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Media for mass-finishing-processes

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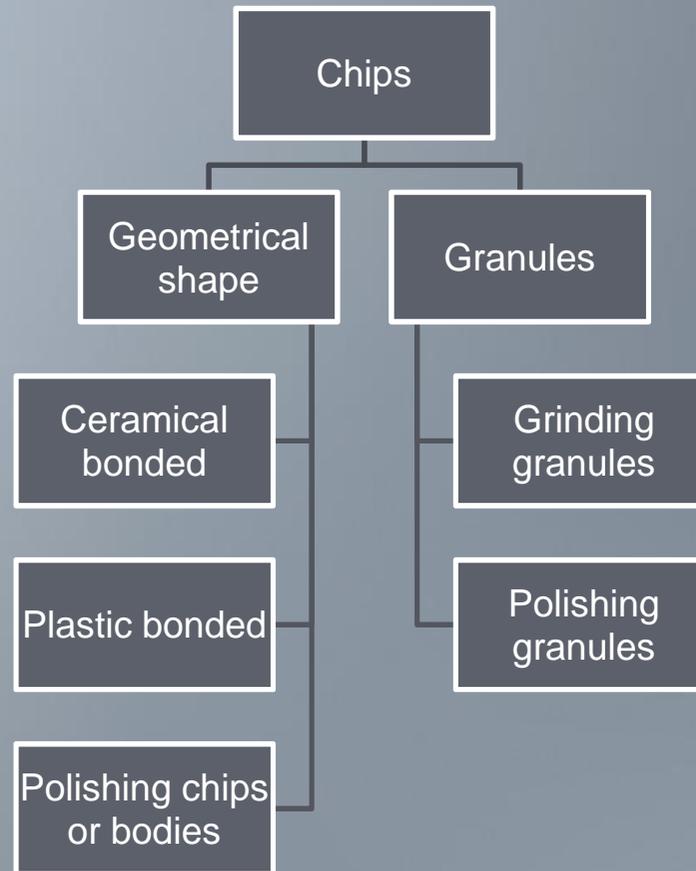
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The selection of the correct media for the mass-finishing process depends on following issues:

- ▶ Target of the treatment: – deburring, grinding, polishing
- ▶ Characteristics of the workpiece – geometry and material
- ▶ Additional requirements: degreasing, preserving, up brighting



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Classification of chips

Geometrical shape:

- Plastic-bonded abrasives



Density appr. 1,3 – 2,1 g7cm³



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Plastic-bonded abrasives

Plastic grinding media consist of approximately 65% of polyester resin and an abrasive powder, which is involved in it. This may be silicon oxide, but also silicon carbide (especially for very highly abrasive grinding media). For the application of slide grinding of electronic contacts, magnesium oxide is used as an abrasive powder. The polyester resin is the binding material for the abrasive grinding powder, depending on the desired grinding effects; the binding is selected: softer or harder. During the finishing, the grinding media should resharpen itself by the mutual friction or by the friction on the work piece itself, i.e. if an abrasive grain is dull, it should break away from the surface.

To recognize the grinding effects, the highly abrasive media is generally coloured with dark colours and the slightly abrasive media is coloured with bright colours.

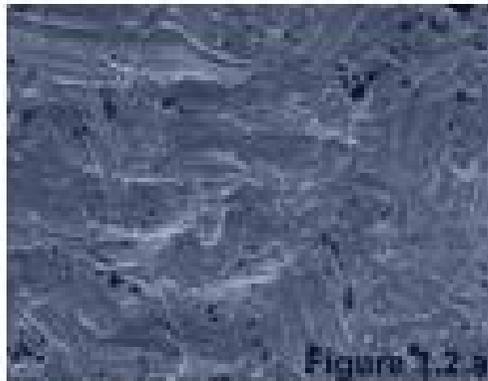
The polyester resin is mixed with the abrasive grinding powder, poured into a mould and then cured under UV light. This manufacturing process is relatively expensive and complex.



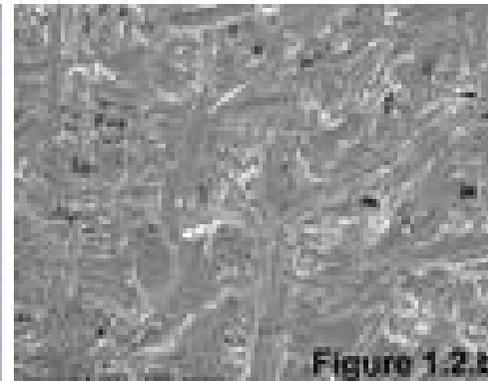
Application areas

- Deburring, grinding of nonferrous metals
- Fine grinding of steel, titanium, CoCr-cast materials
- Preparatory grinding for following polishing process.

