

Construction Materials track

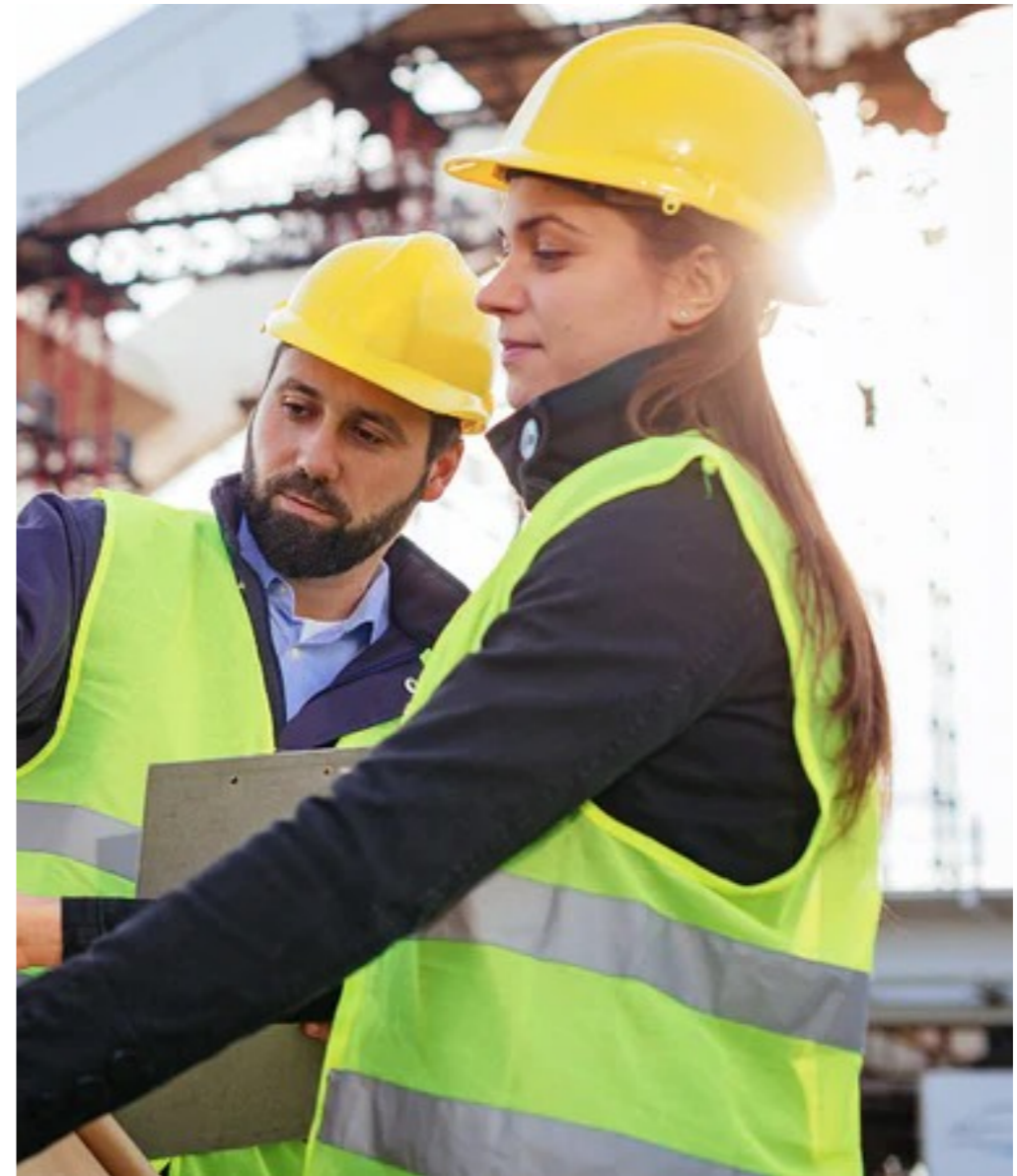
Dr. O. Çopuroglu

Associate professor section M&E

CM-track coordinator

Construction Materials Engineer

- **choose, develop** and **manufacture** construction materials
- **research, monitor** and **assess** materials and structures
- design and engineer for **sustainability** and **durability**
- *Failure analysis, forensic engineering, SLD*



