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Research area: Product aims

End products made of paper, paperboard and board // Other

Key words:

Light-weight construction material, fire protection, core systems, moisture resistance

TITLE:**Developing flame-retardant and moisture-resistant paper core material as well as light-weight construction elements based on these core systems****Background/Problem area**

Light-weight construction elements based on paper cores (sandwich structures consisting of core material and top liner) are highly attractive for many applications due to their low weight and nonetheless good mechanical properties. They provide a great deal of design freedom in manufacturing construction materials (e.g. laminating and coating capability). Whereas top liners or décor surfaces are available for these sandwich constructions with properties of flame retardancy and moisture resistance, the core materials in the low-priced segment based on paper (virgin / secondary fibres) do not exhibit the requirements regarding fire protection and moisture resistance. The possible uses of light-weight construction panels produced with them are therefore limited. Appropriate materials and the resulting light-weight structure therefore constitute a lucrative expansion of the range of possible uses.

Objectives/Research results

The aim of the overall project is to develop light-weight construction elements in the low price segment on the basis of paper cores with specific product properties focusing on moisture resistance and flame retardancy. An essential part is to develop appropriately application-oriented paper cores. The aim is to incorporate or enhance the flame-retarding function of the core material and to improve the moisture resistance whilst maintaining other properties (convertibility, mechanical stability, costs ...). The fire protection goal for these core elements and for the light-weight construction elements is building material class B1.

To develop the base papers for core material production, a model pulp system was developed on the one hand which comprised papermaking using specific additives. On the other hand, selected base paper was impregnated with flame-retarding impregnation agents. As far as the model pulp system is concerned, the paper must have a high inorganic share to achieve the targeted fire protection. This, however, significantly reduces the strength properties of the paper. In order to achieve the necessary flame-retarding action by impregnation, the application procedure and the properties of the paper and fireproofing material must be carefully matched. Based on these findings solutions were found for an application-oriented base paper for the core material. Trials were conducted on the pilot paper machine using the systems developed on a laboratory scale, which verified that such papers can be produced in a continuous manufacturing process. Foldcores were produced using these papers, which served as the base material for the production of sandwich constructions. Ready-to-use light-weight construction elements were then manufactured as demonstrators by selectively combining commercially available top plies with the corresponding innovative core materials.

Application/Economic benefits

As the result of this project in the project network, cost-effective flame-retardant and moisture-resistant sound elements/light-weight construction elements (paper core sandwiches) are to be made available. By virtue of their material properties, paper folded core structures in a flame-retardant and moisture-resistant design offer an expanded property profile and range of possible uses of the light-weight construction elements thus produced. This opens up additional fields of application in the product range of light-weight construction elements. In addition to using them as sound elements or light-weight construction elements, it is also feasible to use them in previously non-existent sales markets as partitions for toilet facilities, exhibition wall partitions, use of light-weight walls in rooms with intermittently high atmospheric humidity (storage halls / production halls).

Period of time: 01.03.2012 – 30.06.2014

Remarks

Research project ZIM KF2037911WZ2 is being funded by the Federal Ministry for Economic Affairs and Energy (BMWi) and is being performed together with Richter Furniertechnik GmbH & Co. KG.