INDTECH2018

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PILLAR 1

Session 1.1

New market opportunities in the framework of the circular economy: recycled components integration into construction products

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VIMARK srl

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FFG Promoting Innovation.
Federal Ministry Republic of Austria Transport, Innovation and Technology
e2018 · at

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 767162.

VIMARK expertise

VIMARK is an Itaian SME that has been manufacturing powder based, pre mixed materials for the building sector for 35 years

VIMARK manufactures more than 150 products designed for both old and new constructions (mortars, rennders and plasters, coatings, adhesives, industrial floors..)

VIMARK is involved in research and development activities and in technological innovation for optimizing and automating its industrial processes, for improving existing products and developing new ones and reducing the environmental impact of products and processes.

PRODUCTS

- BUILDING MORTARS
- RENDERS & PLASTERS
- COATINGS AND FINISHES
- DEHUMIDIFYING SYSTEM
- COLOURED MINERAL COATINGS
- CONCRETE REPAIR
- INDUSTRIAL FLOORINGS
- SCREEDS
- ADHESIVES & GROUTS
- PRIMERS & SPECIAL PRODUCTS
- RESTORATION & GREEN BUILDINGS
- PAINTS AND COATINGS
- DIY
- EXTERNAL INSULATION SYSTEMS
- DECORATIVE FINISH RANGE
- ECOARIA LINE

R&D

REGIONAL and INTERNATIONAL PROJECTS

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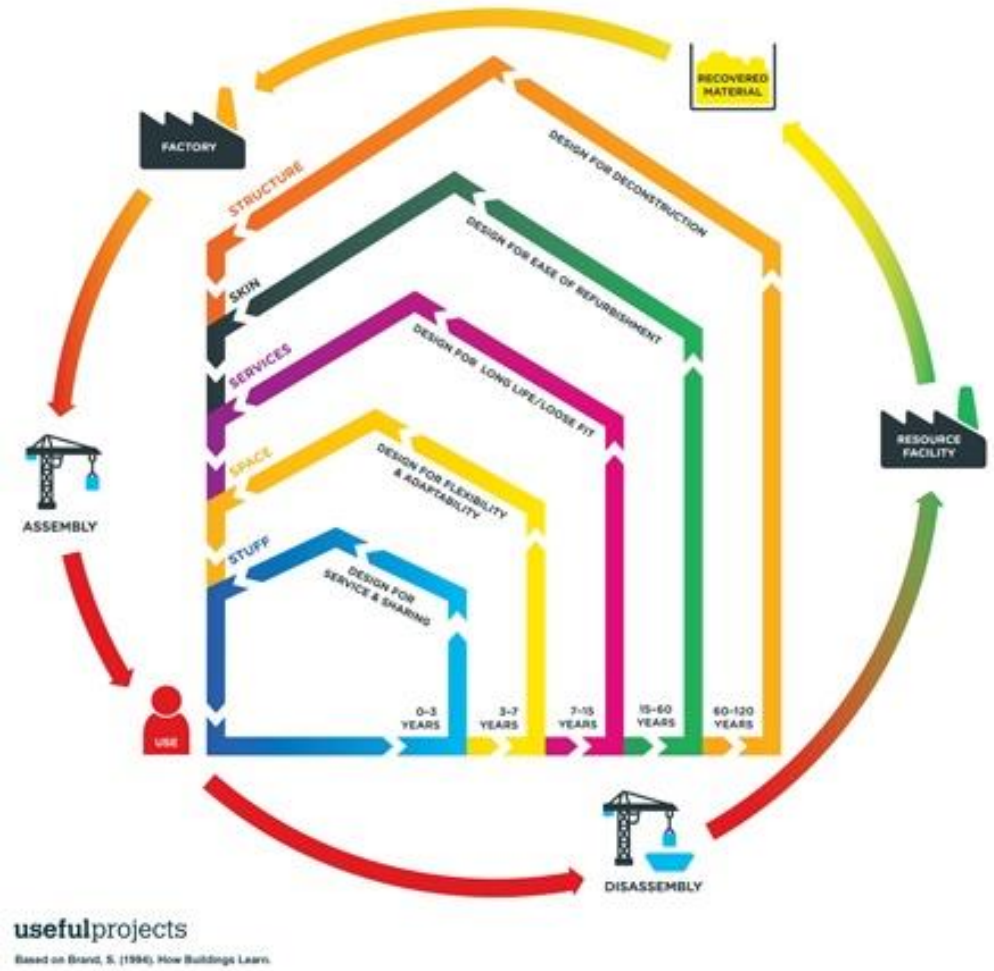