Skills of a Construction Materials Engineer

Basic

Communication

Research

Problem Solving

Multidisciplinary mindset

Defining

Materials engineering

Materials science

Testing

Budgeting

Necessary

Engineering Mechanics

Materials chemistry

QC / QA

Uncertainty and Data analysis

Distinguishing

Failure analysis

Materials selection

Computational Modelling

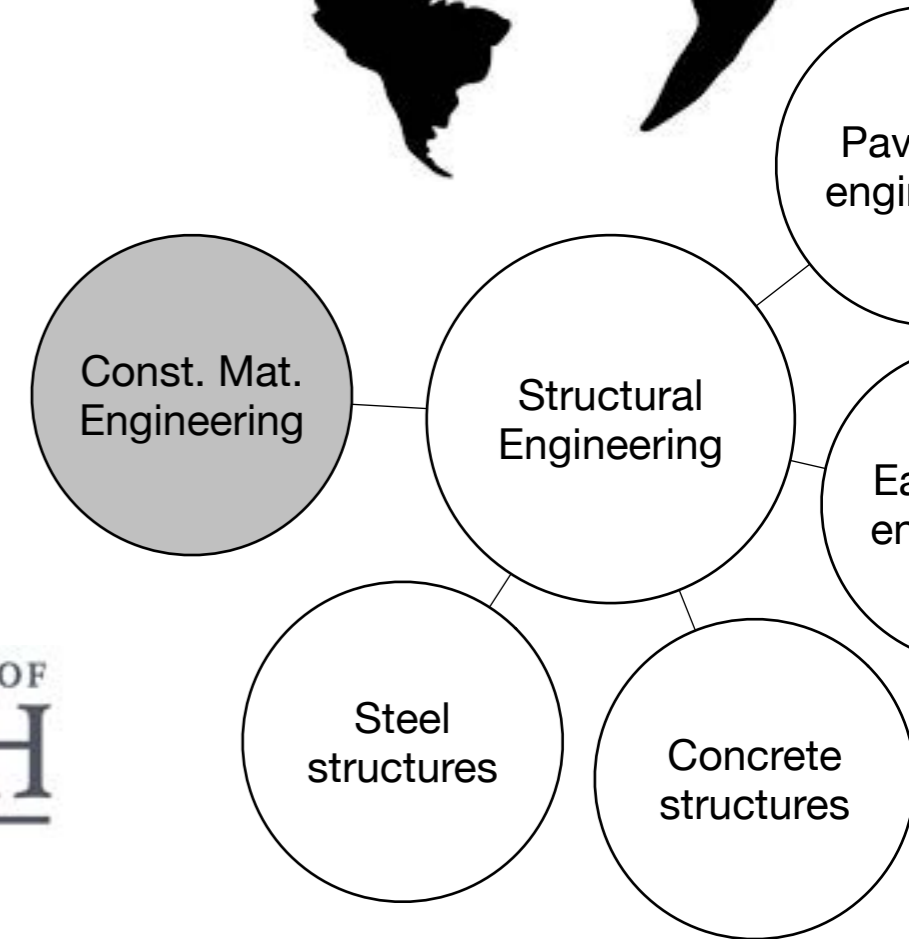
Advanced technologies

Global CM education

TU Delft CM-track

Construction Materials Engineering

- Around the world offered under SE curriculum.
- Only a small number of prestigious universities offer **dedicated CM-engineering master programs**

