



**aseo**

T H I N K

C R E A T E

A U T O M A T E

CATALOGUE

# BRAKE PADS GRINDING MACHINE

## MAIN FUNCTION

Automatically grind the brake pads of the friction material side.



## DESCRIPTION

The brake pad grinding machine is a self-contained machine, substantially consisting of an electrowelded steel bed, where the following is fixed:

- One worktable suitable for translation of brake pads;
- One working unit consisting of a power spindle, which the grinding wheel is coupled to.

Loading and unloading of the brake pads to be ground are carried out by means of two units, mounted on the worktable and including suitable pneumatic actuators, used to control the displacement and rotation of the pick-up units.

The pad picking-up units are fitted with appropriate electromagnets.

## SPECIFICATIONS

### SPEED

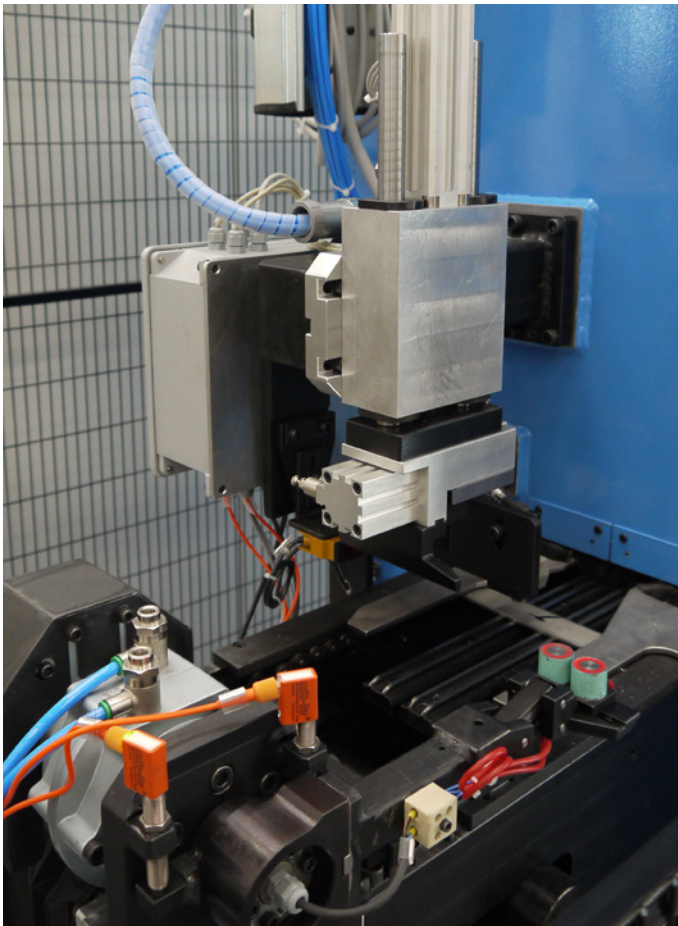
The speed of the worktable where the brake pads are sliding may be adjusted function of the loading manipulator speed.

### LOADER

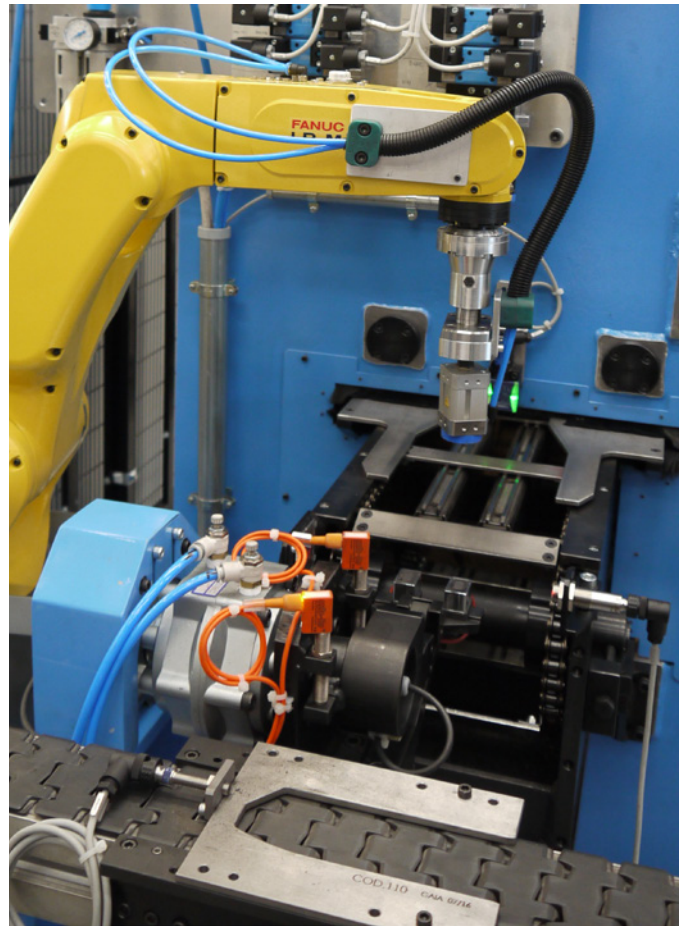
- A - capacity 550 pcs/h.
- B - capacity 850 pcs/h.

The grinding head unit includes the following main components:

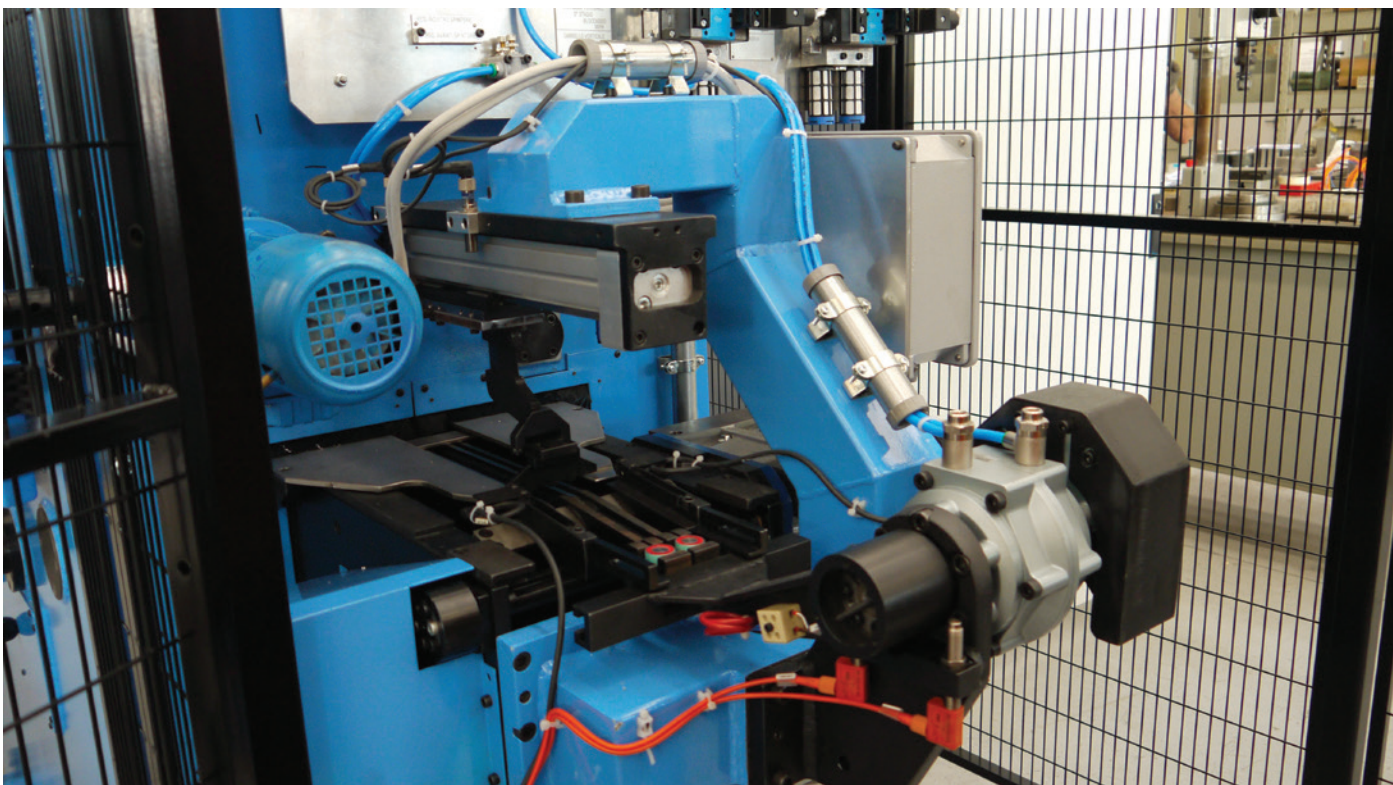
- Head slide running on round bars and fixed to the frame of the bed unit;
- Floating plate, constrained to the hinging plate by means of 2 pins, where the head coupling plate is fixed;
- Power spindle "Omlat", 2-pole, 380 Volts, secured to the head coupling plate, where the diamond wheel has to be mounted;



