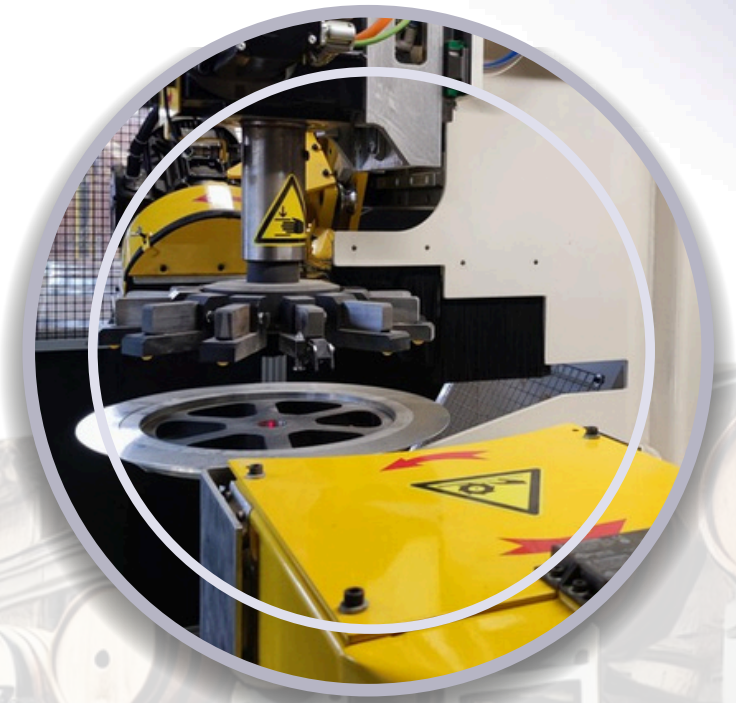
Head cutting machine

MARIAUD CONSULTING



Our Program

Head cutting machine

01 Description

Role of the Machine

The head-cutting machine is an essential machine in cask-making.

It machines the barrel head in two successive operations:

- **scribing** (cutting the head to the exact diameter required to match the croze)
- **beveling** (chamfer machined around the entire edge of the head, allowing it to fit precisely into the croze)

The goal is to obtain a perfectly fitted head, whose bevel matches the croze groove along its entire circumference, thereby ensuring the barrel's watertightness at these joints.

Operating Principle

The head is held in place against a rotating table, which drives it in rotation at constant speed.

The tools remain fixed: it is the head that rotates against them, allowing regular, continuous machining around the entire circumference.

Tool Composition

- **A scribing tool:** circular saw, spindle moulder, or band saw depending on the machine version, used to cut the head to the exact diameter.
- **A spindle moulder with profiled cutter:** used to cut the bevel around the entire edge of the head.
- **A rotating table:** the support surface on which the head rests during machining.
- **Clamping dogs:** a clamping system ensuring correct positioning and holding of the head while it rotates.

Head cutting machine

01 Description

The head-cutting machine is generally positioned close to the heading-up station, in line with the production flow.
It exists in several configurations:

- **Horizontal or vertical**, depending on the orientation of the rotating table.
- **Two-stage machining**: a first tool scribes the head to the correct diameter, a second cuts the bevel.
- **Single-tool machining**: a single tool performs both operations simultaneously, scribing and beveling.

Fondos ensamblados y cepillados/enrasados

Heads out of the head-cutting machine

Example of the bevel obtained

Head cutting machine

01 Description

Manual and Digital Versions

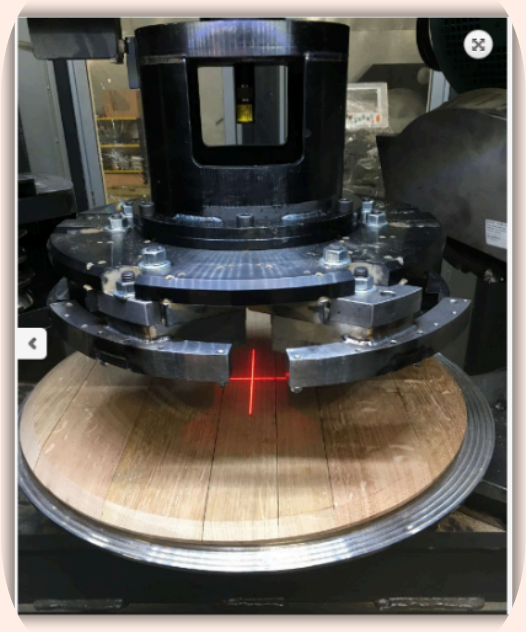
The head-cutting machine exists in a manual or digital version:

- **Manual version:** the operator feeds the head into the tool using adjustment handwheels, manually controlling the depth and feed rate.
- **Digital version:** the machining parameters are recorded once. The operator positions the head on the table and the machine performs the machining autonomously.

➡️ **Advantage:** time savings and increased precision.
➡️ **Disadvantage:** higher investment cost and more technical maintenance.

Machining Parameters

The cooper distinguishes three characteristics in bevel machining:



Machining type

- **Pointed:** the bevel ends in a sharp angle.
- **Square:** the bevel has a flat surface at the cutting edge.

