



MA 400

Automatic CNC tube rolling work centre

Production

Tube rolling



A winning story since 1961

The Beginning

At the end of the 1950s, Domenico Franco Agostino became the Italian representative of Albert Otto, a German manufacturer of tube expanders. In 1961 Franco Agostino's Albert Otto Italiana was founded and in 1972, after purchasing an area of 10,000 square metres in the municipality of Bagnolo Cremasco, Maus Italia Sas was established.

The Growth

In 1976 his son Stefano, a mechanical engineer, joined the company. Together with his father, he studied products, introduced new machinery onto the market and filed the first patents by Maus Italia. Above all, Stefano was firmly convinced that people are the very heart of a company's success. Therefore, he invested in human capital by valuing people and roles, and he surrounded himself with skilled operators as well as technical, commercial and administrative collaborators. The result was a winning, competent and proactive team.

His daughter Anna - also a mechanical engineer - has been working in the company since 2016, giving new impetus and energy to the business her father and grandfather had built.

Father and daughter work together side by side every day to guarantee the excellence of Maus Italia and support all customers worldwide with competence and passion: the company's distinctive traits.



Stefano Agostino
CEO - Mechanical Engineer

Anna Agostino
COO - Mechanical and Management Engineer



In-house production of each component ***Workshop 4.0 and 24/7 production control***

The production of Maus Italia branded items is entirely carried out in Bagnolo Cremasco, in the heart of an Italian industrial area 30 km southeast of Milan.

The company boasts a 4.0 workshop equipped with state-of-the-art machinery, an in-house heat treatment room and a final inspection department that allow Maus Italia to independently manage every phase of the manufacturing process of its wide range of products whilst maintaining high quality standards.



Quality first. ***Design and development***

One of Maus Italia's strengths is its willingness to understand its customers' needs.

Our technical department is always ready to find operational solutions to the most complex applications, even via feasibility studies. We develop accurate work processes, draw with FEM analyses to verify our mechanical-structural performance and optimise the manufacturing process of each component.

Ready To Deliver

A well-stocked and complete warehouse of finished products enables Maus Italia ship quickly to customers all over the world according to a ready-to-deliver logic.

The warehouse is fully located within our premises in Bagnolo Cremasco at controlled temperatures and conditions to guarantee the maximum safety and quality of Maus Italia products for all our customers.

Quality, environment and safety policy

Research, quality and safety are the watchwords of Maus Italia Spa.

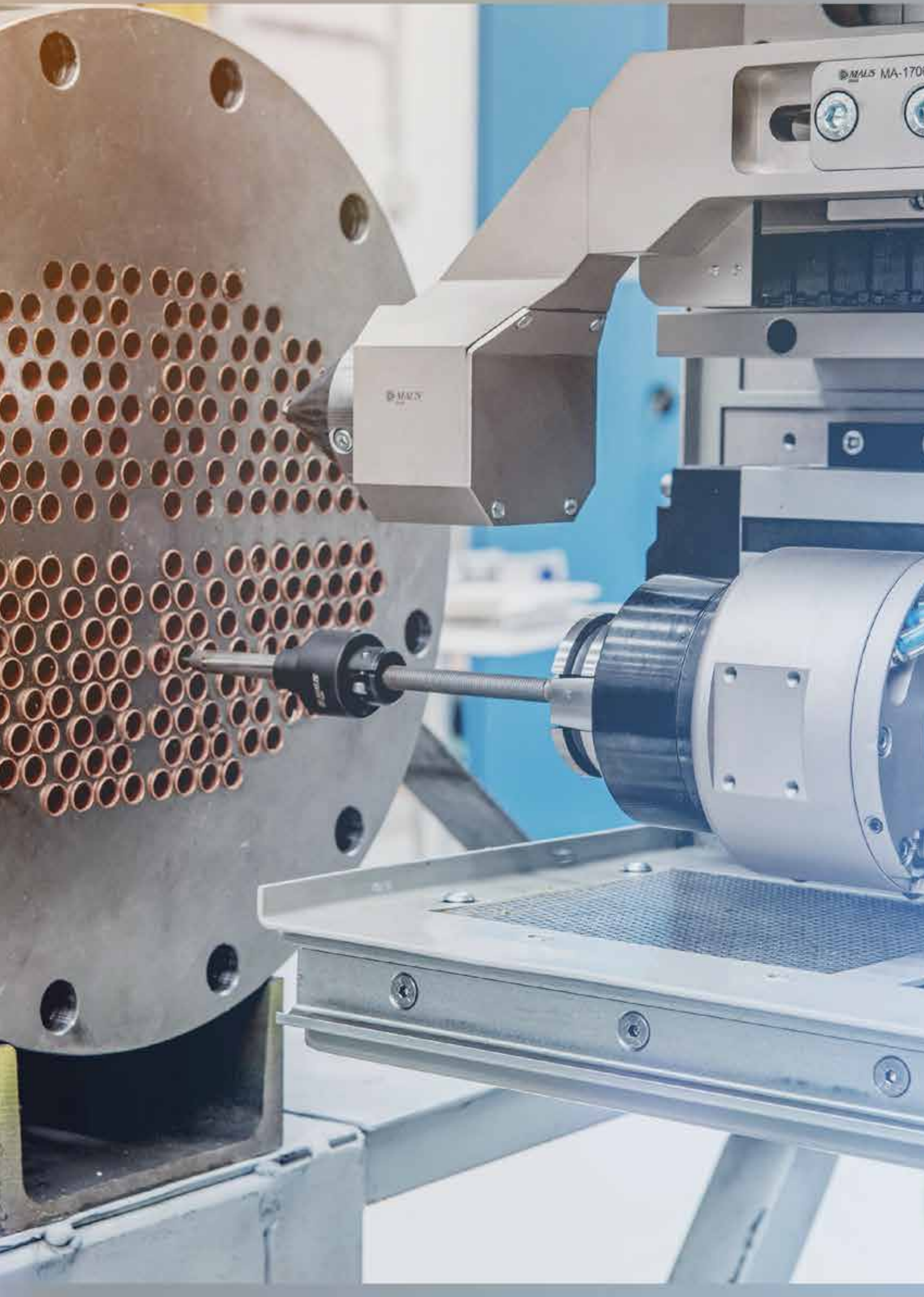
Maus Italia has several projects underway aimed at increasingly sustainable development and integrates environmental concerns into its business model. The company's actions, behaviour and development choices are focused not only on the short run but rather mainly on a medium and long-term horizon.



