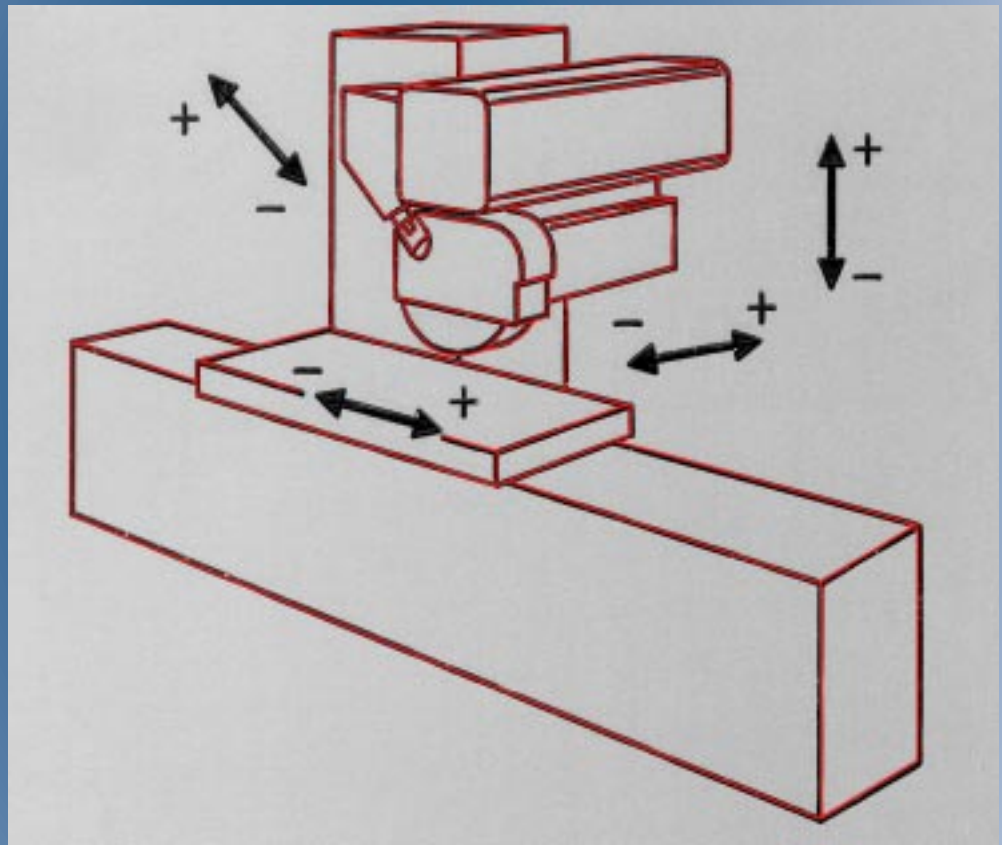


SPECIALIST SINCE 1934

FAVRETTO

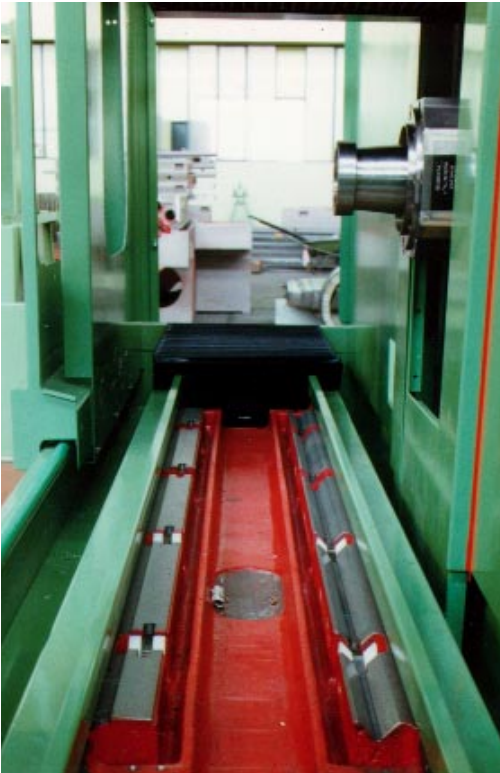
**SURFACE AND PROFILE GRINDING MACHINES
WITH HORIZONTAL SPINDLE**

STRUCTURAL ELEMENTS AND DRIVE TECHNIQUE

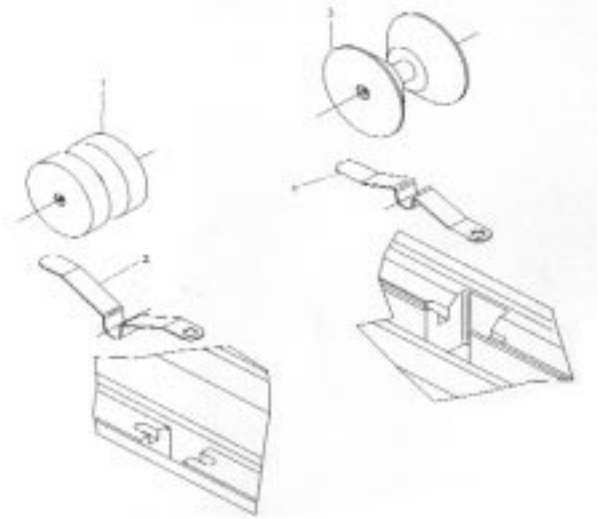


OFFICINA MECCANICA FAVRETTO S.p.A.
10025 PINO TORINESE (TO) ITALY
CORSO CHIERI, 96
TEL. 011 - 811.44.11
FAX. 011 - 811.11.03
E-MAIL FFAVRE@TIN.IT
WEB <http://www.FAVRETTO.it>

BED and TABLE



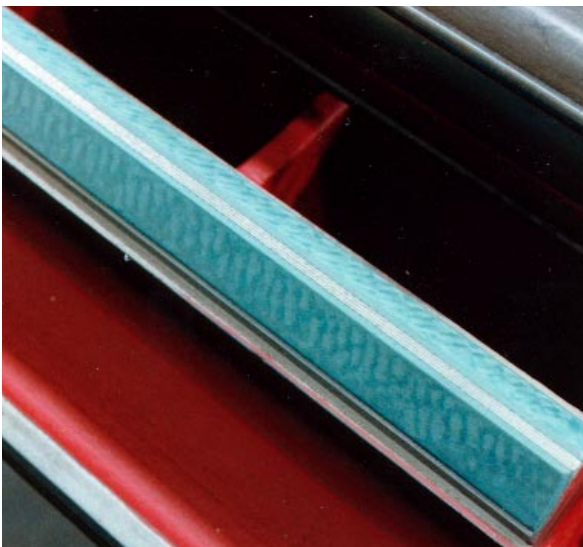
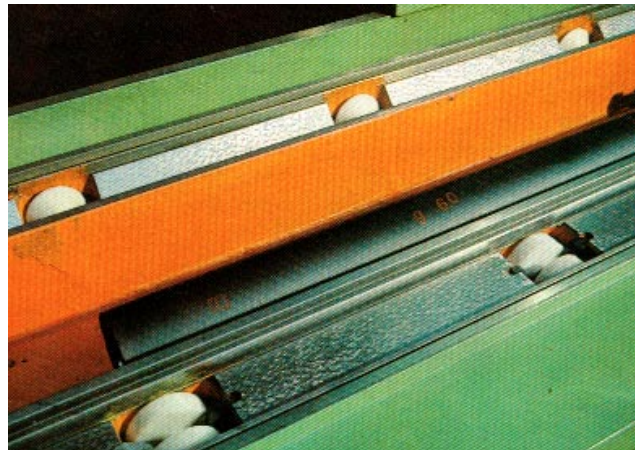
Sturdy machine bed with flat and V-shaped guideways twice the length of the table slideways.



Lubrication of the table slideways is obtained by a system of rollers in oil pockets.

ADVANTAGES

- No oil pressure under the table
- No oil heating
- No maintenance
- More accuracy
- More reliability



The table guideways are provided with anti-friction coating.

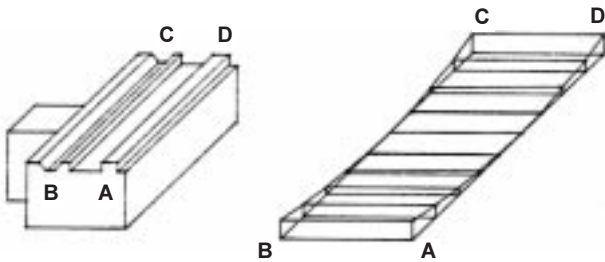
The coupling between bed and table guideways is obtained by high precision hand-scraping.