Distribution of the bevel within the head's thickness

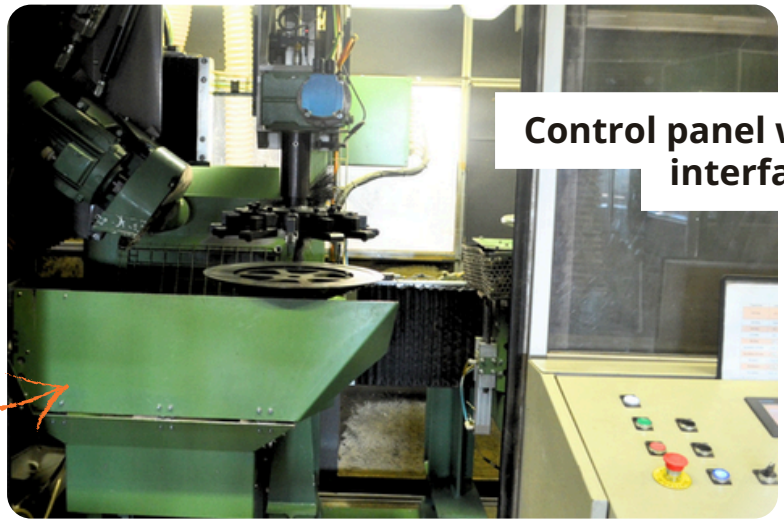
- **1/3 - 2/3:** the bevel is distributed asymmetrically within the thickness of the head.
- **50/50:** the bevel is centered, distributed equally on both sides.

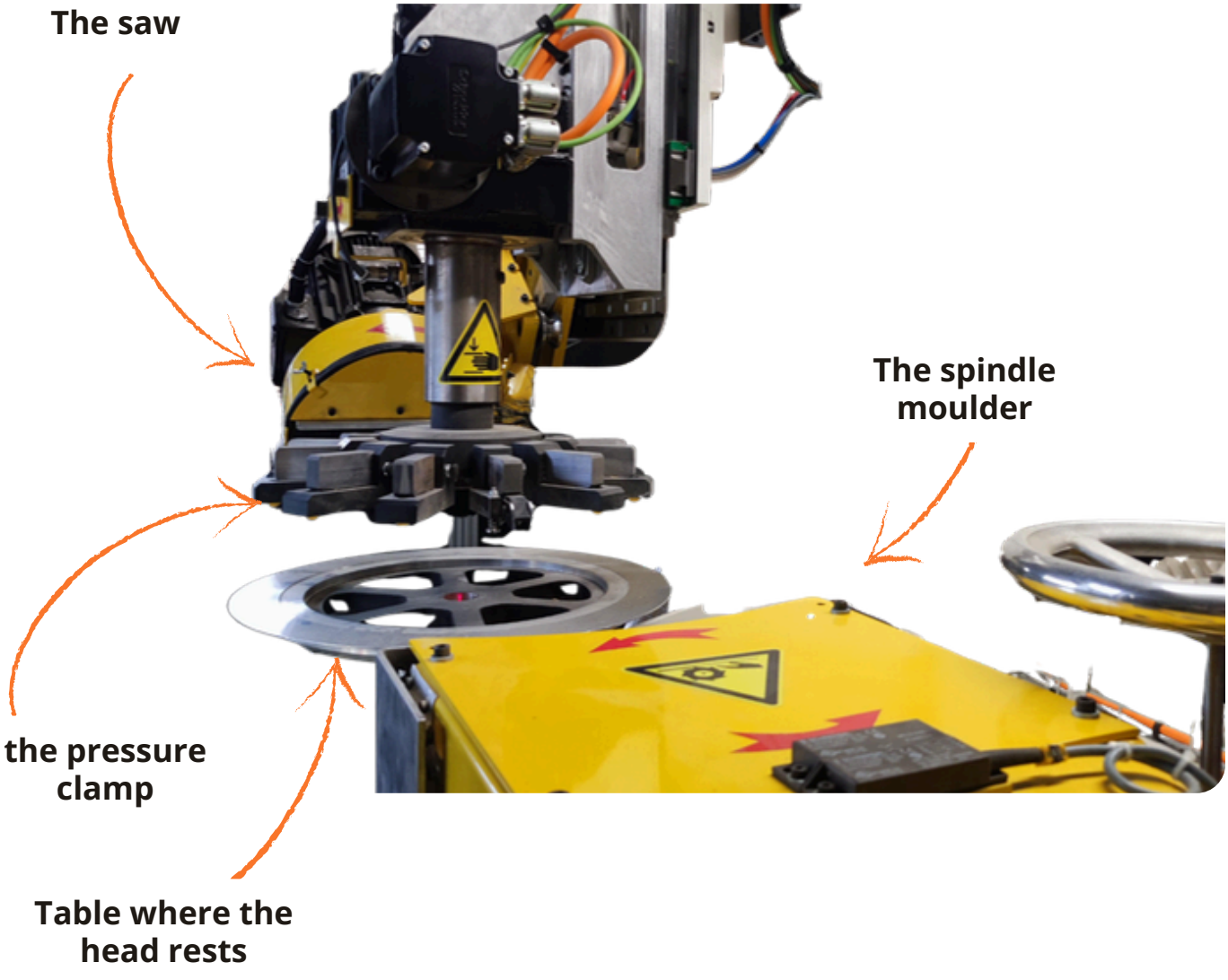
Head shape

- **Round:** standard circular-shaped head.
- **Slightly oval:** head with a slight ellipse.

Head cutting machine

02 Terminology





Head cutting machine

02 Terminology

Table where the head rests

LThe table is the surface on which the head rests during machining. It consists of a **central base** mounted on a **freely rotating axle**. Rings of **different diameters** are attached to this base, allowing the machine to be quickly adapted to the size of the head being machined.

The base = small central table, freely rotating, fixed to the axle.

The rings/discs = interchangeable pieces that attach to the base according to the diameter of the head.

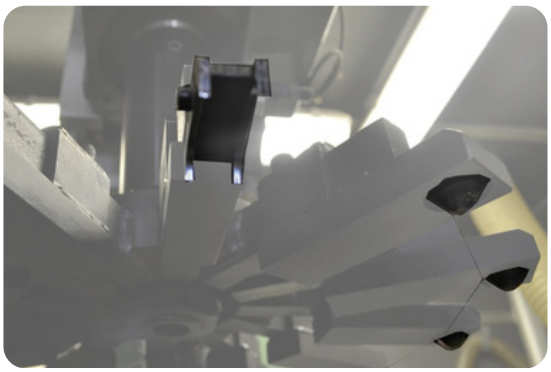
Head cutting machine

02 Terminology

The presser:

The clamps form a multi-arm structure which, driven by a cylinder, **clamps and holds** the head in position throughout the entire machining cycle.

