

EPOC™ - Standard Machine Main Technical Characteristics

• Spindle rotation speed	5 - 4500 rpm	• Spindle motor	Brushless AC servo motor
• X-axis machining head travel	1320mm (51.97")	• Spindle feed motor	Brushless AC servo motor
• Y-axis machining head travel	80mm (3.15")	• Tool holder feed motor	Brushless AC servo motor
• Z-axis machining head travel	327mm (12.87")	• Hydraulic gear pump	200 bars (2,900 psi)
• X-axis auto-centering capacity	12mm (.47")	• OAL machine dimensions	2150x1300x2300mm (85x51x91")
• Y-axis auto-centering capacity	12mm (.47")	• OAL machine table length	1500mm (60")
• Usable machining spindle tilt (all directions)	6°	• OAL crate dimensions	2400x1600x2150mm (95x63x85")
• Z' spindle sheath travel	95mm (3.75")	• Machine average net weight	1600 kg (3,528 lbs)
• Y'-axis machine parallels	138mm (5.43")	• Machine average gross weight	2000 kg (4,409 lbs)

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EPOC CS™

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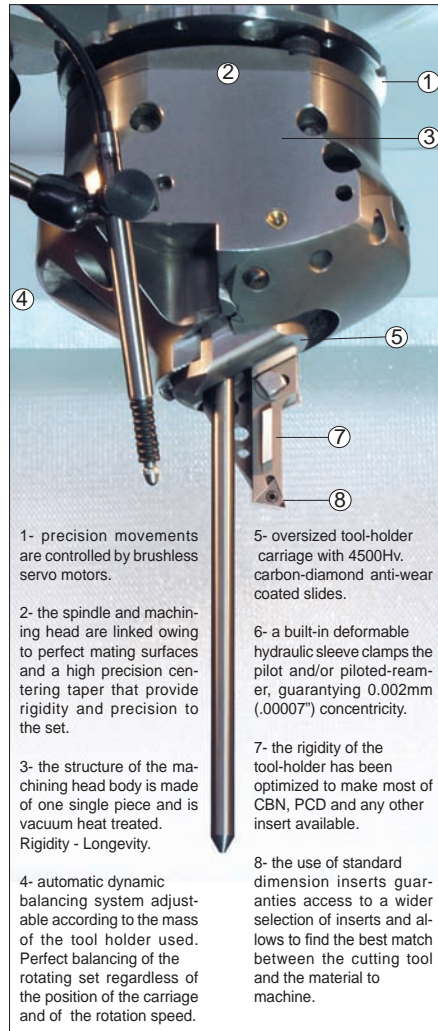
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FIXED-TURNING.
Else Power Concocting™

NEWEN[®] FIXED-TURNING[®] PROCESS

EPOC[™] (elite power contouring[™])



EPOC[™] machining spindle

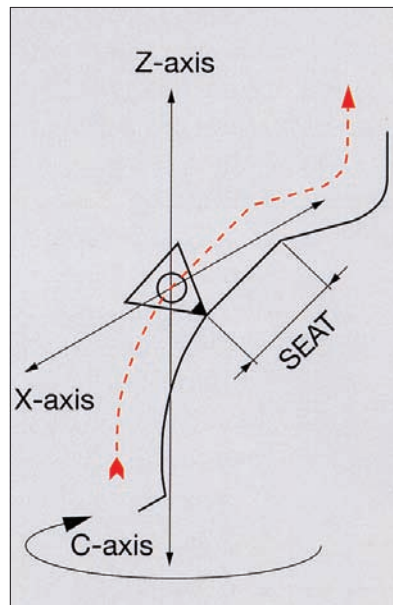
Aside from the fact that it is the cutting tool that is spinning and not the part being machined itself, the EPOC[™] spindle and machining head, following the example of a CNC lathe, allows to very simply machine the most difficult and most complex shapes regardless of the quality of the valve seat material.

The single point cutter technique permits the use of the latest cutting tools, including CBN, PCD, CERMET, various coated materials, etc...