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MAKS MA-1700

DMN

MA 400

Automatic CNC tube rolling work centre with machine vision, pallet change and fully automatic tools changing device

Maus Italia has solved the problem of production of small dimension tube bundle batches with an automatic tube rolling work centre complete with innovative solutions, such as:

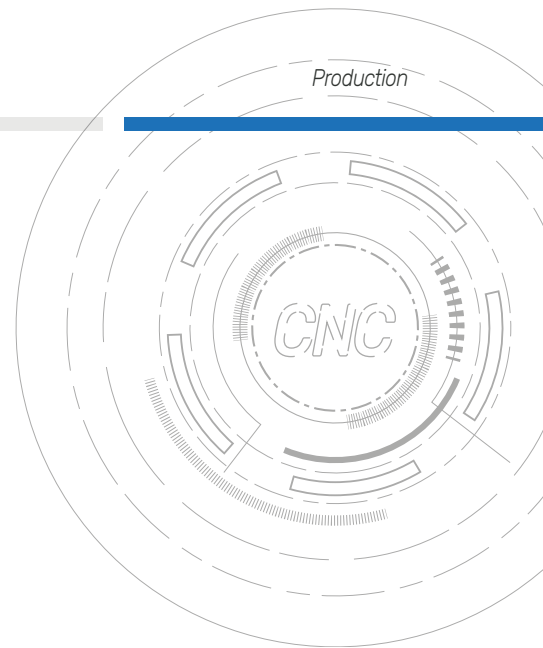
- machine vision system for rapid centring of holes;
- multiple fixing templates with vertical loading for the assembly of tube bundles and precis positioning for production;
- pallets for the loading / unloading of tube bundle batches in front of the MA 400.

More than 600 tubes/hour 1 cycle in less than 6 sec.

Quality, uniformity and repeatability of the tube-tubesheet joint guaranteed



/ Main features



Unparalleled productivity

A series of measures and applied technologies allow the MA 400 to work at high speed with the achievement of more than 600 tube expansions per hour.



Total automation

The MA 400 productive process does not require the continual presence of an operator who can then, as a result, dedicate his time to the preparation of the next pallet to avoid machine down times.



Immediate programming directly from the tube sheet design

The software created by Maus Italia, known as MausCAM, has evolved to aid the MA 400 as an interface for X-Y programming by reading the CAD drawing of the drilling pattern of the tube sheet.



Self-learning machine vision centring system

The necessity of reducing production times has led the Maus Italia technical staff to make use of a camera, thus avoiding any type of mechanical contact for the centring of the tubes.



Operational simplicity

The extremely user-friendly control console ensures access to all parameters by the operator.



Tube rolling always certified

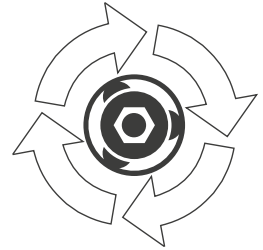
Each tube expansion with X-Y position, expansion and torque data is monitored in real time and the information collected constitutes the report for certifying the completed work.