ADVANTAGES

- Elimination of deformations caused by assembly of groups,
- Lower friction during the sliding of table,
- Higher accuracy



SPECIFICHE DI RASCHIETTATURA BASAMENTO
MACCHINA "MB 130"
SPECIFICATION OF BED SCRAPING
MACHINE "MB 130"



B + 9,4 + 6.5 + 4.1 + 2.0 + 0.6 +/- 0.0 + 0.6 + 2.2 + 5.2 + 9.1 C
A + 9.1 + 6.2 + 4.4 + 1.7 + 0.3 + 0.3 + 0.3 + 2.8 + 5.5 + 9.4 D

VALORE DI RIFERIMENTO : 9.4 Micron
REFERENCE VALUE : 9.4 Micron

NB: LA TENDENZA DELLA RASCHIETTATURA DEVE
ESSERE SEMPRE CONCAVA E MAI CONVESSA

NB: SCRAPING TENDENCY MUST BE ALWAYS CONCAVE
AND NEVER CONVEX

The flatness chart shows the optimal shape of the guideways, obtained through hand-scraping.



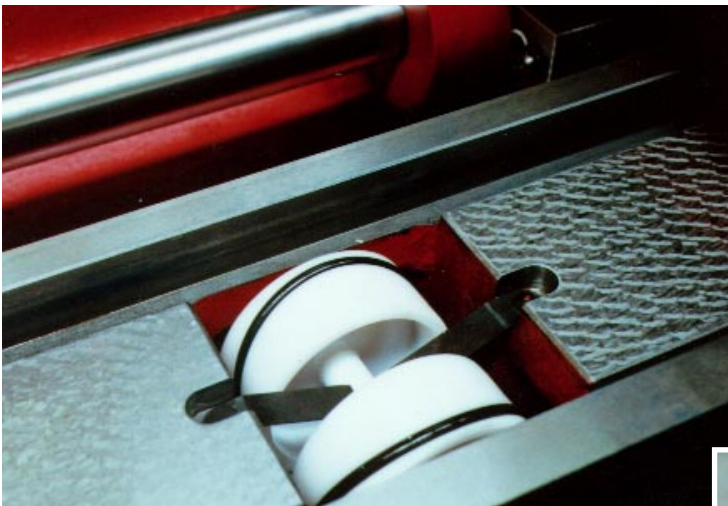
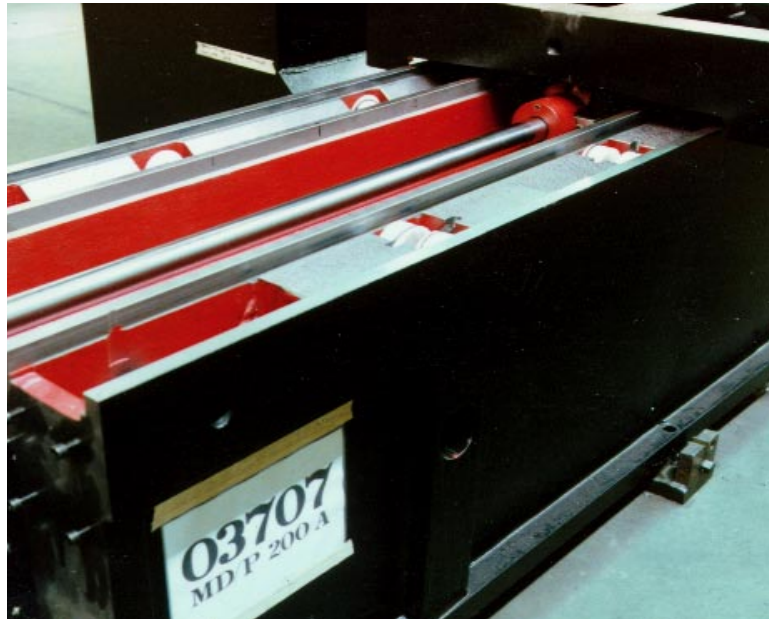
Each bed is accurately tested through high precision instruments.

HYDRAULIC TABLE MOTION

Longitudinal table stroke of MB, MC and MD by double hydraulic cylinders fully insulated with non-conductive material.

The MA - ME - MF are driven by double effect cylinder.

The newly designed surface grinding machines are provided with enlarged beds and table width. Highest accuracy requirements over the whole grinding surface.



The slideway and guideway design is a result of extensive researches and takes into account all working needs.

The different sections, and the sliding systems, balance friction and thermal effects. The hydraulic unit operates by the centre of the sliding guide .





The automatic table reversal points are programmable on the keyboard through parameters. The stroke speed can be set via control unit and is adjustable by potentiometer. Manual movements are performed by means of jog push-buttons. The machine working area is completely safe guarded. The doors in the front and rear sides allow good accessibility for piece loading and set-up operations.

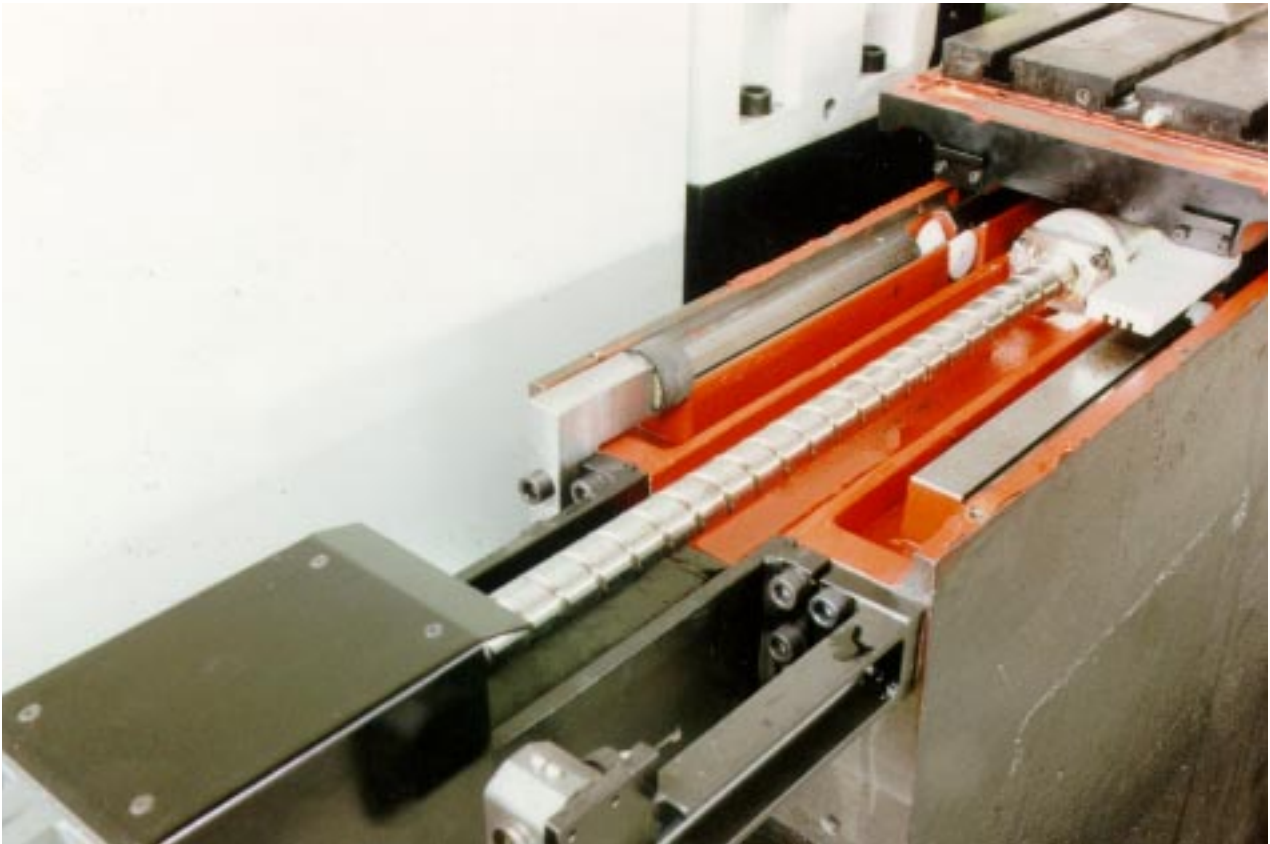
All the hydraulic unit parts are manufactured by VICKERS