Two clamps are specifically reinforced at the chanteaux. These areas correspond to the two ends of the head, made up of smaller pieces**, where machining begins against the grain:** holding force is therefore particularly stressed at these points.



Head cutting machine

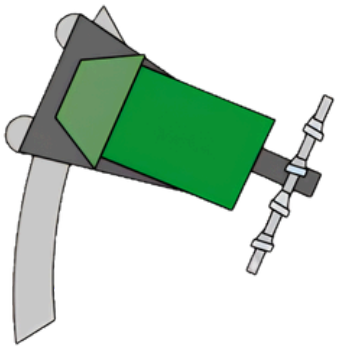
02 Terminology

The saw:

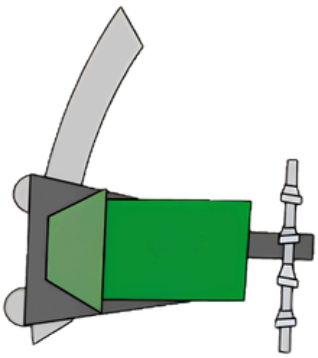
The Scribing Tool

The scribing tool is **a saw** with teeth or interchangeable inserts.

It is mounted on a **cam system** that controls its gradual entry into the wood: the tool descends along a radius until it reaches its lowest position, where the saw ends up perpendicular to the head to complete the cut.



Tool in raised position

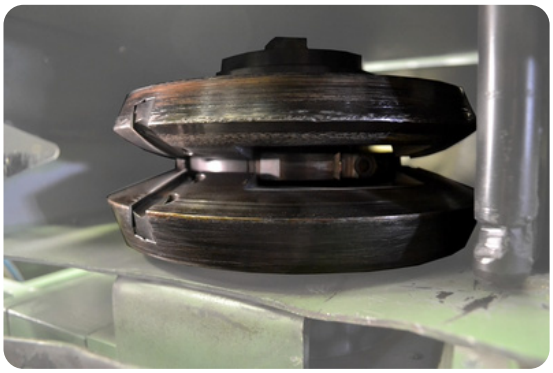


Tool in lowered position, i.e. cutting position.

Head cutting machine

02 Terminology

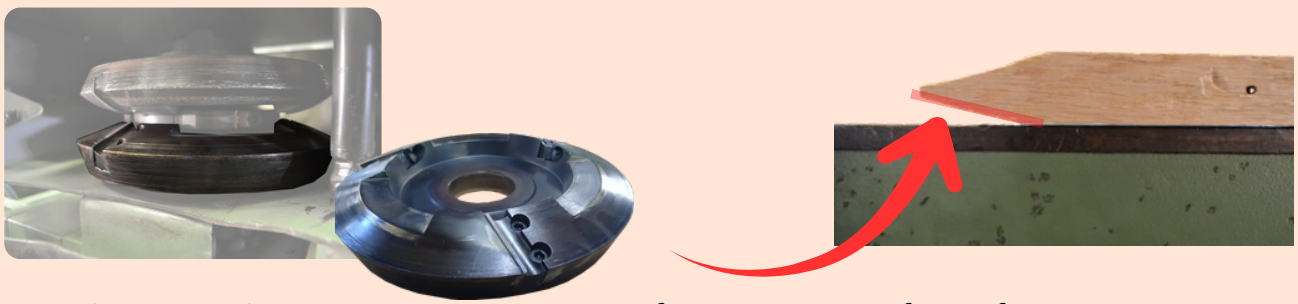
The spindle moulder tool



The spindle moulder tool consists of **three distinct parts**:

The curved cutter: machines the main bevel, slightly rounded or straight depending on the setting, allowing the head to fit into the croze.

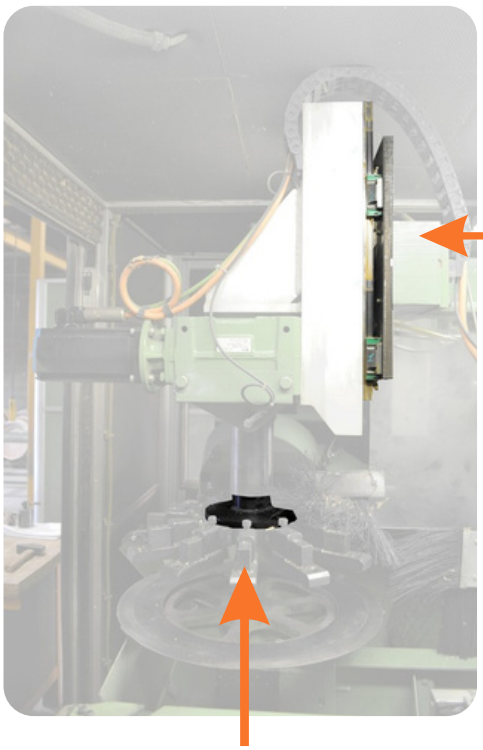
The squaring cutter: machines the edge of the head with a square cut. Retracting it produces a pointed cut.



The lower tool: creates the straight chamfer on the outer face of the head.

