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Roughing disc having a backing layer

The invention relates to a roughing disc.

10 A roughing disc of this kind is known from the state of the art and is suitable for rough-grinding of material surfaces of various materials, i.e. for planar removal of material. It comprises a disc-shaped main body having a tool side, which can face a tool, and a workpiece side, which can face a workpiece. The main body comprises a central opening through which an axis of rotation passes and which serves for direct or indirect attachment of a drive shaft of a tool. The main body further comprises a disc-shaped
15 backing layer disposed on the tool side, at least one abrasive layer, and a separating layer between adjacent layers.

Known roughing discs consist of multiple abrasive layers which comprise a mixture of phenolic resin and abrasive grains, wherein said mixture can be blended with various fillers and additives. It is also known for the layers to be separated from each other by
20 separating layers, the abrasive layers and the separating layers being disposed alternately along the axis of rotation.

Also, roughing discs that have layers made of different materials are known. This allows precise adjustment to the application or to the grinding process through different abrasive mixtures in the various abrasive layers.

25 However, known roughing discs do not exhibit a satisfactory interconnection between adjacent layers made of different materials and the inserted glass fabric layers. Moreover, known roughing discs lack strength and/or rigidity.

The object of the invention is to provide a roughing disc of the kind mentioned above which is characterized by an improved structure and which exhibits, in particular,

improved interconnection between adjacent layers made of different materials and improved strength and/or rigidity.

According to the invention, this object is attained by the roughing disc having the features of claim 1.

- 5 The roughing disc according to the invention comprises a disc-shaped main body having a tool side, which can face a tool, and a workpiece side, which can face a workpiece. The main body comprises a central opening through which an axis of rotation passes and which serves for direct or indirect attachment of a drive shaft of the tool, a disc-shaped backing layer disposed on the tool side, at least one abrasive layer,
10 and a separating layer between adjacent layers. As used here, the term adjacent layers refers to adjacent abrasive layers in an assembly of multiple abrasive layers and to an abrasive layer and a backing layer adjacent thereto. The roughing disc according to the invention is in particular characterized in that the backing layer is made of a material mixture that is free of abrasive additives and that comprises at least one mineral
15 additive.

This ensures good interconnection between the backing layer, which does not comprise any abrasive additives, and the abrasive layer, which does comprise abrasive additives. Moreover, good interconnection with the glass fabric and appropriate strength and/or rigidity can be ensured. The advantages of the roughing disc according to the invention
20 are achieved in particular by the backing layer being free of abrasive additives and having a purely supporting function. Mineral additives are particularly suitable to achieve said function.

In a preferred embodiment of the roughing disc according to the invention, the mineral additive can be basalt, quartz sand, wollastonite, aluminum silicate and/or kaolin. The
25 mixture of the at least one backing layer can also comprise different additives from this group.

In another preferred embodiment of the roughing disc according to the invention, the mineral additive can have a Mohs hardness of at least 2, preferably between 7 and 9.

This in particular allows ensuring high strength of the roughing disc the higher the hardness of the additive is.

In another preferred embodiment of the roughing disc according to the invention, the mineral additive has a grain size of 30 to 1000 μm , preferably 200 to 500 μm .

- 5 In another preferred embodiment of the roughing disc according to the invention, the grain of the mineral additive is covered in phenolic resin systems comprising a resol/novolak mixture. Resols are meltable soluble phenolic plastics that contain reactive methylol groups and are obtained when phenols are condensed with formaldehyde under basic conditions. The benzene rings are connected via methylene groups and via
10 ether bridges. Novolaks are phenolic resins having a formaldehyde/phenol ratio of less than 1:1 and are obtained by acidic condensation of the educts.

In another preferred embodiment of the roughing disc according to the invention, the resol has a viscosity of 1000 to 5000 $\text{mPa}\cdot\text{s}$, preferably 1200 to 3500 $\text{mPa}\cdot\text{s}$.

- In another preferred embodiment of the roughing disc according to the invention, the
15 novolak has a hexamethylenetetramine content of at least 9 vol%, preferably 12 to 16 vol%, and a flow length of 15 to 35 mm, preferably 17 to 26 mm. Moreover, the novolak can be modified novolak.

- In another preferred embodiment of the roughing disc according to the invention, additional defined amounts of other additives and/or aggregates of less than 20 vol%
20 can be added to the novolak.

Other advantages and advantageous embodiments of the subject-matter of the invention are apparent from the description, the drawing, and the claims.

- An embodiment of a roughing disc according to the invention is illustrated in a schematically simplified manner in the drawing and will be explained in more detail in the
25 following description.

The single figure of the drawing shows a section through a roughing disc according to the invention.

