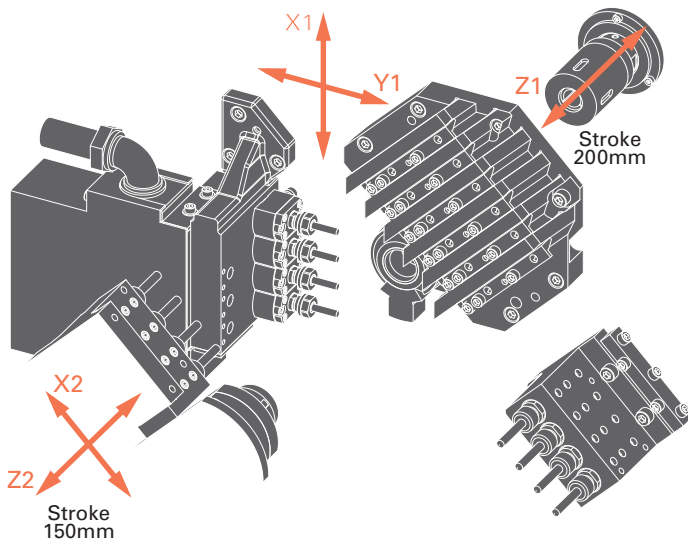
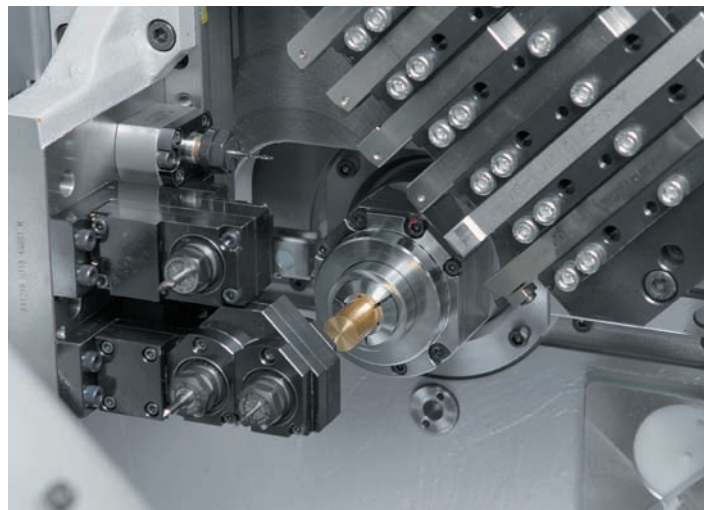
Front drilling tools: 4

Back drilling tools: 4

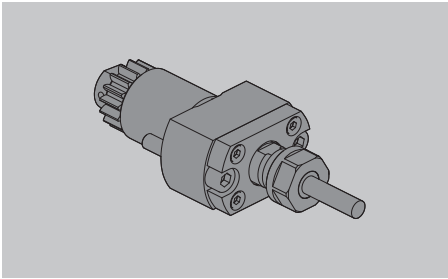


## Non-Guide Bushing Model K16 VIIC

K series features, high productivity and multi-functionality are retained in the K16 non-guide bushing model. The pull-type chuck system that has been successful with the Cincom "BL series" (automatic fixed headstock type CNC lathe) is used in this model as well. Less waste helps save on material cost and the powerful chucking force enables heavy cutting, minimizes roughness and improves roundness.



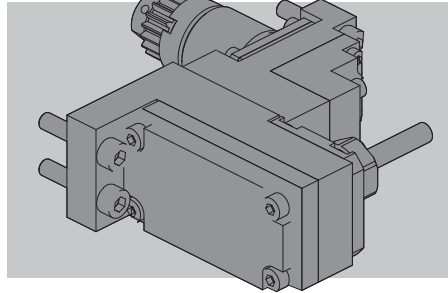
# Wide Variety of Tool Layout for Various Needs



## GSC807

### Cross-drilling spindle

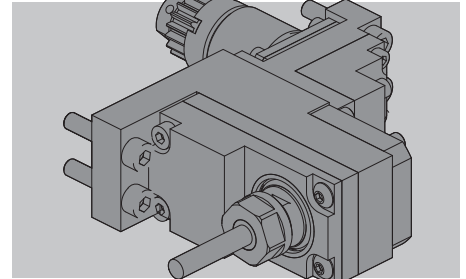
Used for cross drilling and D-cutting. Up to 4 spindles can be mounted on T11 to T14 (standard).



## GSE2607

### Front end-face drilling spindle

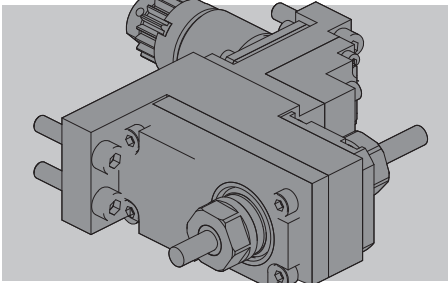
Used for eccentric face drilling. This spindle can be mounted on T12 to T14 every 2 stations.



