



Information

What is center hole grinding

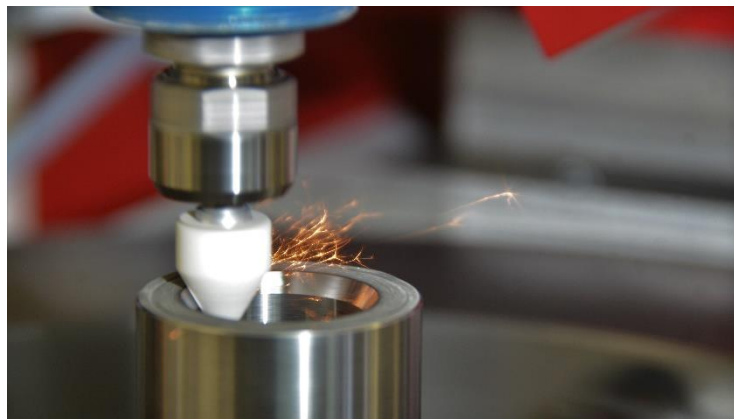


swiss technology

What is centre grinding?

A centre grinding machine offers decisive advantages for the further processing of components such as cylindrical, gear or thread grinding. Centre grinding restores the shape and position of deformed centre bores after heat treatment. In addition, cross-grinding is used to retain the oil between the fixed centres during cylindrical grinding. A concentricity accuracy of up to 0.001 mm in the centre can be achieved.

Centre grinding is the optimal and essential preparation of a component in order to achieve the final, high-precision grinding process after hardening.



Why centre Grind?

Heat treatment can cause components to bend. This results in out-of-round and deformed centre holes, which lead to inaccurate results during further grinding operations. Centre grinding is a necessary pre-machining operation, especially when components are further processed on several machines after hardening (cylindrical grinding, gear grinding, thread grinding, etc.).

Advantages:

- ✓ Optimal roundness and concentricity when accuracy of the centre hole is to 0.001 mm
- ✓ Restore the axis in deformed components
- ✓ Establish concentricity, between a finished bearing diameter and the centre holes
- ✓ Minimisation of the cylindrical grinding time thanks to smaller grinding stock removal
- ✓ Achieve higher efficiency, greater accuracy and a lower reject rate during following processes
- ✓ Increased process reliability and capability for series production

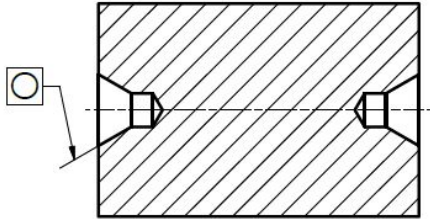
Advantages when using our **Precision chuck**:

- ✓ Grind the centre concentrically to a bore, although clamping is performed on the deformed and non-circular outside diameter.
- ✓ **(With the chuck, the components can be aligned according to a bore, for example)**
- ✓ Intentional displacement of the axis (if required by the component)
- ✓

Application examples

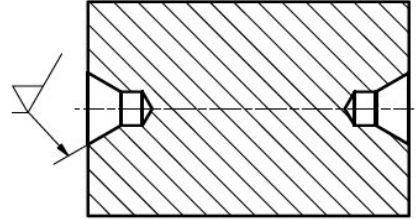
1. Roundness

Achieving high roundness and concentricity in the centre



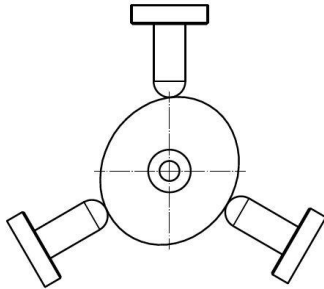
2. Surface Finish

Achieving the optimum surface for cylindrical grinding between the centres (cross grinding)



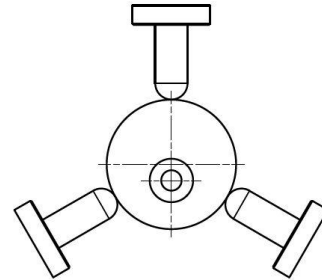
3. Out-of-round

Alignment of non-round components with the chuck so that the sanding allowance can be minimised