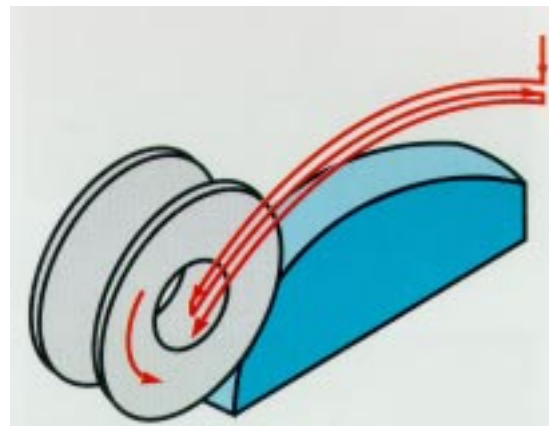
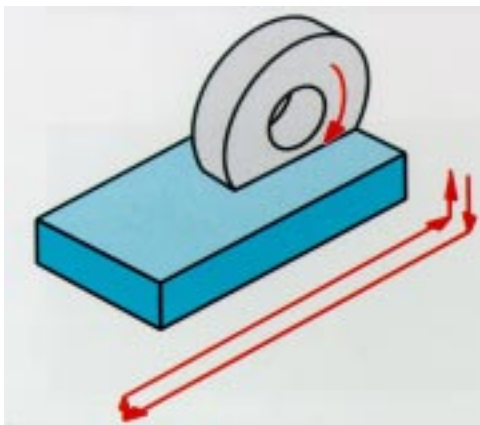
The hydraulic power pack is located into an independent external unit. This allows easier maintenance interventions, and avoids heat transfer to the machine structure. Air-oil heat exchanger standard on the machine.



The table speed from 1 to 40 m/min is continuously adjustable by the electronic Vickers valve connected to the NC unit.



The longitudinal table stroke is obtained by electro-mechanical motion of the ball screw, driven by a.c. brushless motor and controlled with linear transducer. The manual drive function is performed by means of "JOG" push-buttons or electronic handwheel. The automatic table reversal points and stroke amplitude are programmable on the keyboard. The stroke speed can be set on the control unit and is adjustable by potentiometer.



ROTARY MACHINE

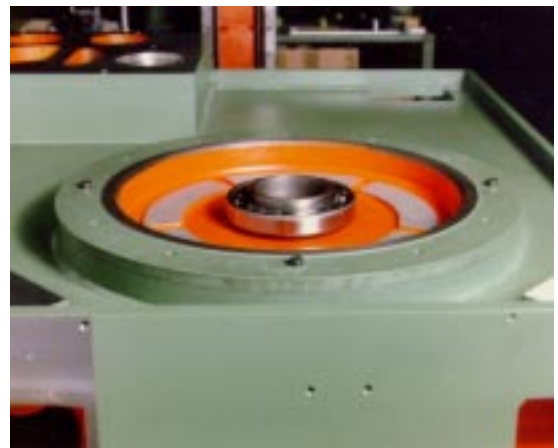
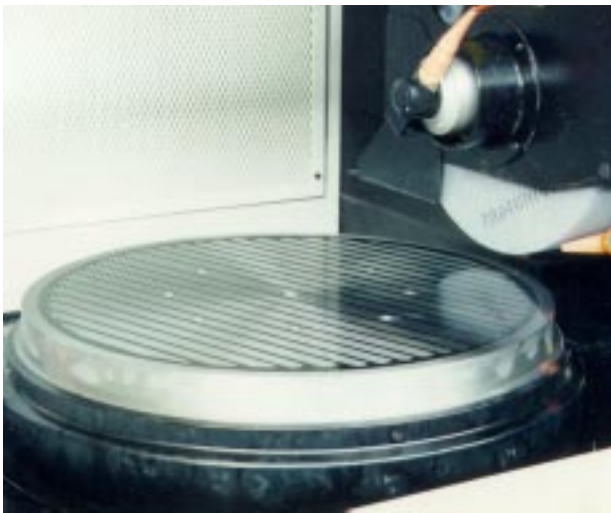
BED and TABLE

Sturdy machine bed with sliding surface for rotary table.

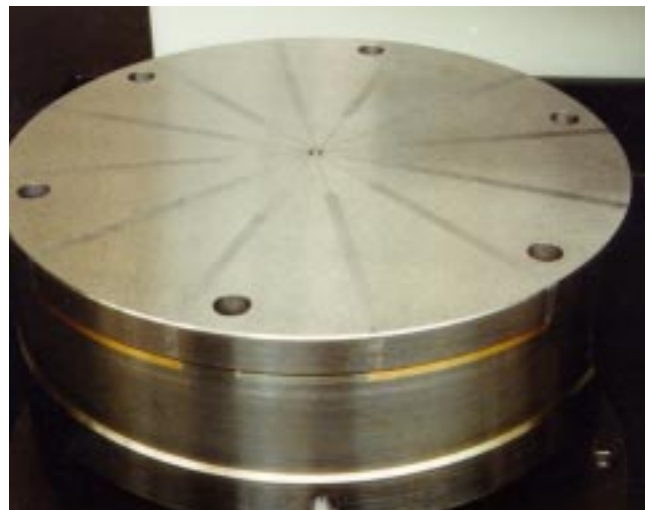
The coupling between bed and table is obtained by High precision hand-scraping.



The table rotates on a sliding race, coated with antifriction material.



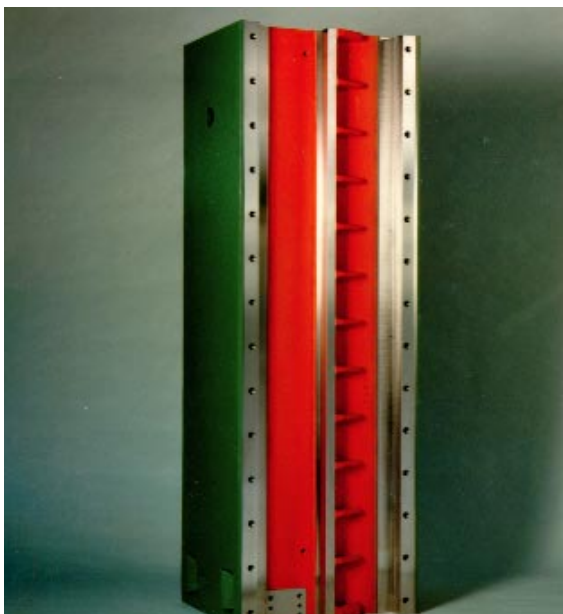
Rotary table with electronically controlled permanent magnetic chuck and relevant control, including an electrical safety device to prevent the table rotation when chuck is not magnetized. The rotation is obtained by a hydraulic motor with a V-belt drive. Table speed is continuously adjustable by potentiometer.



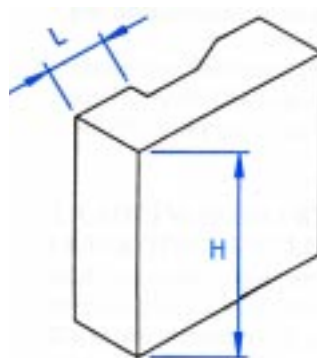
Maximum rigidity of the column

The FAVRETTO column designed for MB, MC and MD machines offers the following main advantages:

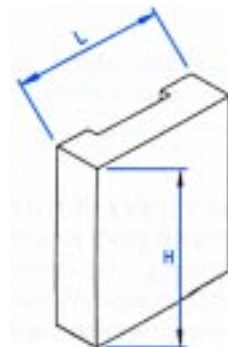
- three low-friction slideways granting higher pre-load compared with the two-guideway-system,
- no mechanical counterweighting inside the column,
- the wheelhead motor mounted outside the column allows heat to be quickly dispersed,
- a longer vertical grinding stroke.



- Higher straightness accuracy of the vertical sliding,
- High finishing precision
- 1:5 Ratio between width and length of the vertical guideways.