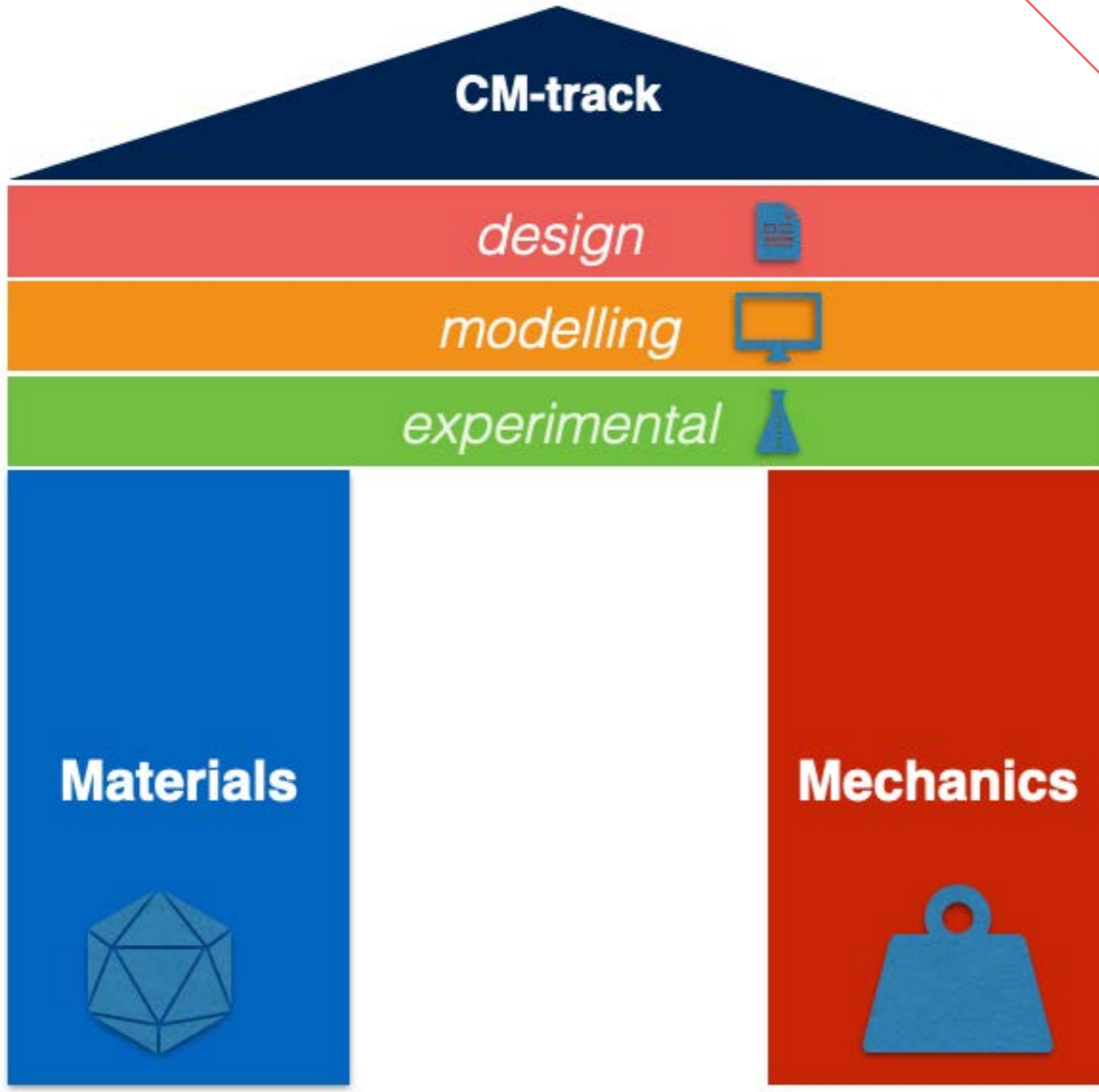




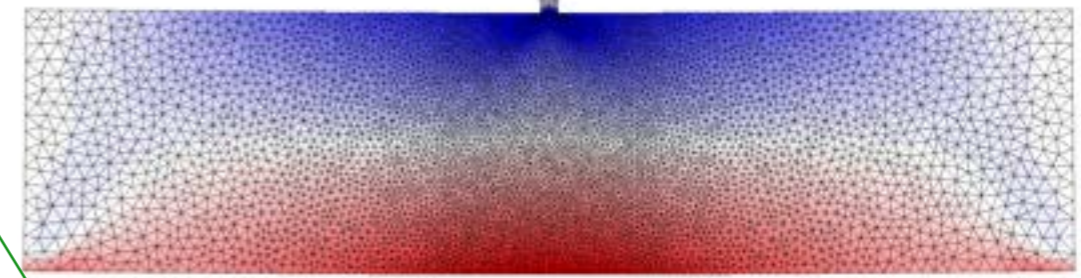
Super asphalt



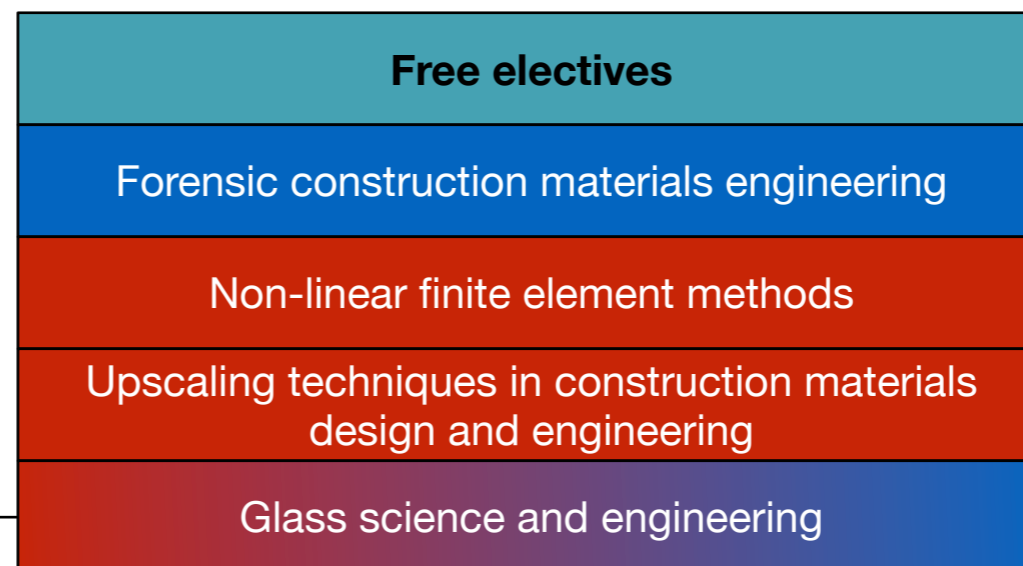
