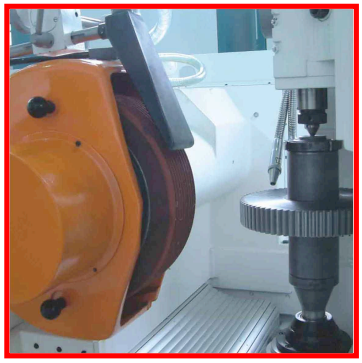
QC American
Creating Value in Workpiece Finishing Machine Tools, One Application at a Time.

QC YK7236-B

CNC Worm Wheel Gear Grinding Machine

The #YK7236-B CNC Worm Wheel Gear Grinding Machine utilizes a continuous generating or shift grinding principle similar to the machinations experienced in a gear hobbing machine. The electric gearbox (EGB) transmission unique to this type of gear grinding machine shortens the length of the internal transmission chain and makes this machine highly efficient and accurate for its relative size. The design of this machine is ideally suited for grinding gears in production batches, but will produce prototype volumes if necessary.

Based on our ever present #YK7236-A, the B model differs only in some key features with motor HP, grinding wheel size, stock sensing, multi-start threading, wheel braking and automatic wheel dressing features. Combined, these features make the B model much more suitable for higher throughput applications.



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Main Features

- **Compact machine design featuring a single, ribbed cast iron bed.**
- **Ergonomic design with complete machine access from the ground floor and through a well designed and completely lit enclosure.**
- **NUM (Swiss Made – USA Serviced) 1050H Axium PC Based CNC control.**
- **Multi-Start threading capability (3 start). Multi-Start worm wheel grinding is used for grinding gears with a larger teeth number to improve grinding throughput.**
- **For improving the efficiency of gear finishing processes, the continuous shift grinding strategy QC incorporates in this line of machines replaces the reciprocating grinding method found in earlier designs. Based on earlier Csepel (Hungarian) designs, the QC #72xx series have been greatly enhanced by adopting the continuous shift grinding process successfully used in Reishauer AG brand machine designs and adopted by other builders, such as Kapp Niles. In most rough grinding operations, the single 'start' of the continuous shift grinding process can be 3 to 5 times faster than that of the reciprocating grinding process! The precision of finish grinding is typically much greater as well.**
- **The Electric Gear Box (EGB). The EGB of this CNC grinding system can carry out the continuous synchronized movement of the workpiece and grinding wheel rotational axes. This EGB also coordinates the workpiece and tangential feed axes. The indexing drive and differential drive coordination also allow for grinding of spur and helical gear designs.**
- **Profile and longitudinal modification. Per the requests of our customers, we can make special diamond wheels for profile dressing. The longitudinal modification is realized by the CNC system controlling simultaneous work piece radial feed axis and work piece axial feed axis movements. As a result, all manner of longitudinal profiles may be obtained.**
- **The special Human Machine Interface (HMI) was developed by QC according to the working characteristics of continuous shift grinding. Based on a conversational programming protocol, programming is simplified by entering work piece parameters and relevant technical parameters as called out by the operator.**
- **Selection of manual or automatic grinding cycles are standard. The manual grinding cycle is suitable for grinding a single workpiece, clamping and unclamping of the workpiece collet or start/stop of grinding wheel feed. The automatic grinding cycle is suitable for grinding workpieces in batch production. Wide grinding wheel and tangential shift**

movements ensure grinding accuracy and uniformity of workpieces.

- The on-board automatic dressing cycle of the grinding wheel improves the uptime and efficiency of this machine tool.
- Automatic stock sensing unit standard.
- An Acoustic Emission Monitoring Sonar (AEMS) sensor is utilized to carry out the automatic stock dividing of two flanks on the workpiece. This system is provided by SBS of Oregon, USA. (This is standard on our stock machines). This system and programming is highly recommended for high throughput and unique for machines in this class.
- SBS – USA Internal grinding wheel balancing unit (Standard).
- Automatic Enclosure Door Opener