## GSE2707

### Back end-face drilling spindle

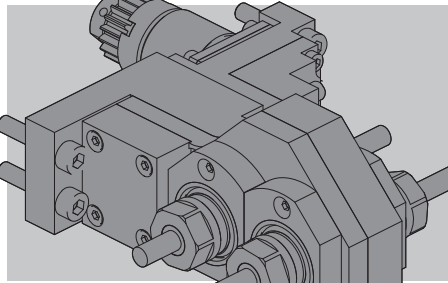
Used for eccentric face drilling. This spindle can be mounted on T12 to T14 every 2 stations.



## GSE2807

### Both-end drilling spindle

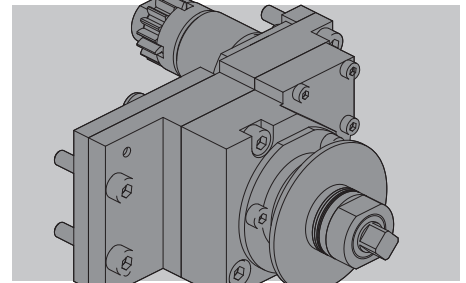
Used for eccentric face drilling. This spindle can be mounted on T12 to T14 every 2 stations.



## GSE2507

### Double both-end spindle

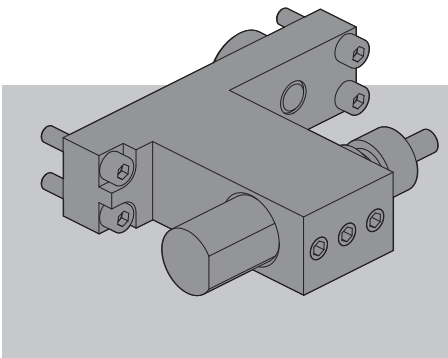
Used for eccentric face drilling. This spindle can be mounted on T14 only.



## GSS950/1050

### Slitting Spindle

Used for slitting. This spindle can be mounted on T13 only. Maximum cutter size is 50 mm in diameter.

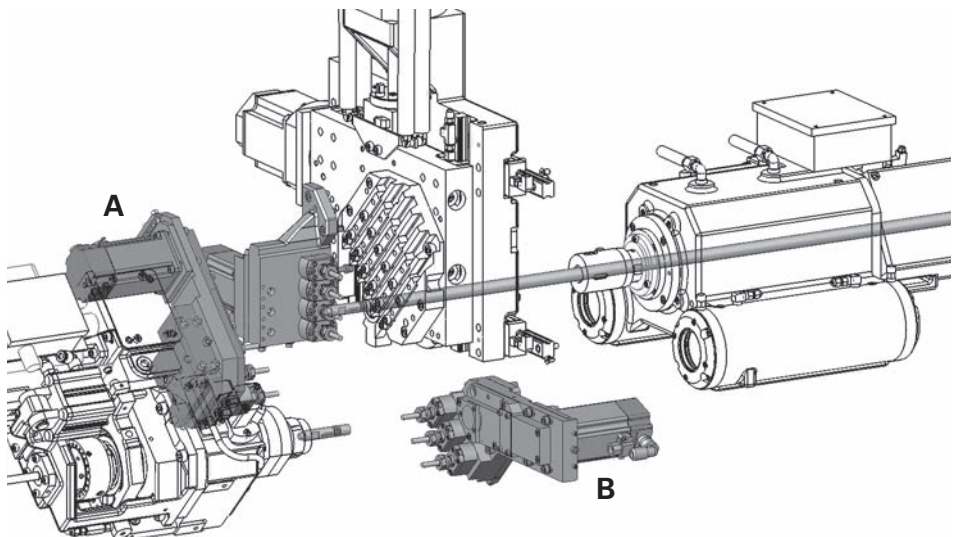


## BDF103/104

### Stationary single sleeve holder

Used for drilling with stationary drill sleeve. This holder can be mounted on T12 to T14.

