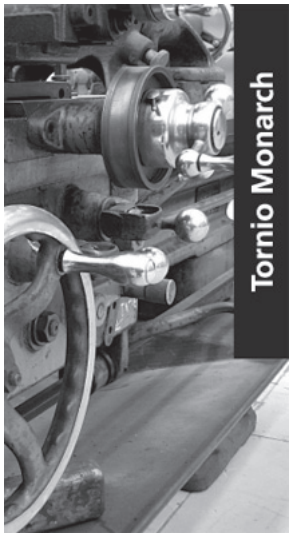


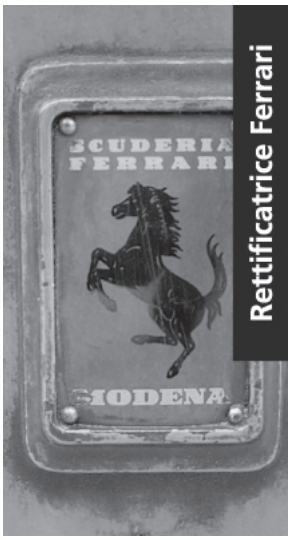
Tornio Monarch

Mola

attrezzeria

Fresa Maserati

Nel 1937 la famiglia Orsi, già proprietaria delle Acciaierie e Ferriere di Modena, acquistò dai fratelli Maserati la loro fabbrica di automobili da corsa e il relativo marchio. Successivamente, durante il periodo bellico, decise di diversificare la produzione nel settore delle macchine utensili con la costruzione di fresatrici. Negli stessi anni i fratelli Orsi fondarono la "Maserati Candele e Accumulatori", per la produzione di motori a scoppio, nella vecchia cintura industriale di Modena. La produzione di macchine utensili proseguì fino alla prima metà degli anni Sessanta, quando l'attività venne ceduta alla Oerlikon, azienda della Svizzera tedesca. Questa fresatrice orizzontale ha subito negli anni una trasformazione: da macchina che costruiva pezzi unici, è stata adattata alla produzione in serie tramite l'inserimento di un braccio idraulico (attualmente non presente).
È stata segnalata presso la ditta Eredi Mori Elio S.r.L., di Sambuca Pistoiese (PT), e da questa donata al Museo Laboratorio di Officina Emilia il 17 aprile 2007.

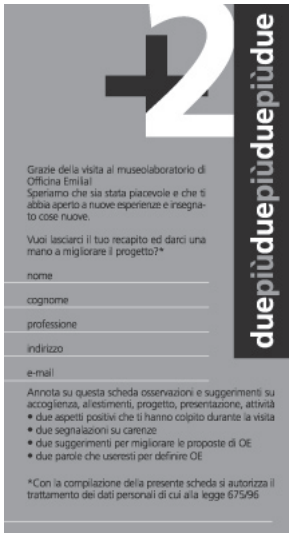


Rettificatrice Ferrari

innovazione

Fresatrice Induma

Sega Opus



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Schede imbullonate - english version

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From A to Z
This part of the display recalls the many visits Officina Emilia made to mechanical engineering firms in the Modena area.
We have put together a series of recollections that form a kind of logbook which you can explore from A to Z.
... *and for the little ones*: only safe games are within their reach!

Touching is strictly allowed!
Touch and feel with your hands how smooth, heavy, rough or delicate it is.
Handle with care and then place it back on the shelf you took it from, or in the trolley with other pieces to be returned.

What is it?
If you want to know more about a particular object, you can write its code number on this form. You will find the code number on its label. Afterwards, you can look the object up in the digital logbook: photos, drawings, technical descriptions, interviews, videos and poems document each piece, telling us what it is and how it got here.

|.....|.....|.....|

|.....|.....|.....|

|.....|.....|.....|

|.....|.....|.....|
shelf number description

Please don't take our pieces away with you. You will be presented with a souvenir of your journey at the end of your visit!