Head cutting machine

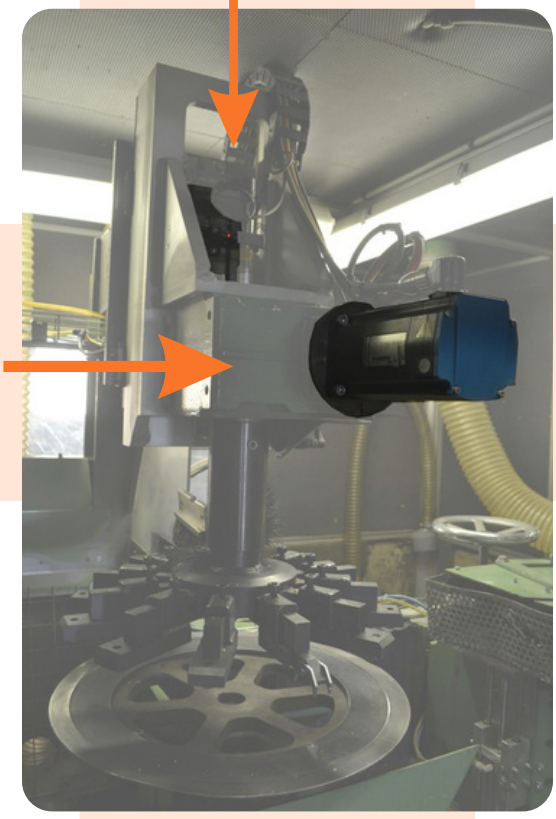
02 Terminology



Connection between the cylinder and the clamps

A system of slide rails ensures the vertical guiding of the clamps, allowing them to rise and lower precisely and in a controlled manner during the clamping and releasing of the head.

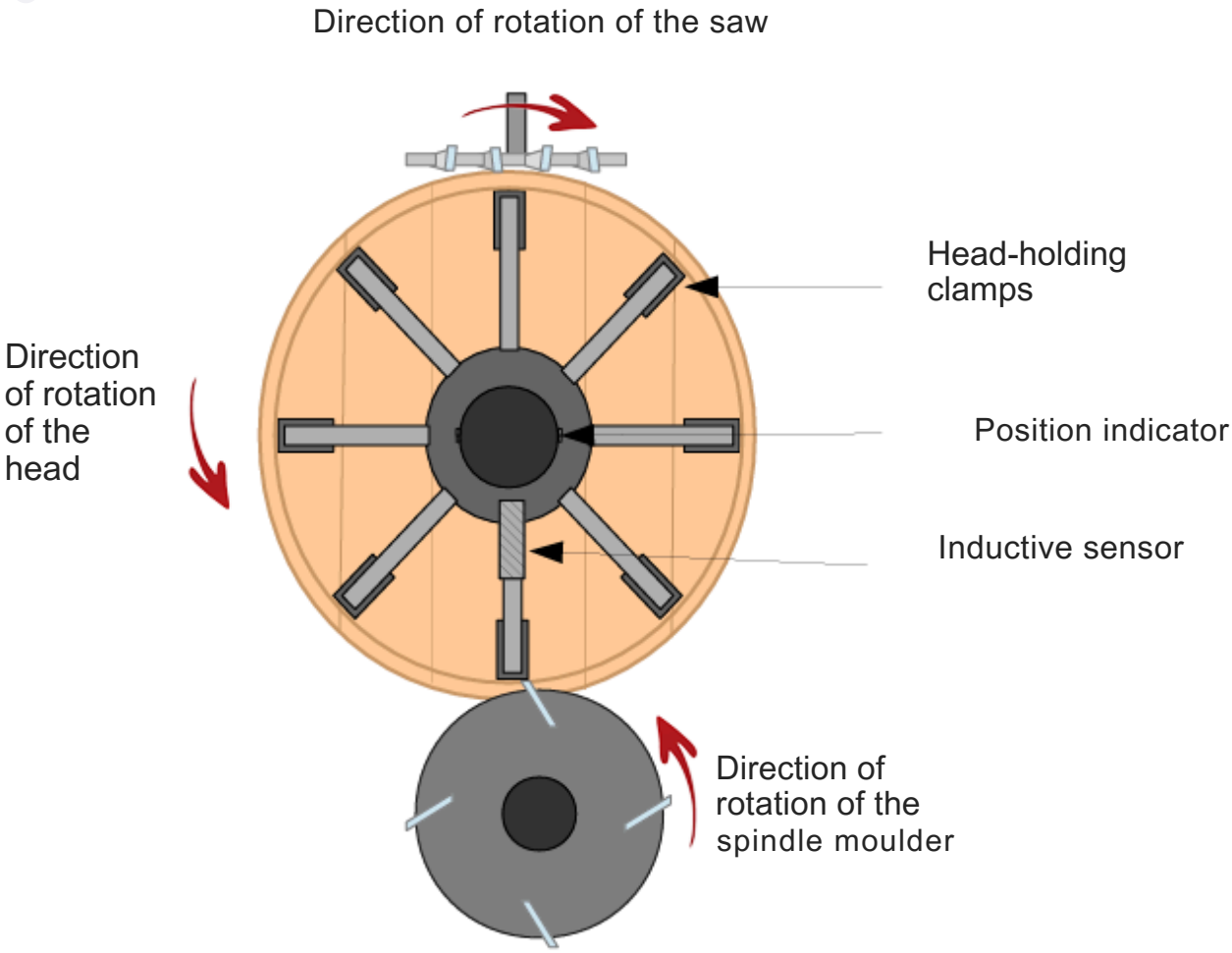
A pneumatic cylinder controls the raising and lowering of the clamps, enabling **the clamping** and **releasing** of the head at the beginning and end of the cycle.



A brushless electric motor drives the rotation of the table and the head during machining, via the axle of the pneumatic cylinder.

