

# Durability study of bituminous mixtures incorporating alternative materials by mechanical calculation methods



2<sup>st</sup> MEETING OF THE DOCTORAL  
PROGRAM IN CIVIL ENGINEERING  
EIDEIC II 2016



**GITECO**  
**UC** UNIVERSIDAD  
DE CANTABRIA

**Israel Rodríguez Fernández**

**May, 2016**

**Supervisor: Daniel Castro Fresno**

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## 1 Introduction



Mixture designs with alternative materials



Software

## 2 Project context



### Design of asphalt mixtures with alternative materials

Two kind of mixtures (PA and BBTM) with:

- Reclaimed Asphalt Pavement (RAP)
- Electric arc furnace slags
- Bitumen modifications

## 2 Project context



### Design of asphalt mixtures with alternative materials

One kind of mixture (AC) with different combinations of:

- Reclaimed Asphalt Pavement (RAP)
- Electric arc furnace slags
- Basic oxygen furnace slags
- Foundry sand
- Two different bio-based rejuvenators

## 2 Project context

LVECD 1.0 (BETA)

### Durability simulation of developed mixtures using software

Layered ViscoElastic pavement analysis for Critical Distress (LVECD)

- Finite Element calculations
- Advanced mechanistic models of damage prediction
- Specific laboratory test are needed

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## 3 Main results

### Courses

- ❑ EDUC basic training course (2016).
- ❑ Statistics for research in construction engineering I and II (2016).
- ❑ Technical English for civil engineers (In progress).
- ❑ Introduction to sustainable construction (In progress).

### Congress

- ❑ European Road Infrastructure Congress. **ERIC 2016**. Leeds, 18<sup>th</sup>-20<sup>th</sup> October 2016.
  - Abstract accepted.
- ❑ World Conference on Pavement and Asset Management. **WCPAM 2017**. Milan, 12<sup>th</sup>-16<sup>th</sup> June 2017.
  - Abstract under review.

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## 4 Compliance level of PDIC skills

<b>Basic competences</b>	Science and Technique	Technology	Training courses	Results	SWOT analysis	Workplan	Mobility	Funding	Ethics
CB11	✓	✓	✓						
CB12				x		✓	x		
CB13				x					
CB14					✓		x		
CB15				x					
CB16				x					✓

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