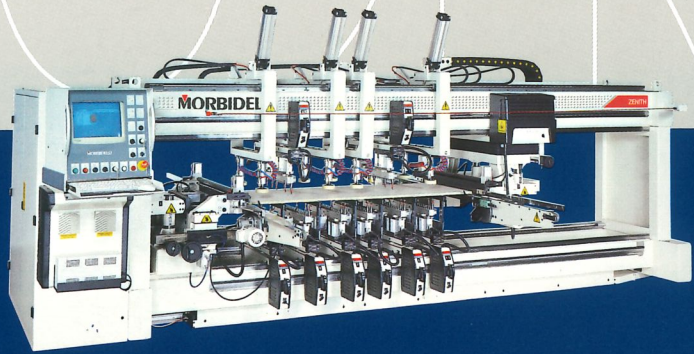
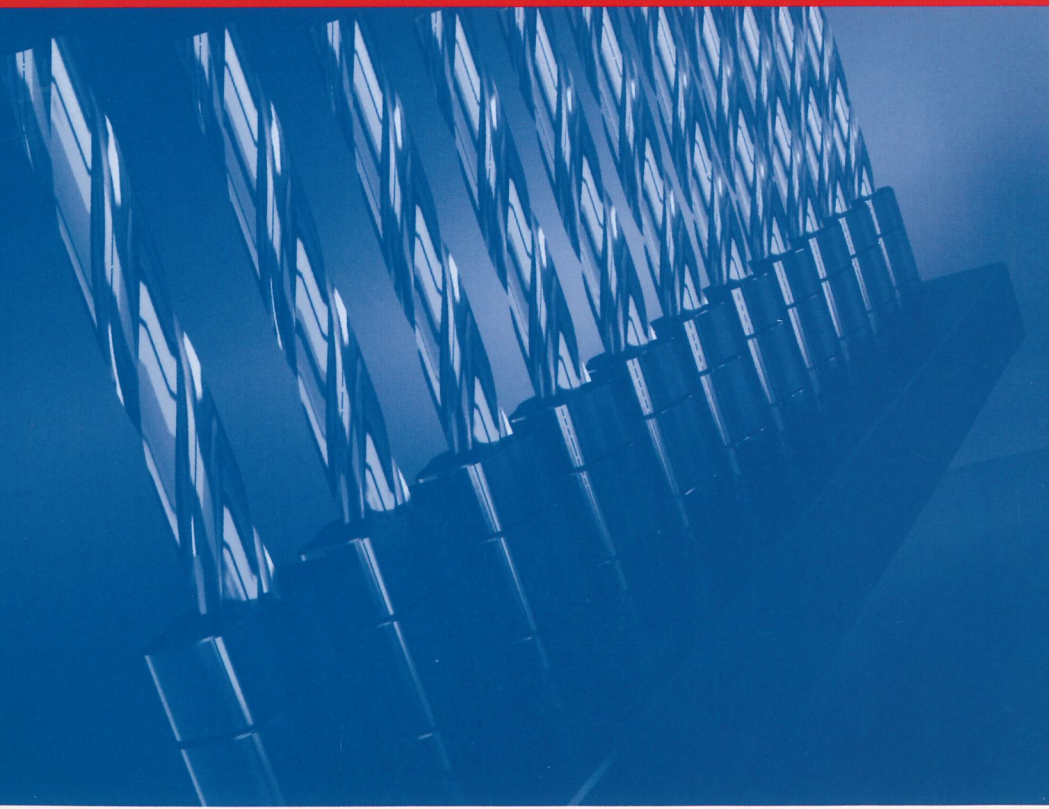


# WORK



Hi-tech throughfeed boring machine

Zenith A · Zenith · Zenith CDM

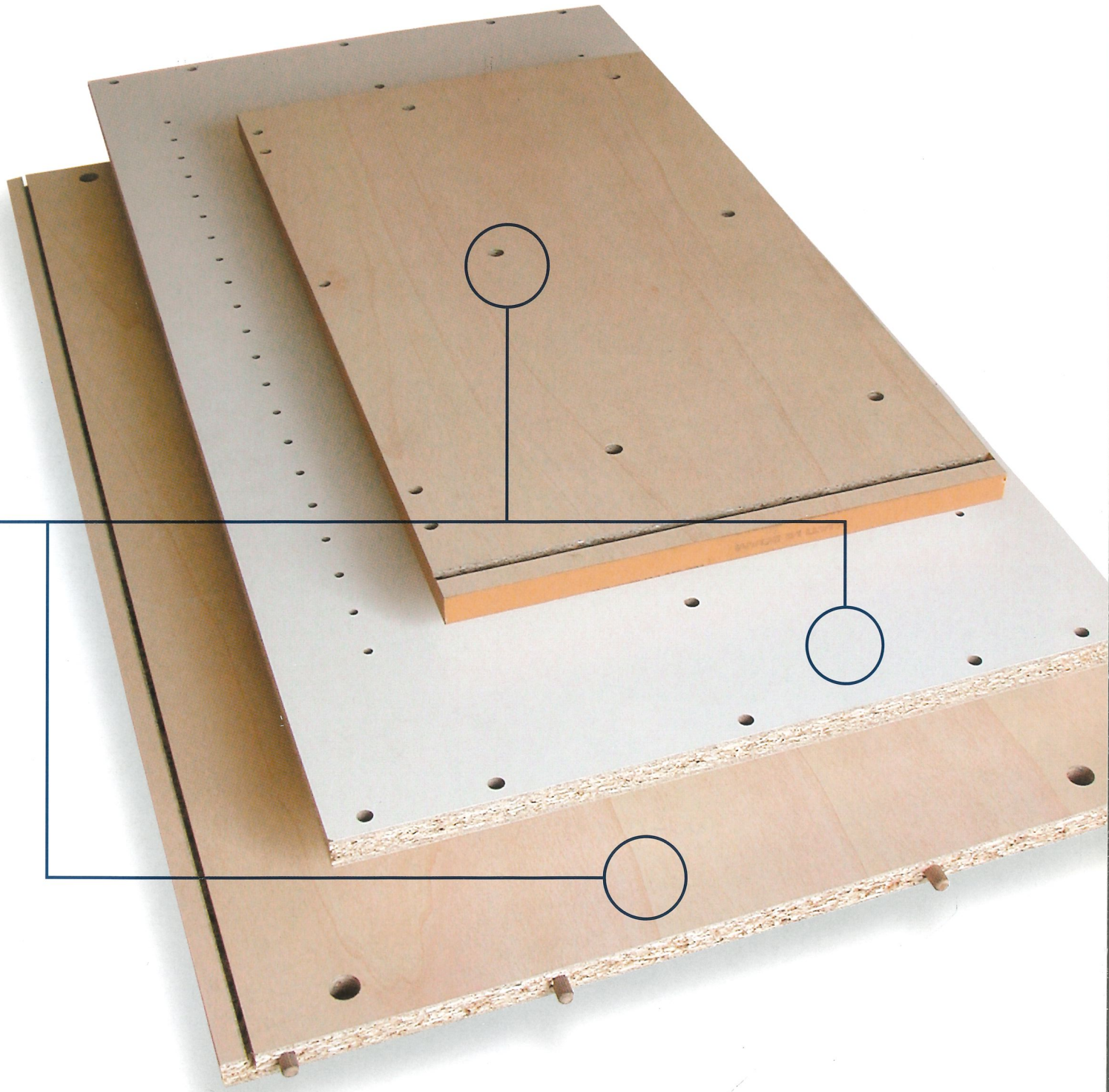


**MORBIDELLI**



if aiming at these results...