BDF103 (mm)/BDF104 (inch)



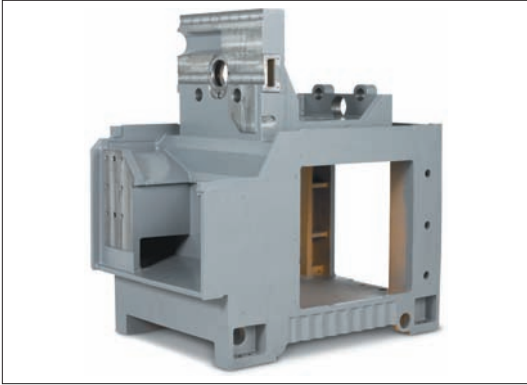
## A: U122B

### Front face rotary tool driving device

## B: U152B

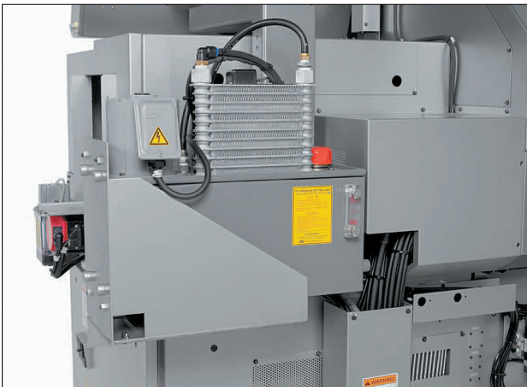
### Back face rotary tool driving device

# High Rigidity, High Precision and Long Life



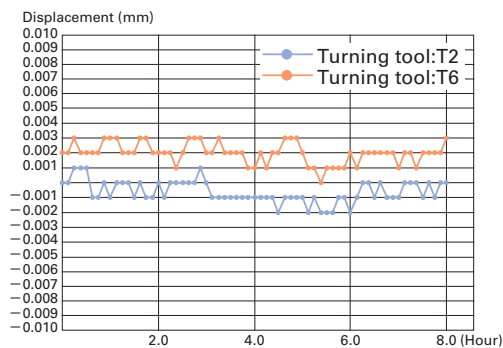
## Use of the highly rigid bed

The bed is twice as thick and 1.8 times heavier than the conventional model, thereby improving heavy cutting and machining accuracy.



## Measures against heat generation

The main spindle is equipped with an oil cooling system that effectively cools the spindle.



Heat displacement of test piece

## Long-life ball screws and centralized lubrication system

The centralized lubrication system for all the ball screw shafts ensures a long period of maintenance-free operation.



# User Friendly Operation



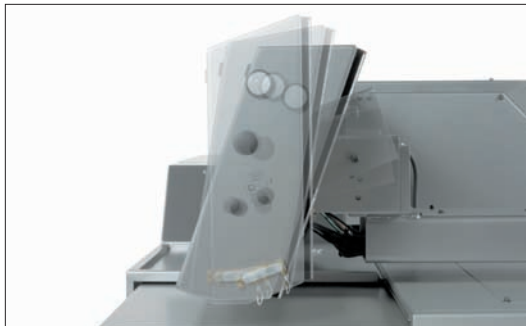
## Folding-type cover

The folding-type cover creates a wider opening thus making the cutting area more accessible.



## Toolbox

A toolbox is mounted on the spindle slide cover.



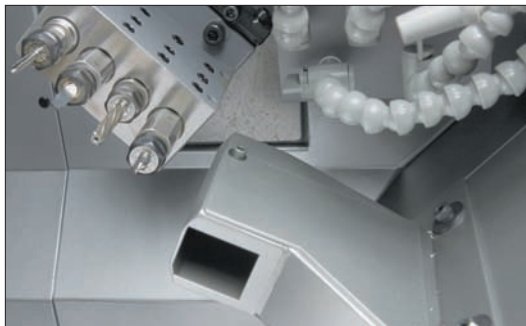
## Adjustable operation panel

Operation panel can be adjusted in three angles for optimum visibility.



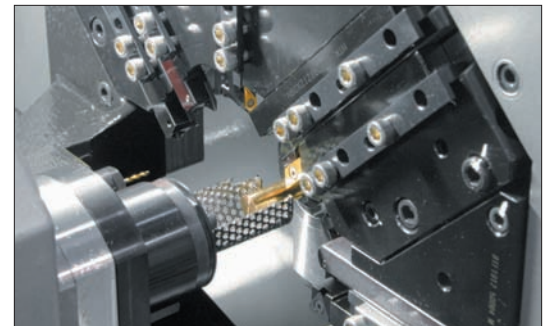
## PC card slot

You can input or output the NC program by using the PC card slot in the front of the operation panel.



## Parts collection chute

The parts collection chute provides fast and efficient ejection of parts.



## Cut-off and product separation (option)

Instead of being picked off by the back spindle, the workpiece can be cut-off and collected in the basket mounted on the back spindle.



## Lamps (option)

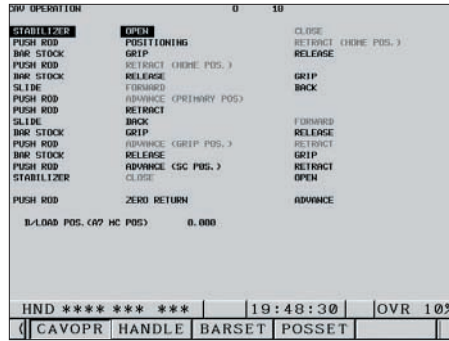
Either a fluorescent lamp or a halogen lamp can be selected for in-machine illumination. (The photograph shows a fluorescent lamp).