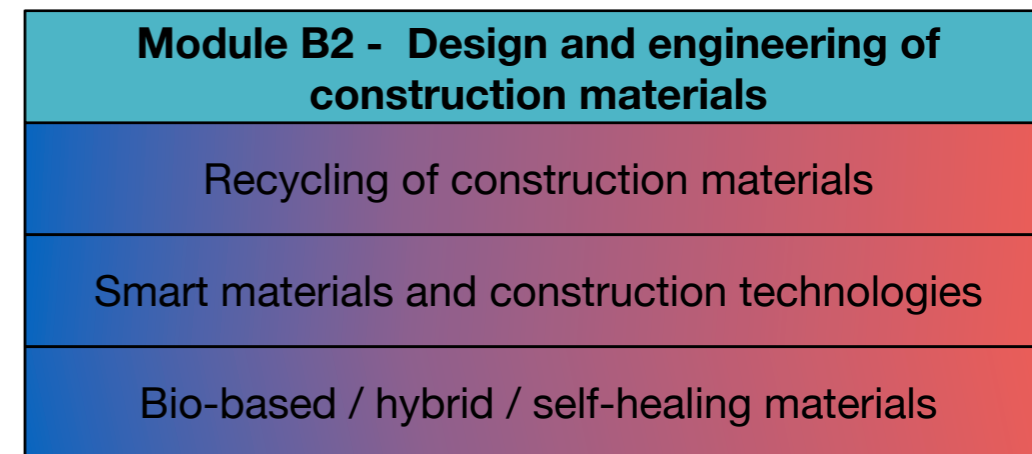
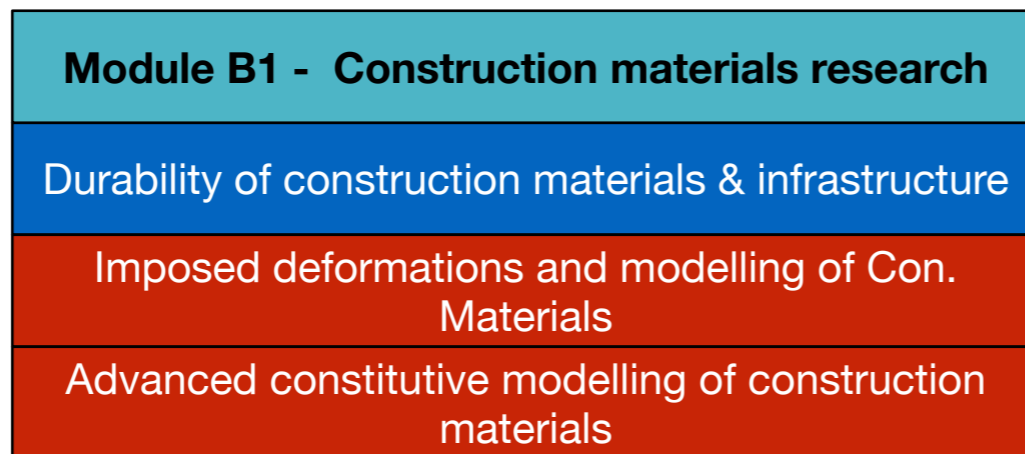
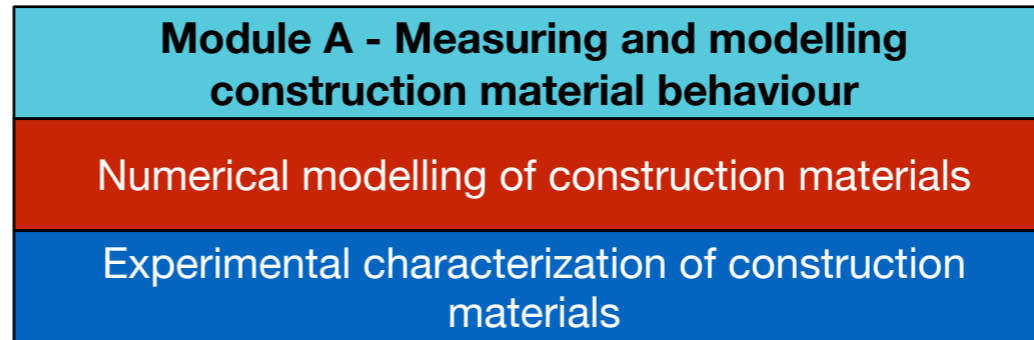