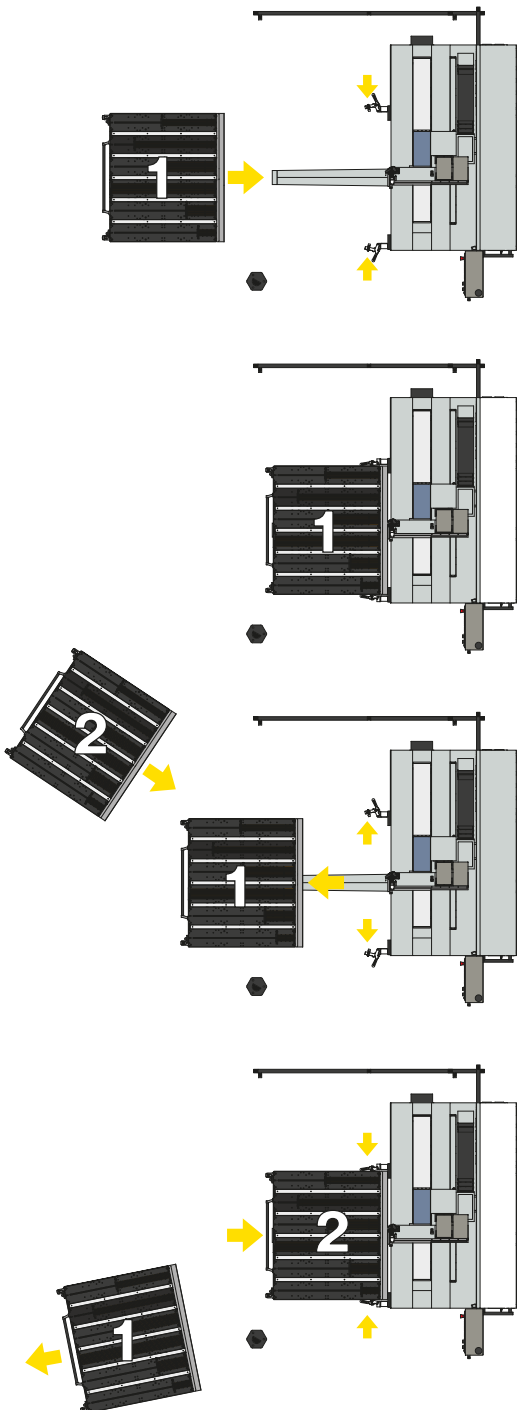
Particular attention to safety

Physical, photoelectric and sensor barriers ensure total safety for the operator from all potentially dangerous moving parts.

Fully automatic



Operation with tube bundle batches pallet change



Easy positioning

References and mechanical feedback on the MA 400 and its pallets make positioning of the tube bundle batch easy and precise.

Automatic workpiece zero

Thanks to the use of a machine vision system, the procedure for centring the tubes is guaranteed automatically and in short times without any mechanical contact.

Operation

The MA 400 works autonomously by following the program set using the dedicated MausCAM software and expand each tube of the tube bundle batch by passing from one bundle to the next.

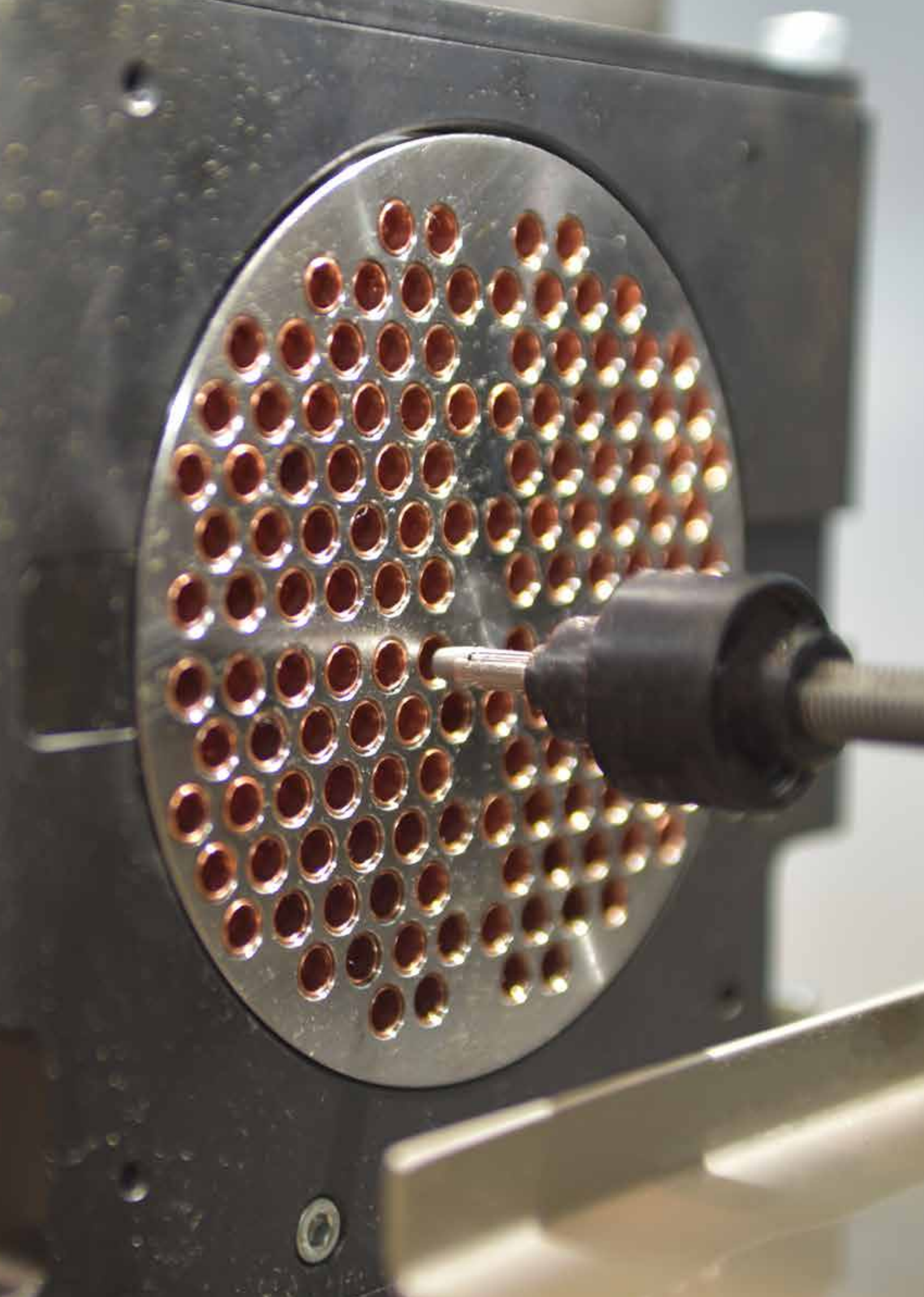
New pallet preparation

While the pallet is being processed, the operator can get the next pallet ready so as to reduce downtime.