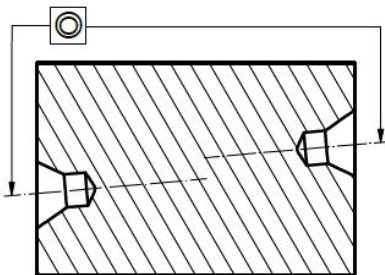
4. Moving the axis

Align the component according to the bore and grind the centre eccentrically to the outside diameter



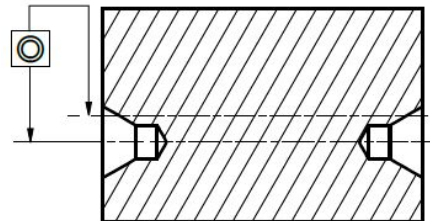
5. Positional Error

Correct position errors of two centres



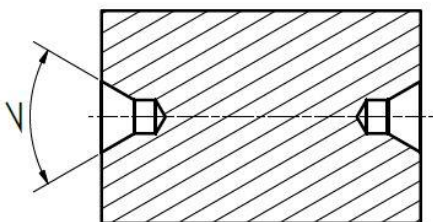
6. Centralising Centre Holes

Restore the axis of two centre holes to run true to the outer diameter



7. Centre Angle

Restoration or creation of the desired centre angle

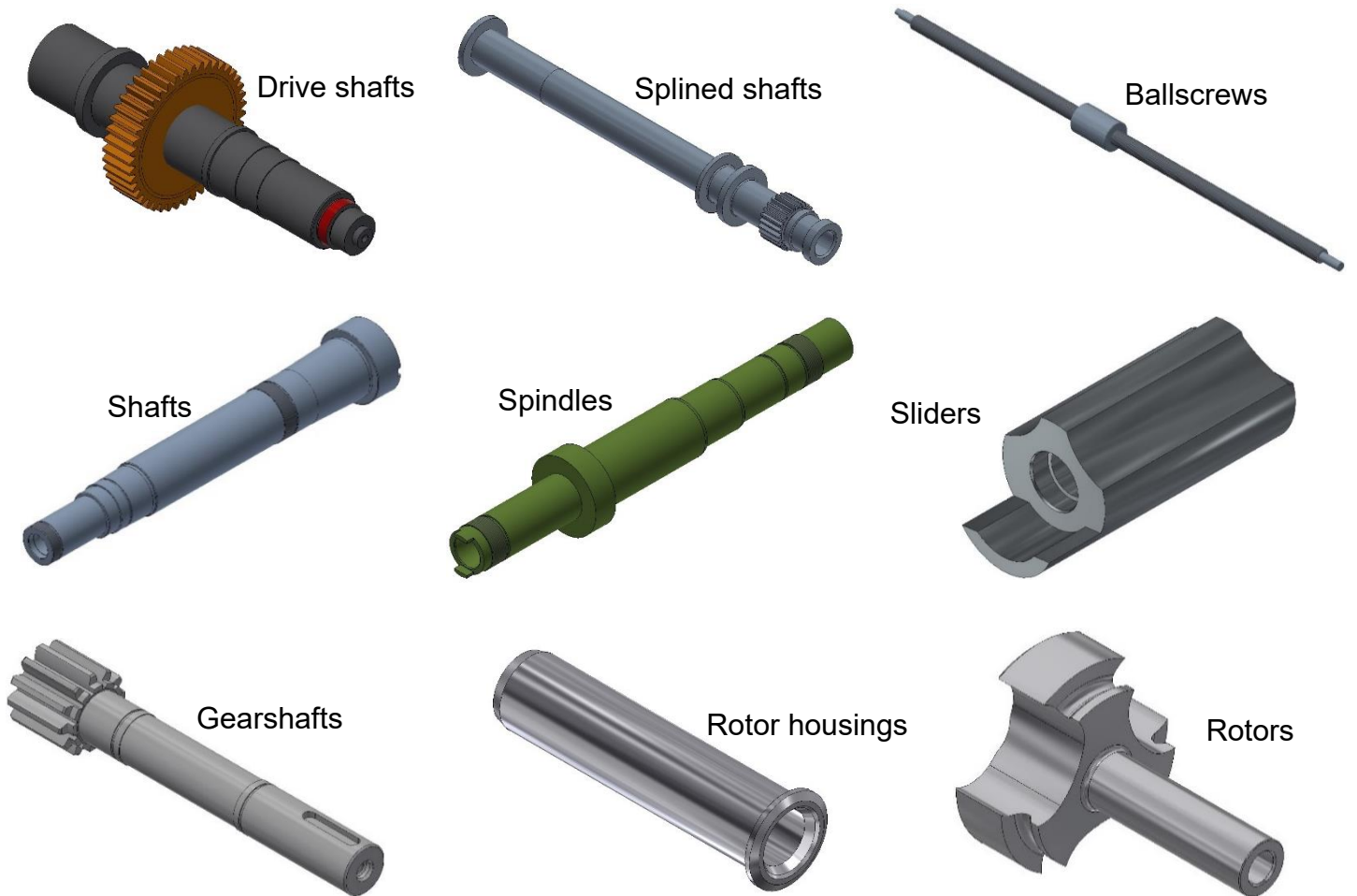


Grinding the centre holes on the centre grinding machine brings greater precision & predictability.

Centre grinding corrects form and position errors. As a result, hardening depths and grinding allowances can be minimised as the component has the perfect starting position for all further component processing.

Some typical parts and industries

A small selection of typical components that are ground on the centre grinding machine:



Our centre grinding machines are used in the following sectors / areas / industries:

- Spindle production
- Mechanical engineering (grinding machines, machine tools, etc.)
- Automotive industry
- Engine construction
- Aviation industry
- Gearbox construction
- Wind power
- Gear manufacturing
- Gripping and clamping technology
- Hydraulics