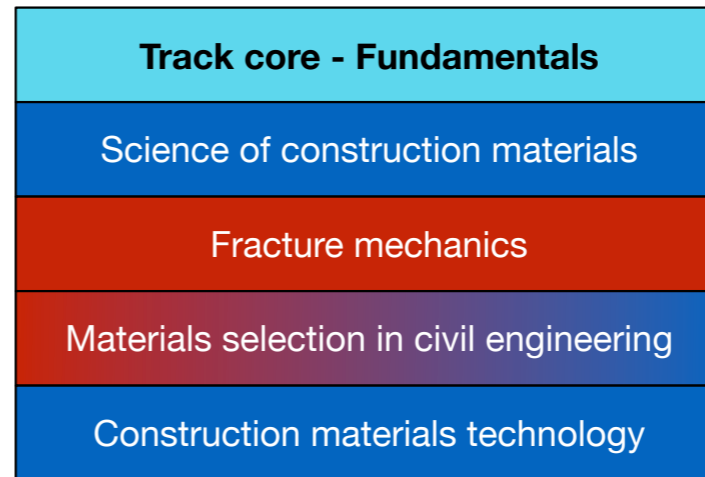
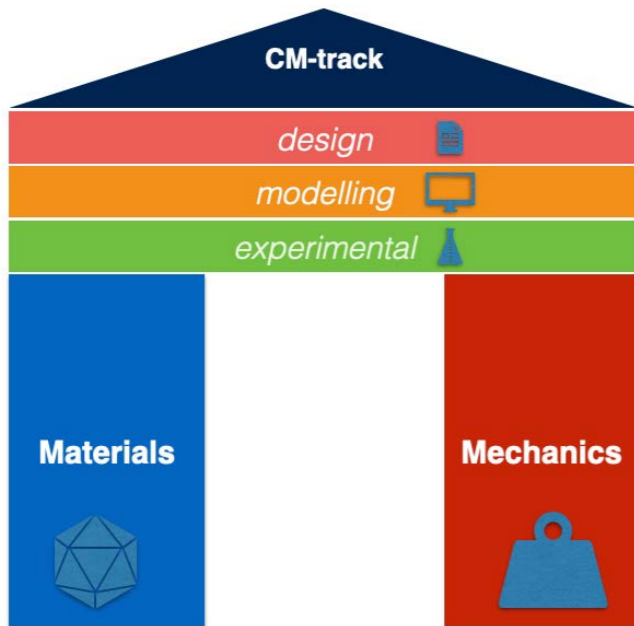
3D Concrete Printing



