OPTIMIZATION OF THE DESIGN OF ALTERNATIVE ASPHALT MIXTURES

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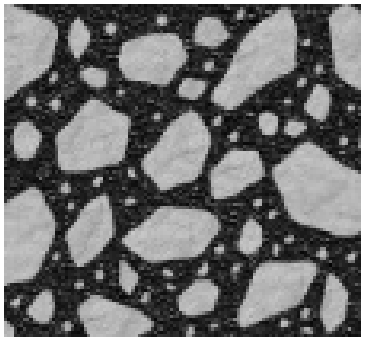
INTRODUCTION

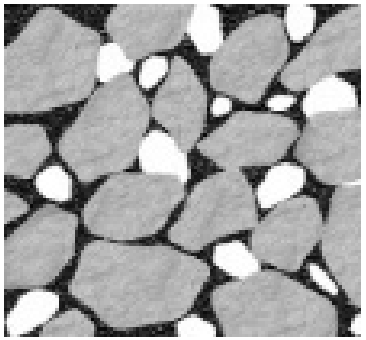
Natural aggregates

Binder

ASPHALT MIXTURE



Dense asphalt mixture



Porous asphalt mixture

MAIN OBJECTIVES

Provide solutions to mitigate **road/vehicle related emissions** including noise, exhaust gases and microplastics coming from tyres' wear and tear.

Reduce the environmental and economic impact of the transport infrastructures by means of the **optimized design** of new bituminous mixtures incorporating **residual fibres** to improve their mechanical performance.

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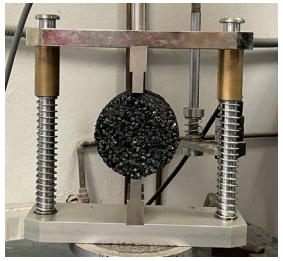
ACTIVITIES

1. State of the art
2. Characterization and selection of materials
3. Design and optimization of an asphalt mixture incorporating **recycled fibres**
4. Design of a new **urban** asphalt mixture
5. Design of a new **inter-urban** asphalt mixture
6. LCA and CCA
7. Internationalization, dissemination of results and transfer of knowledge

RESEARCH CONCLUSIONS

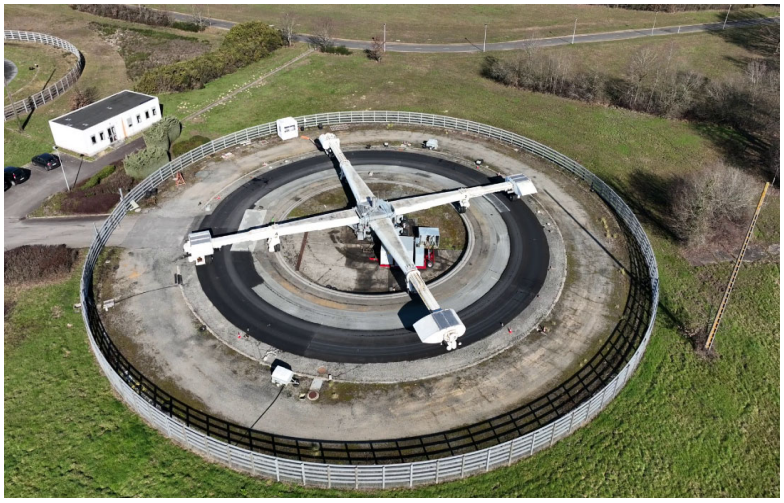
- Recycled fibres are potentially suitable for use in mixtures.
- **AC** mixtures
  - Upgraded performance against plastic deformation and higher dry strengths
  - Best fibre: Pulp
- **PA** mixtures
  - Improved performance against particle loss
  - Best fibre: Ecofibra






RESEARCH CONCLUSIONS

- **Urban** mixture
  - 2.5 dB less than the reference
  - Good mechanical properties
- **Inter-urban** mixture (2LPA)
  - 6.8 dB less than the reference
  - Good mechanical properties
  - Use of fibres (Pulp)



SCIENTIFIC ACTIVITIES

• SCIENTIFIC PAPERS

Published:

- **Miera-Dominguez, Helena**; Lastra-Gonzalez, Pedro; Indacoechea-Vega, Irune; Castro-Fresno, "Evaluation of the mechanical performance of AC mixtures with recycled fibres," *Dev. Built Environ.*, vol. 18, no. April, 2024, doi: 10.1016/j.dibe.2024.100435.
- **H. Miera-Dominguez** *et al.*, "Design and validation of a new asphalt mixture to reduce road traffic noise pollution in urban areas," *Case Stud. Constr. Mater.*, vol. 20, pp. 0–9, 2024, doi: 10.1016/j.cscm.2024.e03107.
- D. Castro-Fresno, **H. Miera-Dominguez**, P. Lastra-González, I. Indacoechea-Vega, R. van Loon, and G. van Blokland, "Two-Layer Porous Asphalt: Main Properties to Decrease the Noise Emissions," *Transp. Res. Rec.*, 2023, doi: 10.1177/03611981231203231.
- **H. Miera-Dominguez**, P. Lastra-González, I. Indacoechea-Vega, and D. Castro-Fresno, "What is known and unknown concerning microplastics from tyre wear?," *Road Mater. Pavement Des.*, 2023, doi: 10.1080/14680629.2023.2281956.
- M. Ballester-Ramos, **H. Miera-Dominguez**, P. Lastra-González, and D. Castro-Fresno, "Second Life for Plastic Fibre Waste Difficult to Recover: Partial Replacement of the Binder in Asphalt Concrete Mixtures by Dry Incorporation," *Materials (Basel).*, vol. 16, no. 3, 2023, doi: 10.3390/ma16030948.