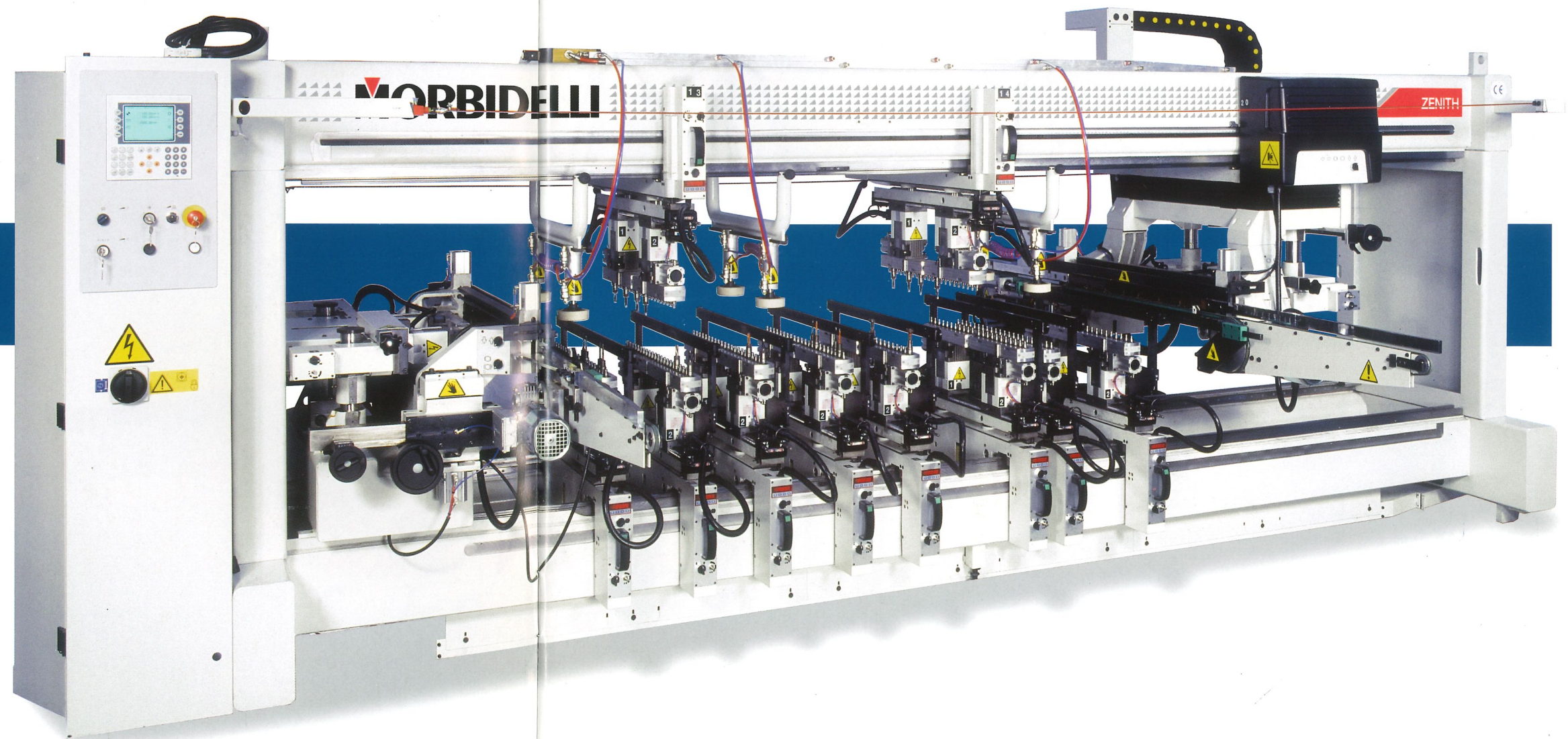




...Easy of use and boring precision

# Zenith A

- **Strength and reliability** guaranteed by a steel frame with double-beam at both the top and bottom
- **High productivity**, with working cycles of up to 28 panels per minute
- **Flexibility of use never seen before**, achieved by the elimination of machine down times
- **Unequalled boring precision** achieved by the new one-piece structure of the heads and by the rigidity of the sliding supports for the machining units.
- **Absolute precision in positioning** the units by means of a reading system providing digital display of the values



- **Easy tooling up** due to ergonomic design of the devices
- **Quick and simple use** by means of the dedicated governing unit