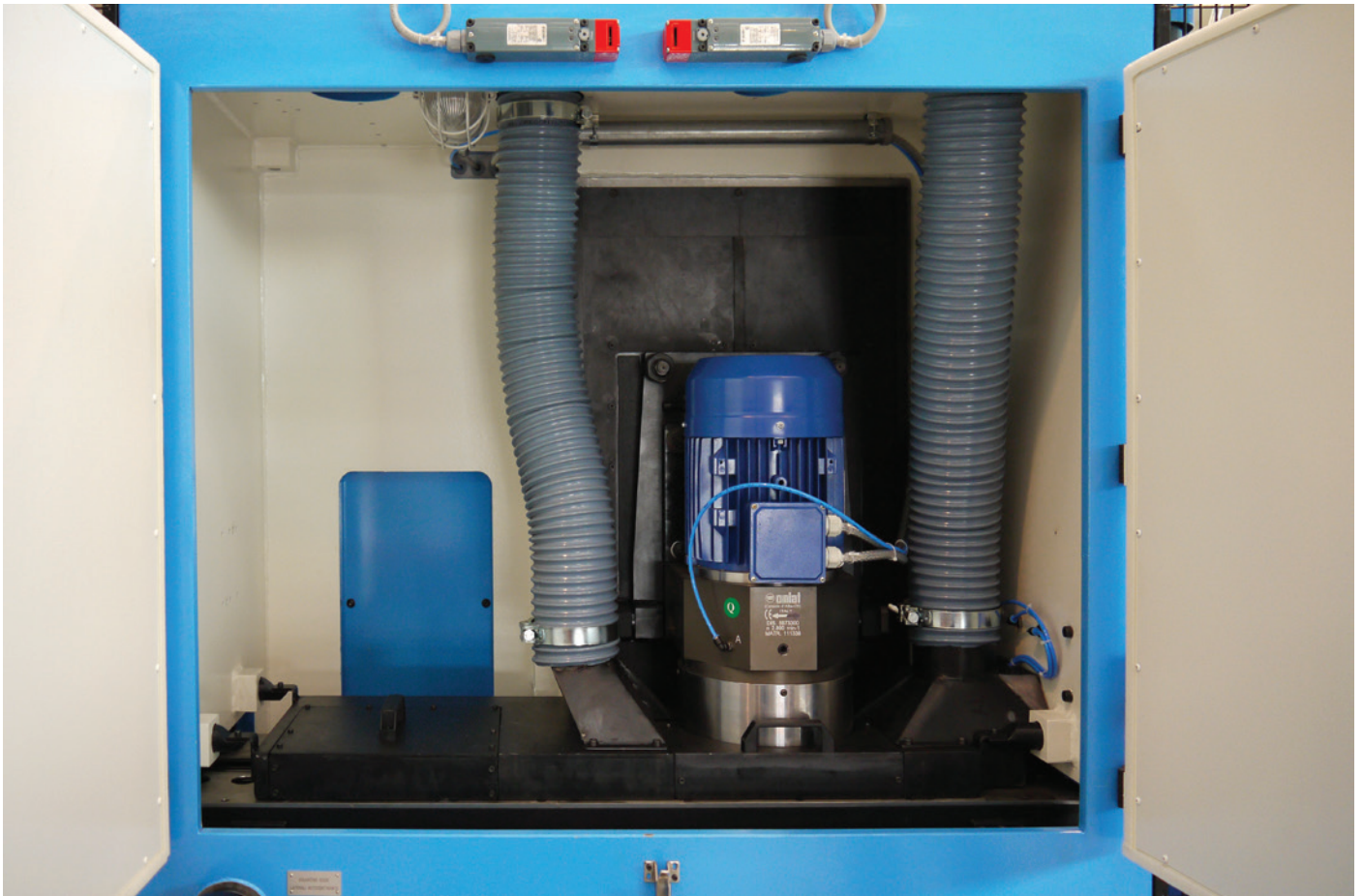
Loader A



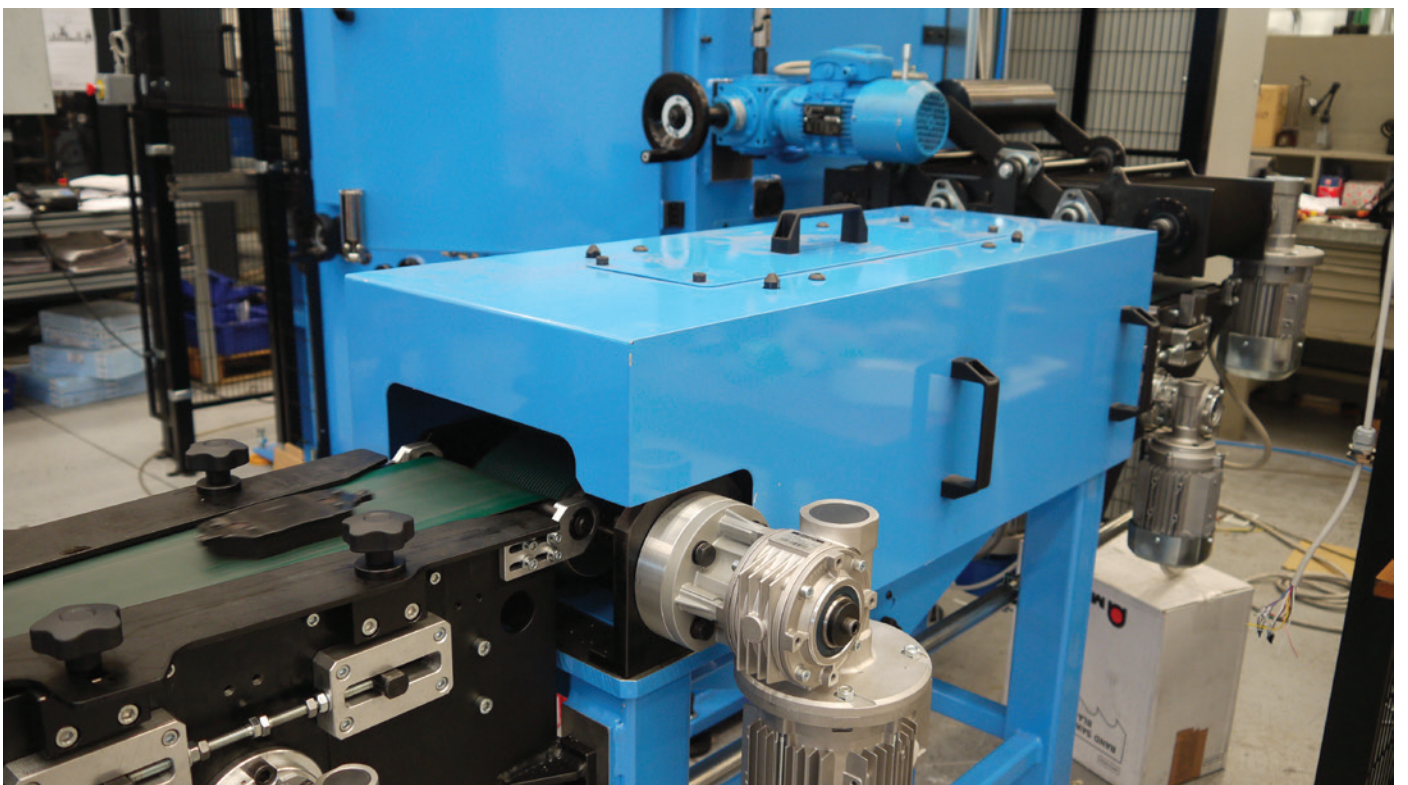
Loader B (Robot)



Unloading tipper



*Machine inside – Grinding head and cutting arrangement*

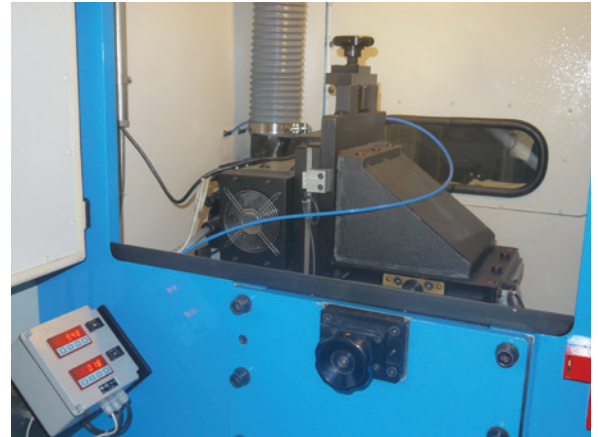


*Unloading tipper*

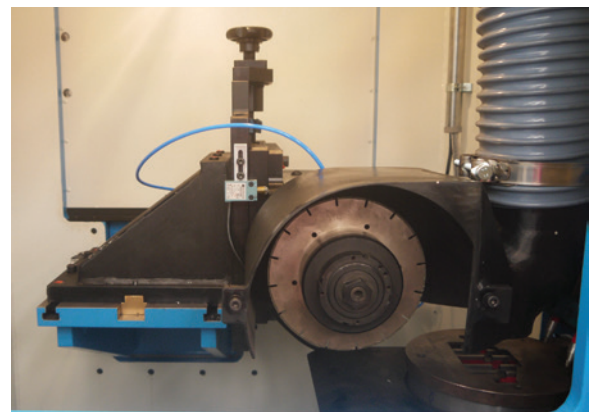
# BRAKE PADS CUTTING MACHINE

## MAIN FUNCTION

Carry out parallel and oblique cuts on the brake pads and it is also possible to machine the “J” bevels on the brake pads by fitting a specially shaped wheel and positioning the cutting head in the desired position.



*Combined system for adjusting the position of the electric head*



*Cutting head with adjustable height*

## DESCRIPTION

The brake pads cutting machine is a single-component system consisting essentially of a welded steel base on which are fixed:

- a working bench suitable for shifting brake pads;
- a controlled axis, the one for angular positioning of the brake pad;
- working unit, consisting of a spindle fitted with a cutting disc.

The brake pads are loaded manually by the operator onto a special dedicated template, depending on the kind of pad, with metallic support on the bottom, in order to be loaded on the machine in the exact cutting position. The pads are locked by means of special electromagnets.

To change type a special mask is required for each type to be machined, consisting of a disc shaped like the pad, and appropriately connected for fast positioning on the fixed electromagnets support.

The pads are unloaded manually by the same operator.

## SPECIFICATIONS

### WORKING CYCLE

- pad manually loaded in specific template;
- brake pad locked with the aid of the electromagnet;
- door closed– translation authorized;
- translation of linear table towards the cutting head;

- machining (cutting)
- linear table returns to starting position, passing under the cutting head again;
- door opened- electromagnet unlocked;
- pad unloaded manually;

### **PRODUCTIVITY**

3 pcs per minute

(Productivity valid only in case the operator loads / unloads and starts cycle 4 “).

### **GRINDING HEAD**

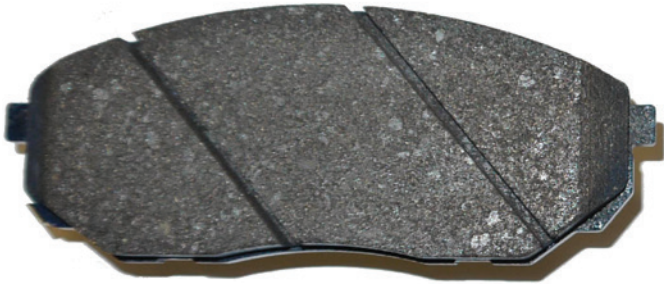
The grinding head group consists of the following main parts:

- combined system with horizontal and a vertical slide with the possibility to be angularly adjusted with maneuvering handwheels.

- ability to view the position of the head by magnetic readers or with tachometers.
- Electric spindle “HSD” 4-pole - 8.1 kW - 380 V, attached to the faceplate of the head, on which to mount the diamond wheel;

The work area of the electric head is closed and isolated in a suitable compartment maintained in depression so as to allow aspiration of powders.

The angular position of the element will be managed by the Megatorque Motor NSK system including manual programming keypad.



*Examples of machining*

# MULTI-PURPOSE BEVEL-GRINDING MACHINE

## MAIN FUNCTION

Carry out parallel and radial bevels of the brake pads, and possibly as a first operation, if necessary, grind the horizontal surface of the pad.



*Combined system for setting of the electric grinding head position*



*Electric grinding head*

## DESCRIPTION

The multi-purpose bevel-grinding machine for laboratory use is a self-contained system, substantially consisting of an electrowelded steel bed, where the following is fixed:

- One worktable suitable for brake pad transfer
- One working unit consisting of a power spindle, which the grinding wheel has to be coupled to.

The brake pads are manually loaded by the operator to a suitable template, dedicated to that specific pad

typology, with metal support on the bottom and so positioned as to be loaded onto the bevel-grinding machine in the right position.

The pads are locked by suitable electromagnets.

When the pad type has to be changed, a template corresponding to the pad type to be machined has to be used; it consists of a disc having the same shape as the pad, properly fitted for a rapid positioning on the fixed support holding the electromagnets.

The brake pads are manually unloaded by the operator.

## SPECIFICATIONS

### WORKING CYCLE

- Manual loading of the brake pad onto a matching template
- Pad locking by means of electromagnets
- Linear table translation towards the grinding head
- Machining (bevel on one side of the pad)
- Return of the linear table to the starting position by feeding again underneath the grinding wheel
- Manual unloading of the brake pad
- Once the whole brake pad lot is machined, the pad template has to be turned by 180° in order to chamfer the pad on the opposite side; then the above-mentioned steps are repeated.

### PRODUCTIVITY

3 pcs per minute

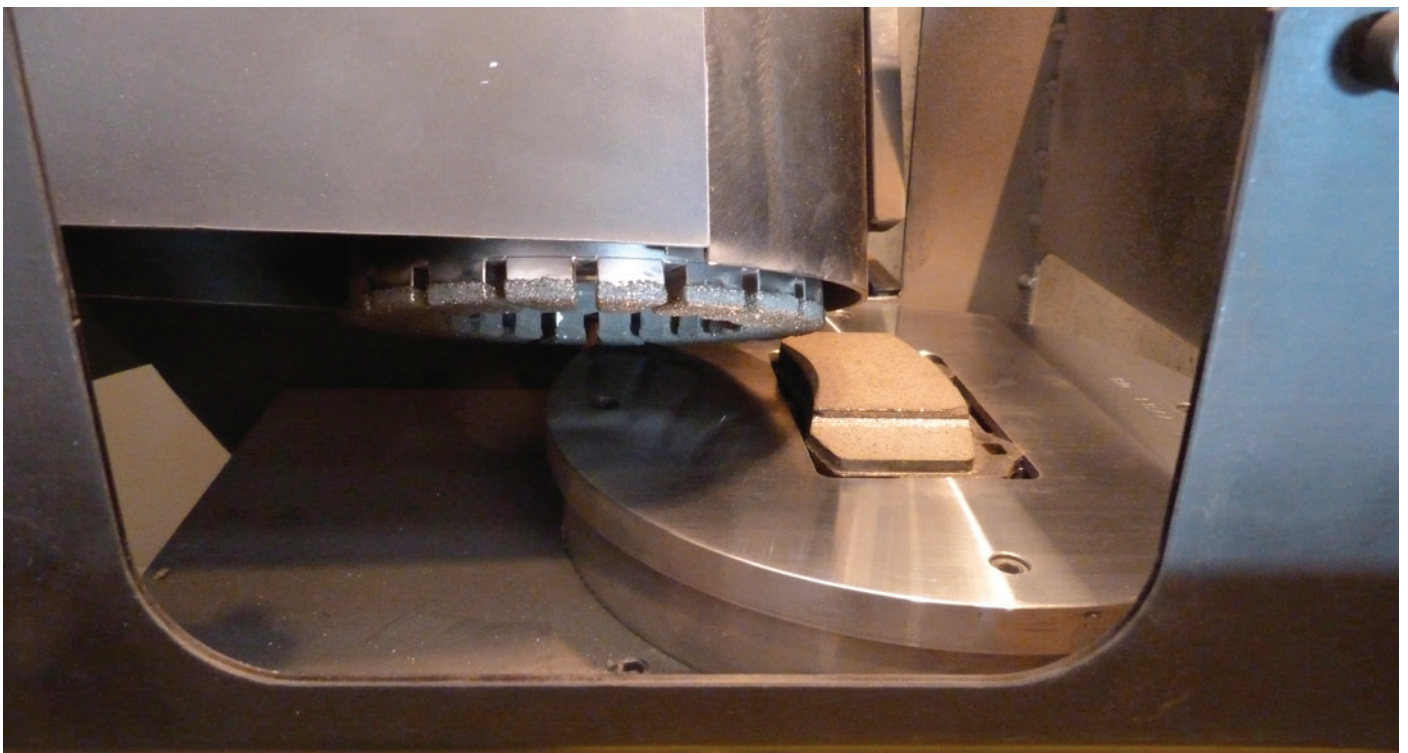
(This output rate may be confirmed only on condition

the operator loads/unloads the workpiece and starts the cycle within 4”).