If you have any objects that you think can complete our logbook, we would be delighted to add them to our collection. Such objects tell the story of those who donated them. When one story is added to another the result is history.

Logbook

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Welcome to the Tooling Workshop!

Here you will find not only tools (from the adjustable spanners and screwdrivers you will discover in the drawers, to the bench vices), but also machines which still work.

In mechanical engineering firms, the tooling workshop is a very important place: it is used for carrying out precisely defined operations, for constructing or fine-tuning a prototype, for repairing a component part and, at times, for studying problems and finding practical solutions. This is why, even in firms that use computer-aided design and manufacturing procedures, there is always a tooling workshop.

In the tooling workshop you can see mechanical parts being made; understand how the tooling machines work; follow the manufacturing cycle phase by phase; see how a technical drawing is used to set up and programme a machine. You will also learn the meaning of the words “safety at work”.

The tooling workshop is an area where “manual” or “manufacturing” (handcrafting) work is carried out. In other words, work is done here “by hand”.
You too can gain “hands-on” experience: there are tools and materials for you to pick up and use to give shape to your drawing.
So many activities await you and will teach you about metals and how they are tooled. You can also create unique pieces of your own.
Remember: nobody expects you to work on your own. There is always an expert to help you.

Warning!
You are asked to move with extreme caution in this room and to exercise a sense of responsibility: what you see here is intended to be entertaining, but it is not a game.

Tooling workshop

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How accurate is the machining work?
Come into the metrology department and you will find out.

In the tooling workshop you saw machining operations and were given a piece produced on the lathe. In the metrology workshop you will be able to take readings, measuring the inevitable "mistakes" to see if they come within the limits (tolerances) acceptable for production purposes.

In mechanical engineering it is essential to carry out checks with the proper measuring instruments. Here you can use a number of these instruments – both analogue and digital, with various degrees of precision – that have undergone technical changes similar to those that have marked the development of machine tools.

Apart form measuring the size of the pieces, checks are also carried out on the materials to test features such as hardness, roughness, smoothness and so on. There are also more intuitive methods, which are just as valid, and ways of making more accurate readings thanks to digital instruments.

Try to make good use of the instruments and treat them with respect: only if they are in good condition will your measurements be exact. Of course, it will also depend on your skill in measuring!

Metrology

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Who creates innovation? How do you set about innovating? How much time do you need to innovate? Why do people innovate?
The story we want to tell you is about what happens when people with different skills in different places come together and start dreaming, how their dreams are turned into technology, and how that technology changes the way we live.

Innovation is not just a technical process, but a social and economic one.

Innovation is generated in many places: in manufacturing industry, in scientific research, in the design sector, in distribution networks. It responds to problems or creates new needs and opportunities.
Innovation is not just the fruit of one person's work. To innovate you need many skills: technical, scientific, economic, managerial and organisational skills.
Innovation can take a couple of months or years, sometimes decades.

Who set up this space?
To stimulate interest, enthusiasm and, who knows, also love for the innovation process, we decided to set up this showcase, working in tandem with all kinds of innovators: mechanical engineering firms, research centres, university laboratories, service centres and schools. Our mission is to light fires in young minds and hearts.