The construction sector can integrate a circular thinking at different levels: from improving durability of performance to allow refurbishment and deconstruction

Improving building skin components:

the roject aims at substituting natural sand with recycled polymeric inerts (polypropilene recycled ground tyres) in construction mortars

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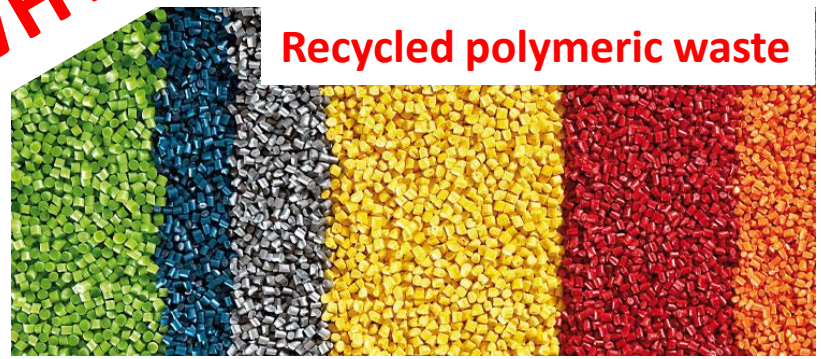
The environmental challenge and the business case

The construction industry is the first global consumer of raw materials. Consumption of aggregates exceeds 40 billion tons per year, equal to twice the sediment carried each year by all the rivers on the Earth. It is therefore urgent to identify systems to reduce the consumption of raw materials, such as sand and gravel, by introducing new aggregates.

WHY?



Tyre Recycling companies must build a commercial justification of the expensive waste treatment process that is based on the environmental need to utilize "tire waste". the suggested research refers to a new usage of GTR that will not have an impact just on the rubber market. The reduction in consumption is aimed at another natural resource (sand).

Industrial polymers waste generally lack of compatibility between different types. In case of the mix of PA, Polyamide, and POM, Acetalic Resin: processing and recycling these mixed materials is almost impossible, even if the contamination is lower than 1% on the total weight.
The transfer to landfill worthes 150 €/ton to the company
A re-use strategy needs to be developed

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Preliminary substitution tests made by the research group from POLITECNICO di TORINO, DISEG

Tipologia malta	Vista laterale dopo la prova a flessione	Vista della superficie di frattura
Malta normale		
Malta con gomma al 29,92%		
Malta con polipropilene al 57,56%		

Tipologia malta	ρ [g/cm^3]	A_F [mm]	G_F [N/mm]	σ_F [MPa]	σ [MPa]
M	2,26	0,02	0,17	2,00	47,69
FIBRE	-2%	+220%	+188%	-13%	-19%
PP_27%	-10%	+76%	+35%	-23%	-37%
PP_58%	-21%	+227%	+100%	-41%	-57%
PP_77%	-34%	+468%	+79%	-69%	-84%
GOMMA_30%	-12%	+60%	+11%	-32%	-51%
GOMMA_59%	-21%	+285%	+75%	-54%	-71%