### GRINDING HEAD

- Combined system consisting of one horizontal and one vertical slides, with angle adjustment possibility by means of handwheels;
- Possible head position visualization through magnetic readers or revolution counters;
- Power spindle “Omlat”, 2-pole, 380 Volts, secured to the head coupling plate, where the diamond grinding wheel has to be mounted.

The electric head working area is closed and insulated in a suitable pressurized zone, vacuum held to assure dust suction.



*Brake pad on process*



*Item to be machined*



*Item machined*



# SURFACE AND BEVELS GRINDING | FOG200

## MAIN FUNCTION

Perform grinding of friction surfaces, parallel and radial chamfers of brake pads.



## DESCRIPTION

The **FOG200** robotic grinding machine possesses an innovative concept for friction surface grinding, in that, in this operation, the gripper attached to the robot's wrist with the pad to be machined attached is clamped in the work station and the tool i.e., the grinding wheel sliding on special precision guides under the pad performs the flattening of the friction surface.

This system allows for greater precision of parallelism and flatness of the ground surface.

The **FOG200** is a machine placed inside an safety cabin equipped with dust extraction hoods. It consists essentially of an electro-welded steel base on which the following are fixed:

- a Yaskawa 6-axis robot for gripping and processing brake pads
- a group composed of an electric head on which the grinding wheel is inserted to carry out planing and chamfering
- a group composed of an electric head on which the grinding wheel is inserted to perform "J" bevels and cuts
- an automatic jig changing unit

- an automatic gripper changing unit
- a brake pad dosing unit.

The brake pads that feed the machine all arrive at the same location through a conveyor, which feeds the robot via an automatic dosing unit.

A single pad is released from the dosing unit, transported by the conveyor and landed on a jig.

The robot picks up and clamps the brake pad by a suction cups system and by a pneumatic gripper, moves to the plane grinding position, then subsequently to the stations dedicated to chamfers and cutting.

Based on the recipe previously set by the operator on the panel, the robot performs the necessary machining operations.

## SPECIFICATIONS

### CYCLE / SEQUENCE OF OPERATIONS

- Release the pad by the dosing unit

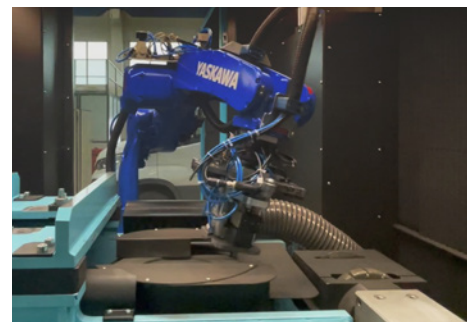
#### Work sequence



Gripper that pick up the pad



Smoothing of the pad surface



Chamfering of the edges

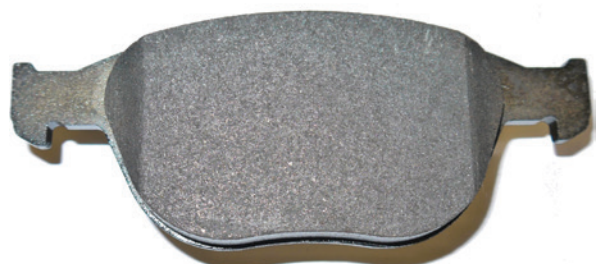
- Locking the pad into the robot gripper using suction cups and gripper fingers
- Moving the robot gripper and clamping into the unit for grinding the plane
- X-axis working stroke with the grinding wheel on board for plane grinding
- Moving the X-axis to the defined position to enable the execution of radial, tangential bevels
- Parallel movement of the robot to the working area dedicated to bevels
- Bevel execution (bevel on one side)
- Possible 180° rotation of the robot wrist for chamfer execution on the other side
- Possible movement of the robot toward the unit for execution of J-bevels and cuts
- Movement of the robot toward the conveyor
- Drop the pad onto the conveyor.

### PRODUCTIVITY

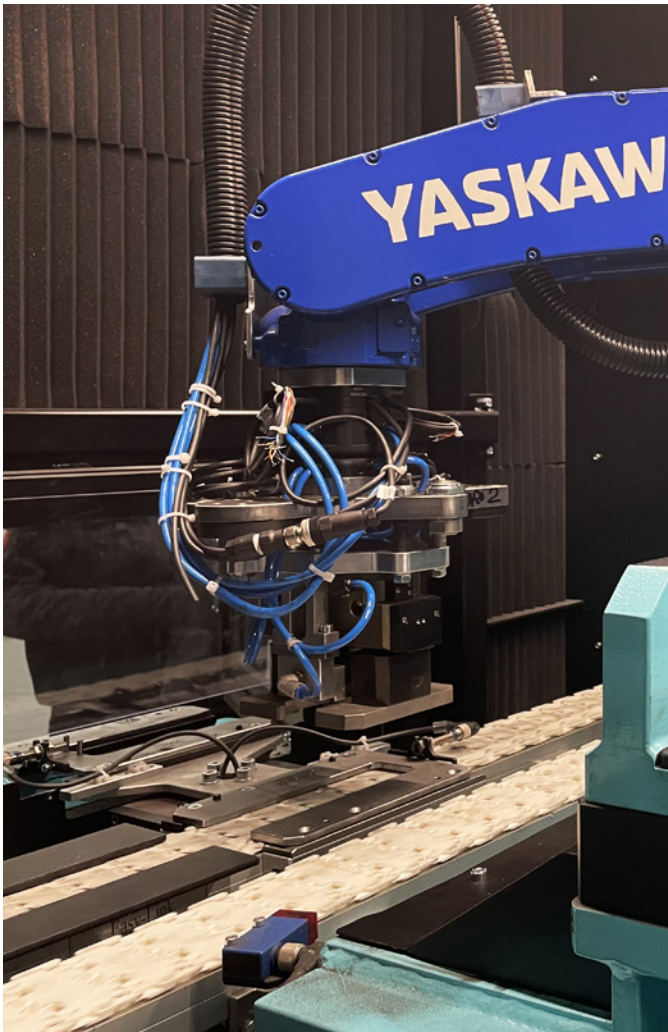
Varies according to brake pad characteristics.



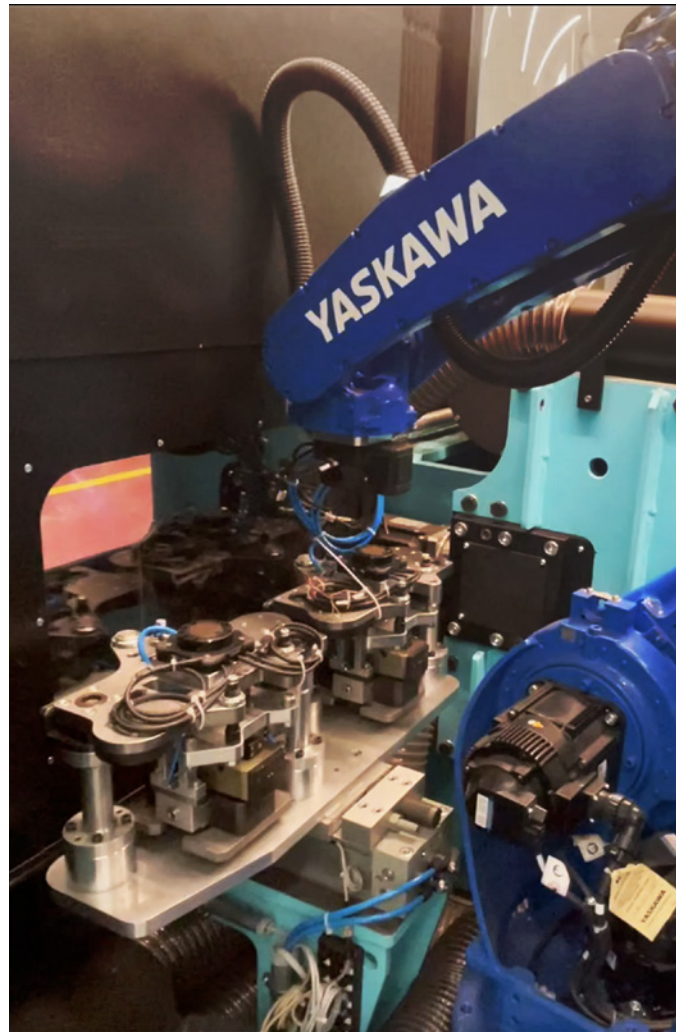
Item to be machined



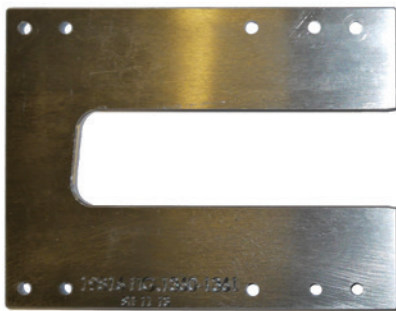
Item machined



Gripper - jig change



Gripper change



Type change kit



## OPTIONAL

The pad type change involves changing the pick-up jig and robot gripper. The latter operation is done automatically by processing robots.

The gripper and jig are previously loaded manually in special locations outside the booth safely with the machine being processed, and it is the robot that, via a quick coupler deposits the gripper and jig of the previous type and picks up the gripper and jig of the type of pad to be made.

The gripper pick-up assembly (type change) , for each type of tablet is composed of the following parts:

- Stop jig on conveyor
- Suction cup holder block
- Right and left jaw

In the working areas of the grinding wheel there are a system of hoods so that dust can be extracted.

# ROBOTIC CHAMFERING MODULE

## MAIN FUNCTION

Perform parallel and radial bevels of the brake pads.



## DESCRIPTION

The robotic chamfering machine is a machine inserted at inside a safety protection cabin, equipped with dust extraction hoods. It is essentially composed of an electro-welded steel base on which are fixed:

- a FANUC robot with 6 axis for gripping and machine the brake pads;
- a unit composed of an electric head on which is inserted the grinder for chamfering;
- a dispensing unit for brake pads;
- preparation for the electric head to cut the brake pads

The brake pads which feed the machine all arrive in the same position through a conveyor, which, through an automatic dispenser, feeds the robot.

A single pad is released from the dispenser and stops on a template.

The robot picks up and locks the brake pad by means of a suction system and a pneumatic gripper.

According to the recipe previously set by the operator on the operator panel the robot chamfers the pad.