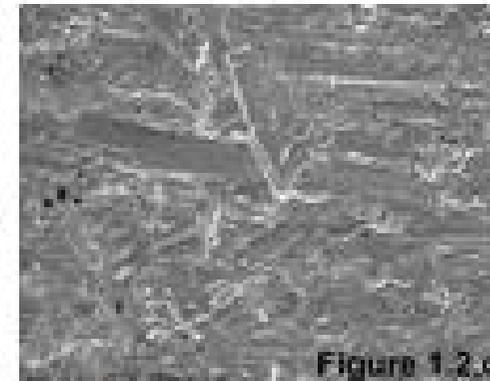
Surfaces



High grinding



Middle grinding



Fine grinding





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Classification of chips

Geometrical shape:

- ▶ Ceramical bonded abrasives



Density appr. 2,3 – 3,8 g/cm³



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Ceramical bonded abrasives

Ceramic abrasive grinding media are generally composed of silicon oxide and silicon carbide. Here silica is the binding agent. The binding and the grinding effect can be influenced by the manufacturing process and the size of each particle. Due to the natural hardness of the ceramic materials and the far higher density than, for example, plastic abrasive grinding media, these abrasive grinding media have significantly different effects on the abrasive grinding process.

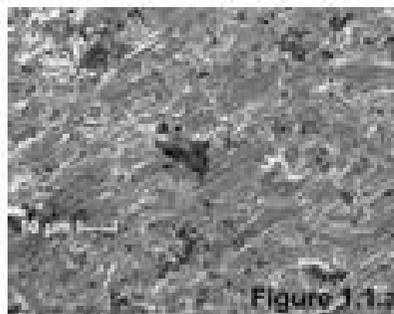
Manufacturing: The ingredients are mixed into a pulp, pressed through a matrix and then fired in a stove. Very low cost manufacturing process.



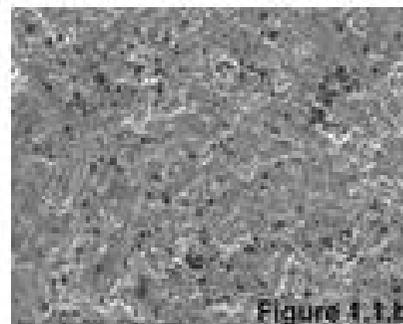
Application areas

Deburring, grinding of steel parts (hardened and unhardened) and non-ferrous metals like aluminium, MS, etc. if the surface quality is not crucial. Even if relatively small ceramic grinding media such as DS 4/4 are used, you can produce relatively good surface qualities.

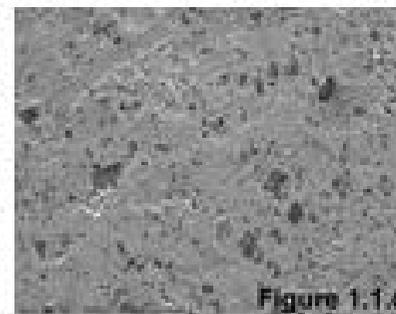
Surfaces



Ceramic triangle
10/8 mm



Ceramic triangle
6/6 mm



Ceramic triangle
4/4 mm



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Polishing chips or bodies

Polishing chips wear in some cases a polishing paste for an abrasive polishing process.

There are also some applications for the use of them without an abrasive paste. In this case the heavy and smooth chips compact the surface of the workpiece.

Typical chips:

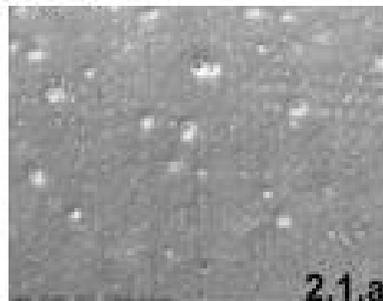
- ▶ Porcelain-bodies
- ▶ Zirconium oxide balls
- ▶ Steel balls
- ▶ Steel pins
- ▶ Plastic bodies



Surfaces

On these pictures you can clearly see, how steel balls and polishing porcelain bodies are able to flatten the surface. This property can be useful, e.g. when you want to remove some porosity.

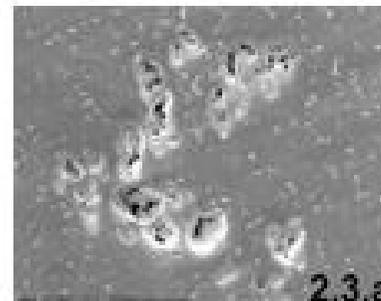
Before



2.1.a



2.2.a



2.3.a



2.1.b



2.2.b



2.3.b

After



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Granules and mixtures of them

Polishing and drying granules like broken corn and walnut-shells are the carrier for grinding or polishing pasts.