Roughing disc 1 illustrated in the drawing has a disc-shaped main body 3 having a layered structure and an outer radius a . Main body 3 has a tool side 13, which can face a tool, and a workpiece side 12, which can face a workpiece. Main body 3 comprises a central opening 2 through which an axis of rotation 5 passes. Axis of rotation 5 is

5 located in the center of rotation of roughing disc 1. An insert 4 for attaching roughing disc 1 to a drive shaft of a tool is disposed in opening 2. A backing layer 6 is disposed at tool side 13 of roughing disc 1, which faces the tool.

Backing layer 6 comprises a mixture that is free of abrasive additives and that comprises at least one mineral additive. The mineral additive can be basalt, quartz sand, wollastonite, aluminum silicate and/or kaolin. The mixture of the at least one backing layer can

10 also comprise different additives from this group. Moreover, the additive can have a Mohs hardness of at least 2, preferably between 7 and 9. The grain size of the additive can be between 30 and 1000 μm , preferably between 200 to 500 μm . The grains of the additive can be covered in phenolic resin systems, wherein the phenolic resin system

15 can comprise a resol/novolak mixture. The resol can have a viscosity of 1000 to 5000 $\text{mPa}\cdot\text{s}$, preferably 1200 to 3500 $\text{mPa}\cdot\text{s}$. The novolak can have a hexamethylenetetramine content of at least 9 vol%, preferably 12 to 16 vol%, and a flow length of 15 to 35 mm, preferably 17 to 26 mm. Additionally, the novolak can comprise additional defined amounts of other additives and/or aggregates of less than 20 vol%. Thus,

20 backing layer 6 has high strength. It can also comprise a mesh-like inlay in order to further increase the stability of roughing disc 1.

Moreover, roughing disc 1 has two abrasive layers 8a, 8b which are stacked in the direction of axis 5 and which are disposed on workpiece side 12. Abrasive layers 8a, 8b can comprise abrasive grains, such as regular brown fused alumina and derivatives, blue

25 fired alumina, white fused alumina, zirconia alumina, silicon carbide, ceramic grain, pink fused alumina, and/or monocrystalline alumina. Additionally, the abrasive layers can comprise supporting fillers, such as poly aluminum fluoride, cryolite, pyrite, calcite, wollastonite, and/or graphite, which can be bound by phenolic resin systems. Thus, a phenolic-resin abrasive grain mixture is formed, which can be blended with various

30 fillers and additives.

A separating layer, which is a glass fabric layer 10, is disposed between the two abrasive layers 8a, 8b. Another glass fabric layer 10 is disposed between backing layer 6 and abrasive layer 8a adjacent to backing layer 6. Glass fabric layers 10 act as separating layers and serve the strength of roughing disc 1. Glass fabric layers 10 extend from an outer edge 15 of roughing disc 1 to central opening 2 and surround central opening 2 annularly.

To ensure optimal connection to a tool, central opening 2 is realized as a recessed hub.

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Claims

1. A roughing disc for machining material surfaces, comprising
10 a disc-shaped main body (3) having a tool side (13), which can face a tool, and a
workpiece side (12), which can face a workpiece, the main body (3) comprising a
central opening (2) through which an axis of rotation (5) passes and which serves
for direct or indirect attachment of a drive shaft of the tool, a disc-shaped backing
layer (6) disposed on the tool side (13), and at least one abrasive layer (8a, 8b),
15 wherein the abrasive layer (8a, 8b) comprises abrasives grains as well as
polyaluminum fluoride and/or cryolite and/or pyrite as abrasive additives, wherein
the backing layer (6) is made of a material mixture that is free of the abrasive
additives and that comprises at least one mineral additive, which is basalt and/or
quartz sand and/or aluminum silicate.
- 20 2. The roughing disc according to claim 1, characterized in that the mineral additive
has a Mohs hardness of at least 2, preferably between 7 and 9.
3. The roughing disc according to claim 1 or 2, characterized in that the mineral
additive has a grain size of 30 to 1000 μm , preferably 200 to 500 μm .
4. The roughing disc according to any one of claims 1 to 3, characterized in that the
25 grain of the mineral additive is covered in phenolic resin systems comprising a
resol/novolak mixture.
5. The roughing disc according to claim 4, characterized in that the resol has a
viscosity of 1000 to 5000 $\text{mPa}\cdot\text{s}$, preferably 1200 to 3500 $\text{mPa}\cdot\text{s}$.
6. The roughing disc according to claim 4, characterized in that the novolak has a
30 hexamethylenetetramine content of at least 9 vol%, preferably 12 to 16 vol%, and a

flow length of 15 to 35 mm, preferably 17 to 26 mm.

7. The roughing disc according to claim 4, characterized in that defined amounts of other additives and/or aggregates of less than 20 vol% are additionally added to the novolak.
- 5 8. The roughing disc according to any one of claims 1 to 4, characterized in that a separating layer, which is a glass fabric layer (10), is provided between adjacent layers.