FAVRETTO H:L=5:1



COMPETITION H:L=1,5:1



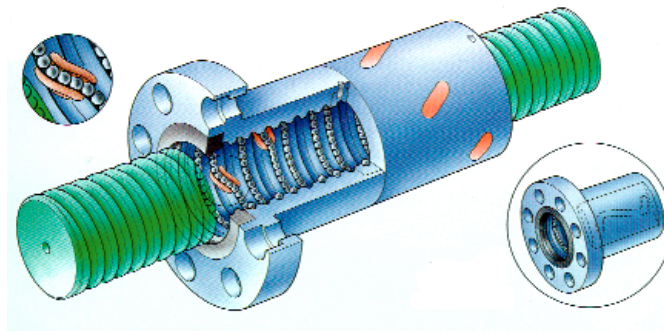
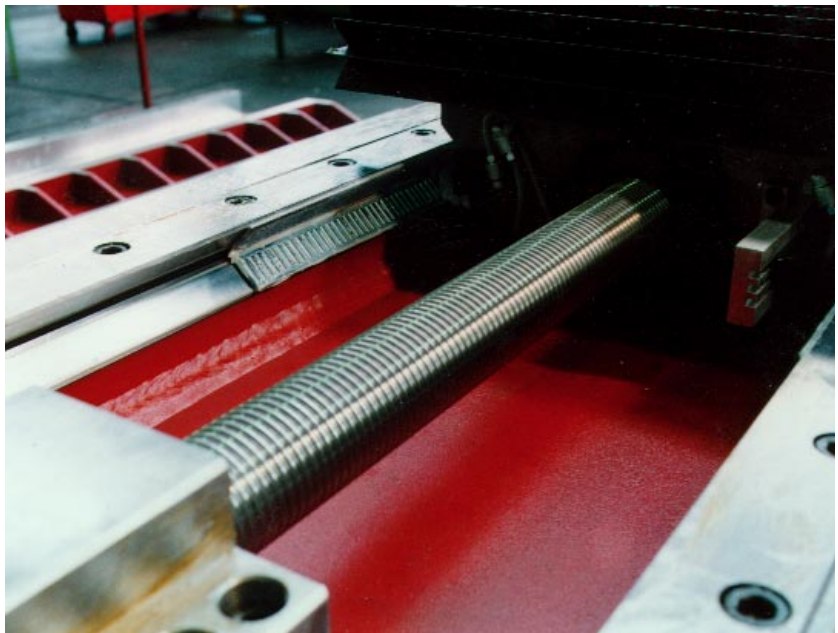
Upright with vertical antifriction coated slideways and recirculating ball screw for the crossrail vertical motion.

Adjustment by means of tapered gibs.

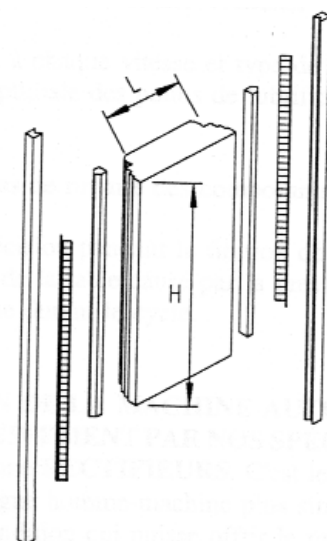
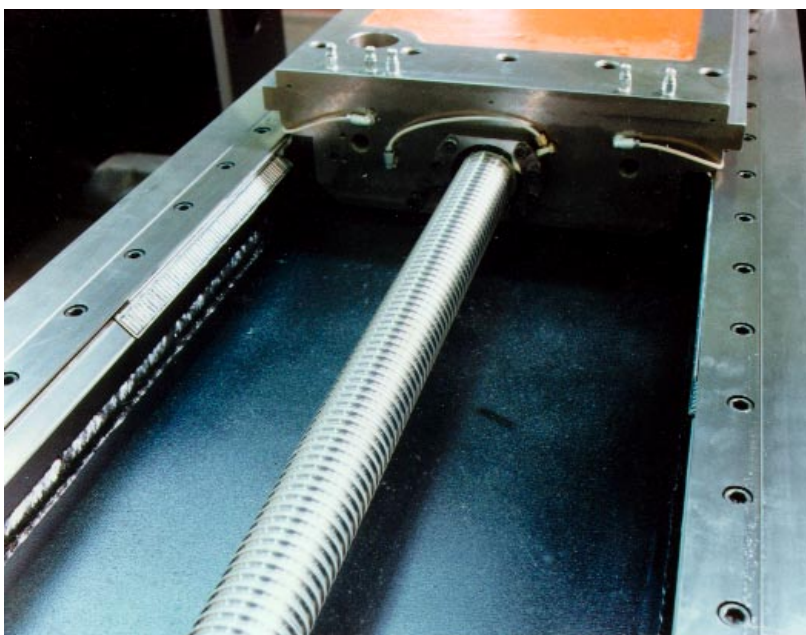


The newly designed FAVRETTO column for the MA, MR and ME MF machines offers the following advantages:

- Optimal preload for light and compact machines which lack in order to release power on the work piece.
- high stiffness for single column open structure with large overhang and heavy powerful head.
- Consequent optimization of cutting forces to improve machining times and finishing performance.



Preloaded roller guideways and recirculation ball screw for the displacement in vertical direction.



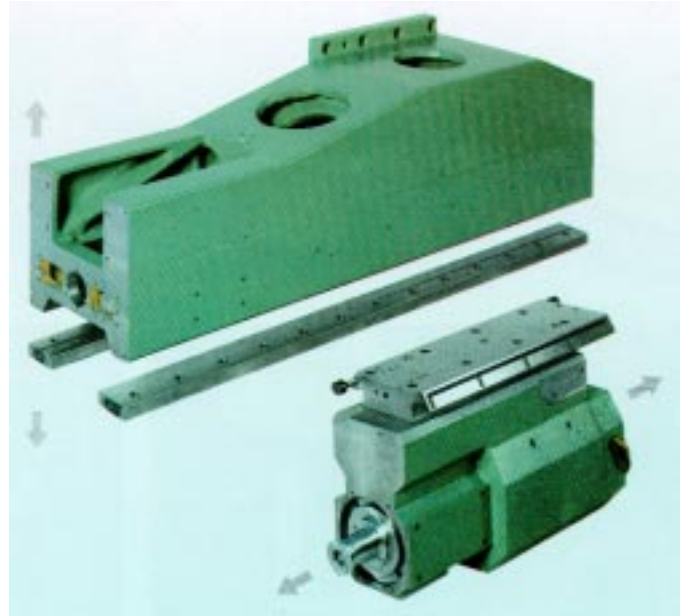
FAVRETTO H:L = 2,5:1

Cross traverse axis...

The high accuracy of the grinding wheel as it moves laterally across the workpiece is maintained by traversing the wheelhead column maintained.

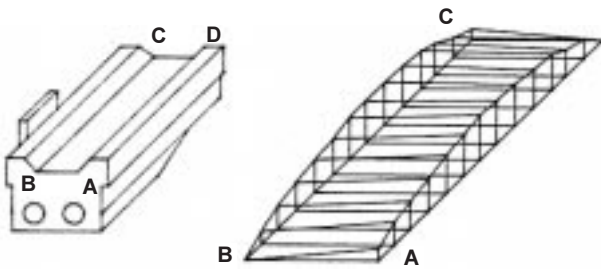
This configuration guarantees that the relation between wheelspindle and the machine table is accurately maintained and creates greater sturdiness, reducing any flexing stress.

Friction and wear will be also reduced. Positional control and sensitivity is heightened.



**SPECIFICHE DI RASCHIETTATURA TRAVERSA
MACCHINA "MB 130"
SPECIFICATION OF SCRAPING OF THE CROSSRAIL
MACHINE "MB 130"**

D



B +0,0 +2.7 +5.2 +7.0 +8.6 +10.8 +11.3 +11.6 +10.8 +10.3 +8.1 +5.8 +2.3 C
A +2.3 +5.1 +6.8 +8.3 +9.5 +10.5 +11.0 +11.0 +10.7 +10.0 +8.7 +6.5 +3.8 D

VALORE DI RIFERIMENTO : 11.6 Micron
REFERENCE VALUE : 11.6 Micron

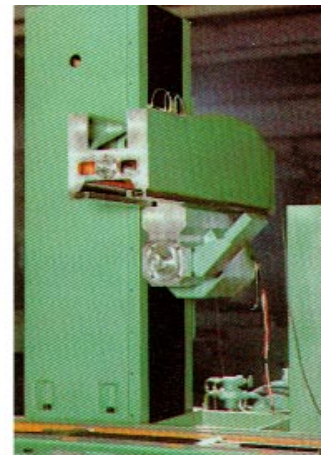
**NB: LA TENDENZA DELLA RASCHIETTATURA DEVE
ESSERE SEMPRE CONVESSA E MAI CONCAVA**

**NB: SCRAPING TENDENCY MUST BE ALWAYS CONVEX
AND NEVER CONCAVE**

Wheelhead support with anti-friction coated slideways and recirculating ball screw for the transverse motion.