Innovation

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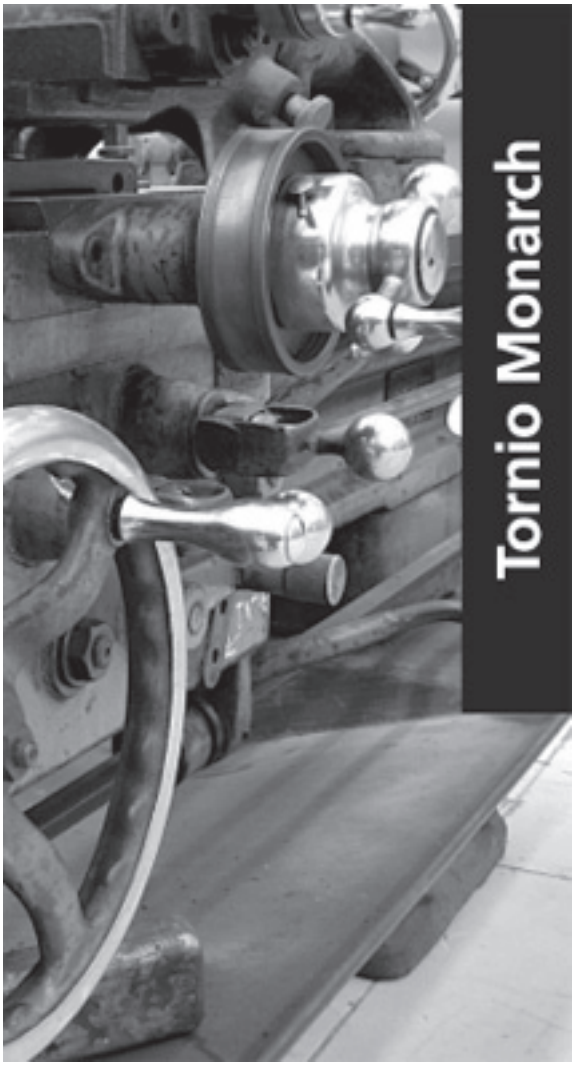

This imposing lathe, produced in August 1942 by *The Monarch Machine Tool Co.*, Sidney, Ohio, USA, came to Italy with the American Armed Forces during the Second World War. At the end of the war, the lathe was left in Modena by the Americans and moved to the Industrial Technical Institute *Fermo Corni*.
Here it was converted from the Imperial to the Metric system and was modified for teaching purposes. The lathe was put up for auction by the school and was acquired by *AFS Tech* of Modena in the year 2000. Maintained in working order by this firm until 6 November 2006, it was transferred to Officina Emilia in exchange for another lathe owned by the Engineering Faculty of Modena University.

The **parallel lathe** is a machine tool for making solids of revolution, in other words solid shapes that are obtained by rotating a flat figure about an axis.
It transfers rotational movement about an axis to the piece being **machined**. This piece is mounted on a **spindle**. A **cutting tool**, mounted on the **tool post**, is moved along a straight or curved line. The cutting tool enters into contact with the material being machined, steadily removing material to form a shape. The part that is removed can be in the form of **chips** or ringlet-shaped **shavings**.

Machine type Monarch Parallel lathe
Serial/Model 16"W
Year of production August 1942
Producer The Monarch Machine Tool Co., Sidney, Ohio, U.S.A.
Customer US Army
Last owner AFS Tech
Last location Modena
Overall size and weight 3000 mm x 1300 mm x 1350 mm / 4000 kg
Drive electrical
Engine output 4,41 kW
Equipment centre / dead centre
Further technical data swing over bed: 225 mm / distance between centres: 1370 mm
Machining processes turning and threading
State good
Modifications converted to metric and made to comply with on/off safety standards