FEA



Materials testing



Teaching Team

- World-class educators and researchers *28 Lecturers from the departments 3MD and ES*
- Research driven education
- Large network with the industrial partners
- Different opportunities for your M.Sc. thesis project: *participation in PhD projects / industry projects / innovative proof of concept projects*



Prof. E. Schlangen

Collaboration with industry



Rijkswaterstaat
Ministerie van Infrastructuur en Waterstaat



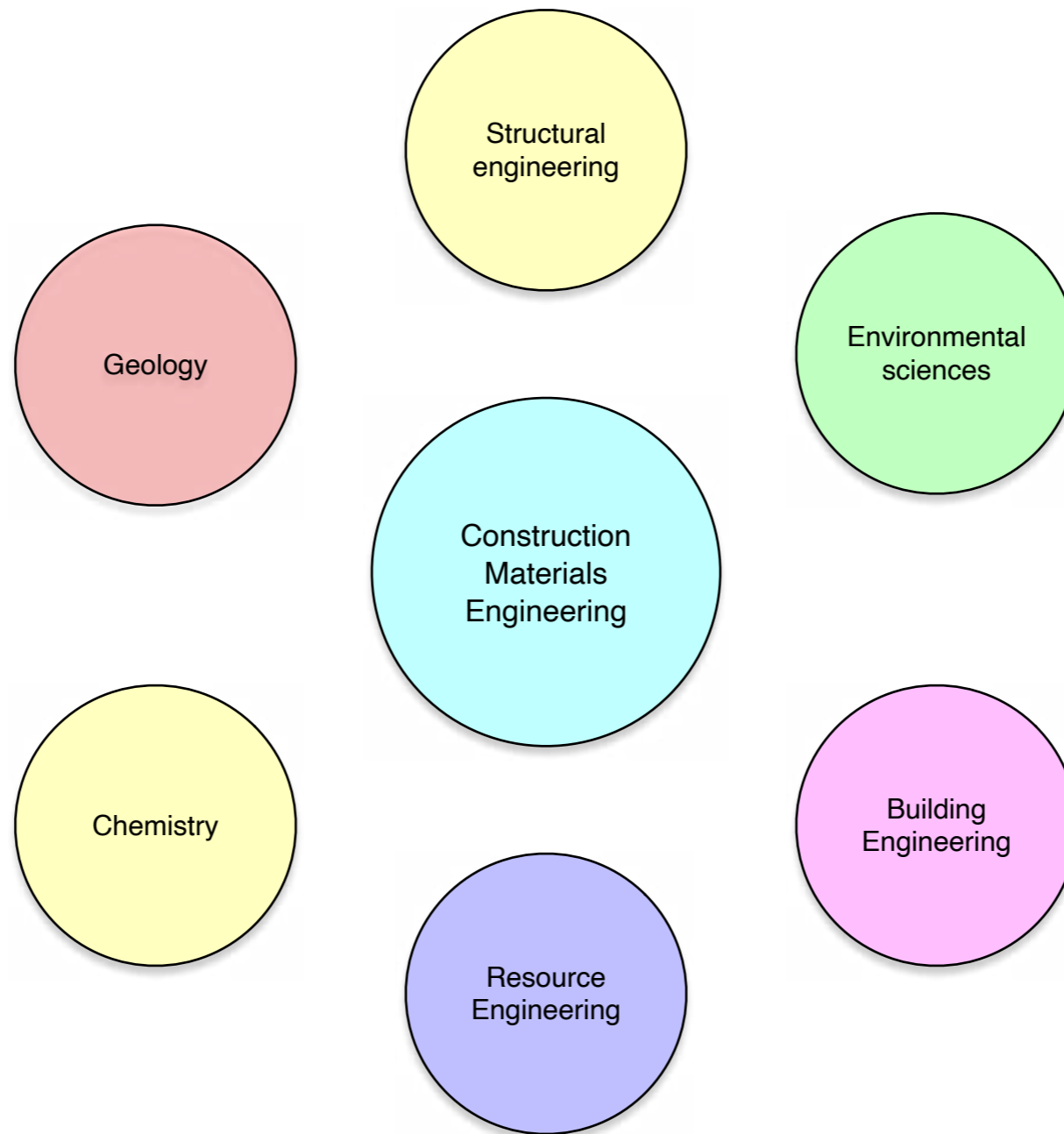
Job opportunities

- Governmental organizations (RWS, gemeenten, provincies)
- Contractors
- Consultancy companies
- Construction materials manufacturers
- Building Research institutes (ENBRI, Universities)