Adjustment by bronze-made opposed tapered gibs.

The flatness chart highlights the optimal shape of guideways, obtained through hand-scraping.



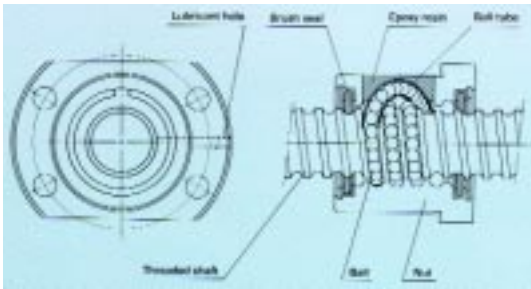
Cross slide mounted on vertical slide with slideways for the displacement of the motor head in a transverse direction.



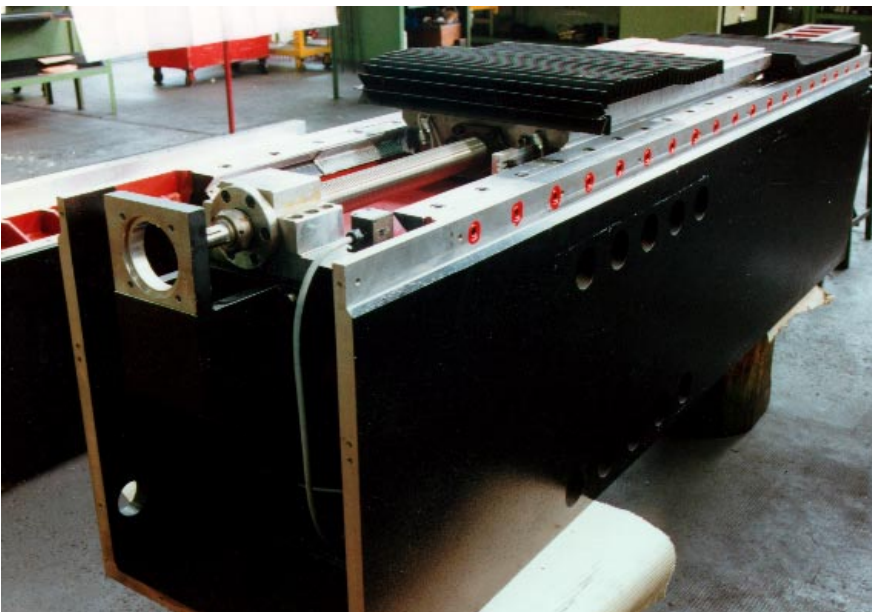
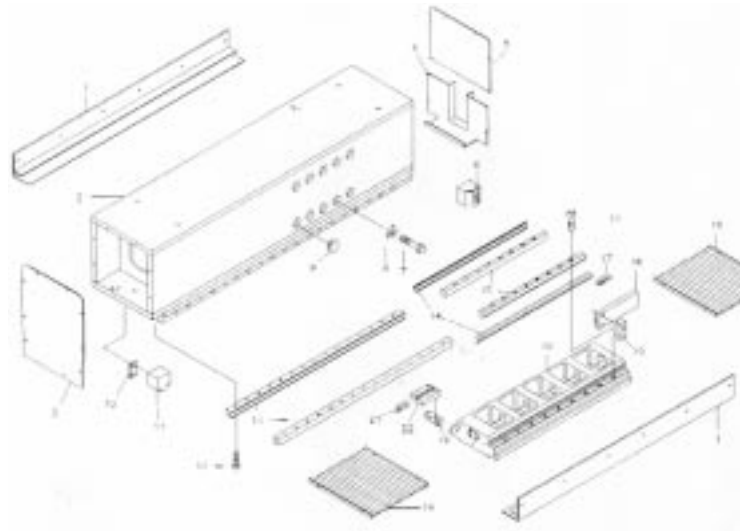
The newly designed FAVRETTO Cross slide specially suitable for high efficiency requirements and closest tolerances.



Cross slide mounted on vertical slide with pre-loaded pins slideways for the displacement of motor head in a transverse direction.

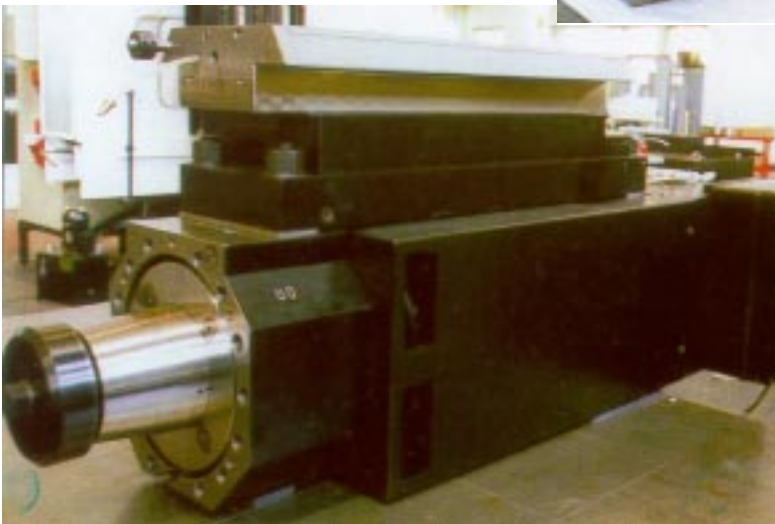


The cross axis is provided with precision-group ballscrew, with double preloaded screw-nuts.



WHEELHEAD

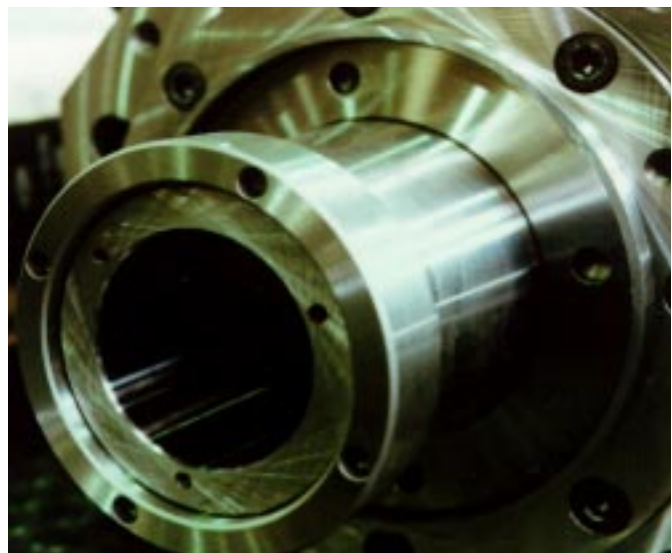
The grinding wheel spindle is made of hardened and ground steel and mounted with a series of high precision preloaded and grease-lubricated ball bearings on the both sides.



Self-cooling by electric fan, or by automatic cooling equipment.