# Precise and Logical Operation



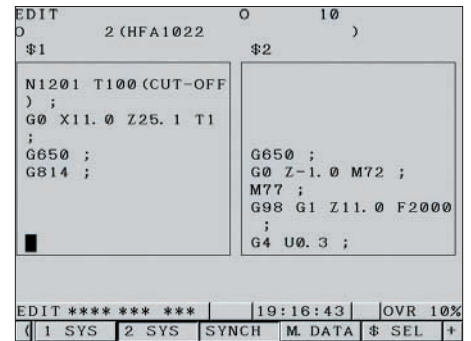
## Dedicated software

The original software can bring out the best capabilities of the K series.



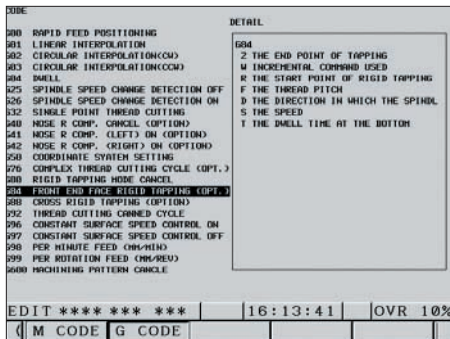
## Dedicated bar loader

K-series supports the dedicated CAV series bar loader that can be operated from the machine controller.



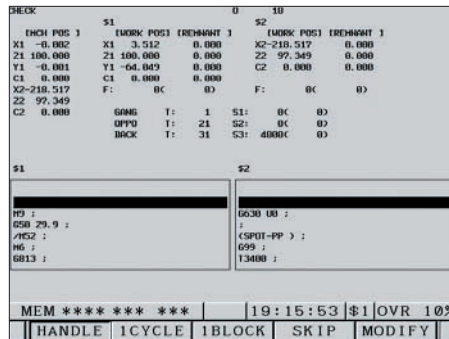
## Program editing

Comprehensive program editing is possible by a two line synchronous display.



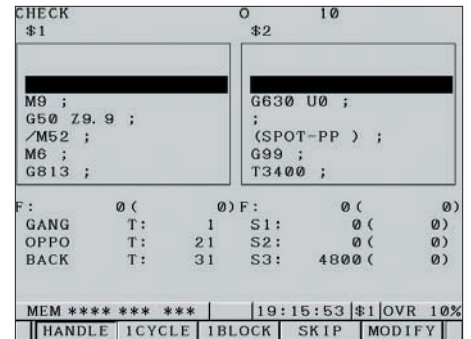
## Code list

The screen displays the available M and G codes and their arguments (useful for programming).



## On-screen character size (small)

Two kinds of character size can be selected for each screen.



## On-screen character size (large)

The screen shows on-machine program check screen with large character size.



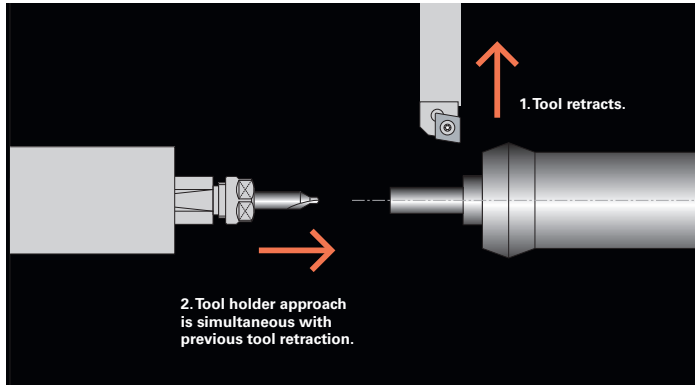
# Technology for Drastic Reduction of Cycle Time

## Streamline Control

Streamline Control is a control system unique to Citizen that produces fast and smooth movements. It reduces idle time without any affect on cutting, and achieves substantial reductions in cycle time.