Under review:

- I. Indacoechea-Vega, **H. Miera-Dominguez**, P. Lastra-González, and D. Castro-Fresno, "Life Cycle Approach for evaluating the environmental and economic viability of Low-Noise asphalt pavements," Journal of Cleaner Production

Draft:

- **H. Miera-Dominguez** et al., Development and validation of a new asphalt mixture to reduce noise pollution from road traffic in interurban areas

SCIENTIFIC ACTIVITIES

• CONGRESSES

- A communication was sent to Congreso Iberolatinoamericano del Asfalto (CILA2024). April 2024. Tittle of the presentation: “Primeros avances del Proyecto CIRPOL: estudios y caracterización de betunes envejecidos”. Author presenting: María González González. Granada (Spain)
- A communication was sent to Transport Research Arena (TRA2024). April 2024. Tittle of the poster: “Recyled fibers in asphalt mixtures as method to improve the mechanical behaviour”. Author presenting: Christopher de la Fuente Navarro. Dublin (Ireland)
- A communication was sent to Forum Acusticum 2023. September 2023. Tittle of the presentation: “Development of Low emission asphalt mixtures for urban and peri-urban roads”. Author presenting: Ronald van Loon. Torino (Italy)
- A communication was sent to Transportation Research Board (TRB2023). January 2023. Tittle of the presentation: “Two-layer porous asphalt: main properties to decrease the noise emissions”. Author presenting: Daniel Castro Fresno. Washington D.C. (United States)
- A communication was sent to Transport Research Arena (TRA2022). November 2022. Tittle of the presentation: “Low-noise and pollutant-reducing asphalt mixtures”. Author presenting: Pedro Lastra González. Lisbon (Portugal)
- A communication was sent to Congreso Iberolatinoamericano del Asfalto (CILA2022). November 2022. Tittle of the presentation: “Impacto de las fibras de aramida en las mezclas porosas”. Author presenting: Daniel Castro Fresno. Punta del Este (Uruguay)

SCIENTIFIC ACTIVITIES

- **SWOT**

STRENGTHS

- Equipment and facilities
- Multidisciplinary group
- EU Project funding

WEAKNESSESS

- Many fields to consider in the research
- Coordination due to many projects

OPPORTUNITIES

- International networking
- Obtain experience for the projects
- Future works and researches

THREATS

- Comparison with old results
- Delays in the publication process
- Coordination and communication with partners

EVALUATION GUIDE

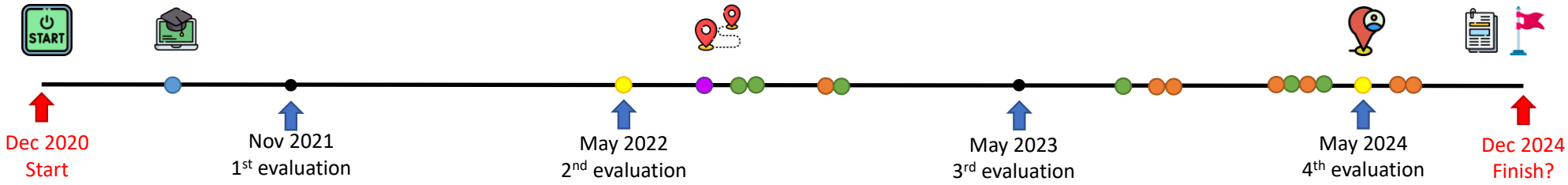
Basic skills

CB11	Systematic understanding of a field of study and command of the skills and research methods related to the field
CB12	Skill to conceive, design or create, implement and adopt a substantial process of research or creation
CB13	Skill to contribute to the enlargement of the knowledge limits through an original research
CB14	Skill to carry out a critical analysis and assessment and synthesis of new and complex ideas
CB15	Skill to communicate with the […] international scientific community
CB16	Skills to encourage […] the scientific, technological, […] progress in a society based on knowledge

Capacities and personal abilities

CA01	Cope in contexts in which there is little specific information
CA02	Find the key questions to be answered to solve a complex problem
CA03	Design, create, develop and undertake new and innovative projects in the knowledge scope
CA04	Work both in teams and individually in an international or multidisciplinary context
CA05	Integrate knowledges, face complexity and formulate judgements with limited information
CA06	Intellectual criticism and defence of solutions

ACADEMIC STATUS



Mandatory training
- 40 h basic formation
- 40 h advanced formation

EIDEIC
- **2022**
- **2024**

International mobility
- UGE (Nantes) – 1 month

Congresses

Scientific papers

FUTURE DEVELOPMENT

- **Finish the article related to inter-urban mixtures**
- **Prepare the thesis document**

QUESTIONS

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