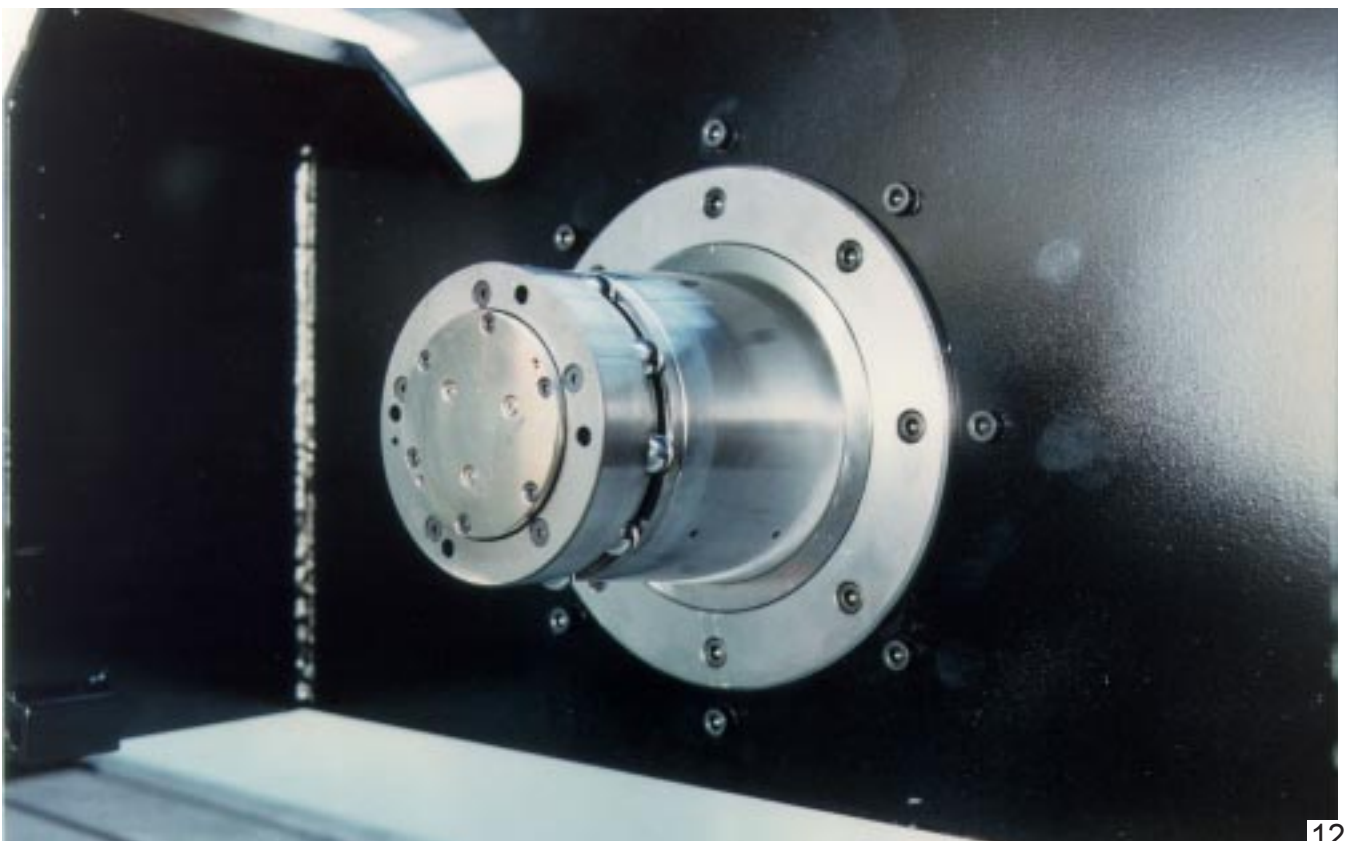
The grinding spindle bearings are protected against soaking-in coolant by means of compressed-air, so that high coolant pressure to the coolant and cleaner nozzles can be applied.

Spindle nose designed for internal assembly of automatic balancing head.

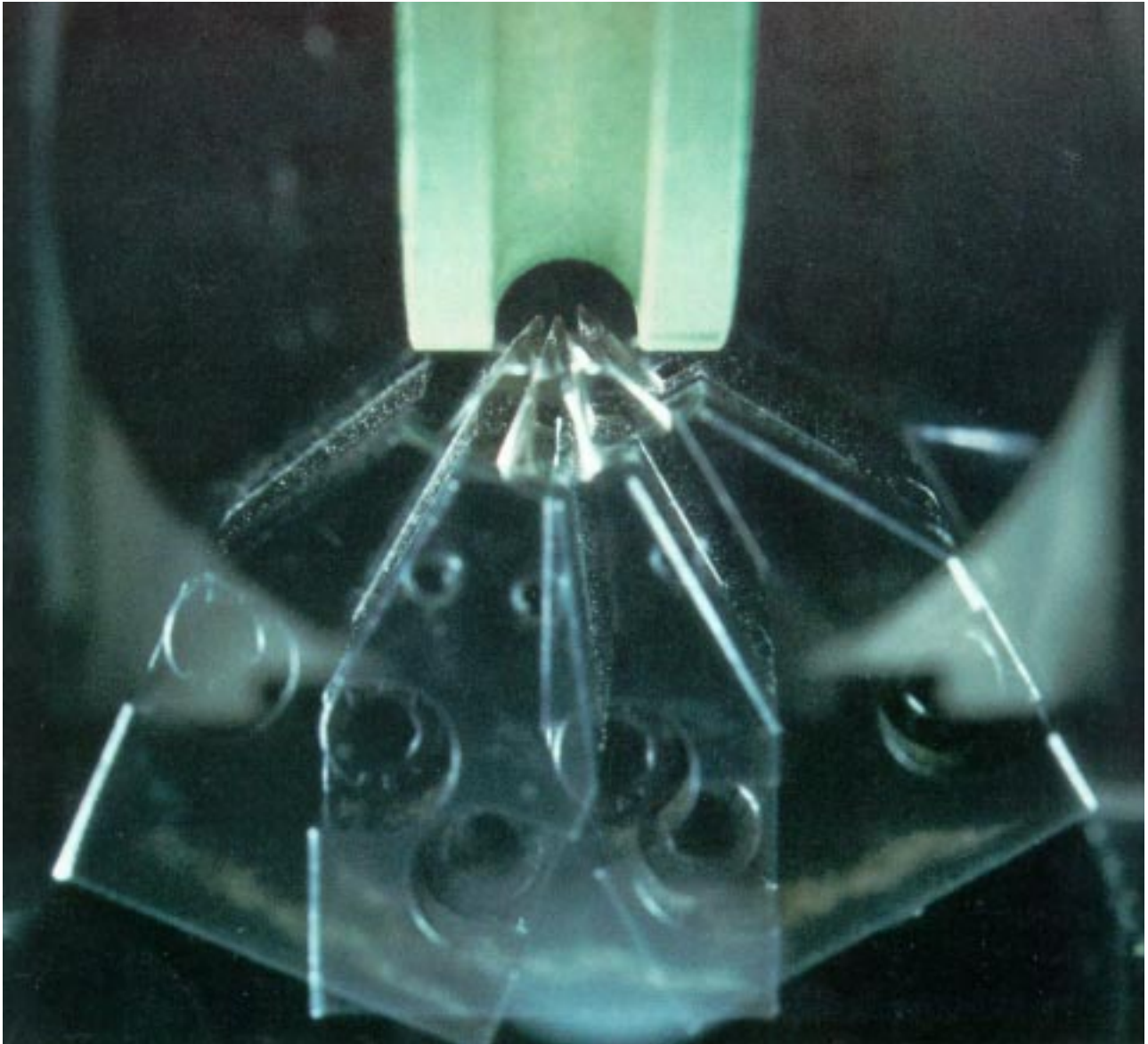




Quick clamping-unclamping of the grinding wheel (during its substitution), operated by a mechanical, hydraulic system, through push buttons, operator controlled.



FAVRETTO WHEEL DRESSING TECHNOLOGY



Experience in the design and manufacture of special profile grinding machines has enabled FAVRETTO to offer fully automatic grinding cycles, with compensation, by means of control units with the widest programming flexibility.

Selection of the type of system best suited for individual requirements, depends on the type of profiles normally employed.

HEAD MOUNTED WHEEL DRESSING SYSTEMS

Semi-E and Automatic machines (option)

Wheeldressing attachment located on cross rail.