A very rigid tool holder is fixed onto a carriage specially treated to work with limited play. The automatically balanced machining head forms one body with a precision spindle moving on its own axis. The movements of the carriage and of the rotating spindle are assured by brushless motors of the latest generation and by pre-loaded and rigid satellite roller screws.

The tool holder carriage is driven without lash owing to a system of connecting rods and rudders oscillating around pre-loaded axes and bearings. **The rigidity of the system and the extreme simplicity of the kinematics allows for the machining of any shape.** The machine programs automatically optimize the travel of the cutting tool in order to reduce the actual machining times.

- 1- precision movements are controlled by brushless servo motors.
- 2- the spindle and machining head are linked owing to perfect mating surfaces and a high precision centering taper that provide rigidity and precision to the set.
- 3- the structure of the machining head body is made of one single piece and is vacuum heat treated. Rigidity - Longevity.
- 4- automatic dynamic balancing system adjustable according to the mass of the tool holder used. Perfect balancing of the rotating set regardless of the position of the carriage and of the rotation speed.
- 5- oversized tool-holder carriage with 4500Hv. carbon-diamond anti-wear coated slides.
- 6- a built-in deformable hydraulic sleeve clamps the pilot and/or piloted-reamer, guarantying 0.002mm (.00007") concentricity.
- 7- the rigidity of the tool-holder has been optimized to make most of CBN, PCD and any other insert available.
- 8- the use of standard dimension inserts guaranties access to a wider selection of inserts and allows to find the best match between the cutting tool and the material to machine.



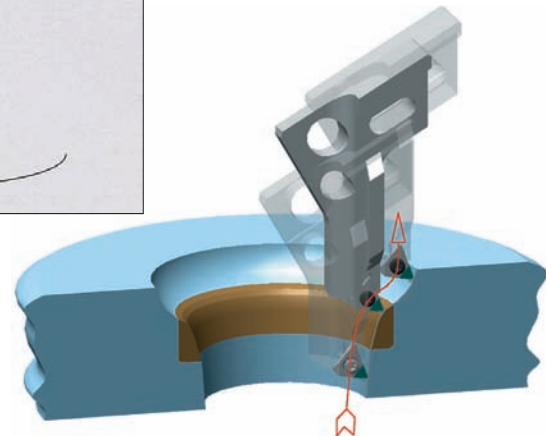
The machining of new sintered material and various other alloys presents difficulties that make machining with traditional methods uncertain.

NEWEN[®] has developed a new contouring system that is rigid, precise and reliable to offer a positive solution to all valve seat machining problems.

NEWEN EPOC[™] is a new concept developed around a simple yet powerful and efficient kinematics. Advanced electronics guaranty the control of all three independent axes. A flexible interactive software makes the technology easy to use and interact with. The system is so simple and user friendly that it spares the necessity of constraining training.

NEWEN EPOC[™] provides a positive response to all the technical problems met in all areas of valve seat machining:

- rapid prototyping
- re-manufacturing
- production



Machining

While rotating, the cutting tool moves on its X and Z axes to describe the profile to machine. The machining can be performed in both directions and the number of roughing and finishing passes is automatically defined by the program itself. The travel of the cutting tool is optimized according to the actual shape of the raw valve seat. An electronic linear gauge defines the depth of the machining. All the dimensions, the profiles and measurements can be very easily modified.



Control Panel

A simplified control panel allows to make necessary changes during production.

Adjustments for machining depth, cutting tool positioning and cutting tool replacement are simplified considerably.

