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Research area: Product aims
Paper, paperboard and board // technical speciality papers

Key words:
Polish agent carrier, polish paper, speciality paper, crêpe paper

TITLE:

Development of polish agent carrier and adaptive finishing aids

Background/Problem area

Polishing rings and polishing wheels made from various cotton fabrics have a wide range of applications. They are used by "aggressive" pre-polishing up to line-free final polishing. Typical materials for conventionally produced polishing rings are various cotton-based fabrics. The fabrics differ depending on the application requirements, e.g. in terms of grammage, softness, flexibility and possibly their finish. Currently, about 10 to 15 different cotton fabrics are used as trimming materials for polishing rings and wheels in the manufacture of polishing agent carriers. Publicly available information indicates that the fabrics differ mainly in the following parameters:

• Strength with respect to static and dynamic force

• Absorbing capacity for liquid and pasty materials

• Flexibility and elasticity

• "hardness" or abrasiveness, respectively

As a result of an expert assessment, the material paper was included in a pre-selection for a number of different reasons. The advantages of paper for this application are the following:

• Good formation

• Compared to woven and non-woven fabrics, a randomly oriented fibre arrangement despite the preferred orientation of the fibres

• The possibility for homogeneously mixing fibres of various morphology and function into the final paper product

• Good wettability when pastes and emulsions are used

Typical polish agent carriers are polish rings and polish wheels consisting of a central support material of metal or paperboard and fan-shaped or flat polish elements.

Objectives/Research results

The project aim is to implement in a cost-efficient way as many of the functional properties of conventional textile trimming materials for polishing tools as possible by using a newly developed specialty paper as the polish agent carrier. The necessary functionality of polish agent carrier is high mechanical strength with long-lasting dynamic stress, absorption, storage, and transportation capacities for polish agents as well as resistance to thermal stress.

Another aim is to gather the specification values of the papers to be developed which are geared to the requirements of the material to be treated and the surface properties of the workpieces and their shape.

The experimental design for full-scale trials was based on two PTS papers. The polishing results were good, the abrasion properties even very good. In polishing trials it emerged that the polishing wheels should be treated with glycerine afterwards to generate the desired results. However, glycerine had to be added already during manufacture because a subsequent glycerine treatment cannot be realized at the company Lenk. The first full-scale trial was done with papers of 120 g/m² and 150 g/m² because of their good results in the preceding polishing tests.

The papers were then used in automated polishing trials. The surface quality of the polished tool was equal to or even better than that obtained with a standard cotton fabric. Temperature development and emulsion demand were comparable to the cotton fabric. A very negative aspect was the service life of the paper-based polishing wheels - it was very low for both paper grades. Compared to cotton fabric, the abrasiveness of paper-based wheels is lower. The paper formulation was therefore readjusted in the mill to compensate for these effects and generate acceptable polishing results. More specifically, the paper grammage and additive use were varied. Among other, synthetic and biopolymer-based plasticizers were used instead of glycerine, and strength aids were added to compensate for plasticizer-induced strength losses. The use of pigments in combination with a strength aid was tested as well.

The removal performance and surface qualities obtained were good. The technological parameters of polishing machines could be positively influenced as well: among other, the speed, pressure and advance of polishing wheels could be reduced.

Application/Economic benefits

Compared to polish agent carriers made from fabrics, there are hopes of achieving advantages, in particular regarding costs, additional features and polishing results. It is expected that users of the technology developed in this R&D project will be able to achieve a competitive advantage. An increase in sales is expected since the polishing tools produced are less expensive than competitive products and give rise to correspondingly faster and enhanced results in the initial tests. This will open up new markets in Germany, the US and China.

Period of time: 01.04.2015 – 31.03.2017

Remarks

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