Head cutting machine

02 Terminology



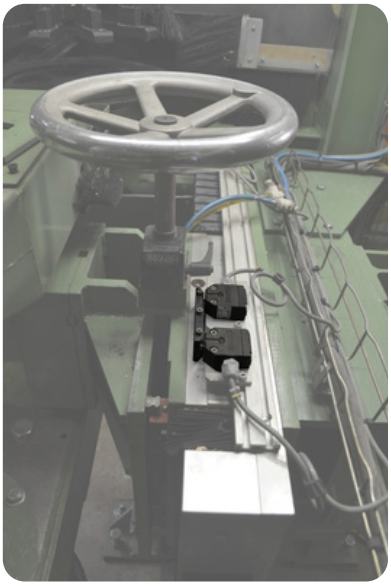
The Inductive Sensor

An eddy-current inductive sensor is integrated into the clamp system. This type of sensor **generates an oscillating magnetic field** at the tip of its sensing head: when a metal object enters this field, it disturbs it and causes an attenuation of the signal, triggering detection.

On the head-cutting machine, this sensor ensures that the clamps always stop at the same position. This is particularly important in the case of **a slightly ovalized head**: during a repair requiring the replacement of a head piece, precise repositioning of the head makes it possible to keep **the ovalization in the same place** and ensure consistency of machining.

Head cutting machine

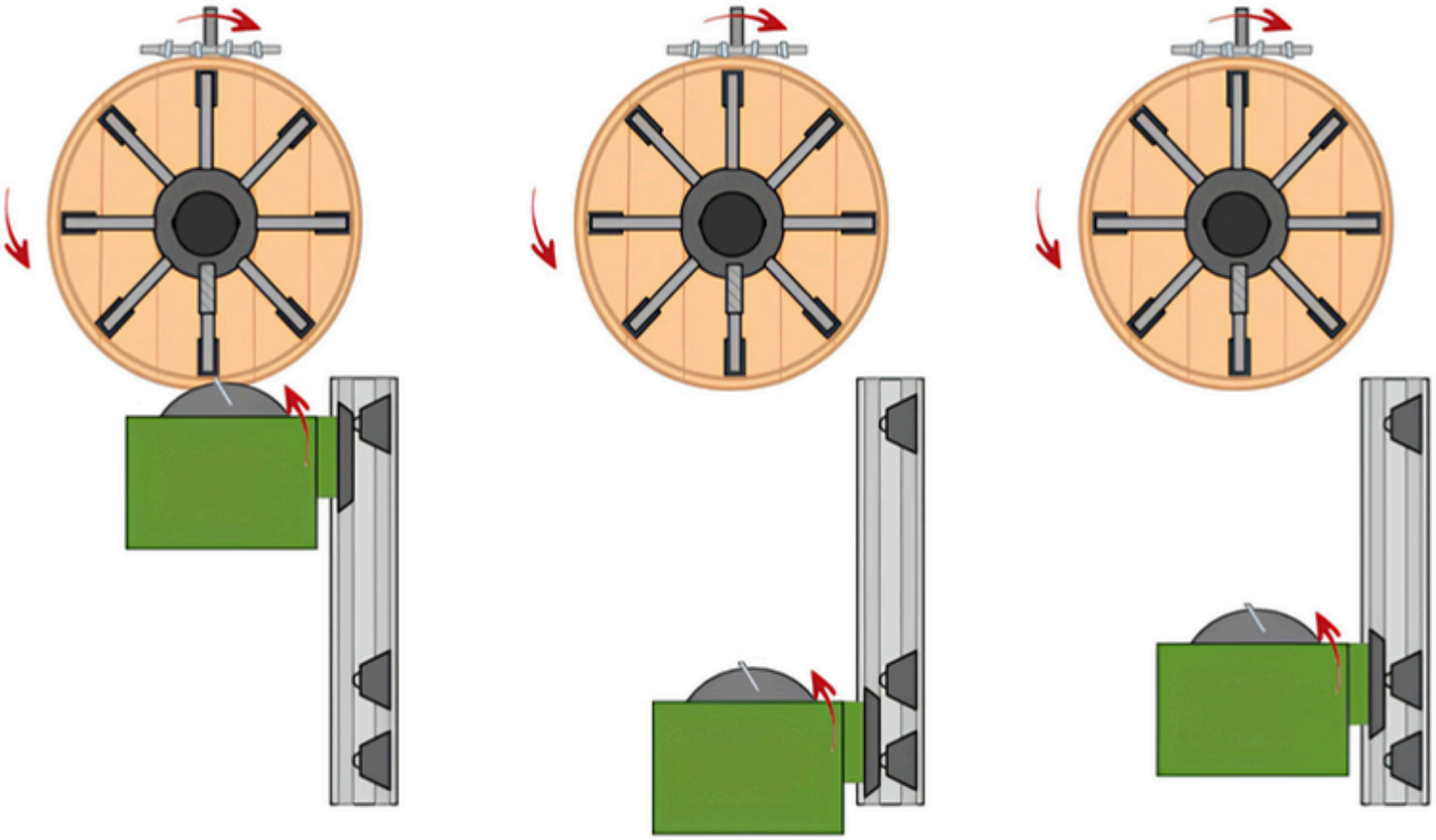
03 Settings



The Electronic Stops

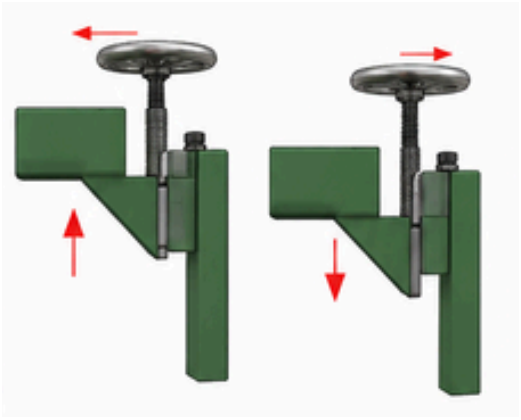
The machine is equipped with three electronic stops:

- **The first and third** constitute the end-of-travel stops, delimiting the extreme positions of the clamps' movement.
- **The center** stop serves as the reference position during machine initialization.