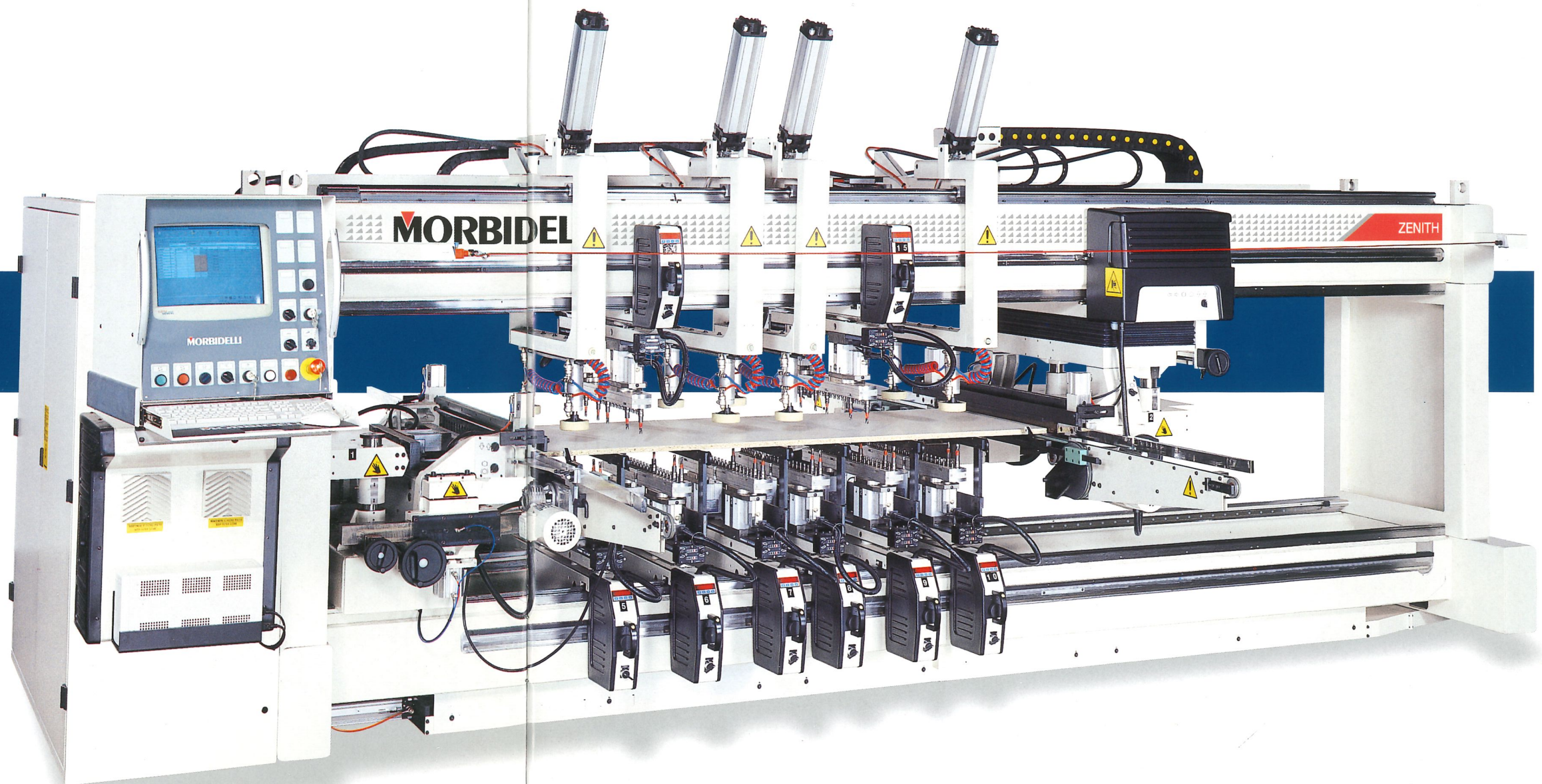


...Boring precision at the service of productivity

- **Strength and reliability** guaranteed by a steel frame with double-beam at both the top and bottom
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- **Absolute precision in positioning** the units by means of a reading system providing digital display of the values

- **Excellent boring quality** due to bits advancing along the Z axis driven by brushless motors and with electronic control.
- **Easy tooling up** due to ergonomic design of the devices
- **Quick and simple use** by means of the dedicated governing unit

# Zenith Zenith CDM





# Superior technology, productivity and reliability

The objective that Morbidelli set itself with the new **Zenith** was that of **reducing all unproductive stages to the absolute minimum**, the cause of higher production unit costs. Mere improvement of the machine tooling up procedure was not thought enough to reach this objective, it was considered indispensable to intervene in a general context too, in order to **overcome old concepts regarding line boring machines** that force the customer to carry out checks on the first panels produced.

If the first step was that of **eliminating machine down times** and to aid the operator in the tooling up operation, the next step was to understand that in order for these solutions to truly translate into **economic advantages**, it was necessary to offer **unequaled boring precision**. It would in fact be a pointless exercise to cut down tooling

up time only to then lose precious minutes in checking the accuracy of the holes on the first panels and then subsequently carry out modifications to the machining unit positions.

**The frame architecture, the new one-piece structure of the heads, the boring units' resistance to stress and the very precise and technologically advanced system of measurement readings** have endowed Zenith with that precision which, combined with speedy setting up operations, allows the customer to proceed with production in series with no more restrictions and to achieve **much higher productivity levels** compared to traditional systems.





# Repeatability and precision beyond all standards

In recent years the choices of furniture makers have also been made on the basis of statistic coefficients which can numerically certify a machine's precision characteristics and aid assembly of the parts that make up the furniture.

Very often the companies themselves ask the manufacturer before purchasing for data regarding the machine's boring capabilities.

The repeatability of boring is demonstrated

by the CM parameter (Machine Capability - the index of variance from the average value, calculated on the basis of a series of bored panels), which is universally considered very significant by both manufacturers and customers.

The CM parameter is obtained by comparing the maximum admissible tolerance, as set by the customer, to the actual variance index of the values measured on the batch of panels tested.

$$CM = \frac{\text{Maximum admissible tolerance}}{\text{Variance index}}$$

For state-of-the-art boring machines the value is  $CM=1$  (with a tolerance around  $\pm 0.2$  mm) and this is an excellent result. **Zenith exceeds this benchmark.**

The operational tests carried out on Zenith, shown in table, brought to light some amazing results.

The data refer to measurements of 12 holes repeated on 30 panels; the final value is obtained by taking the average of the individual CM values for each hole, with a tolerance fixed at  $\pm 0.2$  mm.

The table gives different CM values depending on the statistic sample tested.

## Average CM values for Zenith

Statistic sample tested	90%	80%	70%
CM	2,2	2,9	3,5

The guarantee of a much higher boring repeatability parameter than otherwise currently available on the market makes Zenith the number one choice for your company.



# Sturdiness and rigidity above all else

The technical innovations incorporated into Zenith mean that unprecedented performance can be achieved in terms of **panel finish quality, boring precision and repeatability of boring patterns.**

The structure comprises a steel frame welded and ribbed to absorb the maximum amount of stresses which can occur during machining.

A **double beam**, both at the top and the bottom of the machine, serves as the support base for the operating units along which they slide.

Movements of the vertical units along the X axis are taken care of by means of **recirculating ball pads and THK prismatic guides.**

These elements ensure high precision and ease of movement along the X axis.