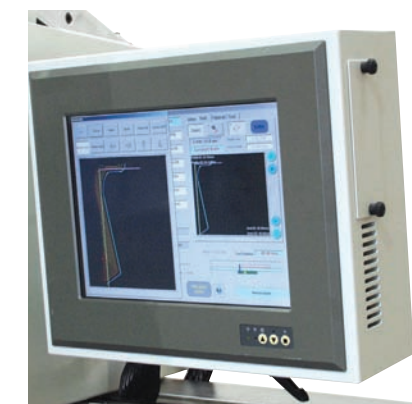
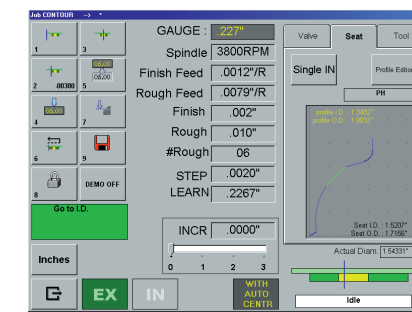
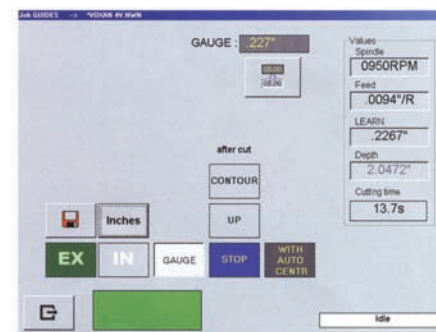
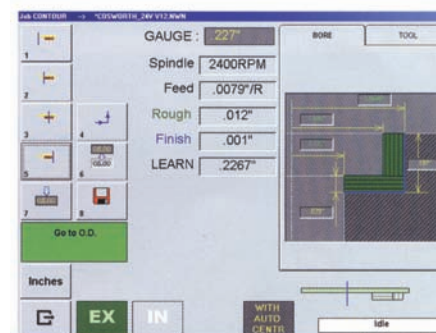
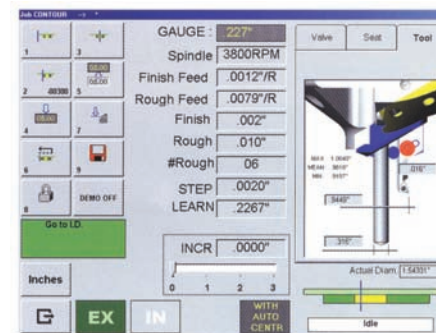
An electronic wheel allows to manoeuvre the different axes. A special command makes the cutting tool describe a selected profile while the spindle is not rotating so as to visualize the travel of the cutting tool prior to machining.



Profile Editor

A special program allows to create, via a touch screen and based upon the indications found on a blue print, any particular profile featuring as many segments as desired. Line segments are defined by their length or by their angles. Arcs or radii are defined by their beginning and ending tangent points and by their radius. A profile made of 10 line segments or radii can be created and saved in under one minute. At any given moment, it is possible to modify a dimension or an angle, to add or remove a segment and to designate which segment represents the valve seat. Based upon that information, the valve diameter or the diameter of reference to realize, the program will automatically place the desired profile at the correct diameter.

All the profiles are stored in a data-base together with all the programs specific to one same cylinder head. All the machining parameters, specific adjustments and depth dimensions are also stored. Changing profile or cylinder head only takes seconds, no tool adjustment is required within the travel range of the carriage. Depth dimensions are controlled with an electronic linear gauge firmly attached to the spindle sheath.



Software

A program is created for each cylinder head model, gathering both roughing and finishing profiles as well as pertinent machining parameters such as machining speed, feed rate per revolution, depth of each machining pass and the number of valve seats.

A program can be retrieved by the operator in the case of standard machines or automatically as in the case of automatic transfer machine.

The software allows to build profiles with as many as 99 segments. Acceptable angles for segments and radii vary from -10° to 110° with respect to the horizontal. The length and radii of the different segments are only limited by the capacity of the machining head.

Once created, profiles can be saved, modified, erased and/or recalled. After having entered a desired profile and the dimensions of the raw valve seat, the software automatically calculates the different machining cycles. The roughing and finishing passes are differentiated by their respective depth and feed rate per revolution.

Quality control information such as internal and external diameters of a profile, diameter of the seat and of the profile are shown directly on the screen.

During the machining it is always possible to know, in real time, the position of the different parts of the machining head, cutting tool, carriage and spindle sheath. All the parameters can be modified directly via touch screen.