## SPECIFICATIONS

### CYCLE / SEQUENCE OF OPERATIONS

- the pad is released by the dispenser;
- the pad is locked in the robot's gripper by suction pads;
- the robot moves the gripper towards the grinder;
- chamfering (chamfered on one side);
- the robot rotates the wrist 180° to chamfer the other side;
- the robot moves towards the conveyor;
- the pad is released onto the conveyor;

### PRODUCTIVITY

10/20 pieces per minute

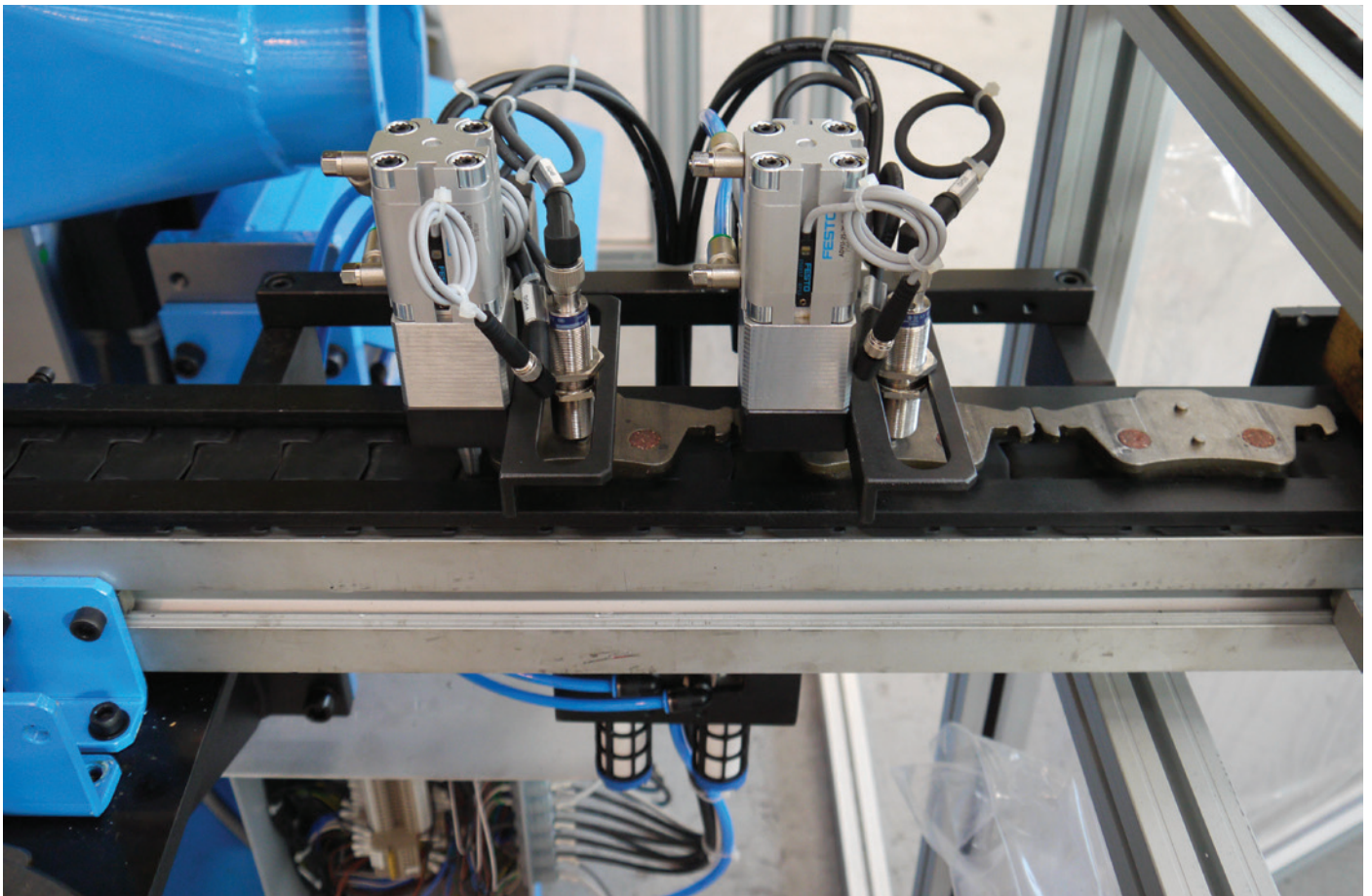
(Productivity is based on the characteristics of the brake pads).

### THE GRIPPER GROUP

The gripper group (change type), for each type of pad is composed of the following parts:

- Template for stopping on the conveyor
- Suction support block
- Right and left Jaw

The working area of the grinding wheel is closed in a hood in order to allow the aspiration of dust.



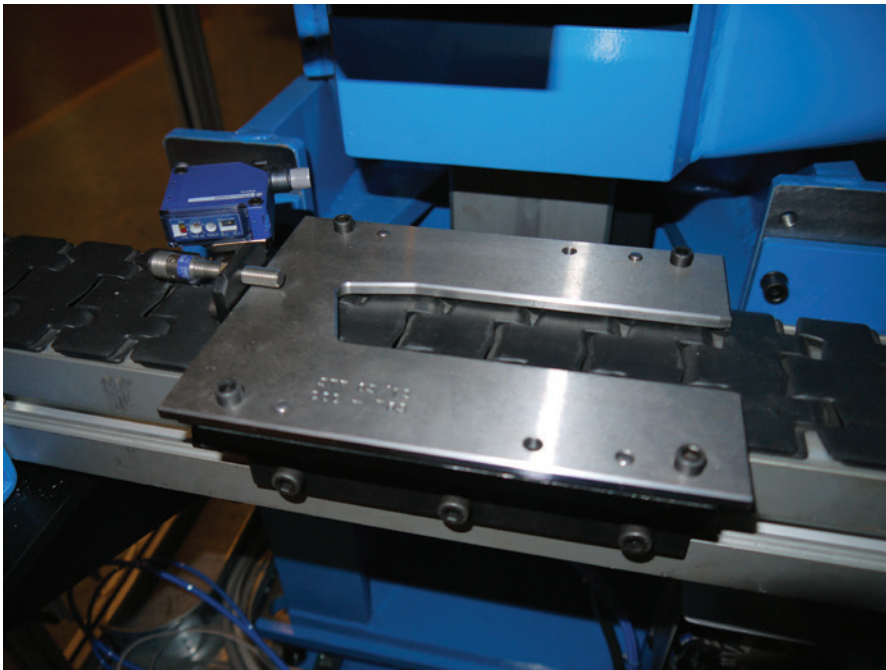
*Brake pads dispensing group*



*Item to be machined*

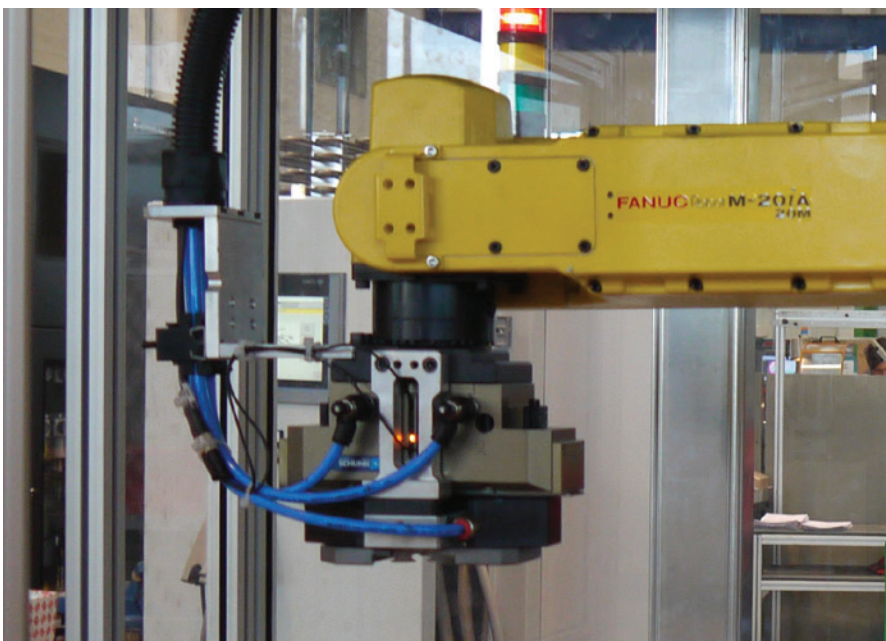
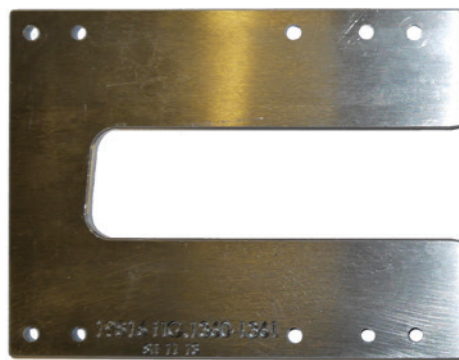


*Item machined*



*Pads stopping template*

*Kit for changing type*



*Pads gripper*

# ELECTRICAL SCORCHING MACHINE 1 WORK TRACK

## MAIN FUNCTION

Scorch the friction surface of the brake pads.



## DESCRIPTION

The operating sequence starts by dosage of the brake pads by means of suitable pneumatic cylinders mounted on a loader.

Afterwards, the brake pads are dragged to a hot-plate unit, to be then compressed by a thrust unit.

Once the cylinder reaches the setting pressure and exerts the preset force onto the brake pad during the preset time period, function of the pad type on process, the first scorching phase is performed.

The brake pads, already submitted to the first treatment, are then conveyed to the cold-plate station in order to be cooled; finally, their starting parallelism is restored.

The finished brake pads are unloaded by means of an out-feeding chute.

The scorching machine is equipped with control devices, so as to make it a multi-purpose machine suitable to accept any kind of brake pad; the pad limit dimensions is the only requirement to this purpose.

## SPECIFICATIONS

### WORKING CYCLE AUTOMATIC

**IN:** brake pads entering the machine by means of a manually filled loader.

**OUT:** automatic unloading of brake pads by means of an out-feeding chute.

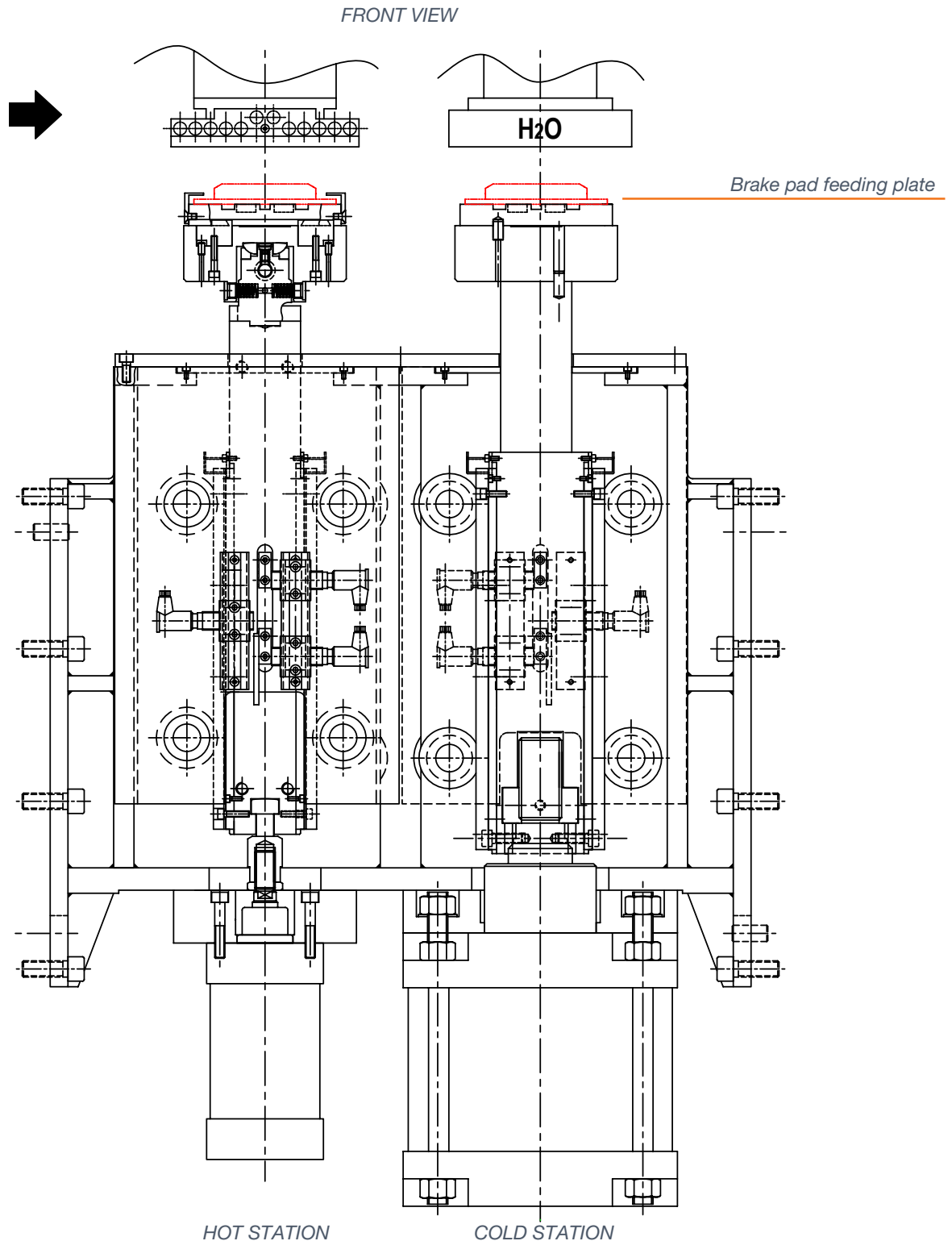
The cycle time is conditioned by two factors: the first one, that may be quantified in 5 seconds, is featured by the pad transfer and lifting up from the hot-plate station towards the coldplate station; the second factor is constrained to the pad sizes, therefore also to the duration time of the scorching operation, usually ranging from 30 to 60 seconds.

$$T_{tot} = T_1 + T_2 = 5 + 30 = 35 \text{ sec.}$$

### HOURLY OUTPUT

~ 103 pcs/hour (at 100% efficiency).