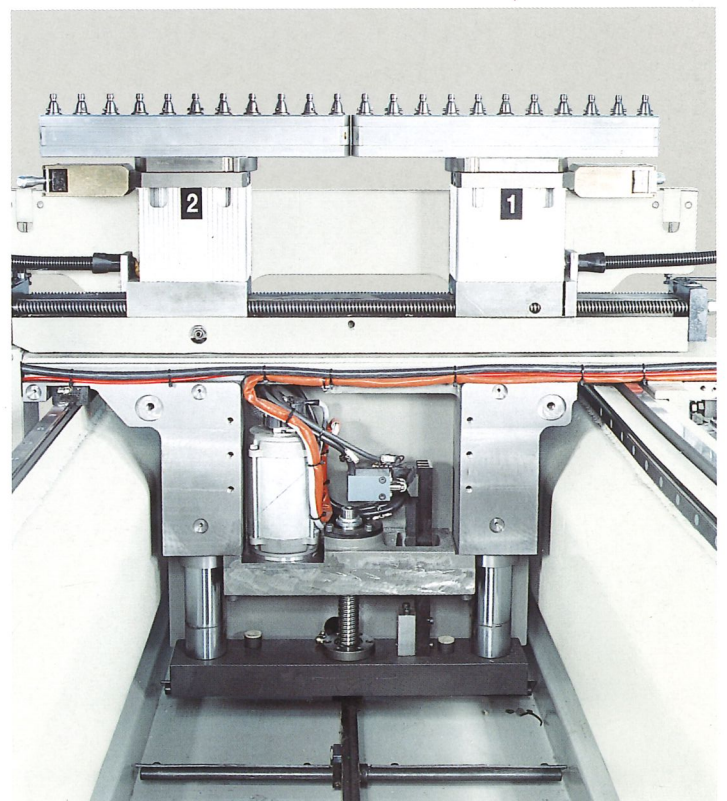
The frame has been designed and sized to accommodate in the parking area those units which are not being used in the machining cycle.



Double beam  
frame and THK  
guides

The distance of 700 mm between the two lower/upper beams ensures **maximum stability and rigidity**, as it allows the centre of gravity of the boring thrust to be contained within the guides, even with bits positioned at the ends of the heads. **This same boring precision is guaranteed in any situation.**

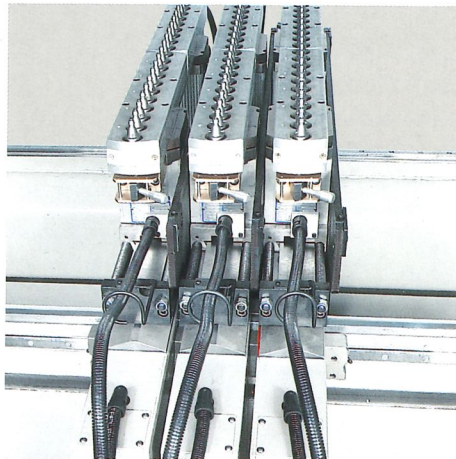
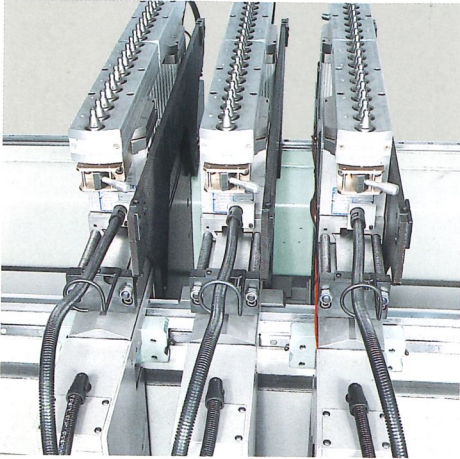
By the clever use of compact motors driven by an inverter, the distance between the guides and the working table is very confined, in such a way as to **reduce to the minimum those flexion** which can be the cause of imprecision.





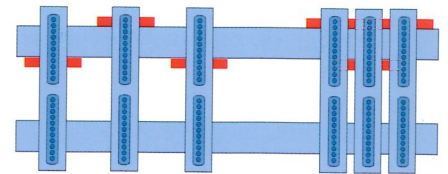
# Zenith A · Zenith · Zenith CDM

## Side-by-side stacking system



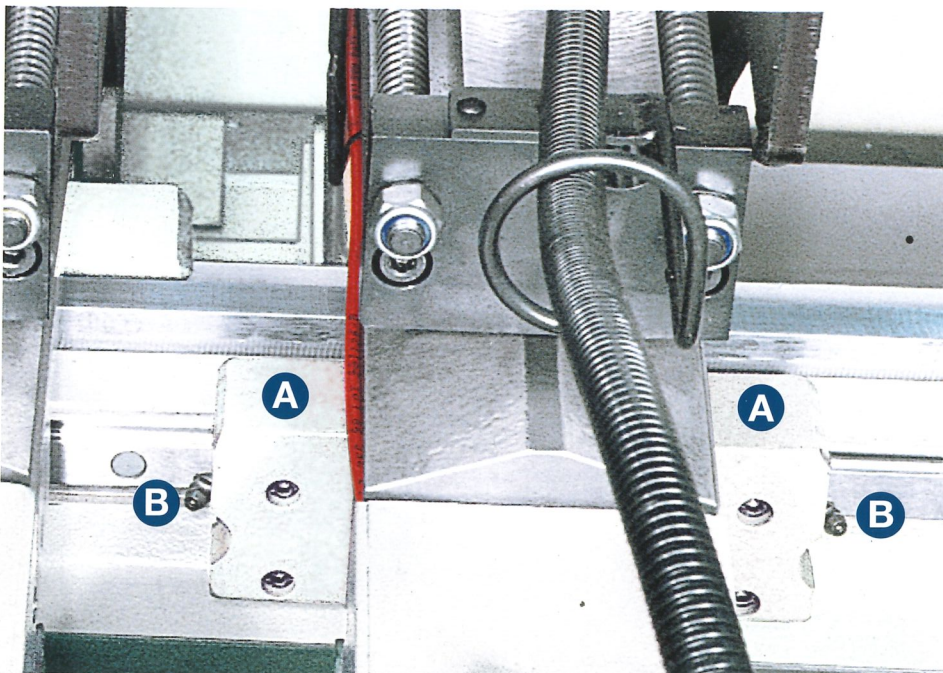
The size and construction of the pads ensure the units are **perfectly balanced**. The supports, sliding alternatively along the two THK guides fitted on either side of the beam **overlap** each other, allowing the units to be stacked side-by-side as little as 96mm apart.

This feature has allowed the support sizes to be increased to **180 mm**, so that a **double pad** can be used. The advantage of this system is that a **base and sliding area** can be achieved **up to three times greater** than seen on traditional systems.



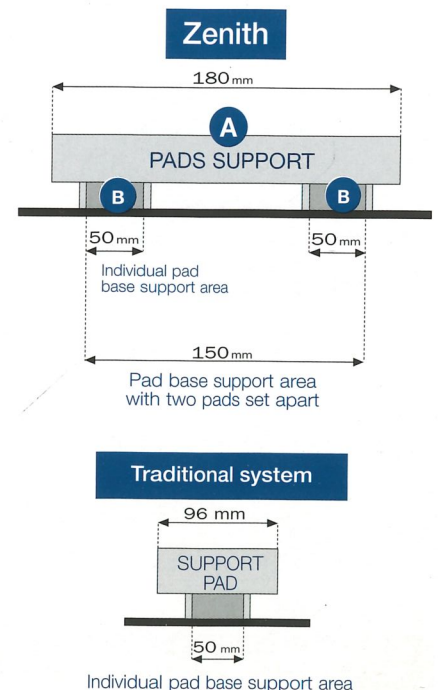
This gives Zenith more precise squareness between the X – Z and X – Y planes and absolute rigidity of the whole operating unit / frame assembly, even under conditions producing considerable stresses.