- Parts production (ball screws, etc.)
- Tool manufacture (solid carbide tools, etc.)
- Tool holders
- Many more

Functionality of ZAMAG centre grinding machines

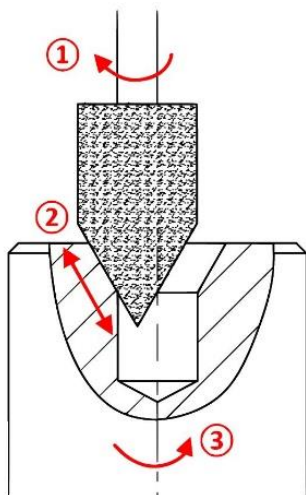
All ZAMAG centre grinding machines work with a rotating workpiece. This has many advantages. Components with pre-ground or finished bearing diameters can be easily clamped in the steady rest. This clamping method automatically grinds the centres concentrically to the bearing diameters. However, this scenario requires the bearing diameters to have good roundness, as this is what is transferred to the ground centre.

There are even more advantages when clamping and grinding the rotating workpiece in our precision chuck. The parts can be precisely aligned using the three adjustable quills in the chuck. This means that it is no problem to clamp raw or out-of-round components. By aligning the outside diameter, the centre is ground concentrically to the axis. This allows the grinding stock allowance to be reduced.

It is also possible to clamp the component on the outside diameter but align it with the bore. This means that the component is intentionally clamped off-centre. This procedure is used if the outside diameter is later to be ground concentrically to a bore on the cylindrical grinding machine.