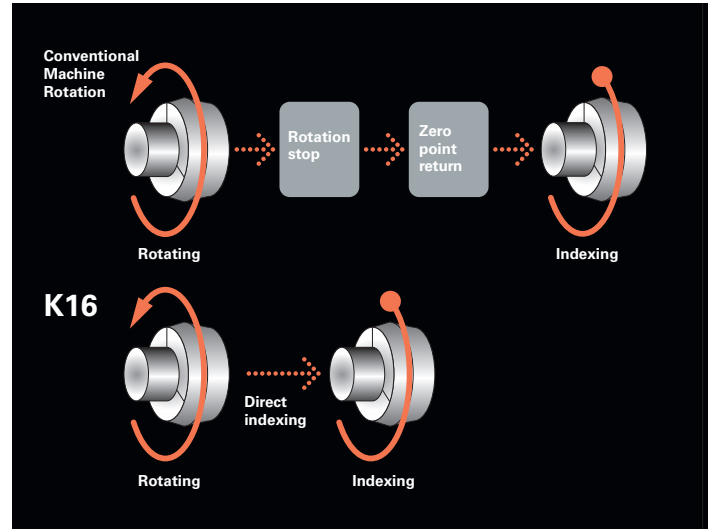
## Tool posts overlap function

While two independent tool posts are in operation, this function allows a tool post to start preparing for machining without waiting until the other has finished retracting. This function helps to completely eliminate idle time.

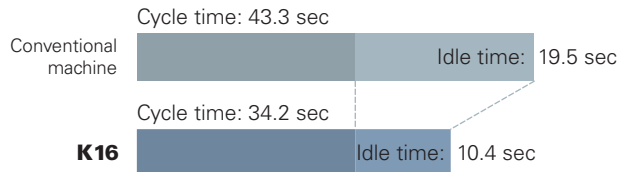
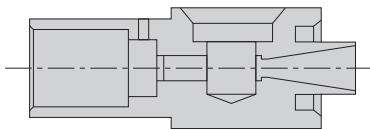


## Direct spindle indexing function

The direct spindle indexing function significantly reduces spindle indexing time. The spindle decelerates directly into the required index position, eliminating the time it takes to stop, reference and index.

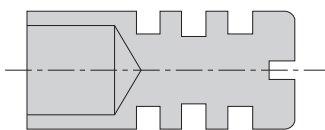


## Comparison Sample A



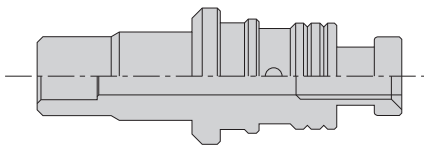
Idle reduction:  
**46.7%**

## Comparison Sample B



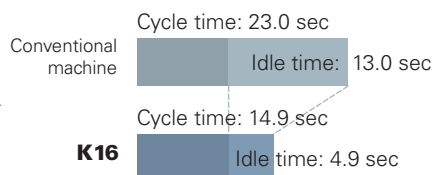
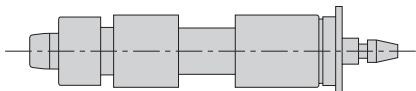
Idle reduction:  
**45.3%**

## Comparison Sample C



Idle reduction:  
**53.5%**

## Comparison Sample D



Idle reduction:  
**62.3%**

# Wide Variety of Features and Options

## Mechanical Options



### Back long workpiece device

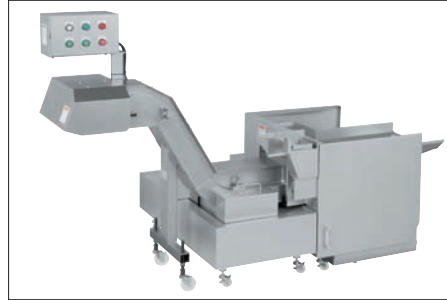
Use this device to machine a long workpiece which turns out a product longer than 80 mm. The device is equipped with a support pipe and unloads workpieces from the left side of the machine. A workpiece of up to 400 mm length can be machined.

### Knock-out jig for through-hole workpiece

This jig prevents chips from going into the back spindle through workpiece. The workpiece is ejected onto the front side of the back spindle.

### Workpiece conveyor

Unloads workpiece (collected by the workpiece separator) to the left side of the machine.



### Chip conveyor

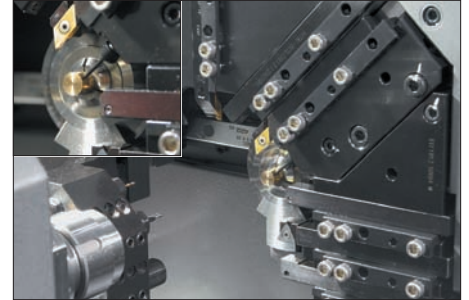
This device carries out chips to outside the machine. Two types of conveyor are provided. Integrated tank (245 liters) is used as a replacement of the standard coolant tank (130 liters). Separate type tank is used in connection with the standard coolant tank. The tank capacity is 210 liters in total.

### Signal lamp

A signal lamp is mounted on the top of the machine. The lamp works in linkage with an alarm indicator on the operation panel of the machine.

### 3-color signal lamp tower

3-color (green, yellow, and red) signal lamp is mounted on the top of the machine. Green as running, yellow as cycle-stop and red as alarm.



### Cut-off tool breakage detector

This detector checks if a workpiece is cut off normally after cut-off process. If a workpiece remains, due to a cut-off tool breakage, the machine stops automatically.