Monarch Lathe

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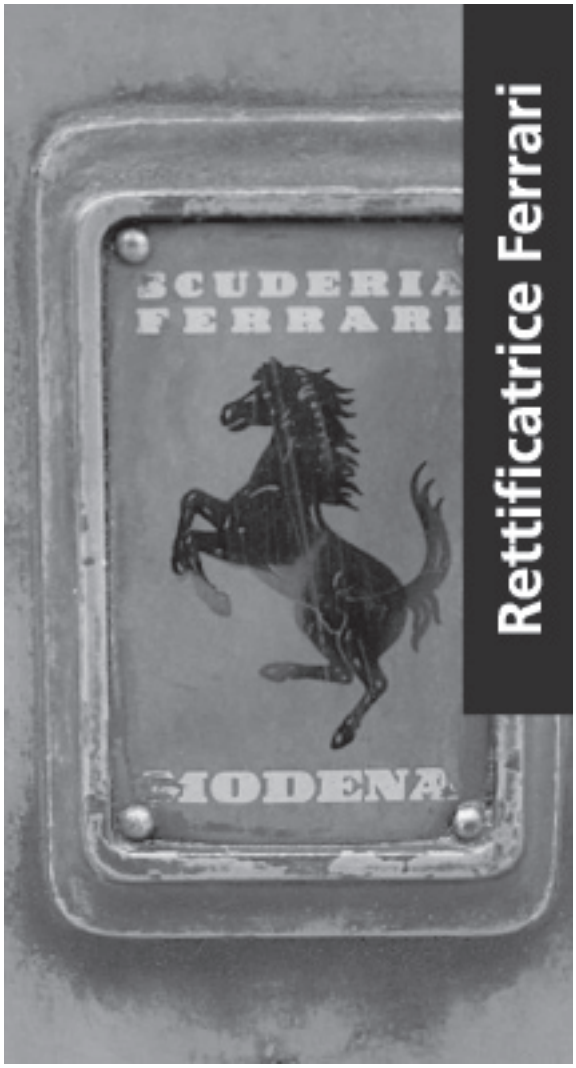

This grinding machine was produced in limited numbers during the Second World War by the firm *Auto-Avio Costruzioni Ferrari*, initially at its Modena plant in viale Trento Trieste. A tangential grinding machine by the German firm *Fortuna*, it is one of the few examples of a machine tool produced by Enzo Ferrari. In 1943, the *Auto-Avio* factory moved to Maranello. The firm discontinued production of machine tools in 1951, concentrating exclusively on car production.
This machine is owned by the *Fondazione Casa di Enzo Ferrari Museo*, and was kindly donated to the Enzo Ferrari House/Museum Foundation by Demetrio Medici of FPM Ltd., Scandiano (Reggio Emilia). It is on loan to Officina Emilia.

Capable of obtaining high-precision lines and edges, the grinding machine is used for **finishing** on jobs where **tolerances** are minimal. The tooling part, called the **grinding wheel**, has tiny abrasive grains and can remove minute shavings or chips. Hence it is also used for smoothing surfaces.
The grinding wheel rotates about its own axis in contact with the piece being machined, performing an abrasive action.

Machine type Ferrari hydraulic surface grinding machine
Serial/Model P600
Year of production 1942
Producer Ferrari Auto-Avio Costruzioni Modena
Last owner FPM Ltd.
Last location Scandiano (MO)
Overall size and weight 2500 mm x 1600 mm x 2000 mm /1200 kg
Drive transversal (worktable): hydraulic/mechanical (all others)
Engine output 1,10 kW
Equipment grinding wheel, electromagnetic chuck/aspirator
Further technical data worktable stroke: transversal 500 mm / longitudinal 200 mm / vertical 180 mm; max revs: 2800 rpm.
Machining processes grinding
State fairly good
Modifications none

Ferrari grinding machine

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Maserati milling machine

In 1937 the Orsi family, the former owners of the Modena Steel and Ironworks, acquired the racing car factory and related brand from the Maserati Brothers.
In 1939 the firm began producing universal milling machines under licence to the Swiss firm *Oerlikon*, a machine tool constructor renowned for the quality of its products. Maserati built over 200 milling machines of this type before production ceased in the '60s and the firm focused all its efforts on the automobile sector.
This horizontal milling machine, brought to our notice by Engineer Roberto Guidotti, was donated to Officina Emilia by *Eredi Mori Elio Ltd.*, Sambuca Pistoiese (Pistoia), on 17 April 2007.

The **milling machine** is a machine tool which removes shavings or chips by means of a **rotating tool** with several cutting edges (**milling cutters**). As it turns about its own axis, the milling machine enters into contact with the block being machined, cutting material as it moves.
Suitable to working on a variety of surfaces, the milling machine is the most **versatile** tool for machining metal. This machine always maintains a rotary movement, which is where it differs from the lathe. With the lathe, the machine tool translates and the piece being machined rotates about its own axis.