## Comparison of the system used on Zenith and a traditional system



**A** Supporto

**B** Pattini

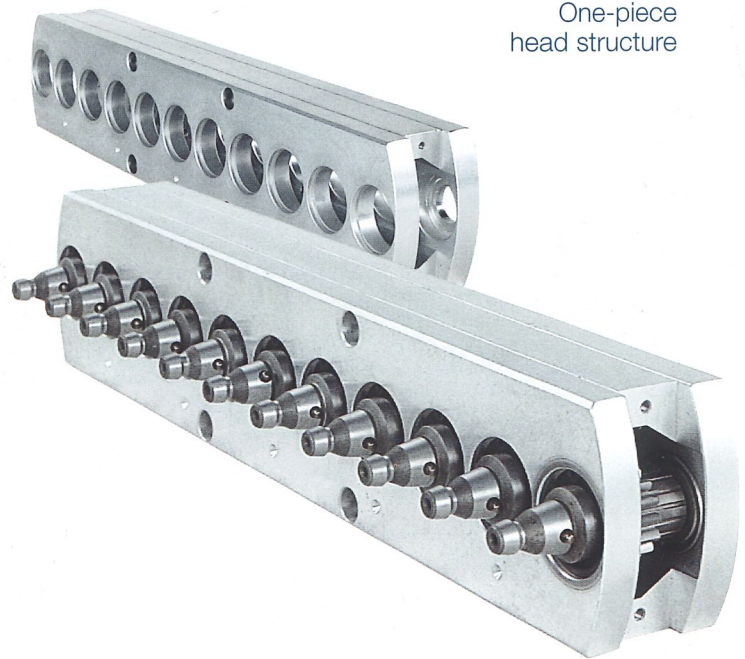




# Incomparable boring precision

The boring units are equipped with **new heads** with a **one-piece structure**. The heads are made from a single aluminium extrusion allowing the bearing housings to be formed in a single operation and the moving parts assembled without having to dismantle the structure. The advantage of this design is **perfect alignment between spindles** and absolute perpendicularity between the spindles and the head. This has led to **up to five times more precision** compared to traditional head structures (obtained by two units operating separately which are then combined).

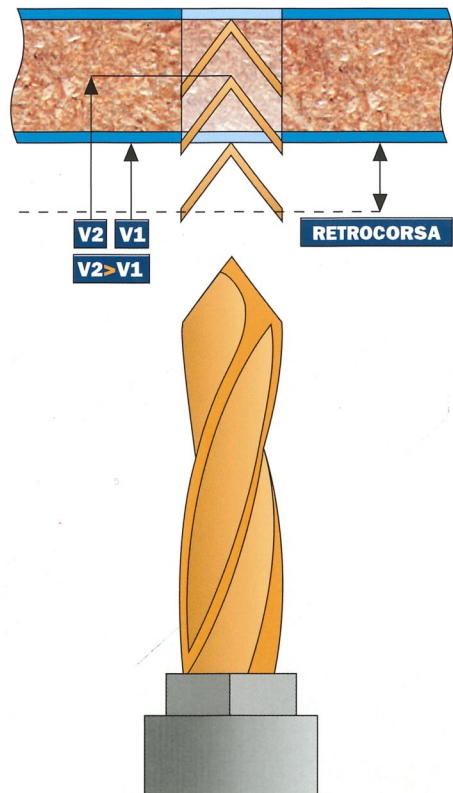
Maintenance procedures benefit from this new design too: thanks to the use of removable lateral side elements, cleaning and greasing operations are much quicker and efficient now.



The operating units are fitted with **coaxial spindle motors** and rotational movement is transmitted directly to the head, avoiding the need for any transmission mechanisms which absorb power and are subject to wear.

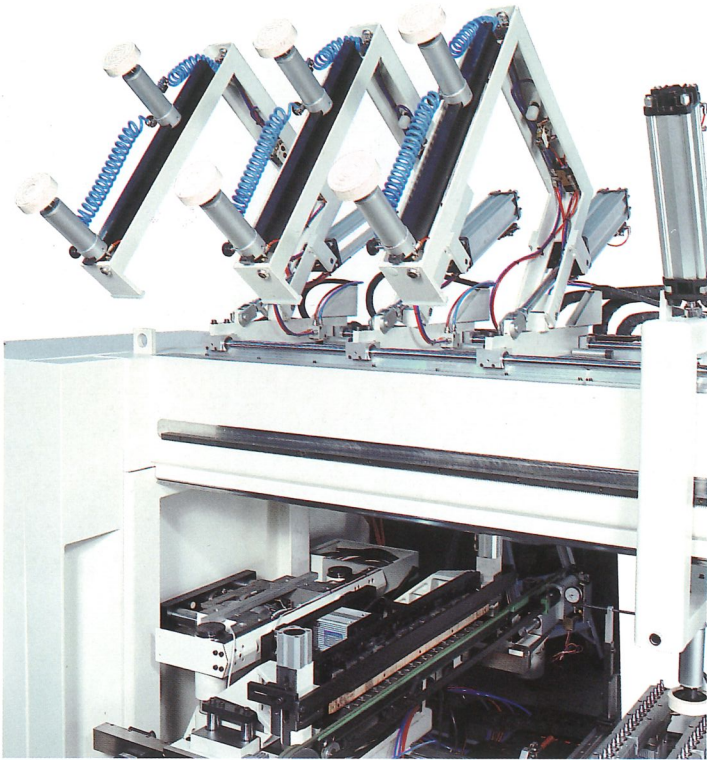
An **inverter** controls the power emitted from the motors to obtain a uniform rotational speed under any conditions.

The units' movement along the **Z axis is governed by the control unit**, which can be used not only to vary the spindle entry speed on the panels in relation to the cross panel and exit speeds, but also to govern the return path of the units to position the bits at the minimum distance from the panel. These features **simplify** drastically the complex control operations of the vertical stroke for through holes and offer **superior quality boring in quicker machining times**.