## DIAGRAM



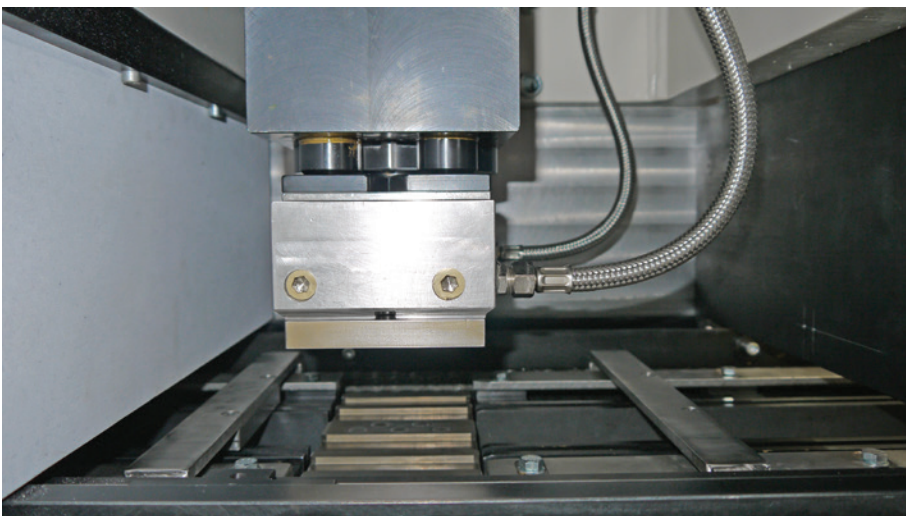




#### **HOT STATION**

*Operating pressure of plates: from 1000 to 4000 N.*

*Working temperature of plates: 750° C (adjustable).*



#### **COLD STATION**

*Working temperature of plates: 25° C (obtained by circulating industrial water inside the plates).*

*Operating pressure of plates: from 5000 to 29000 N.*



*Machined pads*

# ELECTRICAL SCORCHING MACHINE 2 WORK TRACKS

## MAIN FUNCTION

Scorch the friction surface of the brake pads.



## DESCRIPTION

The operating sequence starts by dosage of the brake pads by means of suitable pneumatic cylinders mounted on a loader.

Afterwards, the brake pads are dragged to a hot-plate unit, to be then compressed by a thrust unit.

Once the cylinder reaches the setting pressure and exerts the preset force onto the brake pad during the preset time period, function of the pad type on process, the first scorching phase is performed.

The brake pads, already submitted to the first treatment, are then conveyed to the cold-plate station in order to be

cooled; finally, their starting parallelism is restored.

The unloading of the finished elements is automatic and is carried out through the relative tipper.

A conveyor conveys the brake pads to the cooling tunnel, so that at the end the brake pads can be recovered at a temperature of around 35-40 ° C.

The scorching machine is equipped with control devices, so as to make it a multi-purpose machine suitable to accept any kind of brake pad; the pad limit dimensions is the only requirement to this purpose.

## SPECIFICATIONS

### WORKING CYCLE AUTOMATIC

**IN:** brake pads entering the machine by means of a manually filled loader.

**OUT:** automatic unloading of brake pads by means of an out-feeding chute.

The cycle time is conditioned by two factors: the first

one, that may be quantified in 5 seconds, is featured by the pad transfer and lifting up from the hot-plate station towards the coldplate station; the second factor is constrained to the pad sizes, therefore also to the duration time of the scorching operation, usually ranging from 30 to 60 seconds.

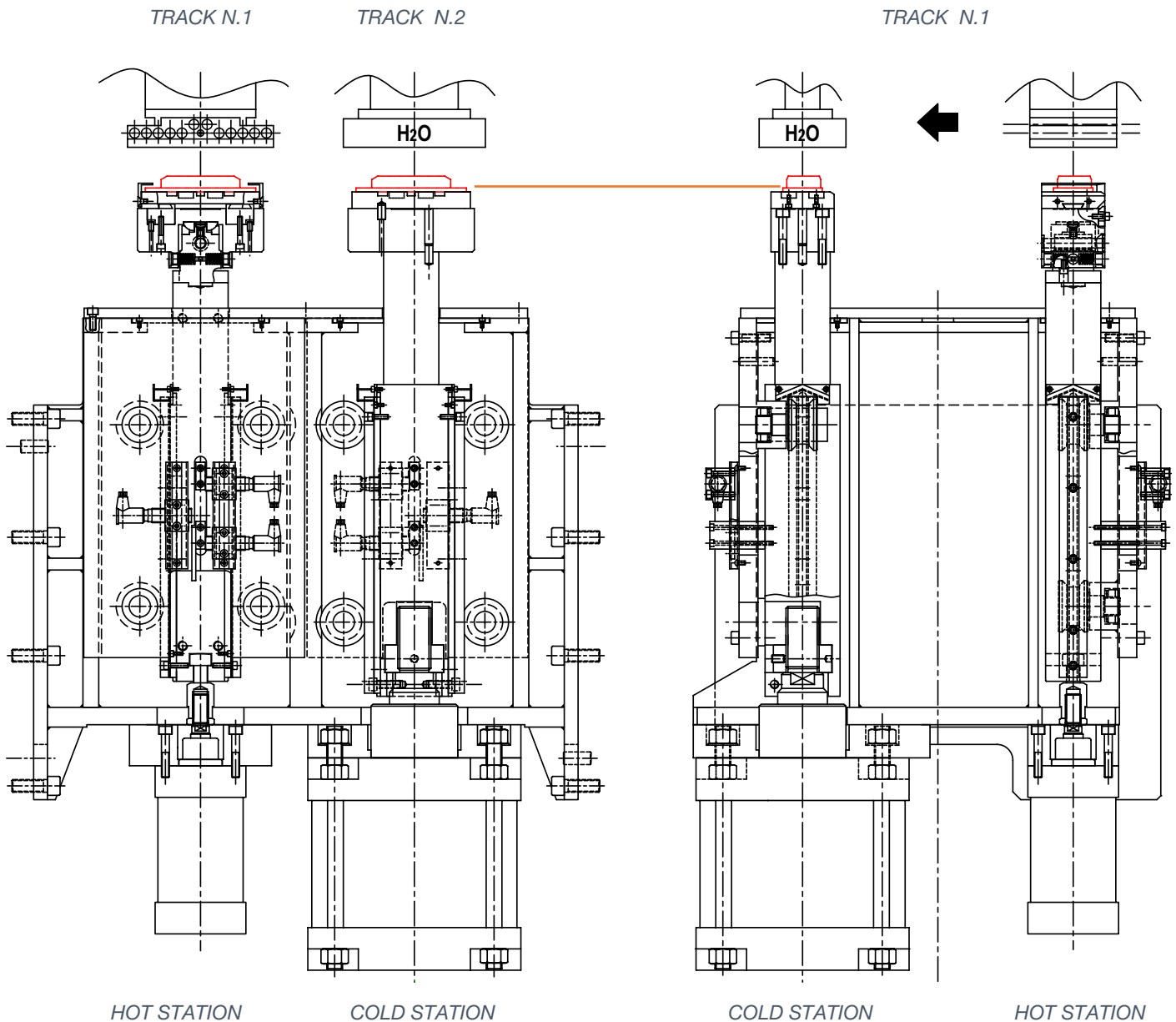
$$T_{tot} = T_1 + T_2 = 7 + 30 = 37 \text{ sec.}$$

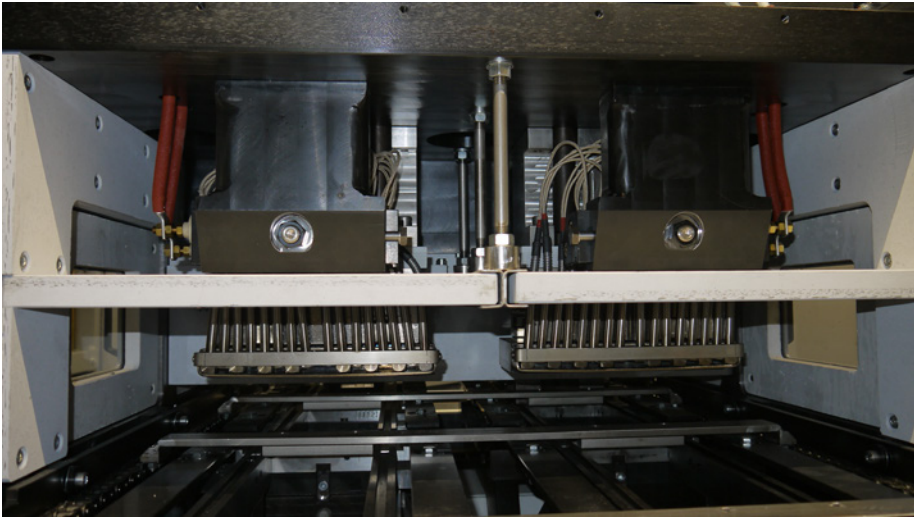
### HOURLY OUTPUT

~ 103 pcs/hour

(at 100% efficiency), for each track, so 206 pcs/hour.

## DIAGRAM

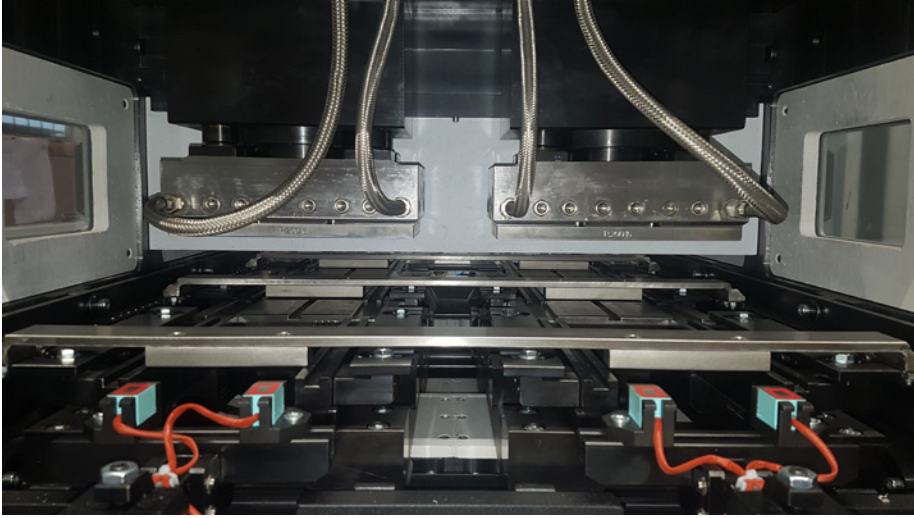




**HOT STATION**

*Operating pressure of plates: from 1000 to 4000 N.*

*Working temperature of plates: 750° C (adjustable).*



**COLD STATION**

*Working temperature of plates: 25° C (obtained by circulating industrial water inside the plates).*

*Operating pressure of plates: from 5000 to 29000 N.*

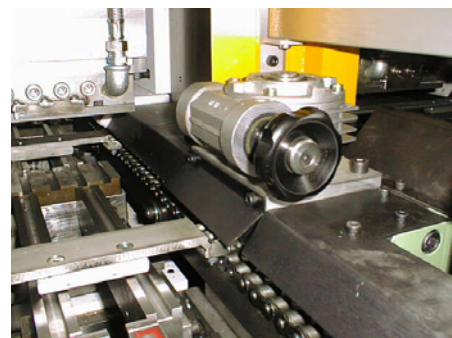
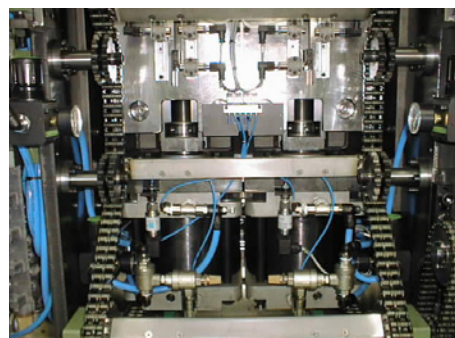
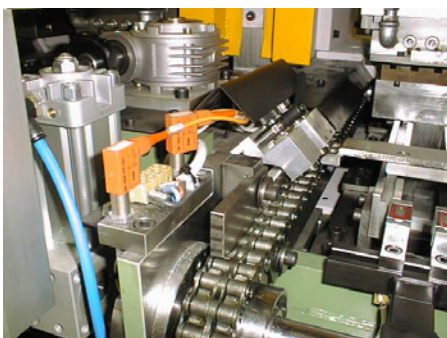
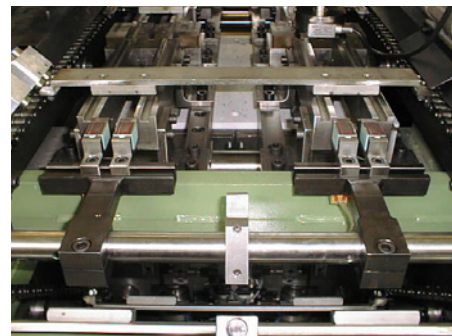
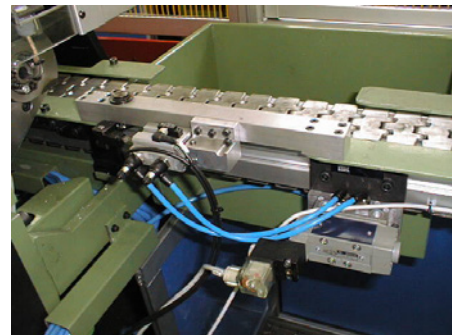


*Machined pads*

# SCORCHING MACHINE 8 WORK TRACKS

## MAIN FUNCTION

Carry out the scorching treatment on the friction surfaces of the brake pads.