Pallet change

When processing is finished, the MA 400 waits in stand-by mode for the pallet to be changed by the operator who replaces it and unloads the tube bundles which have already been processed.





Machine status signals

Complete range of signals and alarms which facilitate the operator during the operational phase and during job setup.

Controle console

Positioned to ensure the maximum visibility of the work zone. The CNC display guarantees extreme operational simplicity.

Y Axis carriage

Vertical stroke carriage and Z axis support with work axes.

Centring camera

Self-learning machine vision system which can work both in sync with the CNC and autonomously.

Z Axis carriage

Transverse stroke carriage up to the tubesheet.

Tool holder head

For tube rolling with manual changing of the tube expanding mandrel.

Automatic tools changing device

An eight-position tools holder with automatic tools changing device is available as an optional for the MA400

Column

Electrowelded structure in normalised steel - extremely robust and compact - located on the X axis carriage.

X Axis carriage

Column support carriage for horizontal positioning.

Base

Electrowelded structure in normalised steel with 6 adjustable feet for fixing to the floor.

Photo-electric barrier

Fixed component of the integrated safety system to prohibit access to the moving axes area.

Electrical cabinet

Installed on the machine, comes complete with air conditioning for automatic control of internal temperature.



Remote control

Allows the operator to manipulate the principal movements in manual mode whilst staying close to the operating area.



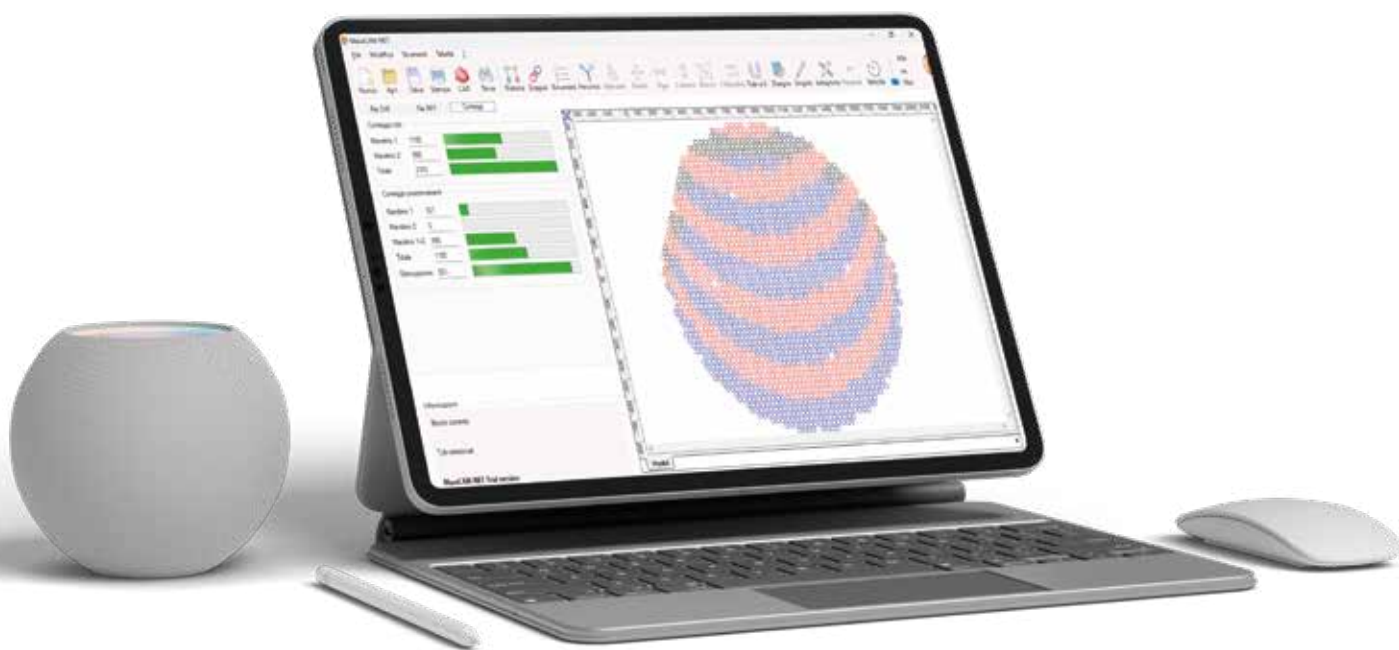
Interface software for X-Y programming

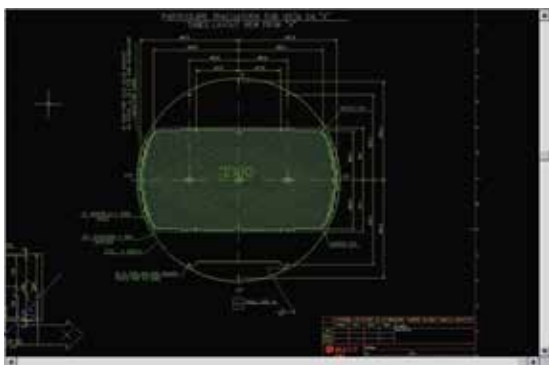
Created by Maus Italia technical staff to facilitate the expansion of work cycles, it allows the automatic processing of a CAD design of the tubesheet hole pattern.