### Coolant flow rate detector

This detector monitors the discharge from the coolant nozzle. The machine stops automatically when the flow rate is getting lower than the preset value.

## NC Features

### Front spindle indexing function (1°)

This function indexes the front spindle at 1°.

### Back spindle indexing function (1°)

This function indexes the back spindle at 1°.

### Corner chamfering/rounding function

This function simplifies the specification of corner chamfering and corner rounding by using the "C" and "R" commands.

### Nose R compensation function

This function makes compensation for the radius of a tool nose by using the G code command.

### Tool spindle rigid tapping

Enables rigid tapping with the tool spindle by synchronizing revolution and feed.

### Main spindle rigid tapping

Enables rigid tapping with the main spindle by synchronizing revolution and feed.

### Back spindle rigid tapping

Enables rigid tapping with the back spindle by synchronizing revolution and feed.

### Spindle synchronization control function

This function synchronizes the front spindle with the back spindle.

### Front spindle C axis/Back spindle C axis indexing function

This function controls the profile positioning of the spindle at an arbitrary angle by using the spindle motor as the C axis control servo motor. The spindle holds the position without any mechanical lock.\*

### User Macro

Enables the use of macro programs.

### Multiple repetitive cycles for turning

This function enables the use of several types of canned cycles.

### Canned drilling cycle

Enables use of canned cycles such as deep hole drilling cycles and boring cycles.

### Milling interpolation function

This function performs contour control toward the end face of a workpiece by using a linear axis and rotary axis (C axis).

### Sub-micron command

This command specifies the least input increment with 0.0001 mm.

### Tool life management I

This function stops the machine when a tool has reached its life, and reports the tool number.

### Tool life management II

This function automatically selects a spare tool when a tool has reached its life.

### Hobbing/polygon machining function

This function enables hob machining (gear cutting) and polygon machining (cutting shape consisting of multiple sides) with a gang tool spindle device.

### Helical interpolation function

This function enables helical interpolation (instruction to other axis synchronizing with the circular interpolation) with a gang tool spindle device.

## NC Options

### Back spindle indexing function (15°)

This function fixes the back spindle by mechanical lock after indexing. Least indexing angle is 15°.