## DESCRIPTION

The sequence of operations starts with the feeding of brake pads toward special stops, for buffering; then brake pads are positioned on the working surface by a tilter unit.

Next, the brake pads are drawn onto a hot-plate unit, where a pushing unit compresses them and the first scorching step is performed; in the second step the brake pads, already submitted to the previous treatment, are conveyed to the cold-plate station, where the pads are cooled and their original parallelism is restored.

The finished parts are automatically unloaded to the exit conveyor belt.

The machine is also equipped with setting controls,

which make it universal and therefore suitable to accept any type of brake pad; it is only necessary to know the part size limits.

## SPECIFICATIONS

**WORKING CYCLE**  
AUTOMATIC

**IN:** automatic brake pad feed on loading conveyor belt.

**OUT:** automatic brake pad unloading through exit conveyor belt.

The cycle time is conditional upon two factors: the first factor, quantified in 5 seconds, is characterised by

the sorting of brake pads feeding from the hot station towards the cold station, while the second factor depends on the brake pad sizes, therefore on the time required for the scorching operation, normally ranging from 30 to 60 seconds.

$$T_{tot} = T_1 + T_2 = 7 + 30 = 37 \text{ sec.}$$

(in 35 seconds, the machine can work simultaneously n°8 brake pads)

### HOURLY OUTPUT

~ 778 pcs/hour (at 100% efficiency).

### HOT STATION

Operative temperature of plates: 750° C (adjustable).  
Operating pressure of plates: variable between 1000 N and 4000 N.

### COLD STATION

Operative temperature of plates: 25° C (obtained by circulating industrial water inside the plates).  
Operating pressure of plates: variable between 5000 N and 29000 N.

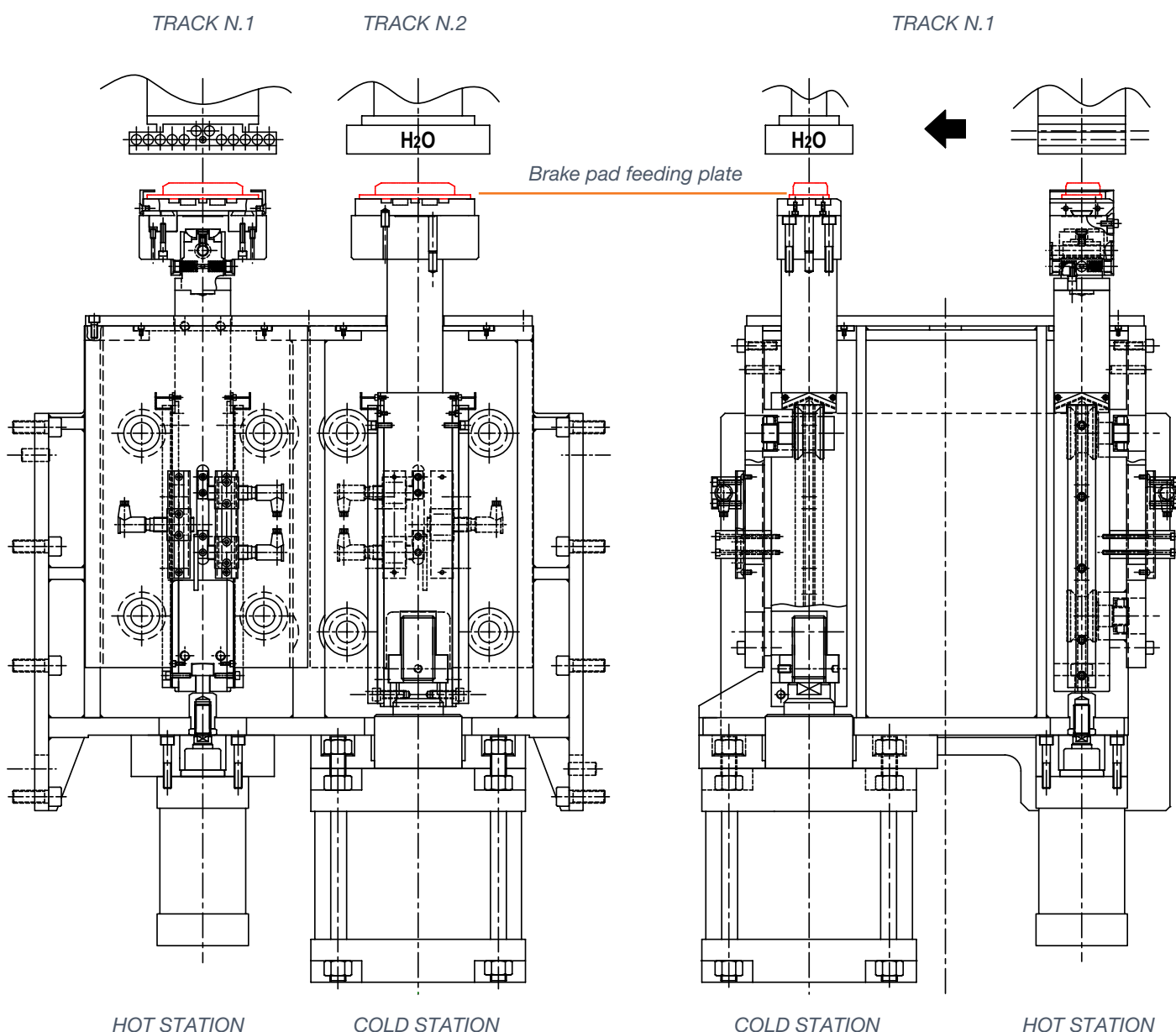
### FUNCTIONING PLANT

Overall dimensions on the ground: 5200 x 4550 x h 2400 mm, weight: ~ 8000 Kg.

### SAFETY GUARDS

Structure consisting of extruded aluminium alloy section bars, oxidised, and steel wire net gratings, provided with n°8 openings, fitted with safety microswitches with positive lock, equally distributed on the front and rear sides of the machine, in order to have direct access to the 4 working modules.

## DIAGRAM



## WORKING BRAKE PAD SIZES

LENGTH	min [mm]	60
	max [mm]	180
WIDTH	min [mm]	30
	max [mm]	70
THICKNESS	min [mm]	15
	max [mm]	30
MATERIAL	special friction mix	

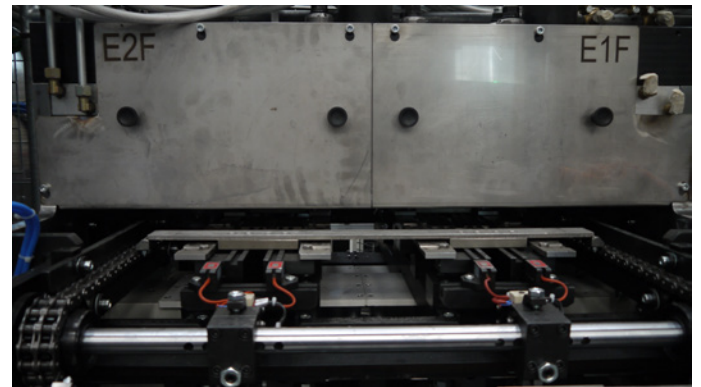
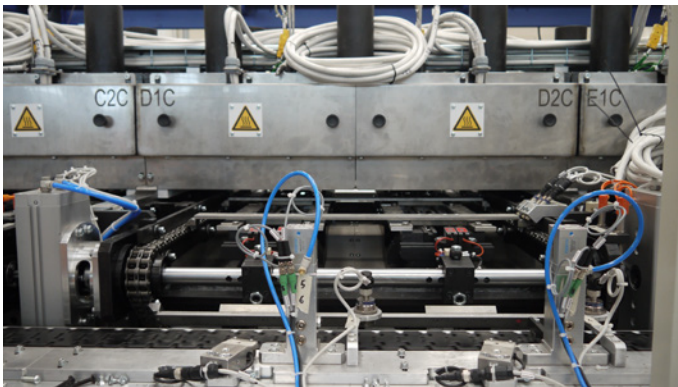


*Machined pads*

# SCORCHING MACHINE 10 WORK TRACKS

## MAIN FUNCTION

Carry out the scorching treatment on the friction surfaces of the brake pads.



## DESCRIPTION

The sequence of operations starts with the feeding of brake pads toward special stops, for buffering; then brake pads are positioned on the working surface by a tilter unit.

Next, the brake pads are drawn onto a hot-plate unit, where a pushing unit compresses them and the first scorching step is performed; in the second step the brake pads, already submitted to the previous treatment, are conveyed to the cold-plate station, where the pads are cooled and their original parallelism is restored.

The finished parts are automatically unloaded to the exit conveyor belt.

The machine is also equipped with setting controls,

which make it universal and therefore suitable to accept any type of brake pad; it is only necessary to know the part size limits.

## SPECIFICATIONS

**WORKING CYCLE**  
AUTOMATIC

**IN:** automatic brake pad feed on loading conveyor belt.

**OUT:** automatic brake pad unloading through exit conveyor belt.

The cycle time is conditional upon two factors: the first factor, quantified in 5 seconds, is characterised by



the sorting of brake pads feeding from the hot station towards the cold station, while the second factor depends on the brake pad sizes, therefore on the time required for the scorching operation, normally ranging from 30 to 60 seconds.

$$T_{tot} = T_1 + T_2 = 7 + 30 = 37 \text{ sec.}$$

(in 35 seconds, the machine can work simultaneously n°10 brake pads)

### HOURLY OUTPUT

~ 973 pcs/hour (at 100% efficiency).

### HOT STATION

Operative temperature of plates: 750° C (adjustable).

Operating pressure of plates: variable between 1000 N and 4000 N a 6 bar.

### COLD STATION

Operative temperature of plates: 25° C (obtained by circulating industrial water inside the plates).

Operating pressure of plates: variable between 5000 N and 29000 N a 6 bar.

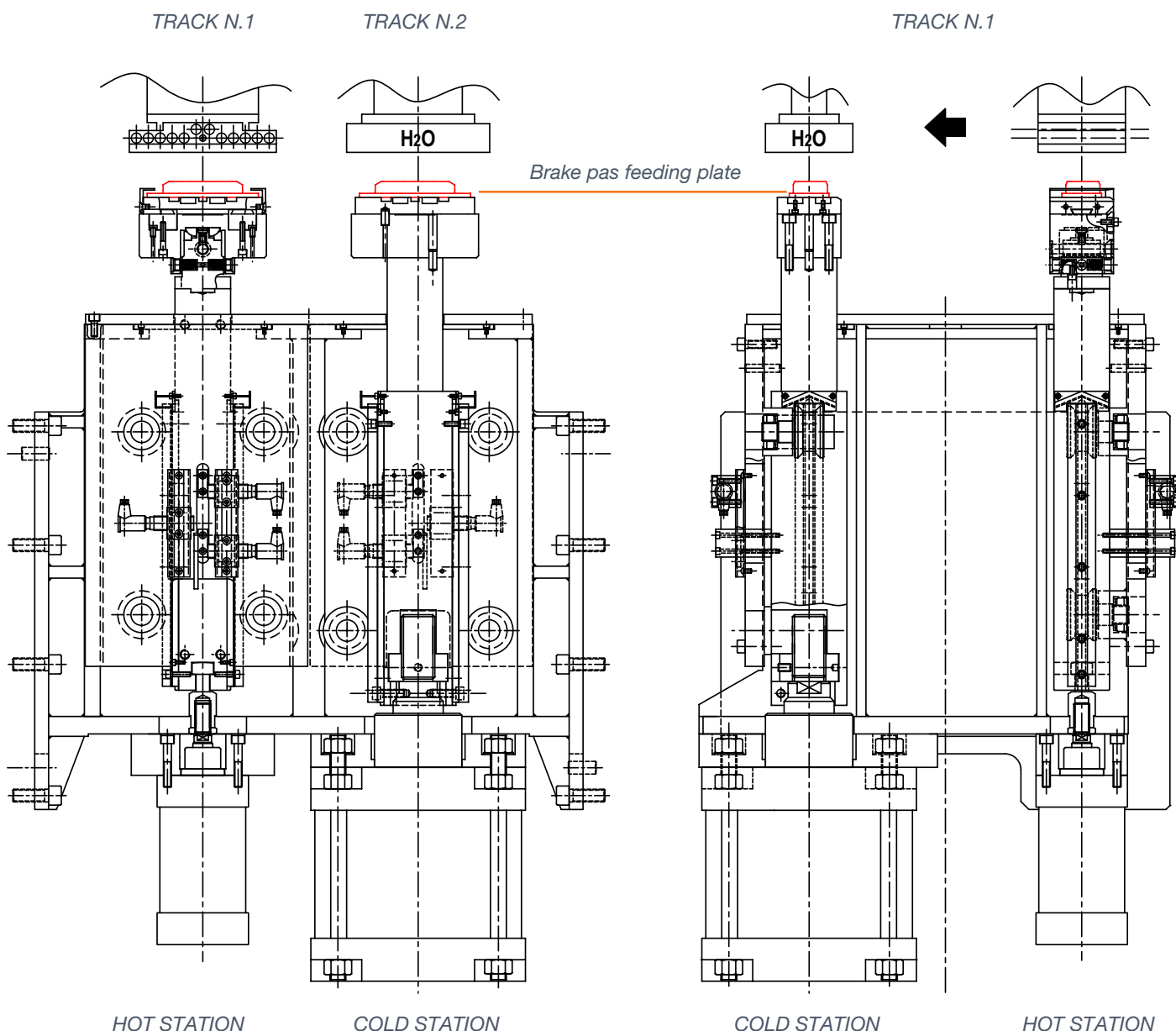
### FUNCTIONING PLANT

Overall dimensions on the ground: 6500 x 2400 x h 2100 mm, weight: ~ 15000 Kg.