Machine type Maserati horizontal milling machine
Year of production 1950
Producer Officine Alfieri Maserati
Last owner Eredi Mori Elio
Last location Sambuca Pistoiese (Pistoia)
Overall size and weight 1700 mm x 1500 mm x 1700 mm / 3000 kg
Drive mechanical
Engine output 5 kW
Further technical data worktable stroke: transversal 500 mm / longitudinal 230 mm / vertical 250 mm
Machining processes milling
State poor
Modifications adapted to mass production via hydraulic arm (now missing)

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The **milling machine** removes shavings or chips using a **rotating tool** with several cutting edges (**milling cutters**). As it turns about its own axis, the milling machine enters into contact with the block being machined, cutting material as it moves. Suitable to machining a variety of surfaces, the milling machine is the most **versatile** metalwork tool. This machine always maintains a rotary movement, which is where it differs from the lathe. With the lathe, the machine tool translates and the piece being machined rotates about its own axis.

Machine type Induma milling machine
Serial/Model 1U-CE
Year of production 1967
Producer Induma gse Ltd.
Last owner Engineering Faculty, Modena
Last location Technical office, University of Modena and Reggio Emilia
Overall size and weight 1600 mm x 600 mm x 1900 mm / 1700 kg
Drive electrical and mechanical
Engine output 4 kW
Further technical data worktable stroke: transversal 500 mm / longitudinal 500 mm / vertical 400 mm; max revs: 1500 rpm.
Machining processes milling
State good

Induma milling machine

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The bench grinder is a machine tool used for polishing, deburring, and sharpening by hand. The tool itself, which is also called the grinder, is very similar to that used for finishing: it is a disk of abrasive material which is made to rotate about its own axis. The operator brings the piece into contact with the rotating abrasive disk, and the piece is ground. Two tools are usually mounted on the grinder: one is fine-grained and the other coarse-grained. The jobs carried out include: chamfering edges; removing flashes left by machining; sharpening blades and drill tips.

Machine type grinder
Year of production ‘40s
Last owner Engineering Faculty, Modena
Last location Technical office, University of Modena and Reggio Emilia
Overall size and weight 1150 mm x 600 mm x 360 mm / 70 kg
Drive electrical
Engine output 1,10 kW
Further technical data none
Machining processes grinding and deburring
State fairly good
Modifications none

Grinder

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Sega Opus

The **vertical saw** is a machine tool for cutting a block of material. The operative part is a toothed **blade**, in the vertical position, moved up and down by an electric motor. As the machined piece comes into contact with the blade's teeth, shavings are removed and a cut is left.

Machine type Opus vertical saw
Serial/Model 400
Year of production 1971
Last owner Engineering Faculty, Modena
Last location Technical office, University of Modena and Reggio Emilia
Overall size and weight 1850 mm x 700 mm x 970 mm / 1000 kg
Drive electrical
Engine output 1,10 kW
Further technical data blade width 3 to 15 mm
Equipment none
Machining processes cutting
State fairly good
Modifications none

