Spanish university offers new recycled concrete with high strength and improved shrinkage

Summary

Profile type	Company's country	POD reference
Technology offer	**Spain**	**TOES20250303008**
Profile status	**Type of partnership**	**Targeted countries**
PUBLISHED	**Research and development cooperation agreement**	**• World**
Contact Person	**Term of validity**	**Last update**
Enrico FRANZIN	**3 Mar 2025** **3 Mar 2026**	**3 Mar 2025**

General Information

Short summary

Spanish university have developed a high-performance concrete (HPC) and improved shrinkage, made with recycled concrete aggregate (RCA) and reactive magnesium oxide (MgO). The developed concrete has a high workability, which allows a simple and economical installation, and a high strength, which allows using it in any type of structural element according to the current applicable regulations.
They seek research and development cooperation agreement

Full description

The main line of research in this Spanish research group is the reuse of steel slags in the construction sector. Many applications of such slags have been developed in mortars, structural concretes, concrete pavements, self-compacting concretes and bituminous mixtures.

High-performance concrete is a type of concrete with high strength and durability thanks to its high cement content. Nevertheless, this high content of cement also implies that it has a high heat of hydration during setting and high shrinkage, in addition to low workability. Recycled concrete aggregate is a waste from the precast concrete industry that is characterized by its very high-water absorption. Magnesium oxide (MgO) is a chemical compound that exhibits expansive properties when mixed with water. In addition, this expansion occurs during the concrete setting process and its production generates 70% less CO_2 emissions than the manufacture of ordinary Portland cement.

The solution proposed by the researchers focuses on solving the existing problems in the traditional manufacture of concrete. The invention seeks to take advantage of recycled concrete aggregate and magnesium oxide to produce a sustainable, high-performance concrete optimal for structural use from the point of view of placement (high workability), from the point of view of strength (high strength) and regarding shrinkage (decreased shrinkage).

The designed high-strength concretes are composed of type I cement (ordinary Portland cement) as the first binder and reactive magnesium oxide as the second binder in a content between 10% and 15% of the total binder mass of the high-strength concrete. The coarse aggregate fraction and the fine aggregate fraction are exclusively manufactured with recycled concrete aggregate. In addition to these components, the designed concretes also incorporate water and a superplasticizer admixture to increase the workability of concrete.

Potential applications are as follow:
- Construction and civil engineering sector
- Sector of new materials valid for structural applications
- Technical sector for the recycling and use of waste from the prefabrication industry

The Spanish research group is looking for research and development cooperation agreement.

Advantages and innovations

- The sustainability of high-strength concrete is maximized by adding recycled concrete aggregate and reactive magnesium oxide as a second binder.
- The dumping of waste, clinker consumption and CO2 emissions are reduced and, with leads to the consequent reduction of climate change.
- The workability and strength of high-strength concrete made with recycled concrete aggregate and reactive magnesium oxide are simultaneously maximized.
- Minimizing shrinkage (shortening) of high-strength concrete and the cracking associated with this phenomenon is achieved by adding reactive magnesium oxide with expansive characteristics.

Technical specification or expertise sought

Stage of development

Lab tested

IPR Status

IPR granted

IPR Notes

Sustainable Development goals

- **Goal 9: Industry, Innovation and Infrastructure**

IPR Notes

Partner Sought

Expected role of the partner

The type of organisation sought is private companies or municipalities.
The expected role of the partner will be high performance structural concrete and search for other needs.

Type of partnership

Research and development cooperation agreement

Type and size of the partner

- **Other**
- **SME 11-49**
- **Big company**
- **SME 50 - 249**
- **SME <=10**

Dissemination

Technology keywords

- **02001 - Design and Modelling / Prototypes**
- **02006007 - Management of construction process & life**
- **02002013 - Moulding, injection moulding, sintering**
- **02006002 - Construction methods and equipment**
- **02006001 - Materials, components and systems for construction**

Market keywords

- **09007003 - Distribution of building products and systems**
- **09007002 - Manufacture of construction materials, components and systems**
- **08004002 - Chemical and solid material recycling**
- **08004004 - Other pollution and recycling related**
- **09007001 - Construction companies**

Targeted countries

- **World**

Sector groups involved