

R&D PROJECT



COMPANIES

COMSA
The University of Sheffield
Imperial College
Twincon Ltd
University of Zagreb
Arkada Ltd
Gradmont Ltd
Werkos Ltd
Dulex Ltd
Gumiimpex-GRP Ltd
Technical University 'Gheorghe Asachi' of Iasi
Cyprus University of Zagreb
Zebra General Construction Ltd
Adriatica Riciclaggio e Ambiente Abruzzo Srl
European Tyre Recycling Association
Fhecor Ingenieros Consultores, S.L.
ZYO Ingeniería Geomática, S.L.

BUSINESS AREAS

Infrastructure Area
COMSA, S.A.U.

DURATION

2013-2016

BUDGET

Consortium budget:
4.499.466,80 €
COMSA budget:
275.000 €

KEYWORDS

Concrete, end-of-life tyres, rubber, steel fibres, polymeric fibres

COORDINATOR

Joan Peset

EXTERNAL FUNDING



Title of the project

Innovative reuses of tyre components in concrete

Acronym

ANAGENNISI

Content of the project

This project has a clear social impact and a direct effect on sustainability. Every year around 1,000 M tyres are produced and about the same amount of end-of-life tyres, of which 38% are incinerated and 10% are sent to landfill, with the corresponding environmental impact.

Tyres are basically made of three main components: rubber, steel and textile polymer, the percentages of which vary according to the type of vehicle. Rubber is a highly durable material with good strength, flexibility and a remarkable ability to maintain its volume under stress. On the other hand, the steel cord used as tyre reinforcement is a very high-strength cord. Textile polymer is of high quality and durability, however, when removed it becomes contaminated with rubber and very tangled.

Tyres can easily decompose, so finding solutions for these components is a priority to reduce the environmental impact of NFUs.

General objectives

The main objective of the project is to develop innovative solutions to reuse the different components in concrete:

- Development of a concrete with confined rubber and steel fibre reinforcement
- Development of a highly ductile recycled concrete with rubber and recycled fibres for integral bridges
- Development of a concrete with recycled steel fibres for different applications: inclined slabs, precast, shotcrete and floor screeds
- Development of a concrete with polymeric fibres for crack control

Results and conclusions

The aim of this project was to analyse the behaviour of **steel fibres recycled from tyres** in different areas such as shotcrete, suspended slabs and sleepers. The analysis was focused mainly on the case of **reinforced shotcrete**. The most characteristic properties are flexural strength and energy absorption. After dividing the project into a preliminary laboratory study and a pilot study under real conditions, highly satisfactory results were obtained. The incorporation of recycled fibres **improves the mechanical activity** by up to 20% compared to plain concrete.

In terms of concrete slab production, the best performance was obtained by the fibres mixture (RTSF + HE 55/35). The recycled fibres have helped to **improve the load-bearing capacity and deformation**. In addition, **detachment can be avoided** in high temperature environments.

Furthermore, the most remarkable result that can be extracted from this project is its **enormous commitment to the environment**. It is worth mentioning that, for future lines of research, a more efficient method of obtaining these recycled fibres at a lower cost needs to be sought.