Technical Data

Tip Diameter	Max /Min	360/20mm	14.18”/0.79”
Number of Teeth		12-260	
Module (Diametral Pitch)		1-6mm	25.4 - 4.233
Max Face Width (Spur Gear)	Max	190mm	7.48”
Helix Angle		±45°	
Maximum Part Weight Total	Spur/Helical	60/30Kg	132/66Lb
Maximum Between Centers	Max	420mm	16.54”
Distance between centers	Max /Min	420/180mm	16.54”/7.09”
Stroke Length	Max	200mm	7.87”
Distance from Slide Center to Wheel Axis	Max /Min	155/415mm	6.10”/16.34”
Travel of Wheel Slide	Max	260mm	10.24”
Travel of Dresser in Wheel Spindle Direction	Max (Axial)	165mm	6.50”
	Max (Radial)	85mm	3.35”
Tangential Shifting of Column		90mm	3.54”

Grinding Wheel

Motor HP	Max	17.6 KW	23.6 HP
Size	Max	350x160x104mm	13.77x6.30x4.09”
Speed	Max	1100-1900rpm	

Machine with Auxiliary Units

- Net Weight	Approx	6,000KG	13,200 lbs
- Space Requirement LxWxH	Approx	5400x3400x2500 mm	212.6”x133.9”x98.4”
- Total Connected Load	Amps		100
- Voltage Requirement	Volts		460/480

1 Base Machine

1.1 Assembly Group

- **Machine Base** of rigid design, made of cast iron. Installation on leveling/vibration isolation pads.
- **Column** made of cast iron with slide guideway.
- **Wheel Stock** made of cast iron**.** Wheel stock radial infeed utilizes precision ball screw, powered directly by an AC servo motor.
- **CNC Dressing Device** Automatic dressing by an on-board diamond dresser. The dressing paths are generated by two slides ('V' and 'U' axis) movement.
- **Enclosure (Full)** Multiple access points through enclosure to key areas of machine facilitates easy dresser, grinding wheel and workpiece changeovers. The loading door is switch protected and opens/closes automatically. The grinding wheel enclosure also turns automatically.

1.2 Electrical Equipment

1.2.1 Power Supply

Operating voltage is 460/480 Volt/3Phase/60Hz.

1.2.2 NUM 1050H CNC controller

Operator Features

- Operator station with TFT color flat screen and control panel in front of the control cabinet.
- Hand-held operating panel for more convenient set-up of the machine.
- The machining program uses standard CNC conversational programming language, and the interface program uses NUM standard MMI TOOL software.
- Swiss-owned NUM is serviced out of Naperville, IL. QC American provides front-line service regardless.