## Quick and precise re-tooling up



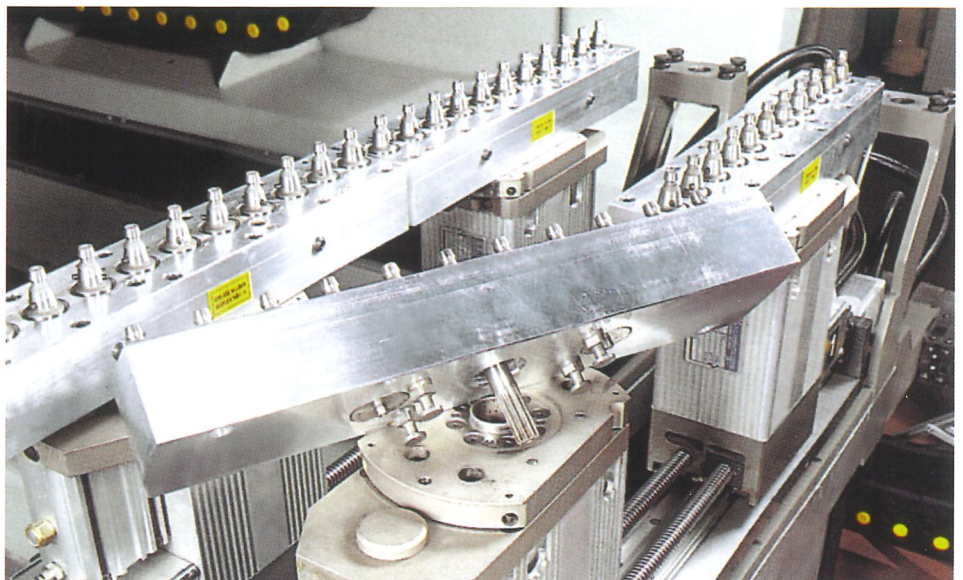
The technological features incorporated in Zenith allow levels of flexibility previously unheard of to be reached due to much quicker and practical setting up operations.

All setting up operations can be carried out from the front of the machine, making things easier for the operator while saving time.

By means of a pneumatic system activated by ergonomically located push-buttons, the **top clamps** can be raised to the top of the beam, leaving the **machine completely open** for all tooling up operations.

Zenith can be equipped with **special Q.R.H boring heads** (Quick Release Head-patent pending Morbidelli - opt.). In this way the heads can be **tooled up in advance** away from the machine while it is running and **subsequently fitted to the units**, with obvious benefits in terms of reducing machine down times that translate into increased productivity. The boring units are fitted with a new device which allows **90° head rotation**.

An **inverter** controls the **conveyor speed** according to the size, type and weight of the panels, optimising the machining cycle in any situation.





## Digital displays: value readouts with no room for error

- A Digital display
- B Release button
- C X axis adjustment knob
- D Drag handle



The positioning values for the boring units are shown to the operator on digital displays, making setting up procedures easier and more accurate. Positions are read by an **absolute magnetic** band fitted to the beam; this device, avoiding the need for transmissions, allows **perfect correlation** between the unit positions and the values shown on the display **with no room for error**. The absolute nature of this readout system means that **the positions set are kept even when the machine has been turned off**; when machining resumes it is therefore no longer necessary to carry out all those laborious and unproductive checks on the first panel.

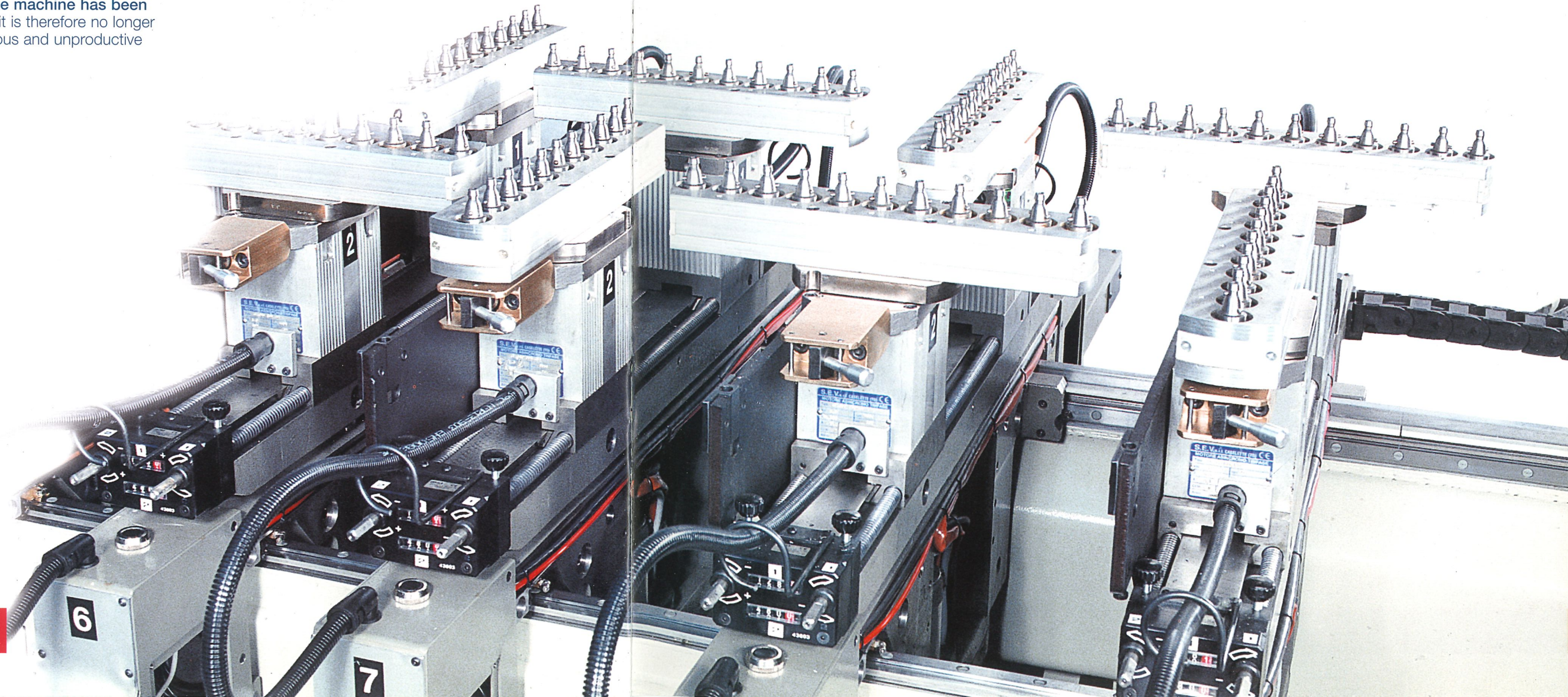
## Zenith CDM. Quick positioning for low-cost production

The **CDM** (Computer Driven Machine) version of Zenith boasts a **computerised positioning system**; this feature allows machine set up times to be cut even further, simplifying and speeding up positioning operations of vertical units along the X axis and heads along the Y axis. Passing from one program to the next, the control unit sends all the displays the positions that differ between the old program and the new one; **all the operator needs do is to move each unit in the direction indicated on the display until the value shown cancels**. In practical terms this means time saved, because the control carries out instantaneously and with no room for error all the calculations (all those necessary to move the units) which would otherwise have to be done by the operator. In addition, the control will not allow the program to start unless the unit is positioned correctly, in this way eliminating all possible errors. Such reliable and quick positioning operations play their part in cutting the unit cost of each panel produced.