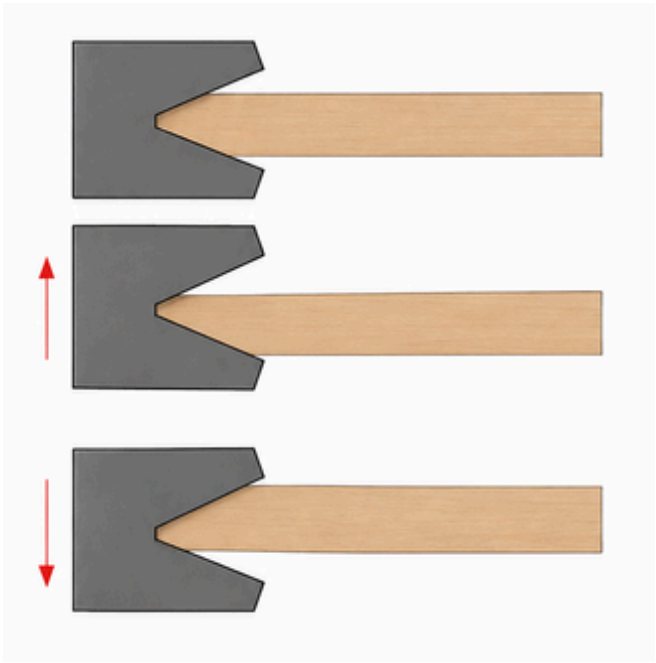
Head cutting machine

03 Settings



The Adjustment Handwheel

The handwheel **raises** or **lowers the spindle moulder tool,** acting directly on the positioning and distribution of the bevel within the thickness of the head. Thus, by raising the tool, **the outer bevel becomes larger than the inner bevel,** changing the distribution between the two faces of the head.

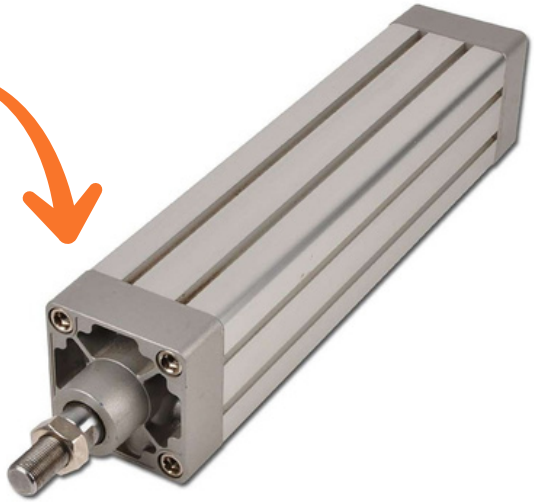


Influence of the tool's height adjustment on bevel distribution

- Tool in central position = Bevel distributed 50/50
- Tool in raised position = Outer bevel dominant
- Tool in lowered position = Inner bevel dominant

Head cutting machine

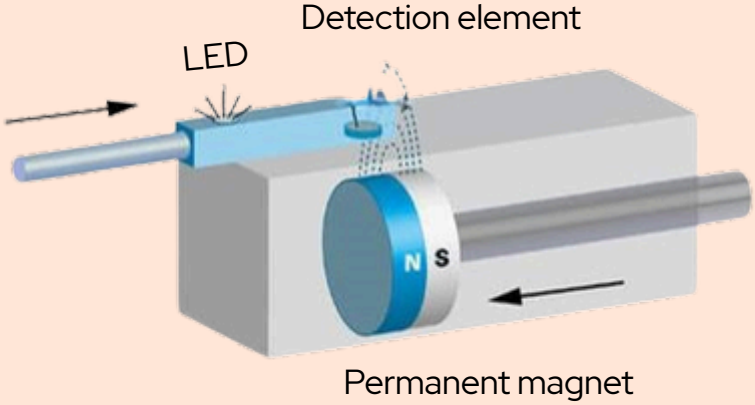
03 Settings



Magnetic limit switches are positioned directly on the cylinders. Moving them along the cylinder makes it possible to define and adjust the desired stroke for each machining cycle.

Magnetic sensors for cylinders

Around the cylinder's piston, **a permanent magnet** is built in, in the form of a ring producing a **magnetic field.** This field passes through all **non-ferromagnetic metals**. The cylinder sensor switches as soon as it detects the magnetic field. For mounting, **the sensor** is inserted into the groove machined into the surface of the cylinder and secured in place. Using the bracket or clamp mounting devices supplied as accessories, cylinder sensors can be fitted to all common cylinder types.