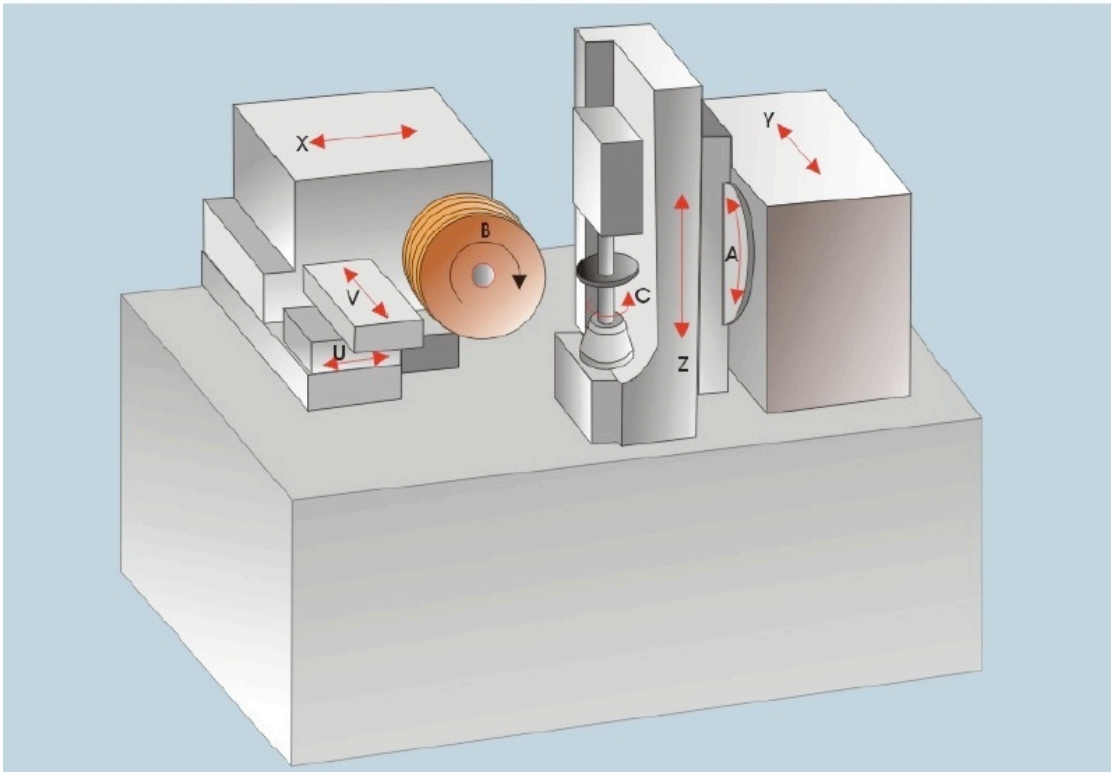
Axis Information

Eight (8) CNC Axes

- 'X'-axis with linear guideway. Radial movement of the grinding wheel slide. Heidenhain #LS477 with 0.0001mm resolution. Grease Lubrication.
- 'Z'-axis with slide guideway. Axial vertical movement of the workpiece stock stroke slide. Grease Lubrication.
- 'Y'-axis with roller/slide guideway. Tangential movement of the grinding slide. Built-in rotary encoder with .0001 degree resolution. Grease Lubrication.
- 'B'-axis. Rotary movement of the grinding wheel. Direct drive AC Motor with Heidenhain #ERN180 with .0036 Degree Resolution. Grease Lubrication.
- 'C'-axis. Indexing and rotary movement of the work piece stock. Heidenhain #RON285/9000 with 0.0001 degree resolution. Servo motor and gearbox. Oil Lubrication.
- 'U'-axis with roller guideway. Dressing axis of grinding wheel for level movement.
- 'A'-axis. Rotation of column for grinding helix gear and meshing with grinding wheel.
- 'V'-axis with linear guideway. Dressing axis of grinding wheel for fore-and-aft direction(s). Built-in rotary encoder with .0001 degree resolution. Oil Lubrication.

The positioning feedback devices of each axis utilize high-precision encoders throughout.

 # YK7236A-B CNC Axis Layout



Service Functions

Integrated modem for remote diagnostics connection between QC computers.

1.3 Peripherals

1.3.1 Hydraulics/Lubrication

- Complete hydraulic system for lubrication, clamping, and tailstock operation.
- Common operating hydraulic system.
- The rotational axis of part (C Axis) is oil lubrication.
- Other axes are via grease lubrication.

1.3.2 Coolant Filtration System

Machine design utilizes coolant for cooling the machine base. The coolant filtration system cleans the coolant using a centrifugal machine design and includes the following:

- Filter capacity = 200L/min.
- Multiple circuit coolant chilling equipment: With automatic temperature regulation for cooling oil.
- Oil mist recovery and electrostatic air filter.
- Multiple coolant system design options are available; please contact one of our associates.

1.4 Automatic Balancing System (standard on stock machines)

Dynamic balancing system for automatic balancing of grinding wheel. Grinding Wheel Balancing system manufactured by SBS Systems of Oregon, USA.

1.5 Acoustic Emission Monitoring System (standard on stock machines)

SBS Systems also manufactures an Acoustic Emission Monitoring System (AEMS) that facilitates automatic and rapid stock division and enhanced wheel dressing cycles. There is a sonar-type sensor for measuring the proximity of the grinding wheel to the workpiece. Both the automatic balancing system and the AEMS have been fitted by SBS to the machines in stock on our floor.