THK prismatic guides

**Zenith CDM** incorporates prismatic guides and recirculating ball screws to slide the units along the Y axis; this feature has been introduced to make positioning the boring units easier and more precise.

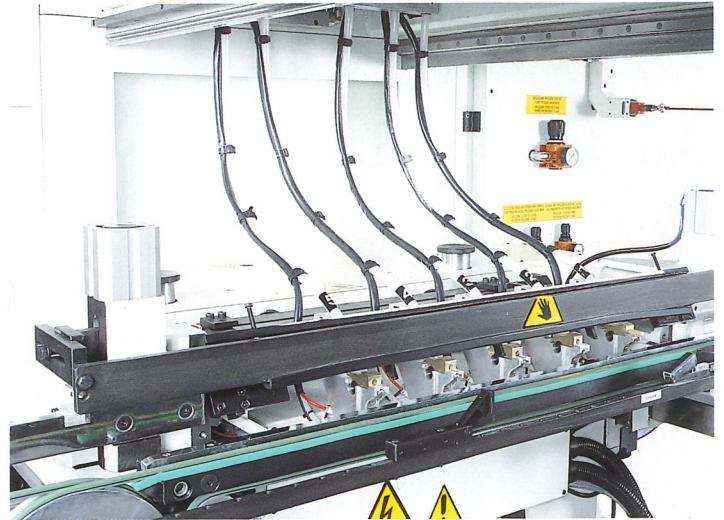




# Dowel gluing unit



For processing strips a system is available which guarantees perfect infeed and outfeed of small size pieces.



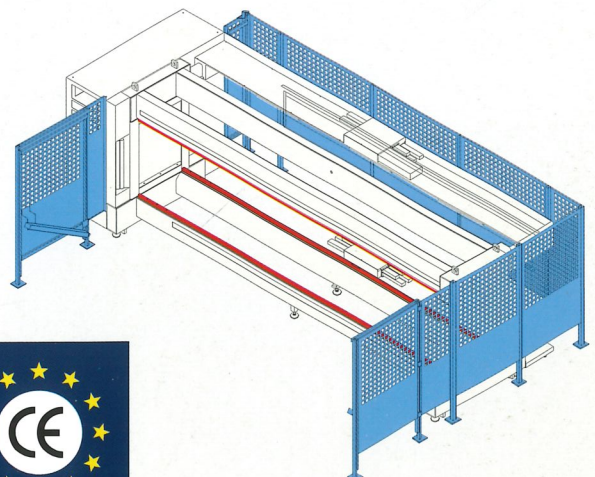
On the dowel gluing version, the machine is equipped with horizontal dowel inserters. These are continuously fed in, by means of a special circuit, from two containers fitted with vibrators to prevent any possibility of dowel jamming. The glue is sprayed by high pressure injectors which ensure maximum distribution; in the stage that immediately follows the dowels, available in diameters from 6 to 12 mm, are pushed into the holes.

## Total safety

The new Zenith is fitted with a **safety system conforming to EC 89/392 standards.**

The machine is protected on all four sides to prevent access while it is running and to safeguard the operator from tool parts or waste material being ejected during machining. At the front of the machine a **photoelectric cell** system immediately stops the cycle when the operator enters the working area

This system ensures **maximum machine access**, without any obstacles to hinder the operator.





# Programming simplicity

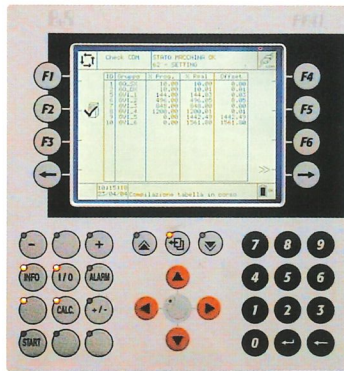


## Software characteristics:

- Guided editor in every programming phase, easy to use for non specialised operators too
- Electronic control of boring depth
- Optimised control of boring feed rate for through holes
- Reverse stroke control
- Electronic tool control (CDM)
- Automatic calibration cycle on start up
- Automatic calibration of motors start and stop (only those required to operate will start)
- Finished workpiece count

## Hardware characteristics

- 2000 MHz Intel Celeron processor or above
- 15" colour monitor
- Keyboard and mouse
- 256 Mb Ram (DDR 266 MHz)
- 40 Gb hard disk
- CD ROM
- Floppy disk
- Sound card
- integrated Intranet card 10/100
- 2 serial ports, 1 parallel port, 1 USB port
- Remote control device for the main functions of the machine
- Modem

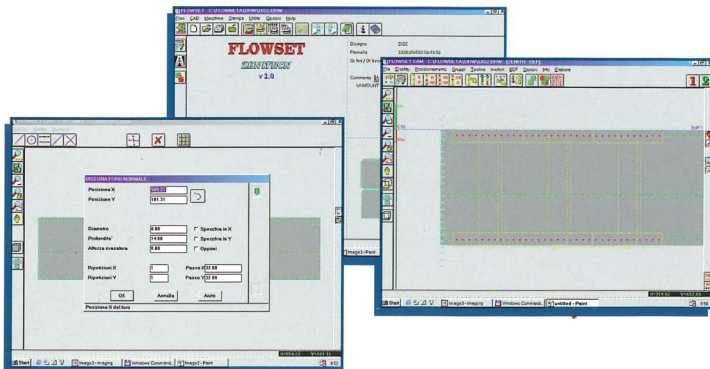


The presence of a dedicated Personal Computer, with a powerful hardware configuration which can be expanded and defined for the specific needs of the individual users, endows the Numerical Control with an incomparable level of user friendliness; the advanced software works under Windows and contains all the potential necessary for simple, efficient and accessible programming.

This solution in addition guarantees limitless opening, allowing all the typical potential of the PC to be used: floppy disk and CD ROM drives, audio card, bar code reader, serial or parallel connection of printer modem, scanner or any other type of peripheral.

In the machining lines, the PC also guarantees perfect dialogue with the other components in the line such as infeed and outfeed systems, edge-banders, etc.