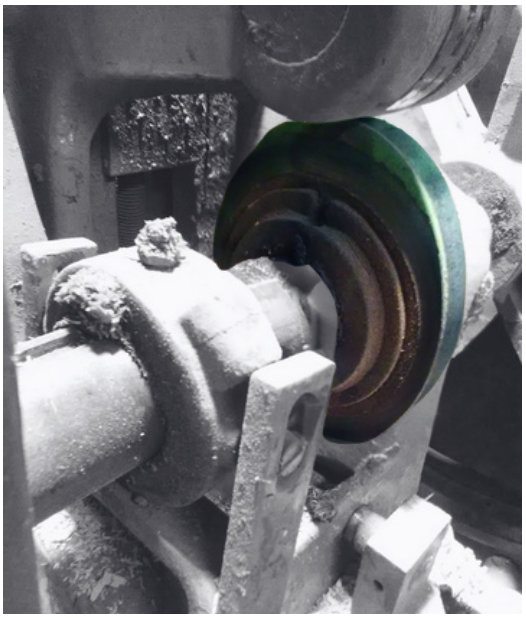


Head cutting machine

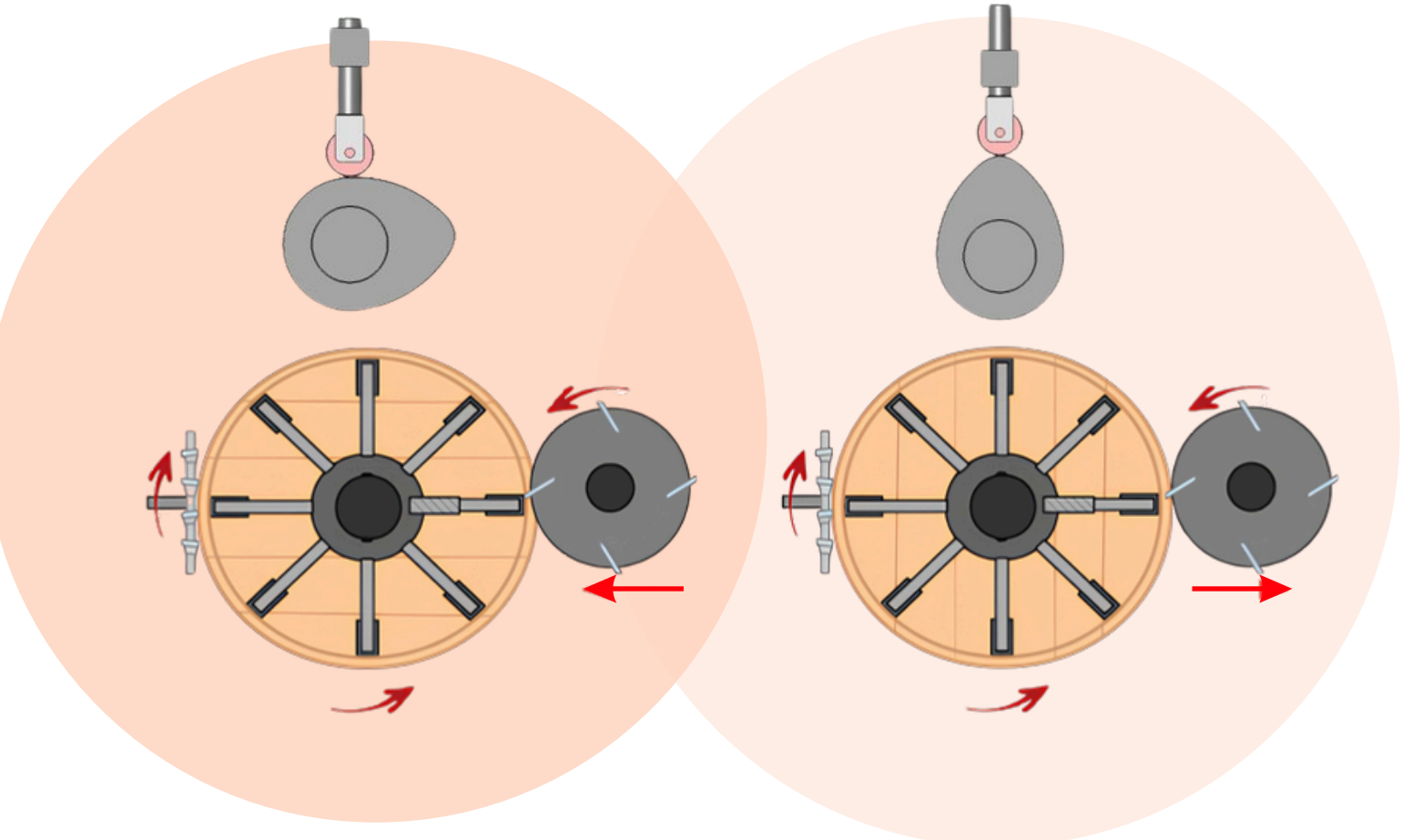
03 Settings

The Cam System

On machines not equipped with a digital interface, the management of head ovalization is handled by a **mechanical cam system.**



The tool shaft is directly connected to this system, which **controls the tool's movement away as it passes the chanteaux**, thereby reproducing the ovalized profile of the head.



Head cutting machine

03 Settings

Changing the Table

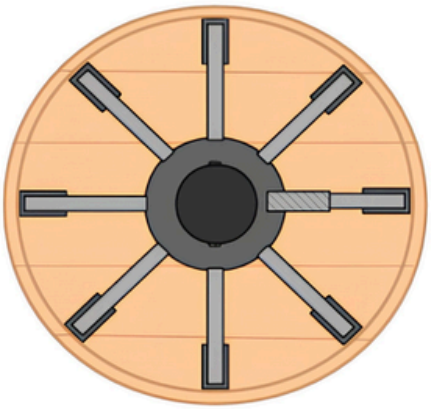
Each head diameter corresponds to a dedicated table. It is essential that the head lies perfectly flat on the table during machining, to ensure cutting accuracy. Changing the table is done simply by unscrewing the holding screws and fitting the table suited to the desired diameter.

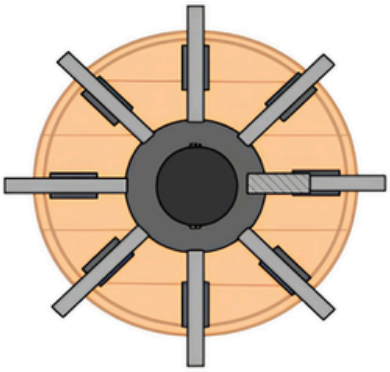
Head cutting machine

03 Settings

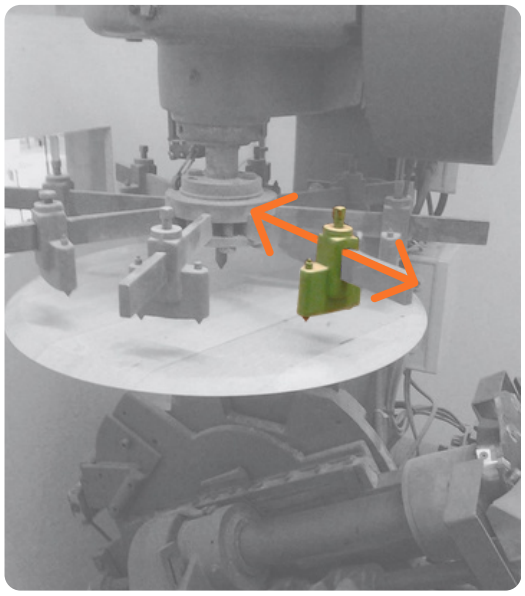
Adjustment of the pressers

The clamps are adjustable in position along the length of the presser's arms, allowing them to be adapted to the diameter of the head being machined.