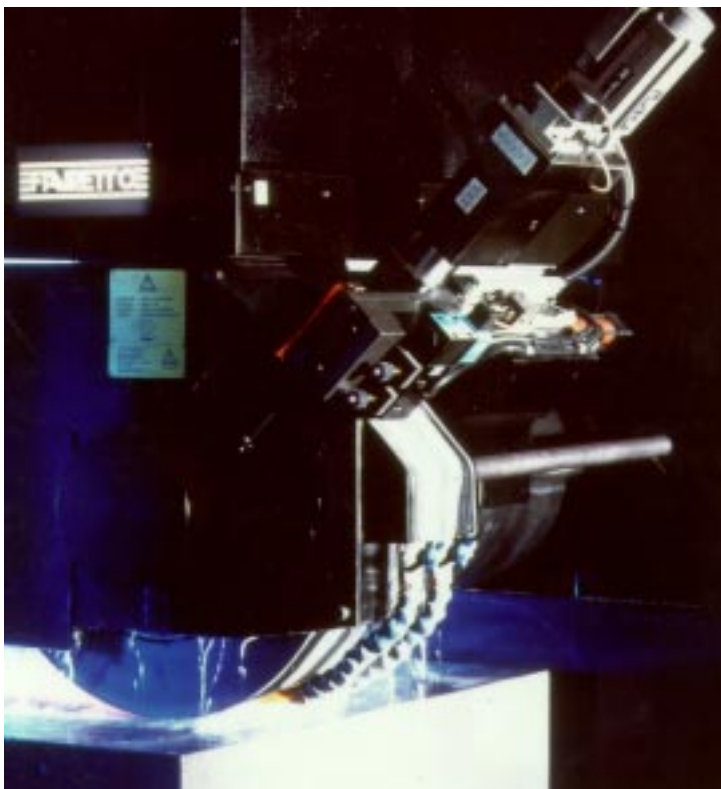
Automatic wheeldressing increments, within a closed loop system by speedometer dynamo, A.C. Brushless motor and encoder. Wheeldressing by means of wheel head transversal displacements as to the diamond.

Automatic dressing intervention and wheel wear compensation.



Semi-E and Automatic machines (option)

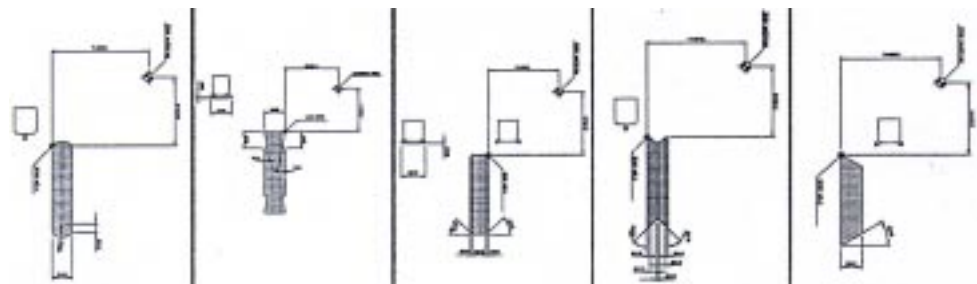
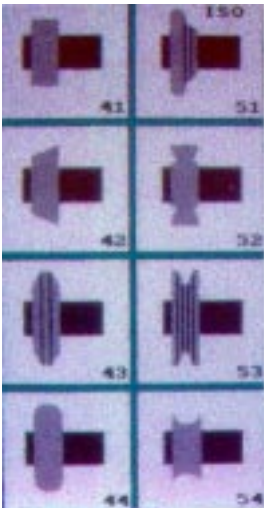
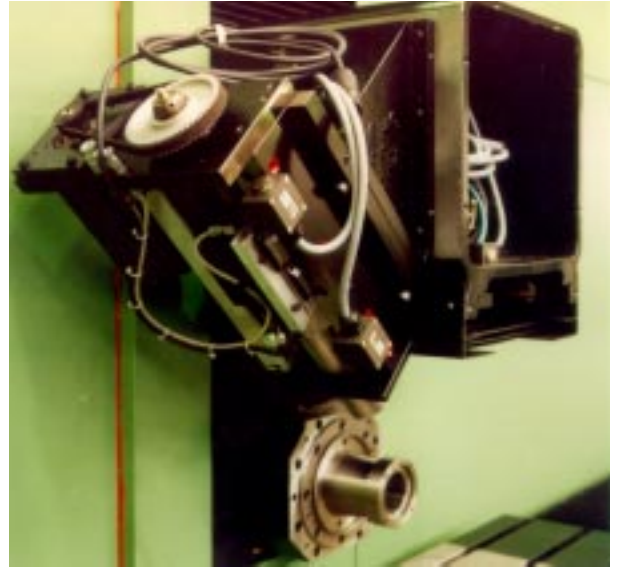
The straight-line wheeldressing attachment is located on motor head and sliding with same. Wheeldressing linear movements are controlled by means of hydraulic cylinder.



Two differential programmable speed ranges are controlled by manual knobs. (roughing finishing) Automatic wheeldressing increments, within a closed loop system by speedometer dynamo, A.C. Brushless motor and encoder. Automatic dressing intervention and wheel wear compensation.

CNC machines (option)

Wheeldressing by means of wheelhead transversal displacements with respect to the diamond and with differential speed programmable for roughing and finishing. Wheel profiling through linear and circular interpolation of wheeldresser and transversal axes within a closed loop system by speedometer dynamo, A.C. Brushless servo motor and high quality linear scales.



In single piece production and in tool manufacturing, simple operation and programming are requested. Dressing cycles to be called via soft keys are shown graphically in the above list. These are some example of our standard dressing systems.



CNC machines (options)

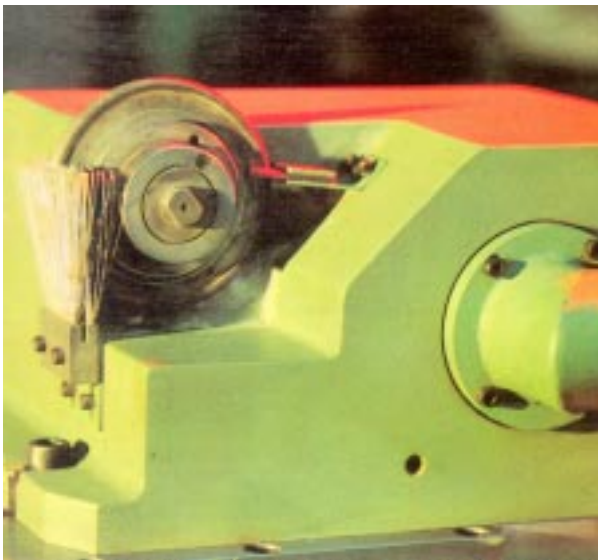
Head-mounted profile dressing with diamond profile rolls in a plunging operation.

This can be employed in "creep feed" grinding with "in process" C.D. system (grinding with Continuous Dressing) for high stock removal rates for difficult-to-cut materials.

This system is located near the wheel head, close to the grinding wheel, to allow dressing cycles to be performed more effectively.

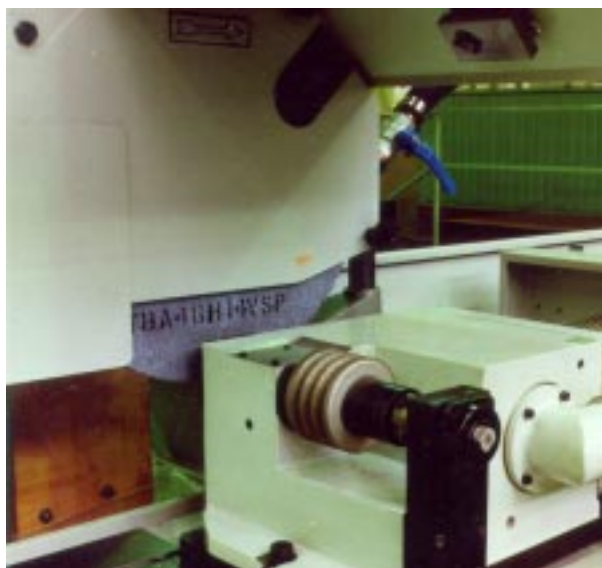
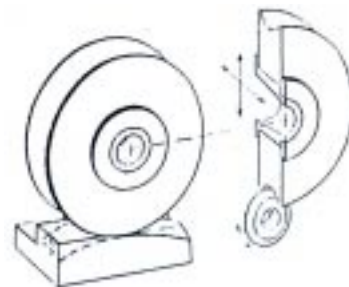
TABLE MOUNTED DRESSING SYSTEMS

Dressing from the machine table assures reliable compensation of external thermal influences, as both the workpiece and diamond are clamped onto the same reference surface. This is the only way to reach the extremely high dimensional precision of the workpiece. Systematic matching of machine design, electronics and dressing technology result in the reproducibility of the very complex dressing operation and, as a consequence, permit planned and automated working procedure. This is the reason why, FAVRETTO as well as head mounted systems has developed and tested table mounted dressing units.