Opus vertical saw

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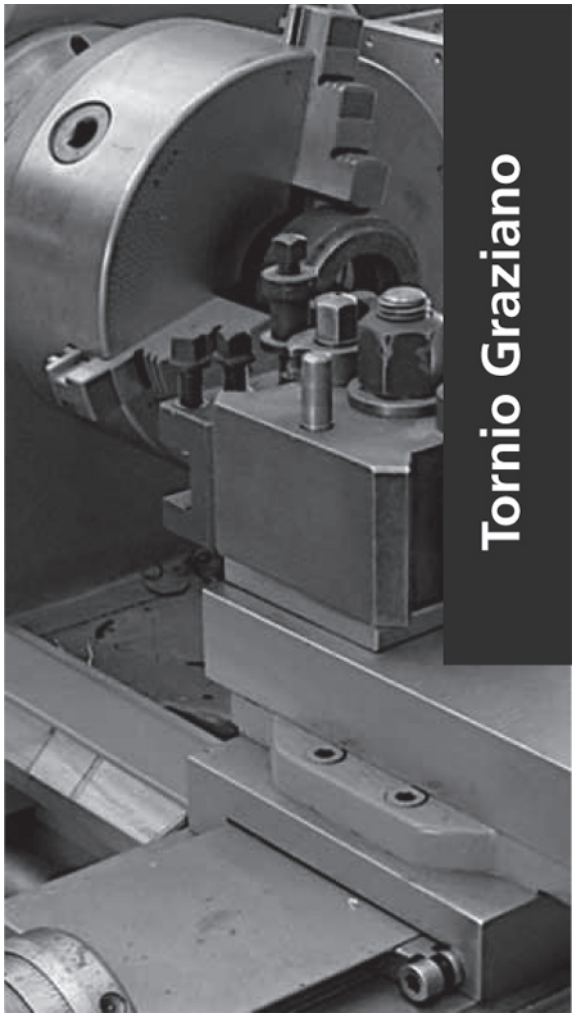

The **parallel lathe** is a machine tool for making solids of revolution, in other words solid shapes that are obtained by rotating a flat figure about an axis. It transfers rotational movement about an axis to the piece being machined. This piece is mounted on a **spindle**. A **cutting tool**, mounted on the **tool post**, is moved along a straight or curved line. The cutting tool enters into contact with the material being machined, steadily removing ringlet-shaped **shavings**.

Machine type Graziano Parallel lathe
Serial/Model Sag 12
Year of production 60s-70s
Producer Graziano & C. Ltd
Last owner Moreno Macchine Utensili
Last location Modena
Overall size and weight 1158 mm x 1830 mm x 804 mm / 1200 kg
Drive electrical
Engine output 2,21 kW
Equipment centre / dead centre
Further technical data swing over bed: 153 mm / distance between centres: 800 mm / max revs 2000 rpm
Machining processes turning and threading
State good
Modifications compliance with on/off safety standard

Graziano paralle lathe

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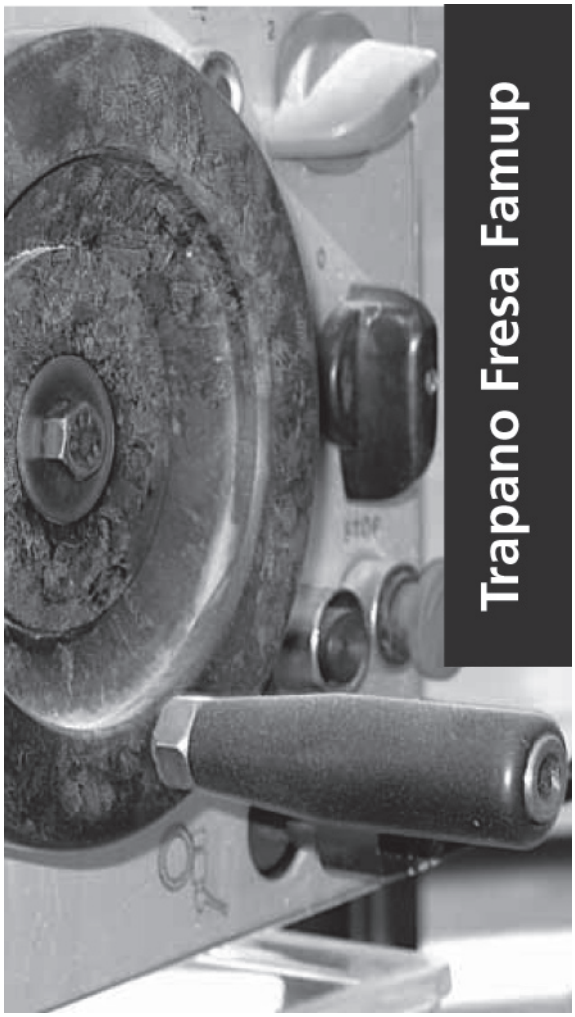