1.6 Automatic Stock Sensing (standard on stock machines)

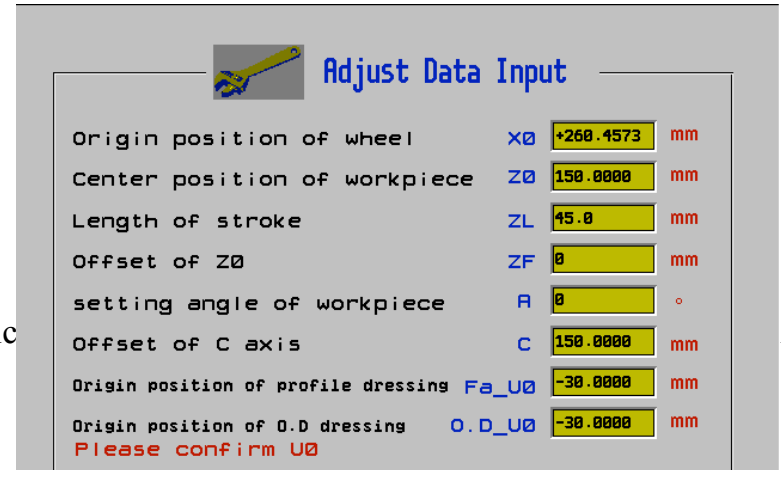
QC Provides an automatic stock sensing unit to work in conjunction with the SBS AEMS system. This unit senses teeth on workpieces and locates the average height. Grinding starts automatically (if the operator so chooses) at a predetermined location on the workpiece.

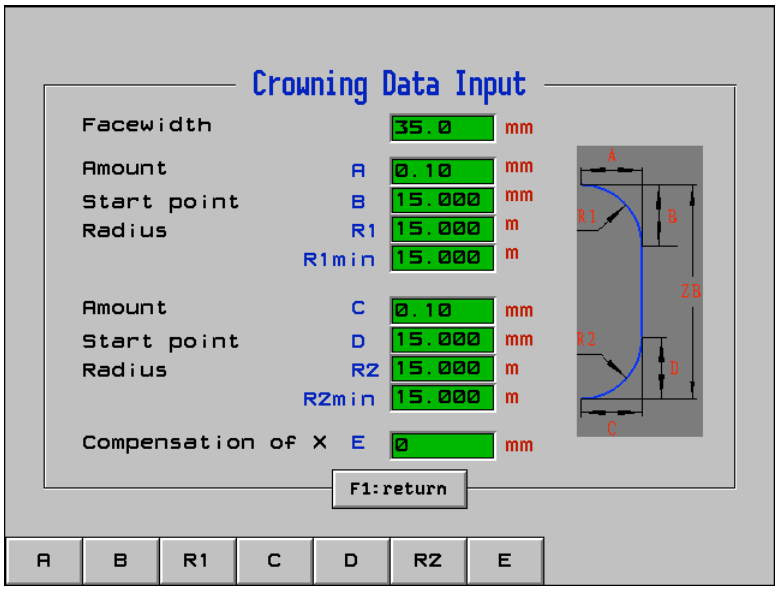
1.7 Machine Accessories and Features

1.8 Software for PC Based NUM Axium Power 1050H Control

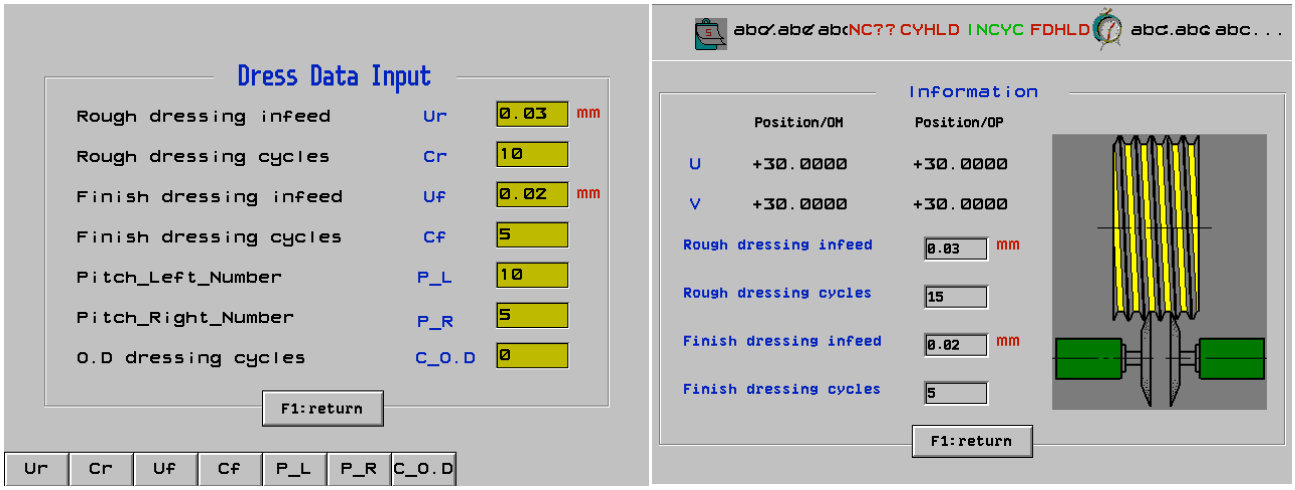
This QC Developed software package enables the user to generate, edit and optimize grinding programs and analyze processing data on the PC on the machine or a remote PC. The software interface is identical with the machine control menu and may even be used for rudimentary training purposes.