The new MausCAMNet software processes DXF files importing all graphic entities so that the operator can set up a machine program assigning a specific work sequence. In particular, CAM (Computer Aided Manufacturing) is the computer support to the programming of CNC machines which through functions developed over time and industry experience makes it possible to transform drawings into a machine program in a simple way. Specific rules pertaining to the work to be carried out as well as the operator's choices are thereby applied.

MausCAMNet is the result of years of work and study by Maus Italia S.p.A. technicians. It provides for the download of the X-Y coordinates of the centre of the tube sheet holes and the selection of the optimized working optimum machining path, as desired by the user.

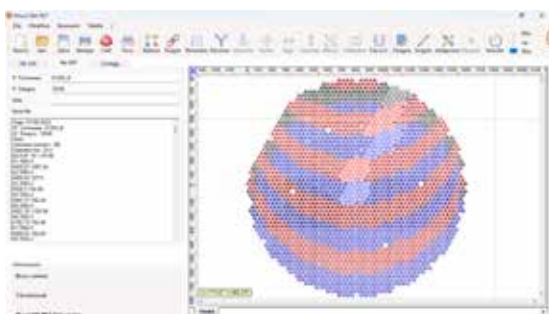
Transfer of programs to CNC





DXF from standard CAD

The system is based on reading the DXF drawing interchange format and is able, in a few steps, to process the CAD file of the tube sheet and automatically obtain the matrix of the coordinates of the tubesheet holes.



Interactive processing

During processing, you can check and optimise the path according to its position or geometry. If the tubesheet is larger than the available stroke, you can subdivide the tubesheet into multiple sectors that will be processed at different times.

The program files can be easily saved or loaded onto the numerical control of the machine using a USB pen drive or by ethernet connection.



An ethernet connection is installed as standard to allow connection to the net. An (optional) diagnostic program is available online.



A USB communication port has been installed for a rapid and secure exchange of information between the machine and the office.





Torque transducer

Expansion torque force certified

Possibility of installing a torque transducer for torque control on the spindle (mandrel) axis SP.

Technical characteristics Torque Transducer:

Nominal torque: 20 Nm

Rpm: 16000 rpm

Accuracy:0.5

FOCS 3

Self-learning electropneumatic centring probe

Used in large Maus Italia work centres, it performs all centring and correction of the distance from the tubesheet using a laser measuring system.



FOCS 4 Sight (optional)

Self-learning centring system with camera

Machine vision system for the automatic centring of tubes without mechanical contact. Combines higher rapidity with extreme precision guaranteeing:

- Immediate identification of the zero work piece
- Detection and automatic correction of any hole positioning errors
- Programmable intervention for each tube and at regular intervals





SM82.2

SM82.2

MAL'S MA-1706-61-R0 20/2775

MAL'S

MA-1707-61-20/1967

Rexroth

RKH 0917
7.88 MM
38° 22° BW

ROLTON

TLU28

TLU28

CNC Control console

Located to ensure maximum visibility of the work zone, it is extremely user-friendly and ensures maximum operational simplicity and access to all parameters by the operator.

