

Economic principles and possibilities of using recycled material based on wood – plastic – rubber



Technical University in Zvolen



Faculty of Wood Sciences and Technology



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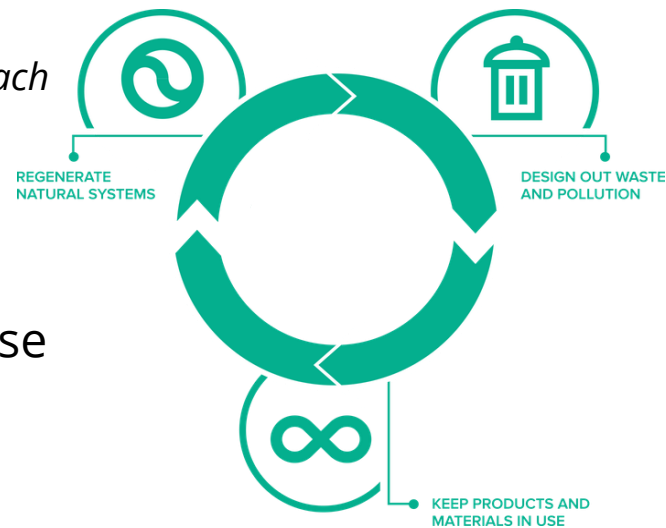


INTRODUCTION

Our paper shows how circular economy principles can be used to produce innovative products using wood waste along with plastic or rubber, as well as pointing out their economic benefits.

Circular Economy

- The philosophy of the circular economy is based on the principle of reusing recycled materials into new products.
 - *Only by integrating all three in a concerted approach can a fully circular economy be achieved.*
1. designing out waste and pollution
 2. keeping products and materials in use
 3. regenerating natural systems



CURRENT SITUATION

**The planet's
resources
are finite.**

- The automotive industry has struggled with the problem of accumulating end-of-life vehicles waste in recent years.
- Challenge is to use waste plastics, rubber, and other parts from end-of-life vehicles.
- UNIVNET a national platform for recycling technologies in the automotive industry (consortium of 6 Slovak Universities and National Automotive Industry Association).

Actual solutions for using recycle material in new products



waste rubber from the used tires and other rubber components

- AVE SK odpadové hospodárstvo Ltd., (rubber paving, rubber curbs, rubber speed retarders, rubber ballistic panels, anti - noise panels)
- Dron Industries Ltd. (gas fuel, liquefied gas, steel cords from tires)

waste plastic can be used in construction materials, electrical components, packaging production, secondary fuel, furniture production (wood-plastic boards, fence parts, paving, etc.)

Potential Use of Wood in Innovative Products

- outdoor terraces,
- tiles,
- ceilings,
- floors,
- molded sheets for the automobile industry,
- Furniture industry,
- injected parts in the electrical industry,
- injected molded parts for toys and musical instruments



Frames/trims



Parts in automobiles*



Various injected parts*



Ikea® WPC chair

UMaine WPC seawall

Existing and Future Results



The partially presented result of the project is the existing proposal of the production of anti-noise panels with the concept of business plan and especially with the specific calculation.



<https://www.enviweb.cz/115541>

An economic analysis of the innovative products (wood – plastic or rubber composite boards) will be conducted through the development of business plans based on time value of investment and operating costs with a defined life cycle and using dynamic and complementary evaluation methods.



Woodrubber board (rubber ratio 10%)



Woodplastic board (plastic ration 15%)

Business plans specifications will also

- include:**
- **Testing physical properties** of composite materials (density: STN EN 323, swelling in thickness: STN EN 317)
 - **mechanical properties** of composite materials (elasticity in bending and of bending strength: STN EN 310, tensile strength perpendicular to the plane of the board: STN EN 319) for innovative products with European standards.
 - Through the software platform SimaPro, the **life cycle of innovative products** is compared with similar products in terms of their environmental impact, based on the assessment of product parts for selected environmental impact indicators (climate change, ozone depletion, terrestrial ecotoxicity, terrestrial acidification, etc.).

CONCLUSIONS

The future of composite materials is an extremely promising one, with composite materials. Market forecasts indicate that composite materials containing rubber or plastic recycled materials are being used significantly more in several industries, such as furniture or construction. As a result, the industries are likely to switch from traditional materials such as wood, plastic, rubber, steel, and iron to more advanced and environmentally friendly composite materials.

Thank you for your attention

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