### SAFETY GUARDS

Structure consisting of extruded aluminium alloy section bars, oxidised, and steel wire net gratings, provided with n°10 openings, fitted with safety microswitches with positive lock, equally distributed on the front and rear sides of the machine, in order to have direct access to the 4 working modules.

## DIAGRAM



## WORKING BRAKE PAD SIZES

LENGTH	min [mm]	60
	max [mm]	220
WIDTH	min [mm]	30
	max [mm]	110
THICKNESS	min [mm]	15
	max [mm]	30
MATERIAL	special friction mix	



*Machined pads*

# LINEA MONTAGGIO SHIM E RIVETTATURA

## MAIN FUNCTION

Carry out the shim assembly and brake pad riveting operations according to the customer's specifications



## DESCRIPTION

### The main features of the line are:

- Pallet frame to support the transporter and machinery present in the line.
- Chain conveyor with flights for brake pad tending, with "Bonfiglioli" gearmotor and inverter for speed management, brake pad loading robot, manual shim assembly stations 1 and 2 with photoelectric barrier safety, electromechanical press1 - electromechanical press2 - free station for future pad printing press or stamping machine, riveting1 - riveting2 - brake pad unloading robot and loading onto the exit conveyor.
- Brake pad loading station with robot with 600 mm stroke, 6 kg capacity.
- Station 1 for manual shim assembly on the brake pad support.
- Station 2 for manual shim assembly on the brake pad support.
- Kistler electromechanical press  $F=4000\text{kg}$ . complete with internal piezoelectric load cell and plate with electrical resistances for a temperature of  $150^\circ$ .
- Free POSTION for future pad printing press or stamping machine.
- Baltec RNE 231 type orbital riveter installed on an orthogonal table with controlled X-Y registration axis system.
- Brake pad unloading station with robot with 600 mm stroke, 6 kg capacity.
- Brake pad exit belt conveyor.
- Upstream of the finishing line there is a galvanized steel plate slat conveyor complete with pneumatic cadencer for brake pads.
- An automatic flaming device is provided on board the galvanized steel slat conveyor Teca-Print FLG201
- Line management software PLC with recipe commands on the operator panel.

## SPECIFICATIONS

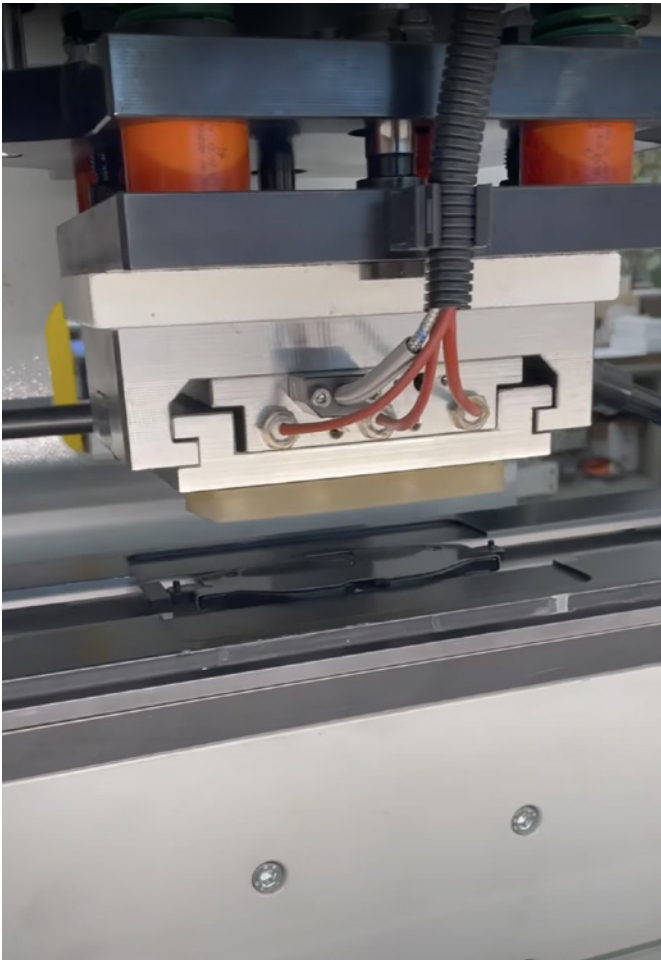
### CYCLE / SEQUENCE OF OPERATIONS

4”

### WORKING CYCLE

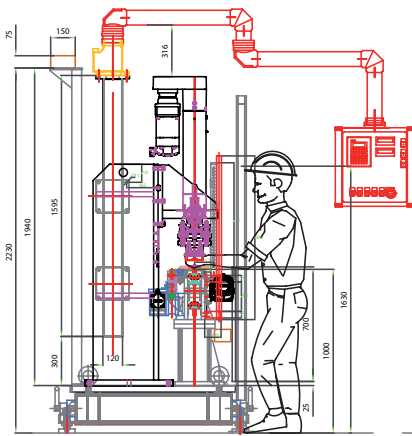
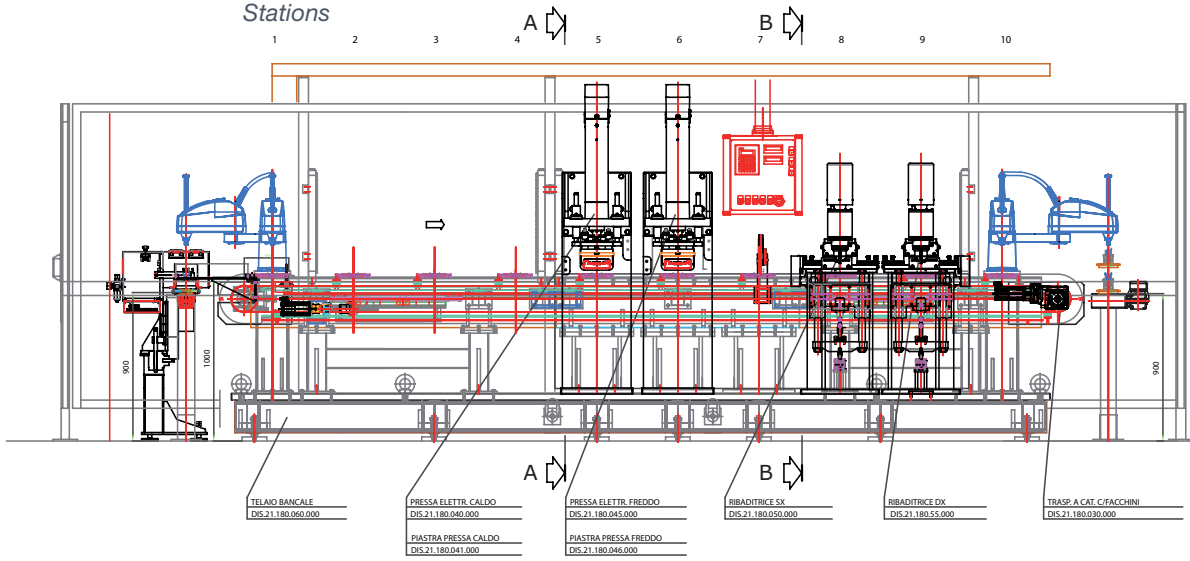
- STATION 1 = collection of the brake pad, previously subjected to the flaming treatment using the automatic Teca-Print device, on board the galvanized steel plate slat conveyor and deposit of the brake pad with a Fanuc scara robot on the finishing line conveyor.
- STATION 2 = manual assembly of the shim on the brake pad in position on the chain conveyor with flights.
- STATION 3 = manual assembly of the shim on the brake pad in position on the chain conveyor with flights.
- Advance translation of the brake pads towards the subsequent stations.

- STATION 4 = vertical pressure with electromechanical press F=4000 kg. of the shim with interface with plate with electrical resistances for temperatures of 100°.
- STATION 5 = vertical pressure with electromechanical press F=4000 kg. of the shim with interface with plate with electrical resistances for temperatures of 100°.
- STATION 6 = free for future pad printing press or stamping machine.
- STATION 7 = riveting of pin 1 on the brake pad.
- STATION 8 = riveting of pin 2 on the brake pad.
- STATION 9 = brake pad unloading with Fanuc scara robot and deposit on exit belt conveyor.
- STATION 10 = belt conveyor for the exit of processed brake pads.

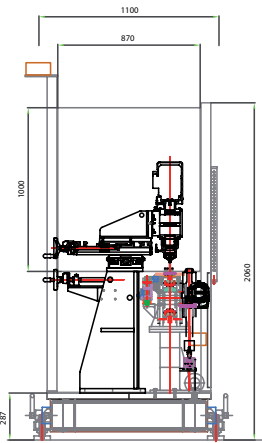


# DIAGRAM

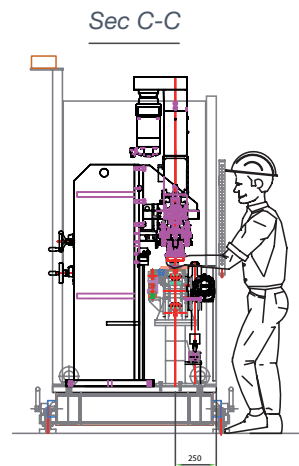
## Stations



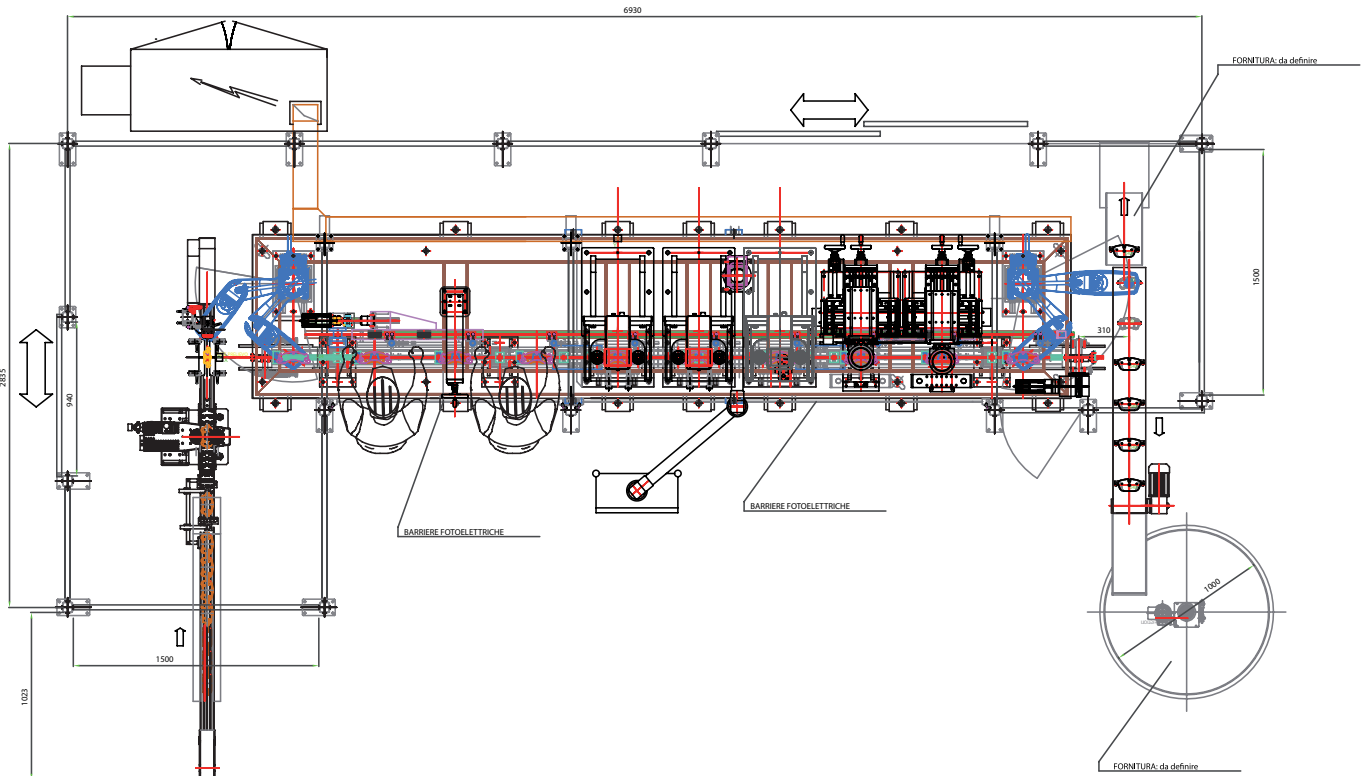
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Sec B-B