Definition of theoretical geometry

Workstation management

Setting of CNC data

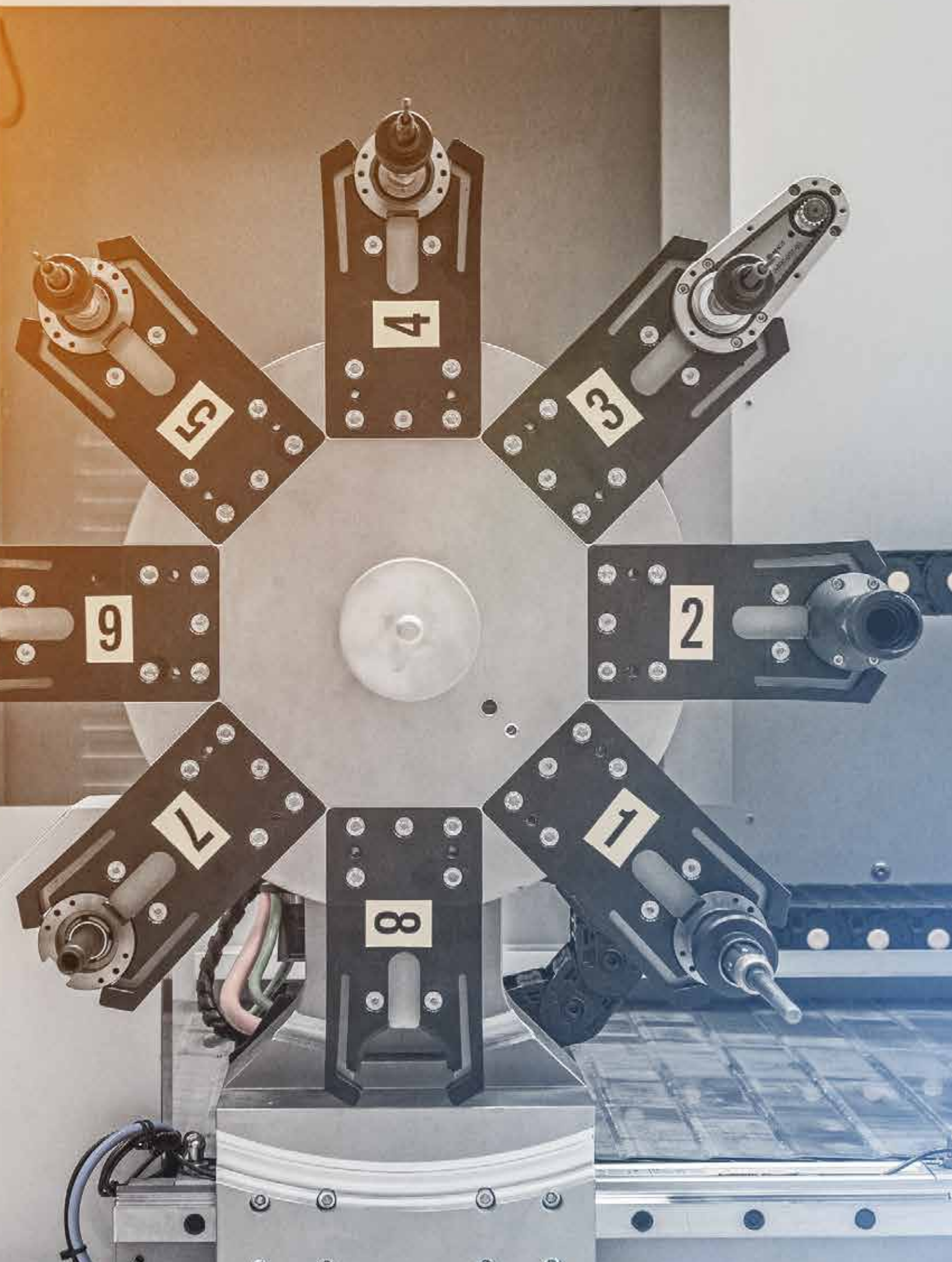


Real-time report for a tube expansion which is always certified

The constant and growing demand for documentation suitable for certifying the total quality of the jobs is satisfied by thorough and detailed data archiving. The report file, as well as recording the dimensional measurement of the rolled tube, also saves its position on the matrix of tubesheet holes, ensuring total traceability of each operation without the possibility of error.



- hole N°
- Coordinate X,Y,Z
- Ø of the tube
 - before expansion
 - during offering up
 - expanded
- torque achieved



NEW Tools changing device

Automatic tools changing device

An eight-position tools holder with automatic tools changing device is available as an optional for the MA400 which allows the execution of different types of manufacturing processes, completely automatically and in unattended way. In fact no needs the continuous intervention of the operator for the replacement of the tool increasing the autonomy of the machine.

The main advantages of an automatic tools changing device are:

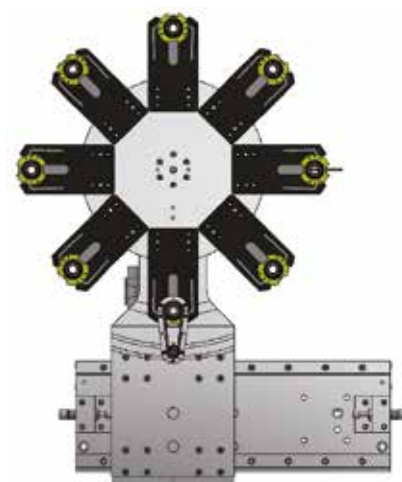
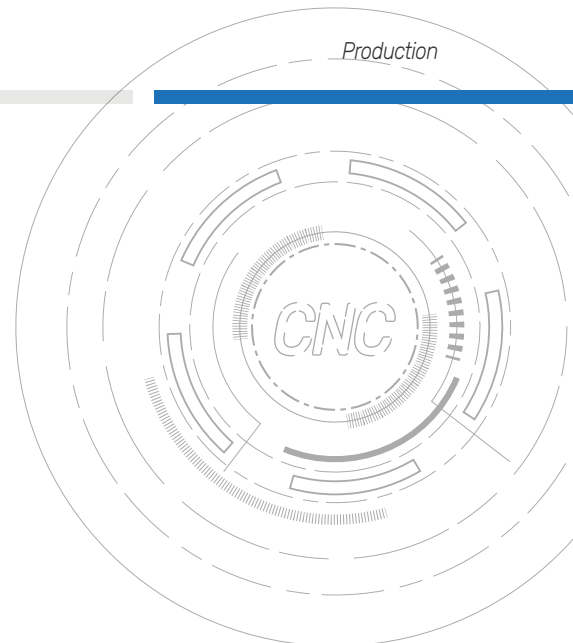
- Increased MA400 autonomy
- Possibility to automatically load different types of tools
- Use of tube expanders with increasing expansion depth
- Use of twin tools continuously
- Memorize work cycles complete with all the information of the different work phases

The eight-position tools holder is robust and easy to access.