### Program Memory Capacity 120m

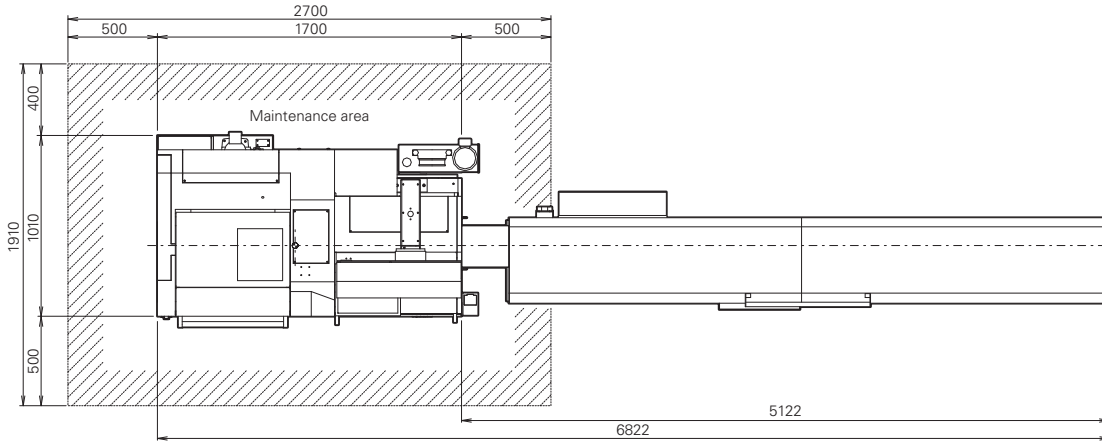
### Conical/Spiral Interpolation

### Custom Macro Variables

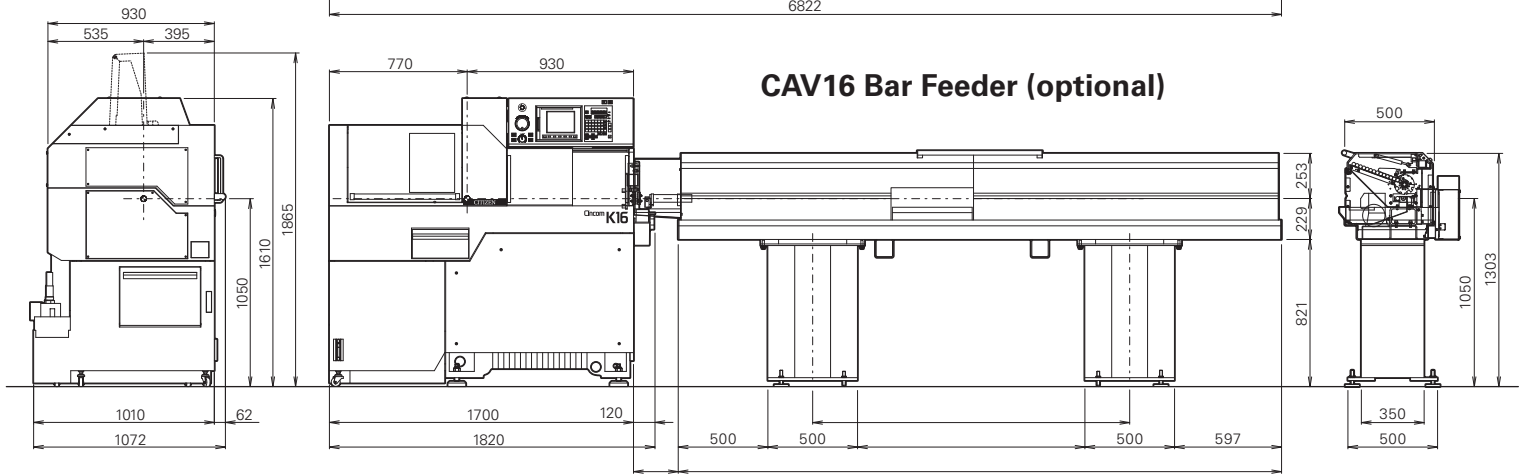
\* For back spindle 1° indexing function and back spindle C axis function, specifications are limited.