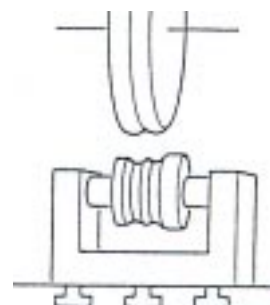
CNC machines (option)

Continuous-path controlled dressing with universal diamond form rolls. By appropriate combining of asymmetrical diamond rolls, nearly all profiles can be generated. These diamond rolls are available with tip-angles of at least 20° (depending on the make) and a min. tip-radius of 0.3 mm (in special version 0.2 mm too).



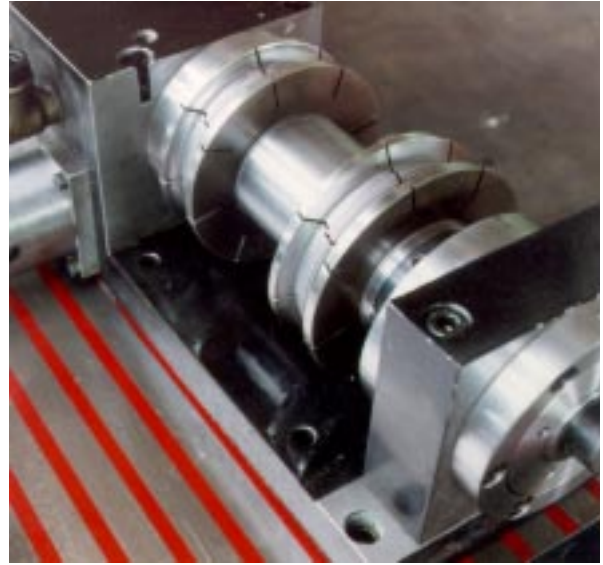
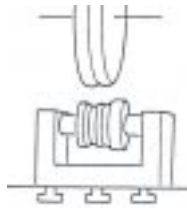
CNC machines (option)

Profile dressing with diamond profile rolls in a plugging operation leads to short dressing times and long edge life of the wheel.



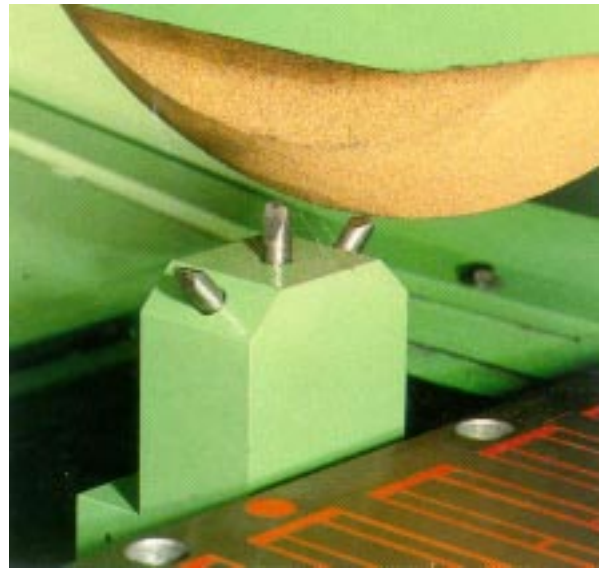
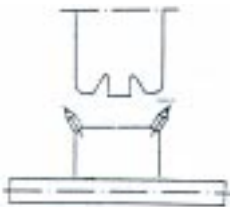
All versions (option)

Profile dressing by crushing operation with steel or carbide rolls leads to short dressing times. The unit is complete with 2 rolls, one of which runs free and the other one is provided with its own hydraulic drive system. Both roll sleeves are mounted on pre-loaded spindle ball bearings. Max. diam. mm 150, bore mm 52, width mm 102 (Wider sizes on special execution). The unit includes a special device for driving the wheel spindle at very low speed with hydraulic motor and reduction unit providing adequate torque.



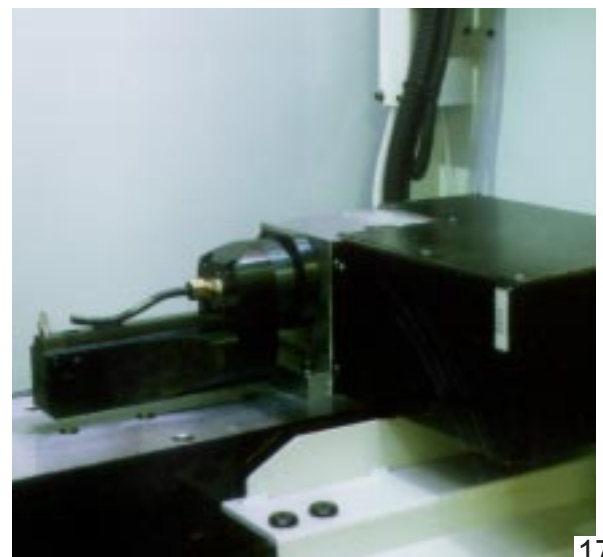
CNC machines (standard)

Dressing with universal dressing attachment. This dressing unit is used for calibrating and relief cutting with diamond blades and profile dressing with ground diamond chisels. This kind of dressing system uses the same profiles as previously described and can be called via soft key from the existing list.



CNC machines (options)

Continuous-path controlled dressing with swivelable dressing diamonds. Location of the ground diamond chisels in the swivel center permits a maximum of flexibility as to the profile form. The unit is mounted on the table and has fully independent rotating movements controlled within closed loop system by speedometer dynamo, A.C. Brushless motor and encoder.

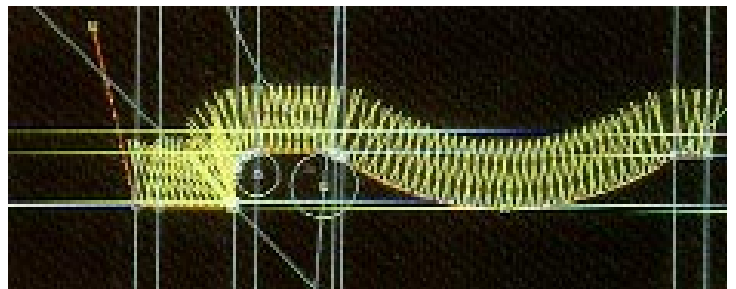
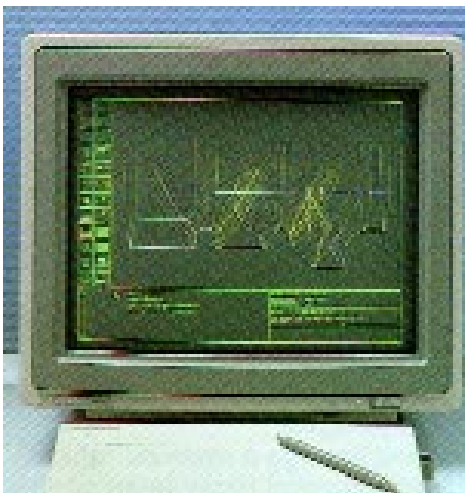




CNC machines (option) Easy Mechanical work, Interactive graphic system supplied with the profiling dressing unit previously described.

Wheel geometry definition through macro instructions given by images.

Dressing cycles definition with automatic optimization of the grinding path and clearance of wheel-diamond incidence angle for the forming and profiling phases.



Wheel profile result and relevant ground workpieces.

Part-program written in ISO format and transferred to the control unit by means of serial port.



```
%SPF 850
(Profile for PEUGEOT)
G16 Y Z
G G90 Y0 Z0 G42
G62 G1 G91 Y-1.9 Z-0.335
G62 G1 G91 Y-0.043 Z-0.185 C0.6
G62 G1 G91 Y-1.221 Z-1.27
G62 G1 G91 Y-2.177 Z-0.926 C3.02
G62 G1 G91 Y-2.64 Z-0
G62 G1 G91 Y-2.177 Z-0.926 C3.02
G62 G1 G91 Y-1.221 Z-1.27
G62 G3 G91 Y-0.433 Z0.185 C0.6
G62 G1 G91 Y-0.08 Z0
G62 G3 G91 Y-0.433 Z-0.185 C0.6
G62 G1 G91 Y-1.305 Z-1.363
G62 G2 G91 Y-4.358 Z-0.006 C3.02
G0 G90 Y0 Z0
M17
```