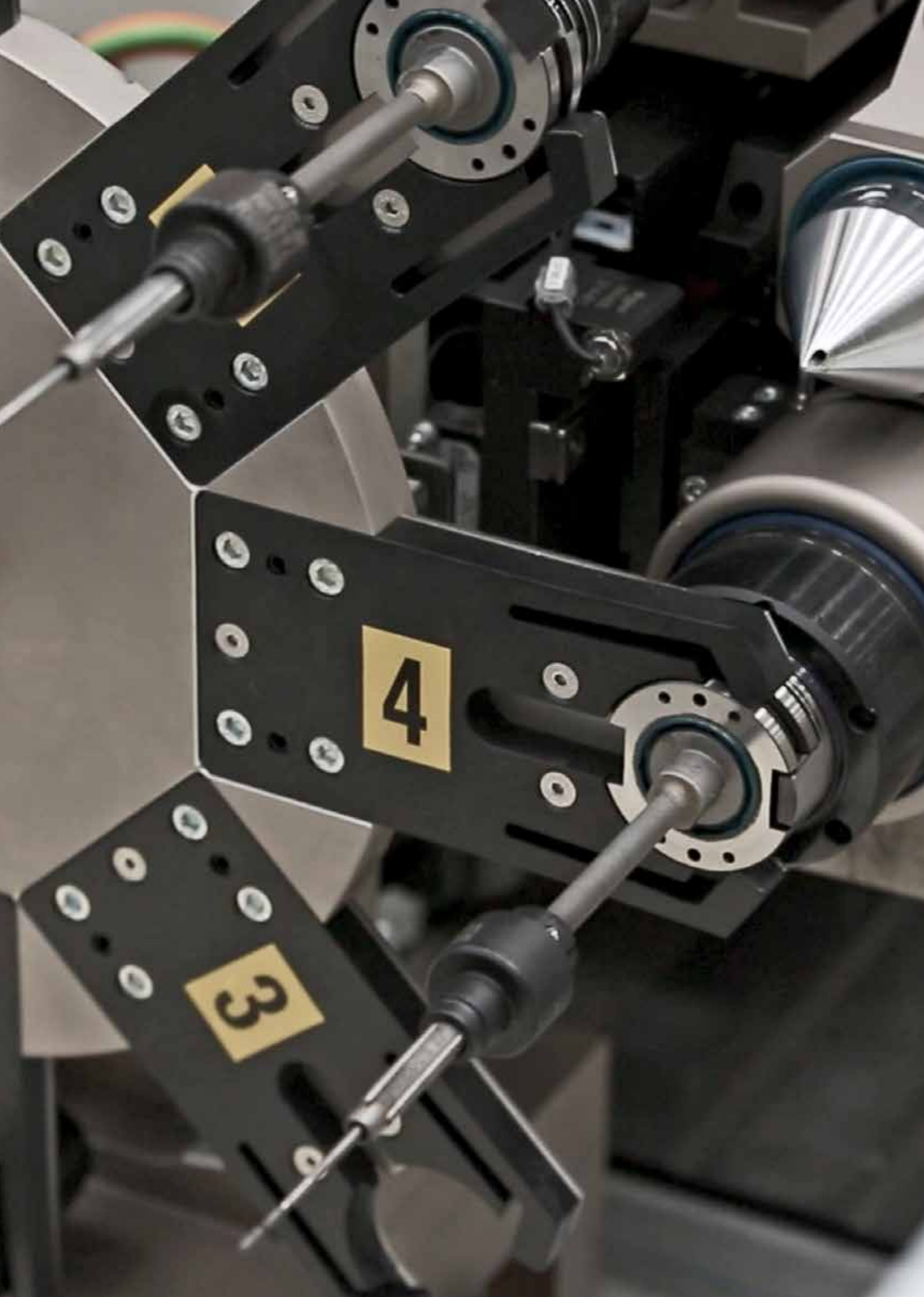
The rotation of the tools holder positioner is driven by a Siemens brushless motor, axis Q1, which allows its rapid and precise positioning.

The tool holder has been mounted on a horizontally sliding and pneumatically operated slide which allows its rapid removal after use.

This movement, which has the purpose of freeing the work area once the change is complete tool, is made fully automatically. A series of safety sensors monitor all tools loading and unloading phases.









Safety systems

The set of safety photo-electric barrier and the fixed protective structure delimits the machine, preventing access to the area of moving axes. The sliding door with electro-mechanical interlock completes the protection of the spindle rotation area.