Trapano Fresa Famup

The **drilling milling machine** is a machine tool that (as its name suggests) both drills and mills. In either case, a tool is mounted: either a **twist drill** or a **milling cutter**.
The tool rotates about its own axis while feeding along that axis in a straight line. In addition to these movements, typical of a traditional drill, with the drilling milling machine the worktable on which the piece is mounted can be moved along three axes. In this way, more varied tooling is possible than is the case with the simple drill.

Machine type Famup drilling milling machine
Serial/Model TCS 40
Year of production 1983
Producer Famup Macchine Utensili
Last owner Moreno Macchine Utensili
Last location Modena
Overall size and weight 1985 mm x 1445 mm x 1300 mm / 700 kg
Drive electrical
Engine output 1,8 kW
Equipment conical tool-holder
Further technical data balancing worktable
Machining processes drilling and milling
State good
Modifications compliance with on/off safety standard

Famup drilling milling machine

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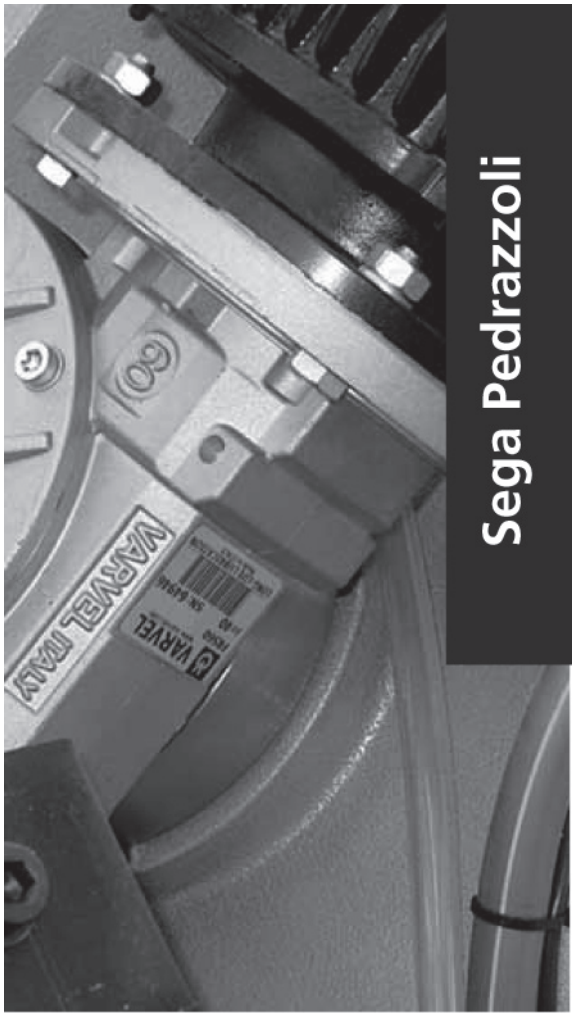

The **horizontal band saw** is a machine tool used for **cutting** a block of material. The tool is a continuous and flexible toothed band of metal driven by a motor. As the piece comes into contact with the tool, the saw's teeth remove material in the form of burrs or shavings, performing a cut. The band saw cuts much faster than a traditional blade, achieving a cleaner surface finish. Thanks to the thinness of the band itself, less material is wasted.