# Machine Layout

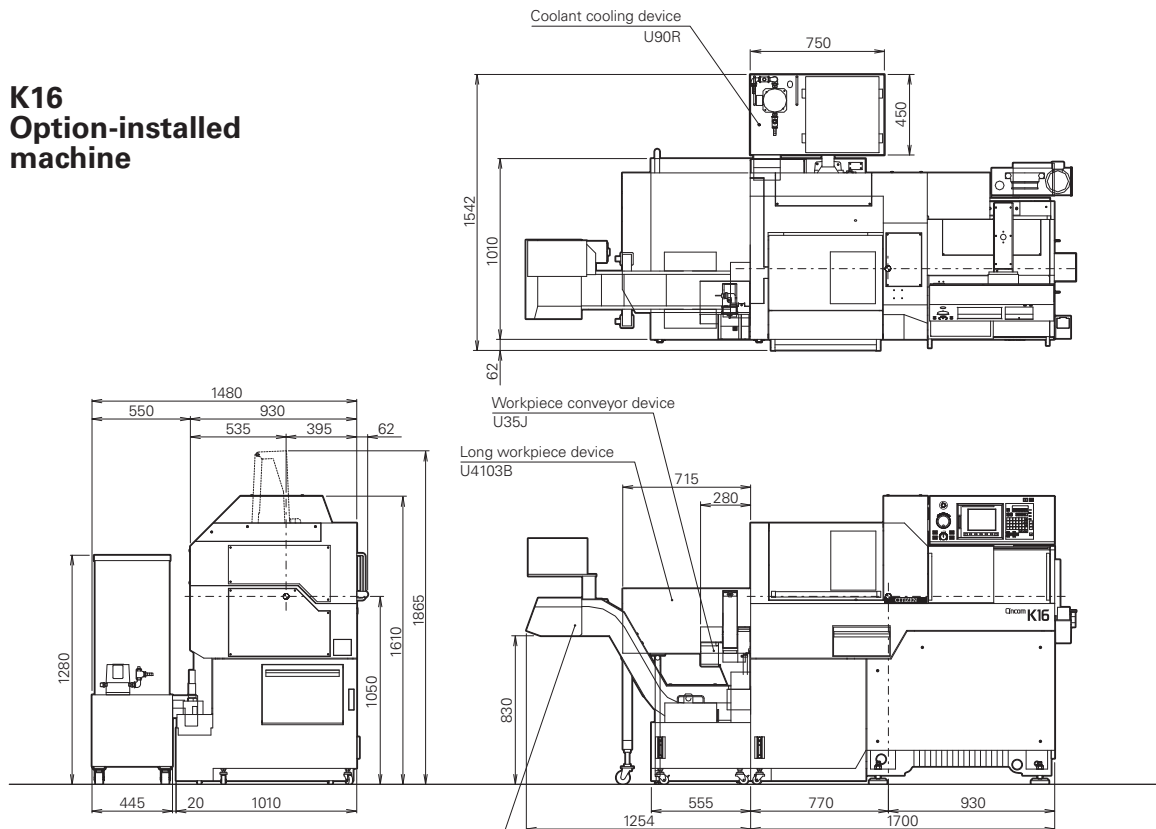
## K16 Standard



## CAV16 Bar Feeder (optional)



## K16 Option-installed machine



# Machine Specifications

Item	K16 VII	K16 VIIC (non-guide bushing)
Max. machining diameter	φ16 mm (.63")	φ16 mm (.63")
Max. machining length	200 mm (7.87")	L=2.5 D mm (Z1 Axis stroke 50 mm)
Max. front drilling diameter	φ10 mm (.39")	φ10 mm (.39")
Max. front tapping size (with tap and die)	M8	M8
Spindle through-hole diameter	φ20 mm (.79")	φ20 mm (.79")
Main spindle speed	15,000 rpm	12,000 rpm
Max. drilling diameter in the rotary gang tool machining process	φ5 mm (.2")	φ5 mm (.2")
Max. tapping diameter in the rotary gang tool machining process	M4	M4
Rotary spindle speed	6,000 rpm	6,000 rpm
Max. chuck diameter of the back spindle	φ16 mm (.63")	φ16 mm (.63")
Max. workpiece length for the front side collection from the back spindle	40 mm (1.57")/Maximum taking-out length of the product: 80mm (3.15")	40 mm (1.57")
Max. drilling diameter in the back machining process	φ6 mm (.24")	φ6 mm (.24")
Max. tapping diameter in the back machining process	M5	M5
Back spindle speed	10,000 rpm	10,000 rpm
Number of tools to be mounted	18	18
Turning tools on the gang tool post	6	6
Rotary tools on the gang tool post	4	4
Tools for front spindle	4	4
Tools for back spindle	4	4
Tool size		
Gang tool post (tool)	φ13 mm (.51")	φ13 mm (.51")
Sleeve	φ19.05 mm (.75")	φ19.05 mm (.75")
Rapid feed rate		
X1,Y1 axis	34 m/min (111.55 ft/min)	34 m/min (111.55 ft/min)
Z1,Z2 axis	32 m/min (104.99 ft/min)	32 m/min (104.99 ft/min)
X2 axis	32 m/min (104.99 ft/min)	32 m/min (104.99 ft/min)
Motor		
Main spindle drive	2.2/3.7 KW	2.2/3.7 KW
Tool spindle drive	0.4 KW	0.4 KW
Back spindle drive	0.55/1.1 KW	0.55/1.1 KW
Cutting oil	0.25 KW	0.25 KW
Center height	1,050 mm (41.34")	1,050 mm (41.34")
Input power capacity	8 KVA	8 KVA
Air pressure and air flow rate for air-driven equipment	0.4 MPa · 50 NI/min	0.4 MPa · 50 NI/min
Weight	2,100 Kg (4,629.7 lbs)	2,100 Kg (4,629.7 lbs)

## Main standard accessories

Main spindle chucking device  
 Rotary guide bushing drive device  
 Rotary guide bushing device  
 Headstock cooling device  
 Coolant device (with level sensor)  
 Door switch/door lock  
 Workpiece separator  
 Lubrication device (with level sensor)  
 Air seal pneumatic device  
 Back spindle chucking device  
 Rotary tool spindle drive unit for gang tool

## Optional accessories

Fixed guide bushing device  
 Long workpiece device  
 Dedicated hydraulic magazine bar  
 Cut-off tool breakage detector  
 Workpiece conveyor  
 Chip conveyor  
 Coolant flow-rate detecting device  
 Signal lamp  
 Work light

## Standard NC functions

NC unit dedicated to CINCOM K series  
 7.2-inch monochrome liquid crystal display  
 Operation time display  
 Preparation function  
 Three-dimensional interference check function  
 Product counter display: Up to 8 digits  
 Automatic power-off function  
 Thread cutting canned cycle  
 Main spindle speed change detection function  
 Back spindle speed change detection function  
 Simplified cut-off tool breakage  
 On-machine program check function  
 Main spindle constant surface speed control function  
 Back spindle constant surface speed control function  
 Main spindle 1 degree indexing function  
 Back spindle 1 degree indexing function  
 Continuous threading cycle  
 Spindle synchronization control function  
 User macro  
 Main spindle C axis function

## Standard NC functions cont'd.

Back spindle C axis function  
 Corner chamfering/rounding function  
 Nose R compensation function  
 Canned cycle for drilling  
 Multiple repetitive cycle  
 Program storage capacity 80 m  
 Tool spindle rigid tapping function  
 Main spindle rigid tapping function  
 Back spindle rigid tapping function  
 Milling interpolation function  
 Hobbing and polygon machining function  
 Helical interpolation function  
 Tool life control I  
 Tool life control II  
 Sub-inch command

## Optional NC functions

Back spindle 15 degree indexing device (Lock type)  
 Program storage capacity 120 m  
 Conical/spiral interpolation  
 Custom macro variables

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