**Tube expansion mandrel
internal lubrication control**



**SIEMENS®
SINUMERIK One**



**Ergonomic console and
remote control**



**Lubrication of sliding
components**



**Air-conditioned electrical
cabinet**



Lamp



USB communication port



Alarm signals

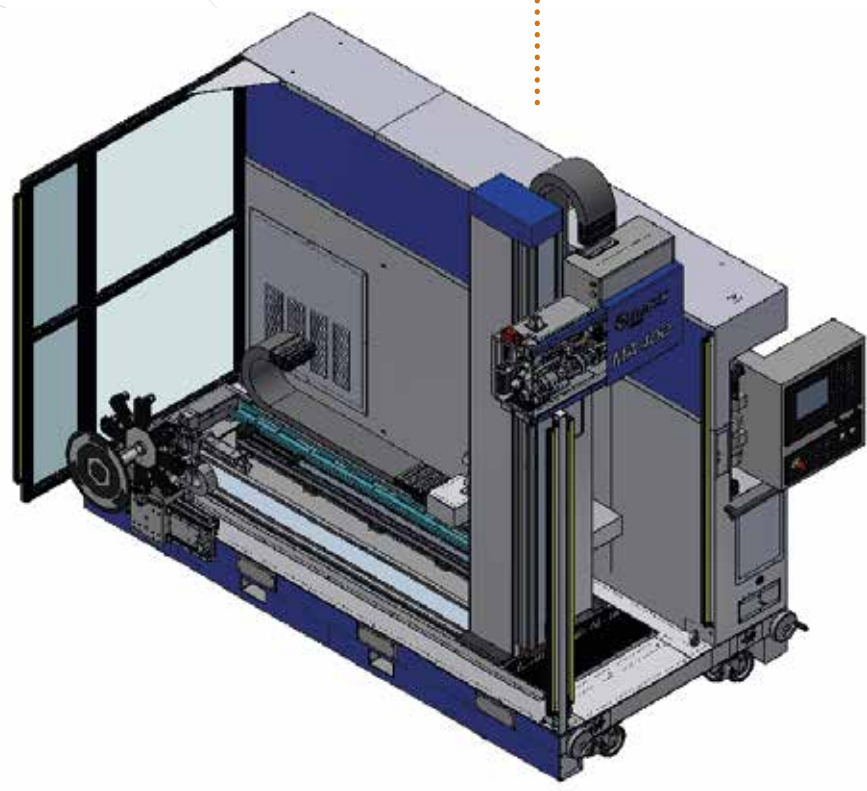
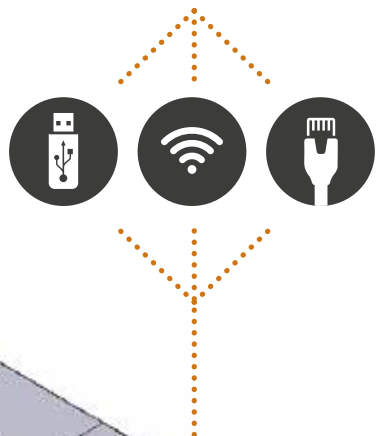
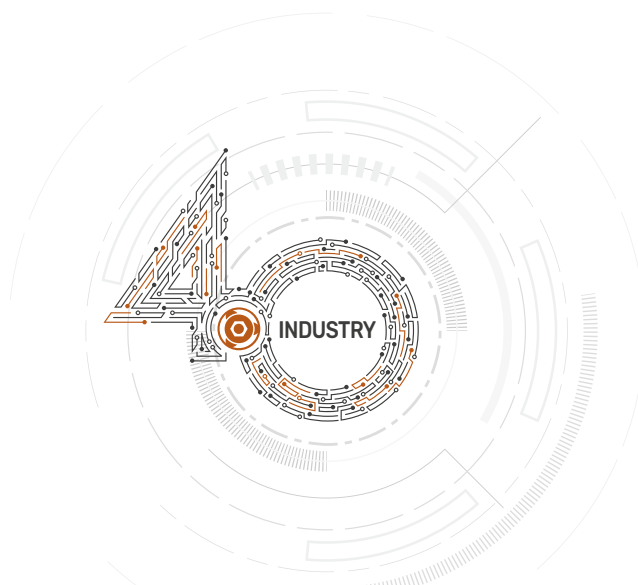
Immediate colour signalling of machine status.

- Green: automatic cycle in progress
- Red: alarm status
- No-light: standby

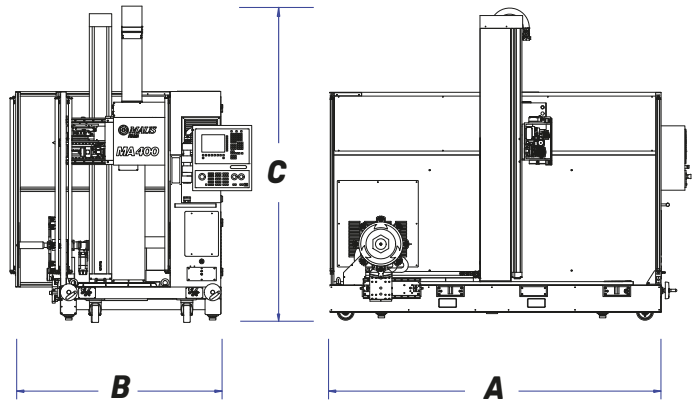
Industry 4.0

Maus Italia machinery will transform you into a Smart Factory!

The compliance of the MA 400 with the requirements of the "INDUSTRY 4.0" system has been examined by an accredited third party and has been deemed adequate to allow interconnection between the machine and company systems.



Technical features



Electric power supply

Voltage	V-ph	400 - 3
Frequency	Hz	50
Installed power	kW	10

Pneumatic power supply

Min-Max pressure	Bar (psi)	5-8 (72.52-116.03)
Flow rate	lt/min (US gpm)	100 (26.42)

Dimensions

Lenght	A	mm (ft)	3200 (10.50)
Width	B	mm (ft)	1600 (5.25)
Height	C	mm (ft)	2750 (9.02)
Weight		kg (lb)	1560 (3439)
Colours		RAL	7030 - 7035 - 5014

Dimensional capacity

X stroke	mm (inches)	1800 (70.87)
Y stroke	mm (inches)	1800 (70.87)
Z stroke	mm (inches)	300 (11.811)
Minimum work height	mm (inches)	620 (24.40)
Tool lubrication tank	l (US gal)	3 (0.793)

Processing capacity

Tubesheet diameter	mm (inches)	1800 (70.87)
Max. tubesheet thickness	mm (inches)	200 (7.874)
Tubes diameter	mm (inches)	6,3÷15,9 (1/4"÷5/8")
	mm (inches)	8÷19 mm (5/16"÷3/4")
Max mandrel torque	Nm (ft lb)	3,4/20 (2.508/14.751)
Mandrel rotation speed	giri/min (RPM)	0÷6000 / 0÷1200
Max mandrel motor power	kW	0,6
Operating temperature	C° (°F)	-5÷50 (23÷122)
Relative humidity (in absence of condensation)	%	30÷90

Each component has been entirely designed by Maus Italia technical staff and checked in a virtual environment before production

Heat exchanger's world

MAUS ITALIA SPA IS THE WORLD LEADING MANUFACTURER OF TOOLS AND MACHINES FOR THE PRODUCTION AND MAINTENANCE OF HEAT EXCHANGERS



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