Machine type Pedrazzoli band saw
Serial/Model SN 255
Year of production 2006
Producer Pedrazzoli IBP
Last owner Moreno Macchine Utensili
Last location Modena
Overall size and weight 1450 mm x 1500 mm x 1870 mm / 275 kg
Drive electrical
Engine output 0,75 kW
Further technical data Band width: 19 mm / length: 2500 mm / thickness: 0.9 mm
Equipment none
Machining processes cutting
State good
Modifications compliance with on/off safety standard

Pedrazzoli band saw

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How is it possible to design a metal object and instruct a machine to produce it?
The computer-controlled lathe is a parallel lathe whose work sequences are memorized by a computer so as to produce a piece automatically by means of special software programs.
It has several advantages over a traditional lathe: the pieces are all identical, take the same time to produce and can be made without a manual operator. All this means that production costs can be kept down.
This does not mean, however, that computers can replace the skilled operator. It means that with computer-controlled operations, skilled craftsmen can develop more varied and rewarding work patterns.

How come this space is still empty?
We wanted to exhibit a computer-controlled machine in this space, but we couldn't decide on the right one. We don't need a lathe that just "produces the parts", but a "real" machine, one that can help our young visitors to find out for themselves what it feels like to program a lathe to produce metal objects.

If you think you may have what we are looking for, please don't hesitate to let us know. That way, the young people who visit museumworkshop Officina Emilia will soon have the chance to start turning pieces.

Computer-controlled lathe

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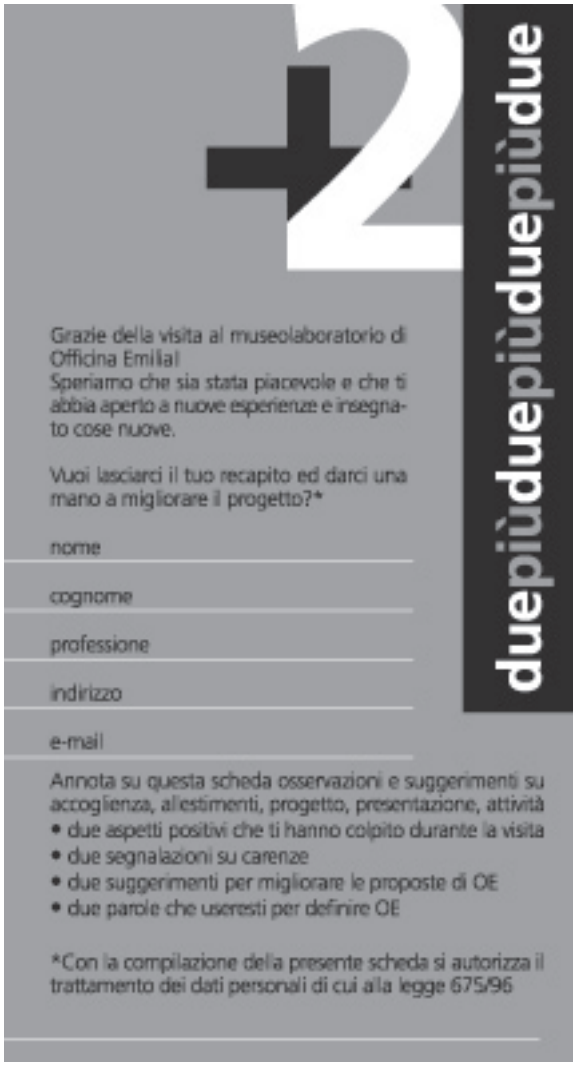

We hope that you have enjoyed your visit to Officinia Emilia's *museumworkshop* and that it has opened your mind to new experiences and taught you things you didn't know before.
Will you please leave us your details and help us to improve the project?*

First name.....

Family name.....

Occupation.....

Address .....

e-mail address .....

Please write any comments or suggestions you may have on the back of this form. This will help us to understand what you thought about the way you were received, the museum lay out, the project itself and how it was presented, plus the activities you were involved in. We would like you to tell us:

• two positive things that struck you during your visit

• two things you think are lacking

• two improvements you think we could make to the OE project

• two words you would use to describe OE

Two positive things

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Two things you think are lacking

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Two improvements we could make

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Two words to describe the OE project

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We really appreciate your help!

*By filling in this form you give us permission to process your personal information in accordance with Italian law 675/96

2+2+2+2

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