# Flow Set



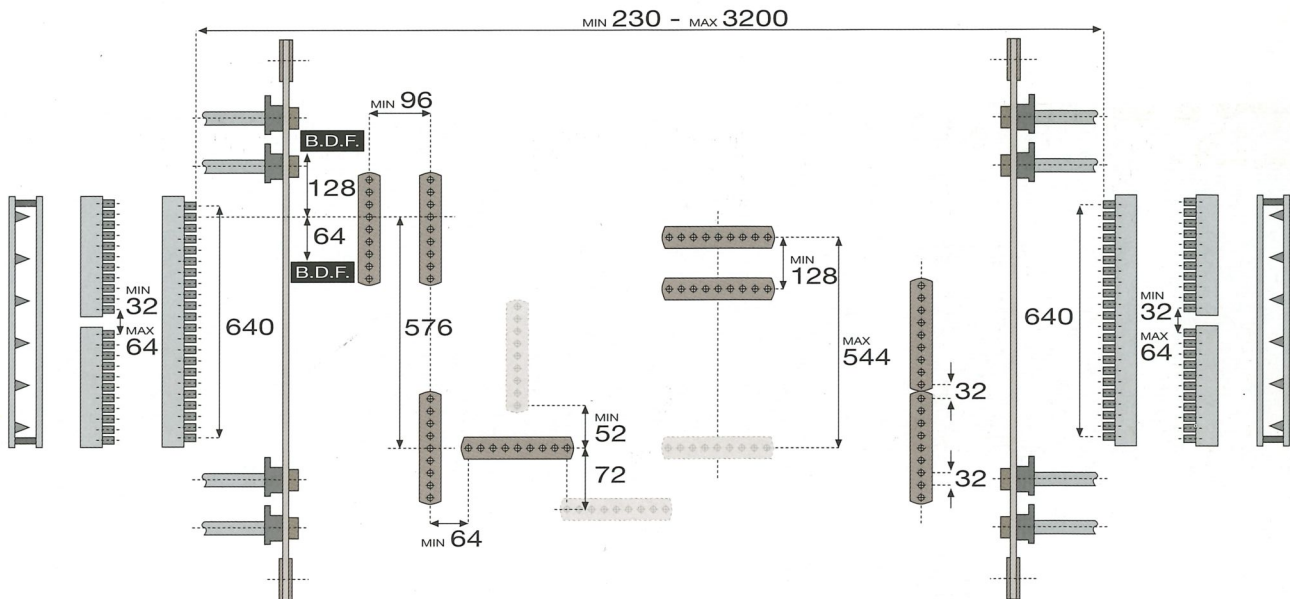
FLOW-SET allows the boring layout to be drawn using CAD and the positions of the units and heads to be automatically configured.

The program is also able to check the feasibility of the boring layout drawn, pointing out any incompatibilities with the machine configuration.

On the PC version of Zenith the positions are transferred to the machine in serial or by floppy disk.



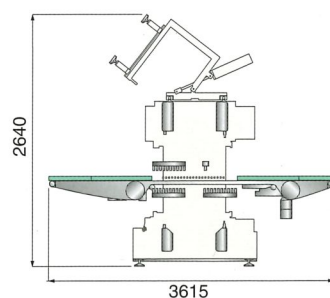
## Working area



## Technical specifications

Panel length (mm)	230/3200	Panel feed motor power (Hp)	0,35
Panel width (mm)	50/800	Panel feed speed at 50 Hz (m/min)	50
Panel thickness (mm)	10/70	Maximum feeder range from side fence (mm)	275
Z axis stroke (mm)	70	Working pressure (bar)	6-7
Height of work table (mm)	900/950(A)	Waste suction air speed (m/sec)	30
Power rating of vertical units (kW)	1,3	Z axis motor power (Hp)	0,85
Min. spacing between vertical heads (mm)	96	Max. boring speed (m/min)	6
Min. distance between parallel heads (mm)	121	Z axis return path adjustment (mm)	40
Max. distance between parallel heads (mm)	544	Boring thrust (N)	4780
Backstop range (mm)	+64/-128	Max. production capacity (panels/min)	26
No. vertical units (max.)	8+4	Weight (kg)	6000
Spindle rotational speed (rpm)	4500		

## Overall dimensions



In this catalogue, machines are shown with options. The firm reserves the right to modify technical specifications without prior notice, provided that such modifications do not affect safety as per E.C. certification.



# Morbidelli: a guarantee of quality, reliability and professionalism since 1959.



Morbidelli has always been synonymous with constant commitment to supply **unique products** of their kind throughout the world.

Those who choose Morbidelli do so for the **reliability and safety** aspects of its machines, for the **quality** of the materials used, for the **technology** which is always the latest available, for the well structured network of after-sales service centres and for the **professional approach** of its employees. Morbidelli means **success is guaranteed**.

SINCERT

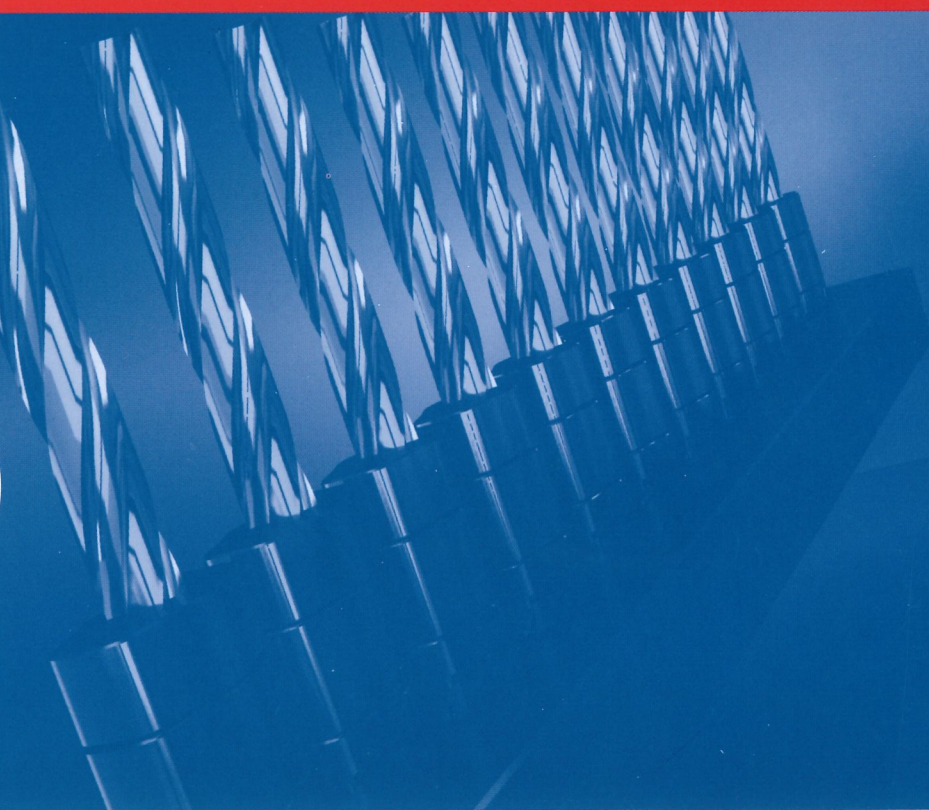


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