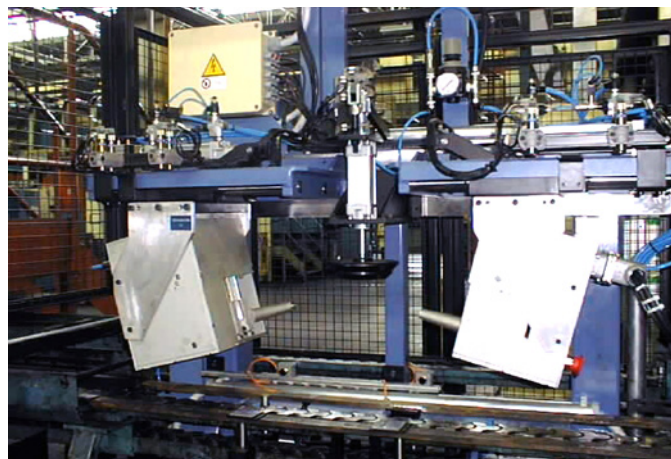
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# SPECIAL MICRO-PUNCHING MACHINE

## FUNZIONE PRINCIPALE

Is to carry out a special double marking operation, called micropunching, in two positions, 180° from each other, on the brake disk cap band, i.e. on the external surface of the zone where the brakes are attached to the hub of the vehicle.



Centering device and micropunching units

## DESCRIPTION

This special machine has been designed and built to identify and mark four different types of brake disks.

The machine is provided with a centering device that lowers onto the brake, clamps and identifies it, thus allowing two side micropunching units to mark the relevant alphanumeric sequence on the cap band.

On one side of the brake-disk cap band, the first micropunching unit (facing it) will carry out the following markings:

- an emblematic/schematic marking,
- the logo,
- a sequence of automatically updating digits indicating the production date and shift.

On the opposite side, the second micropunching unit marks its pertaining part of the cap band with a sequence of digits and letters indicating to the minimum thickness of the disk, in inches and millimetres.

## SPECIFICATIONS

### WORKING CYCLE

AUTOMATIC

**IN:** feeding on an existing conveyor belt.

**OUT:** unloading to an existing conveyor belt.

### TYPES OF MACHINED BRAKE DISKS

4 Types: Ø 227, Ø 254, Ø 257, Ø 260.

The machine can be set up for any type of disc.

**CYCLE TIME**

~ 20 sec. (12 sec for the proper micropunching operations, and 8 sec dedicated to the part handling).

**FUNCTIONING SYSTEM**

Overall dimensions on the ground: 1250 x 1000 x h 1800 mm, weight: ~ 500 Kgs.

**MARKING SYSTEM**

N° 2 micropercussion markers TIPOMATEC MM-2.

**INSTALLED POWER (whole system)**

~ 3 kW.

**SAFETY GUARDS**

Structure consisting of iron square section tubes (40 x 40 mm), 4 mm thick, complete with wire net grating (4-mm diameter wire).

N°2 access doors, one on the machine front face and one on the back, both with two hinged wings, equipped with safety microswitches with positive lock.

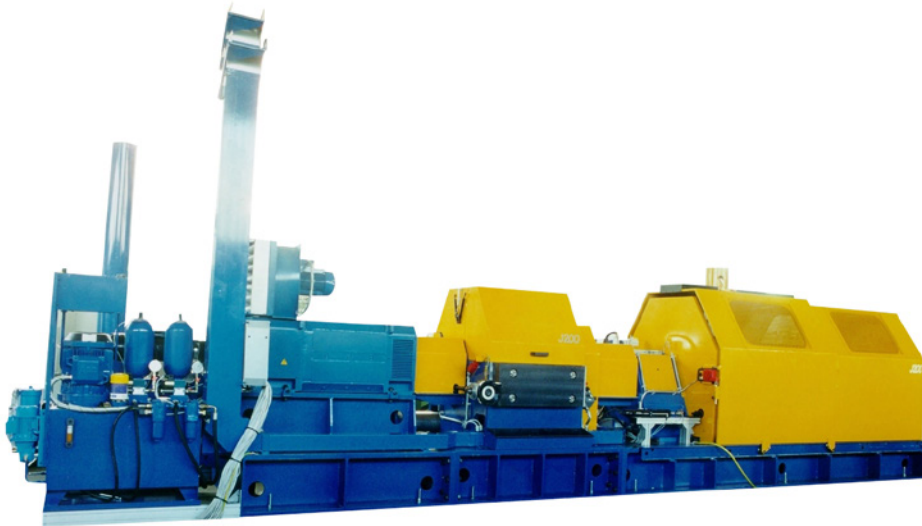
**TIPOMATEC MM-2 TECHNICAL FEATURES (micropercussion markers)**

Marking unit	GME – 78
Electronic unit	ELE – 78
Air pressure supply	0.6 MPa (6 bar)
Max air consumption at 6 bars	70 litres/min.
Supply mains	(220 V o 110 V)
Max. consumption	300 VA
Printing tip (material)	90° Widia tip, tapered
Marking time	100 linear mm / sec.
Working area	70 mm x 80 mm
Elementary feeding pace	1/10 mm
Max. stroke of the printing tip	10 mm
Tip vibration frequency (adjusted according to the tip material)	7000 shots/ min.

# DYNAMOMETER

## MAIN FUNCTION

Measure the functional characteristics of motor-vehicle brakes through a simulation of what usually happens on road, the use of parking brake included.



*Tested part*



*Tested part*

## DESCRIPTION

Moreover, it measures the static and dynamic friction coefficient of the brake pad material.

The variables that may be set at the cycle start or while the cycle is in progress, in order to run the above mentioned functions, are:

- Inertia of motor vehicle (preset at cycle start).
- Speed of motor vehicle (variable while cycling).
- Braking intensity (variable while cycling).
- Ventilation rate (variable while cycling).
- Loading on the parking brake.
- Torque applied for static and dynamic friction measurement.

The measured characteristics are:

- Braking torque.
- Brake temperature.
- Parking brake torque.
- Static and dynamic friction.

## SPECIFICATIONS

**WORKING CYCLE**  
AUTOMATIC.

### TYPE OF TESTED BRAKES

Brakes assembled to motor vehicles in the following configurations:

- a) classic assembly, brake disk and shoe, after construction of interfacing flanges,
- b) assembly of the vehicle hub, complete with brake disk and shoe, after construction of interfacing flanges,
- c) assembly complete with motor vehicle suspension, within the limits set by the dynamometer dimensions and features.

### FUNCTIONING SYSTEM

Overall dimensions on the ground (electric cabinet and overhead channels): 7500 x 2000 x h 2350 mm, weight: ~ 12000 Kgs.

### INSTALLED POWER (DRIVING ENGINE)

Steady torque till 841 r.p.m.: 1798 Nm.  
Steady-state power from 841 to 2500 r.p.m.: 175 kW.  
Minimum torque available for inertia simulation (at 2500 r.p.m.): 669 Nm.

### AVAILABLE INERTIA (RANGING FROM 9 KGM2 MINIMUM UP TO 209 KGM2)

Basic inertia, built up by all of the always present rotating components: 15.2 kgm<sup>2</sup>.

### VARIABLE INERTIA, BUILT UP BY N°4 FLYWHEELS TO BE MECHANICALLY SWITCHED ON AND OFF: 187.5 KGM2, BROKEN DOWN AS FOLLOWS:

- a) n°1 volano con inerzia: 12.5 kgm<sup>2</sup> ,
- b) n°1 volano con inerzia: 25 kgm<sup>2</sup> ,



- c) n°1 volano con inerzia: 50 kgm<sup>2</sup> ,
- d) n°1 volano con inerzia: 100 kgm<sup>2</sup> ,
- e) inerzia simulata dalla copia del motore: +/- 6.25 kgm<sup>2</sup>.

**MAXIMUM SPEED FOR ROAD TEST SIMULATIONS**  
2500 n/min.

**MAX. TORQUE MEASURED FOR ROAD TEST SIMULATIONS**  
5000 Nm.

**MAX. APPLICABLE TORQUE FOR STATIC AND DYNAMIC FRICTION MEASUREMENT AND PARKING BRAKE TESTS**  
4000 Nm (160 bars on hydraulic motor).

**MAX. ANGLE OF ROTATION FOR STATIC AND DYNAMIC FRICTION MEASUREMENT TESTS AND PARKING BRAKE TESTS**  
360°.

**MAX. LOAD APPLICABLE TO THE PARKING BRAKE CONTROL CABLE**  
2000 N.

**MAX. STROKE OF THE PARKING BRAKE CONTROL DEICE**  
50 mm with position control + 50 mm overtravel.

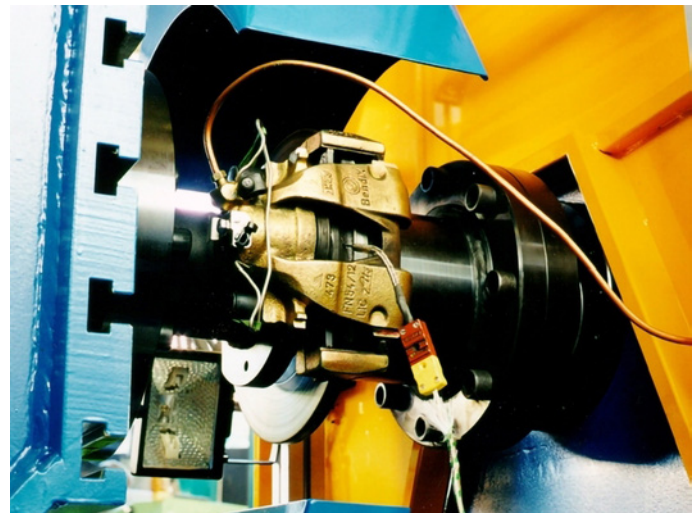
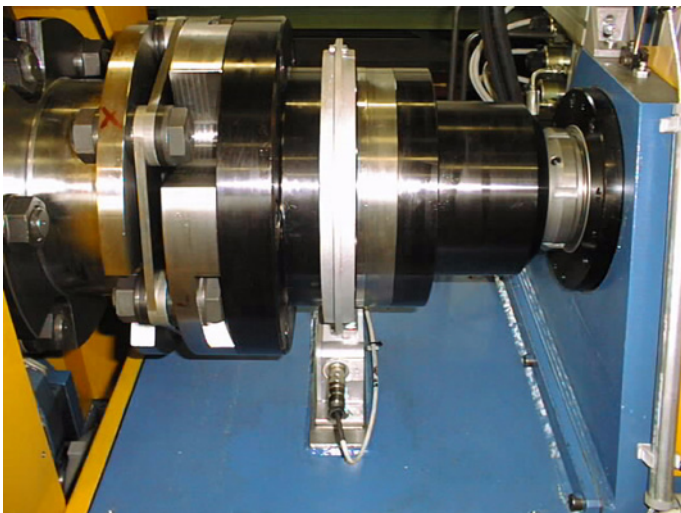
#### **SAFETY GUARDS**

In the brake testing area: fixed and movable (sliding) guards made of sheet metal, provided with safety microswitches with positive lock.

In the torquemeter area: fixed sheet-metal guards.

Inertia flywheel set: movable guards (gull-wing opening) made of sheet metal and provided with safety microswitches with positive lock.

For protection of the clutch connecting the drive unit the flywheel set, some fixed safety guards of sheet metal are installed.



*Torquemeter unit and brake testing area*



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