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HIGH-STRENGTH COMPOSITES FROM RECYCLED WIND TURBINE BLADES IN DIFFICULT MINING CONDITIONS: WIND FARM WASTE AS A RAW MATERIAL OF THE FUTURE

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One of the most important issues of mining engineering, apart from safety, is reliability. Therefore, there is a growing interest in durable and moisture-resistant composite materials that can be used in difficult operating conditions that prevail underground in mines. In this paper, three-layer composite boards were produced and tested, which can be used, for example, as railway sleepers used in underground transport installations. The produced chipboards are characterized by high density, significant bending resistance and excellent resistance to moisture, which makes them ideal for use in a humid and aggressive mine environment. Wind turbine blade grinding was used as the base material for the production of a three-layer flat-pressed board, which allowed for the effective use of technological waste with high strength parameters, while supporting sustainable development strategies, thus reducing the problem of closing the life cycle of wind turbine blades.

Composite chipboards, developed for the purposes of this publication, are characterized by high density and bending resistance, which may result in meeting the requirements for railway sleepers used in difficult mining conditions. In addition, their low water absorption makes them resistant to degradation in the humid mine environment. The results of this study open up new perspectives for the use of composite materials from recycled wind turbine blades in the mining sector, offering both ecological and economic solutions. The analysis shows that composite panels can be a durable and effective alternative to traditional materials used in mines, while contributing to the reduction of waste generated in the renewable energy sector.

The results of bending strength and moisture resistance tests indicate high stability and durability of the composites, making them a competitive solution for applications in difficult underground conditions.