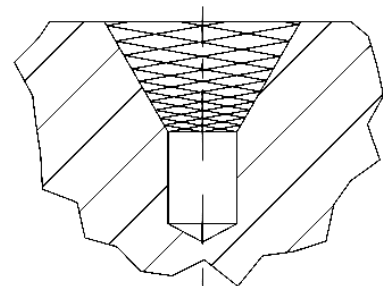
Grinding principle:

1. Rotary movement of the pockets,
2. Stroke movement of the cylindrical grinding
3. Rotating



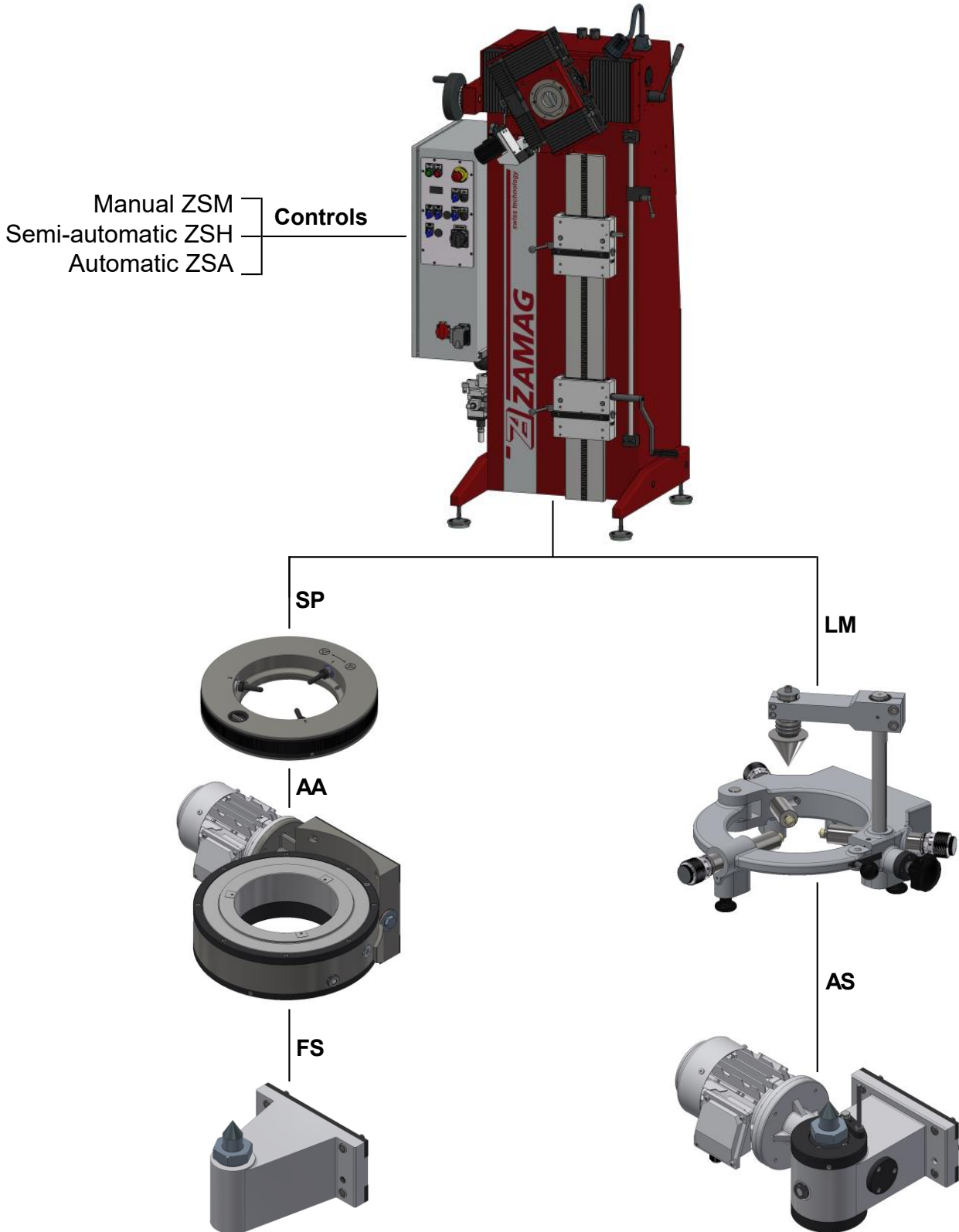
Results:

Grinding wheel cross grinding effect in which the oil film is retained between the centres during subsequent machining of the workpiece.