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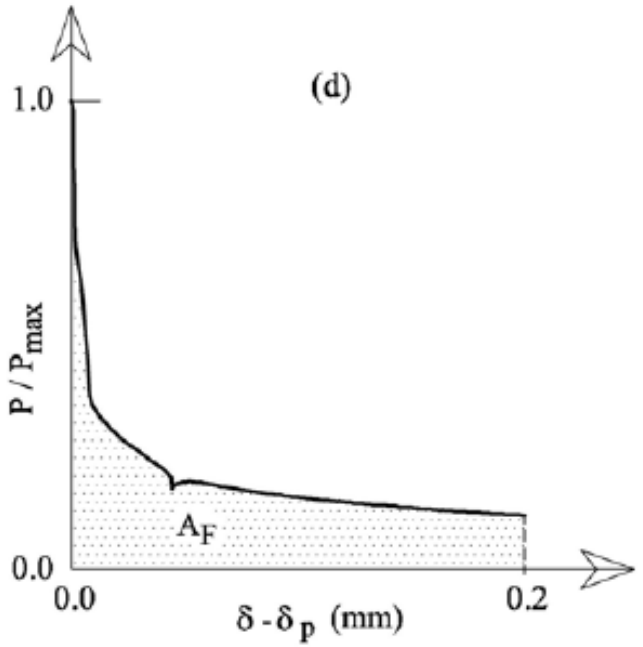
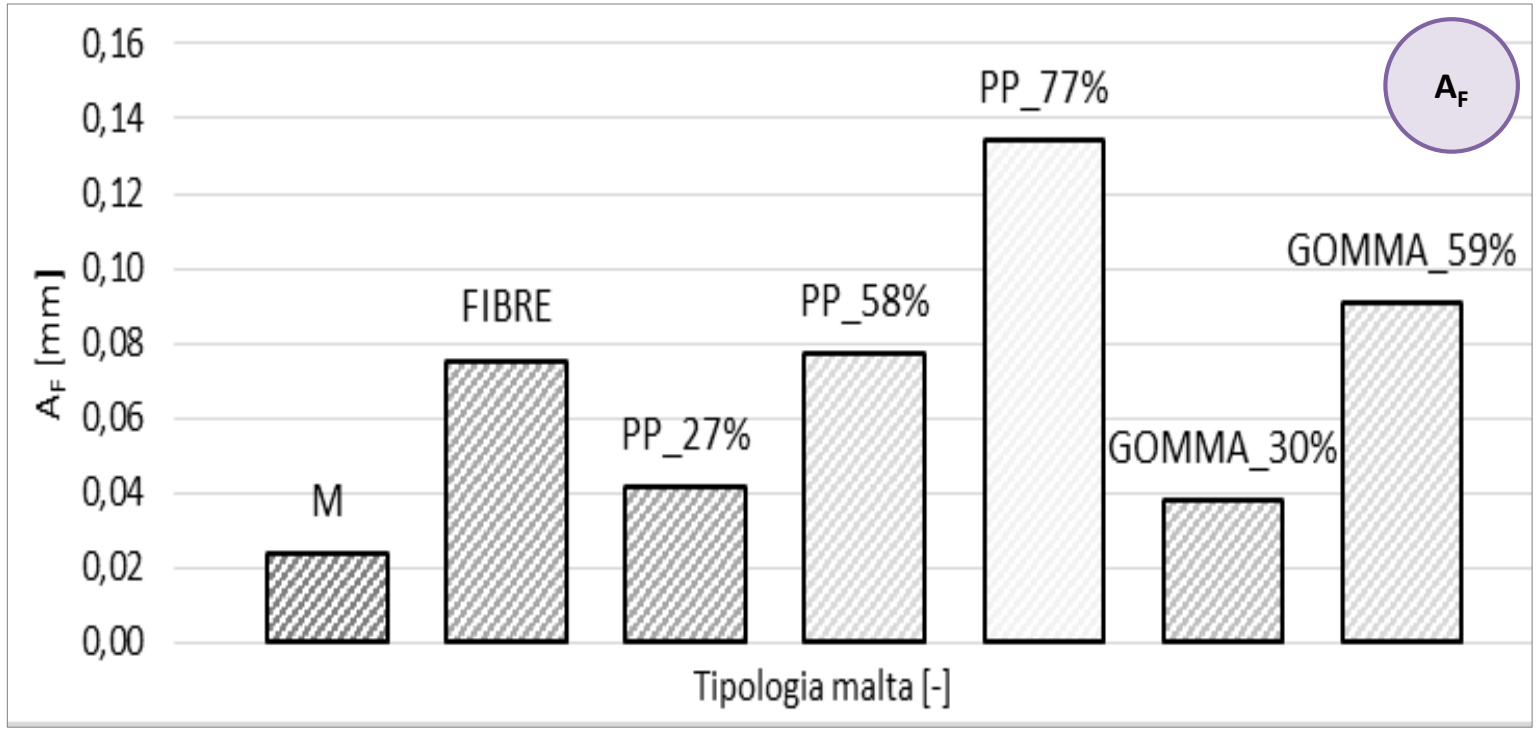
If 58% of sand is substituted with rubber of polypropylene granules the ductility is similar to the traditional mortar with 1% of plastic fibers





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Preliminary tests results demonstrate that mortars show:

- Lower carbon footprint
- Lower mechanical resistance (compression and flexural strenght)
- Lower density (less load and mass for the building envelope)
- Higher ductility after breaking, they can arrest of the propagation of micro cracks and having a major durability

Next steps:

- Defining the allowable level of substitution of the sand with recycled aggregates
- Defining improvements in durability of the material and in thermal and acoustic properties
- Defining the particle size dimension and the treatment needed for recycled aggregates
- Performing LCA and LCC analysis to define the environment and cost impact of the strategy

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