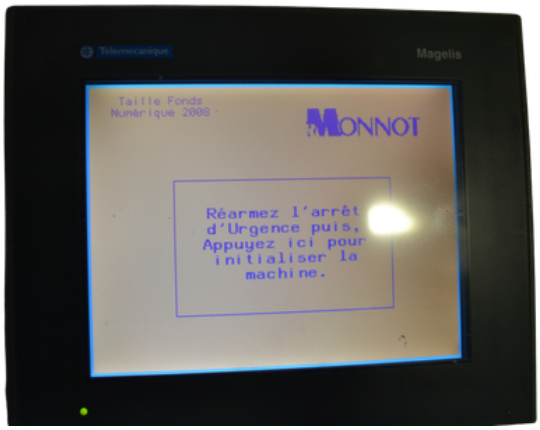


They must be positioned **as close as possible to the tool**, while ensuring that the tool does not strike them during machining.



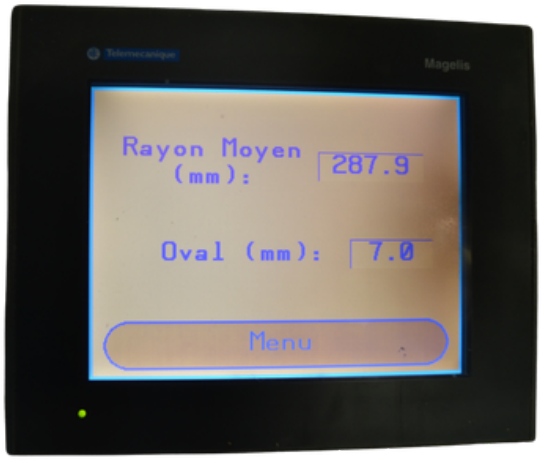
Head cutting machine

04 The Digital Interface



The Digital Interface

The home screen allows the operator to **initialize the machine** before starting the machining cycle.



Once initialization is complete, the operator can adjust the machining radius as well as **the ovalization rate.**

In this example, the ovalization is set to 7 mm.

Parameters are modified directly on the touchscreen: simply **select the value to be changed** and **enter the new dimension**.

Head cutting machine

05 Maintenance

Operator Maintenance

With each use, the operator carries out the following operations:

- **Dust removal from the machine**. Wood offcuts must not be vacuumed up, so as not to damage the extraction system.
- **Inspection of the bearings** and various mechanical components, checking for the absence of abnormal play.
- **Checking the wear** of the presser rubbers.

Changing Consumables

Each tool is fitted with its own specific type of insert. When replacing them, it is essential to use inserts identical to the old ones. To do this, the reference numbers printed on the boxes should be compared before any installation.


Manufacturer name

Manufacturer contact details

Insert references

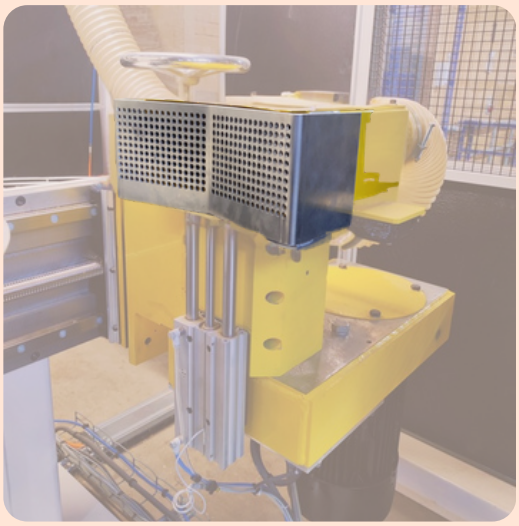
Insert quantity

Head cutting machine

06 Safety

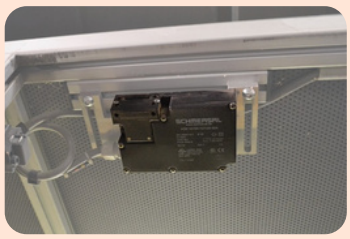
Safety at the Spindle Moulder

The spindle moulder tool has a long deceleration time when stopping. Braking too abruptly could risk loosening it. A guard therefore isolates the tool during the unloading and loading phase of the head, protecting the operator while the spindle moulder is still rotating.



Casing and General Safety

Head-cutting machines are fully enclosed in order to protect the operator from wood chip projections and cutting hazards linked to the tools. Depending on the model, the casing is made of wire mesh or insulating and sound-dampening panels.



The access doors are fitted with **safety interlocks**: the machining cycle cannot be started while a door is open.

An emergency stop button is located on the control panel, allowing the machine to be stopped immediately in the event of danger.

Head cutting machine

06 Safety

Personal Protective Equipment

Using the head-cutting machine requires wearing the following equipment:

- **Safety shoes**

- **Hearing protection:** ear defenders or earplugs

- **Dust mask:** mandatory when cleaning the machine

Knowledge of each component and its settings is the foundation of precise machining and careful workmanship.

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