Types of the various ZAMAG centre grinders

The main difference between our machines is the clamping method. A machine with steady rest (LM) and drive centre (AS) is used for pre-ground parts. For rough, out-of-round parts, a machine with drive unit (AA), precision chuck (SP) and fixed centre (FS).

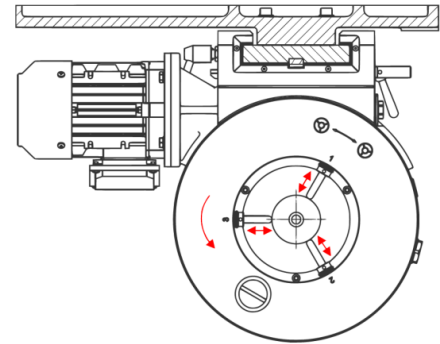


Properties of the clamping variants

Features Precision chuck:

The AA drive unit is used to drive the workpieces. The precision chuck SP is screwed onto the AA. The components are clamped and aligned with the aid of the chuck. The fixed centre FS serves as the counter centre.

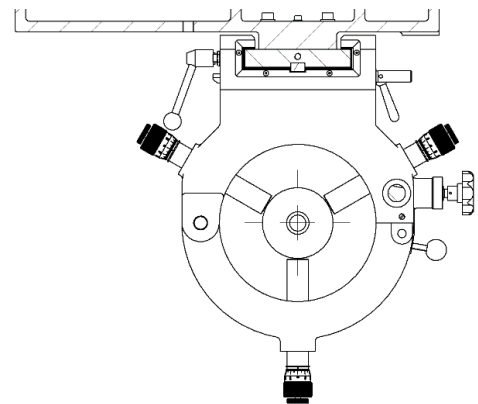
- Rotating chuck = rotating workpiece
- The parts can be clamped on a raw diameter with a non-round locating diameter
- The parts can be aligned using the three individually adjustable alignment pins on the chuck
- The parts must be inserted into the chuck from above or below



Aligning steady:

The parts are clamped in the LM steady rest so that they can still rotate. The AS drive centre serves as a counter centre and also as a drive for the workpieces. The parts are set up on the drive centre with a rotating drive pin.

- Vertical steady rest, workpiece is driven by drive tip
- In order to achieve good concentricity in the centre, the clamping areas of the workpieces must have good concentricity (pre-ground)
- The concentricity of the centre is only as accurate as the concentricity of the clamping diameter
- Very simple and quick clamping of the parts (do not need to be aligned)
- As the steady can be opened, the parts are inserted into the steady on the operator side



Differences between ZAMAG centre grinding machines

The ZAMAG centre grinding machines also differ in the type of control. From manual machines to semi-automatic grinding sequences to fully automatic machines, everything is possible.



ZSM
Manual Machine

All ZSM work steps are carried out manually. This means you are very flexible and can adapt the process and speed precisely to the workpiece. Ideal for individual parts or if the centres of the workpieces differ greatly due to the pre-machining.



ZSH
Semi-automatic machine

The ZSH has the same functions as the ZSM manual machine. Individual parts can therefore be ground completely manually. In addition, the ZSH has a small PLC control for semi-automatic grinding. With the ZSH, the operator clamps the workpiece, aligns it and moves the lifting carriage to the correct grinding height. After starting the lifting movement, the ZSH takes care of the rest with Independent processing.



ZSA
Automatic Machine

The ZSA is equipped with a PLC control system. The machine automatically measures the height of the components with the laser and automatically grinds the centre with the help of the acoustic sensor. The operator clamps the workpiece and aligns it. After entering the necessary parameters, the ZSA automatically carries out all processing steps such as levelling, height, measurement, approaching, touching, grinding out and moving away.

See for yourself!

Make an appointment at our factory and we will grind a test piece of your choice for you.



ZAMAG center hole grinding machines have countless equipment possibilities, options and accessories to meet all requirements. As the machines are based on a modular system, all options can be used individually and fully adapted to the workpiece and the customer's requirements. Furthermore, all doors are open to accommodate special requests and integrate them into existing machines. Put us to the test!

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