- **Gear parameters calculation module – Input and storage of workpiece data.** This module consists of a conversational interface for geometrical parameter data entry, technical parameters and measuring parameters to facilitate computing of standard gears, gears with addendum modification, modified spur (helical) cylindrical gears. Basic work piece data is recorded into a database for later editing or processing.





- **Profile and Lead Modification.** Profile and Lead modifications are finished by an on-board diamond dresser and automatic dressing cycle.



- **Conversational Control Design.** The G code will be automatically created based on the gear processing and grinding parameters entered by the user. In addition, the customers can even directly use and upload straight G code if desired.

Standard Machine Accessories

01	Special Tools	1set	
02	Extended Length Live Center	1set	
03	Adjustable Live Center	1set	
04	Center Adjusting Device	1set	
05	Workholding Collet(s)	1set	
06	Paper Hydraulic Filter(s)	6pcs	
07	Diamond dressing wheel M=2-4 set	1set	
08	Grind wheel flange 200mm ID	3sets	
09	Gage for wheel	1pc	
10	Grinding wheel, Winterthur 400X203X100	3pcs	
11	Diamond pen	1pc	
12	Coolant Chiller device for coolant tank	1set	
13	Workpiece center for Examination	1set	
14	Leveling Pads for Machine Foundation	1set	
15	Operation Manual	1set	

1.9 Machine Color

Machine and peripheral units: Blue

Doors: White

1.10 Power-off Protection System

To provide controlled retreat of the machine into safety parking position in case of a power outage to protect workpiece and tools. Included.

1.11 Operator Training at QC American/Customer Facility

This program is designed in the following way: to prepare your operators to begin operating the machine directly before or after final acceptance at your facility, or at QC American Ypsilanti, Michigan USA.

2. Special Machine Accessories (Option A–Q are included on stock machines)

Option A	Grinding Wheel Gauge	M1-M6 (Total: 17pcs)	1pc	
Option B	Root Roller	M=1-1.5 M=2-2.5 M=3 M=3.5-4 M=4.5-6	1pc 1pc 1pc 1pc 1pc	
Option C	Diamond Dresser Wheel Set	M=1-2 M=2-4 M=4-6 Special form	1set 1set 1set 1set	
Option D	Air Blowing Unit		1set	
Option E	Automatic Stock Dividing System	SBS –AEMS system	1set	
Option F	Grinding Wheel	400X203X100 6KS120C4VM250M2RA 400X203X100 92A100H5V111	 1pc 1pc	
Option G	Grind wheel flange	160mm ID Special	1set	
Option H	Spring clamping head		1set	
Option I	Tail stock center		1set	
Option K	Special dresser	Confirm according to user's requirement		
Option L	Grinding arbor	Confirm according to user's requirement		
Option M	Balance core shaft for grinding wheel balance		1set	
Option N	Roll branch device		1set	
Option O	Balance frame for grinding wheel balance		1set	
Option P	SBS Balance device for grinding wheel		1set	
Option Q	Oil mist recovery and electrostatic air filter		1set	
Option R	Additional Change Gears for dresser system		1 set	
Option S	Ebbco Metalworking Filtration System – 80psi @ 100GPM Cartridge-Type System	#PMF-MWF5-623-T-FP BFH-FP-24K J-8705	1 Each	

3. Machine Warranty

A warranty period of 12 months on entire machine and accessories from time of final acceptance or 5,000 hours of use – whichever occurs first. An extended warranty is available per further negotiation(s).

3.5 Spare Parts Warranty

Spare Parts availability is guaranteed for 10 years from the date of machine commissioning with deliveries under current market conditions.

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