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Granules

Sinter ceramics: (KXMA)

used for dry grinding processes
or polishing of hard surfaces

- ❖ no water in process
- low grinding force
- no cleaning of the surface during process





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Granules

Aluminiumoxide (QZ)

used for deburring of small stamping parts like flat springs and edge-rounding of carbide cutting tools

- ❖ short process times
- separation of the workpieces after wet-process is complex





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Granule mixtures

HSC

(broken Walnut-shells with SiC)

polishing of tools

or

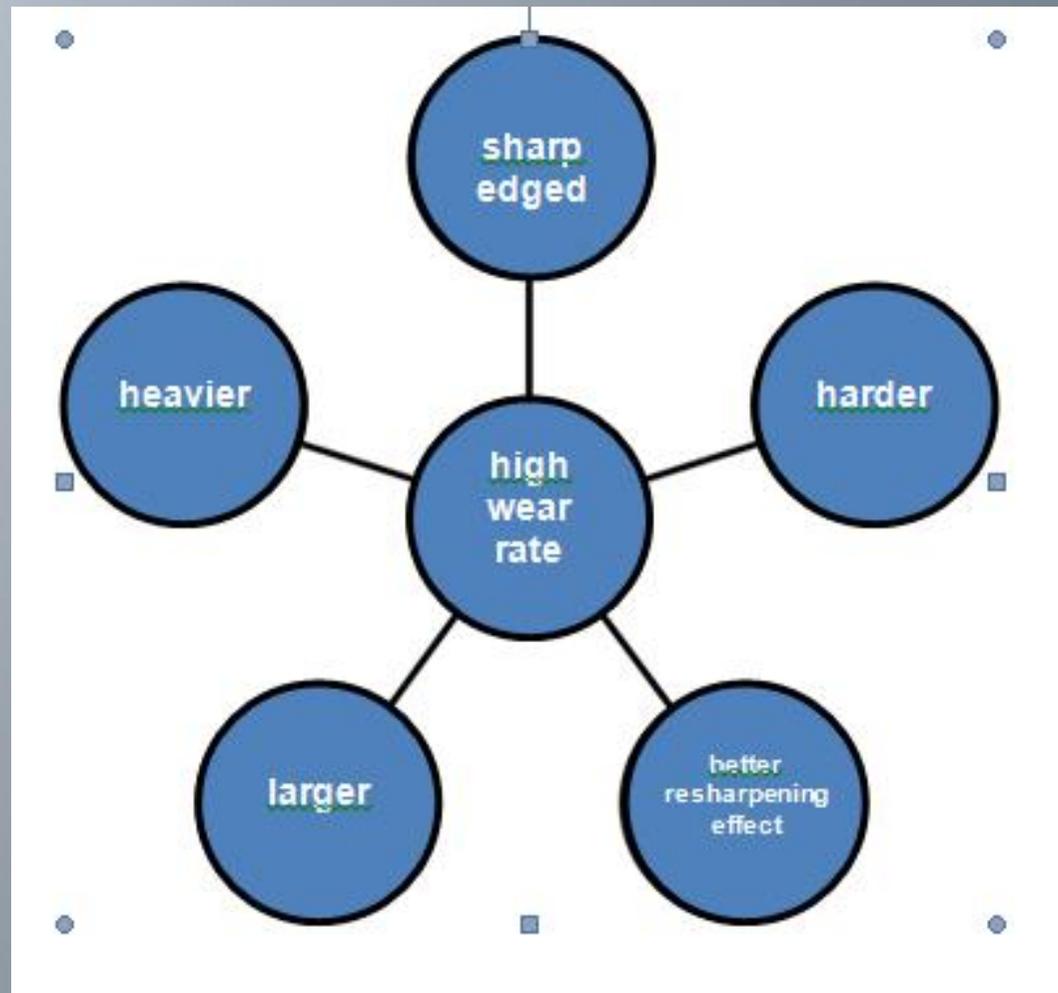
deburring of tap-drills





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Wear rate of abrasives





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Grinding- and polishing pastes

The polishing granule has to be impregnated in certain intervals with polishing paste, or for substitute polishing oils and polishing powder. Usually this happens after a period of time of about 3 hours. The polishing paste is rubbed off during the polishing process of polishing granule or body and thus the polishing effect is lost.

Polishing pastes typically consist of the following additives:

- polishing powder (usually aluminium oxide)
- mineral oil
- vegetable oil
- emulsifying agents
- additives



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Grinding and polishing pastes

During the grinding or polishing process the abrasive particle must stick to the granule or to the polishing body.

In most cases the oil or grease of the pastes are used for this.

By used of pastes in a wet-process, the pastes are ad additives. This special compounds are responsible for the homogenous dispersion of the abrasive Particles during the process.



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Compounds

Compounds are being mixed during the wet process with the required water. Then they are added to the machine. The compounds have the following tasks:

- Keeping the work pieces clean during the grinding process
- Preventing oxidation on work pieces
- Degreasing the work pieces
- If required: smoothing the process through building up foam e.g. in the wet polishing process
- Keeping the grinding media clean
- Removing the waste of the grinding chips from the process (waste water exit)
- Applying corrosion protection during the process
- Lightening up the surfaces

The compounds are mixed with ordinary tap water between 1-5%, either in a container (option dosing pump) or by a dosing unit. Especially in the industrial area a high processing safety is very important. For example: To ensure good corrosion protection, a customer needs a dosing unit.



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Thanks for your attention!

Any questions?