Members	
TNO	BAM
CSTB	EMI
Enterprise IR	IETcc-CSIC
IMS Institute	ITB
SBi	RISE
TZUS	ZAG
BRE	BBRI
EMPA	URBAN-INCERC
LNEC	SINTEF
TSUS	VTT

ENBRI members

Multidisciplinary expertise



Greater projects bring greater construction materials challenges

Casting and curing of concrete

World's largest concrete production factory
100m³/h



Fehmarnbelt tunnel - World's longest immersed road and railway tunnel b/w GER-DK



Cement production is responsible for 7% of the global CO₂ emission.

All construction materials are responsible for about 20% of the global CO₂ emission.

Limestone
Calcined
Clay
Cement



Alternative materials
R&D and design

New regulations and
codes



Betonakkord



Goal of the Dutch Construction Industry:

**100% recycled aggregate in Concrete
by 2030**

Current annual concrete demand in NL is about 17M m³



Aging strategic infrastructure

Diagnosis and Monitoring of structural health and **Prognosis** of remaining service life



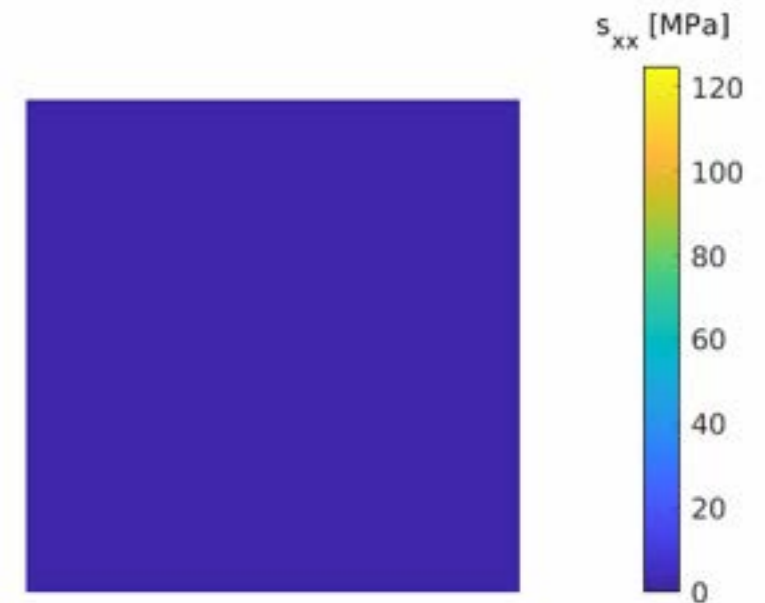
Afsluitdijk causeway, Netherlands

Forensic construction materials engineering is required for failure analysis and revealing the source of damage



Ponte Morandi, Italy (2018) - Corrosion of the structural cables

Thesis topics



Fatigue in FRP composite

3D printing, durability, experimental- and computational micro-mechanics, health monitoring, forensic materials engineering

of

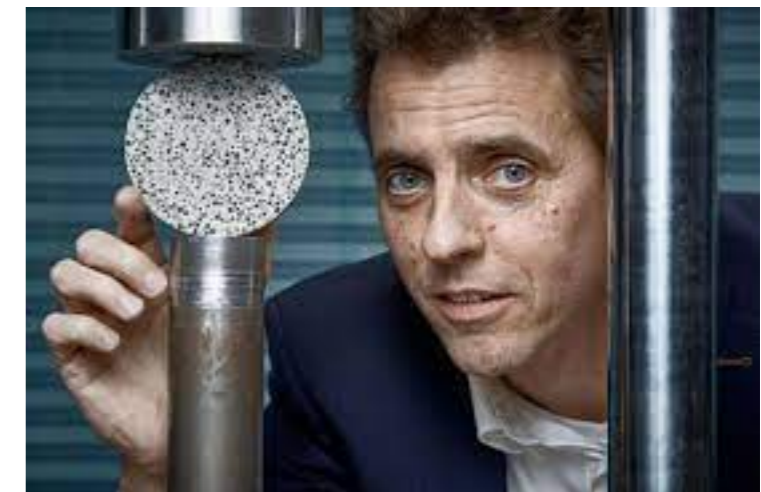
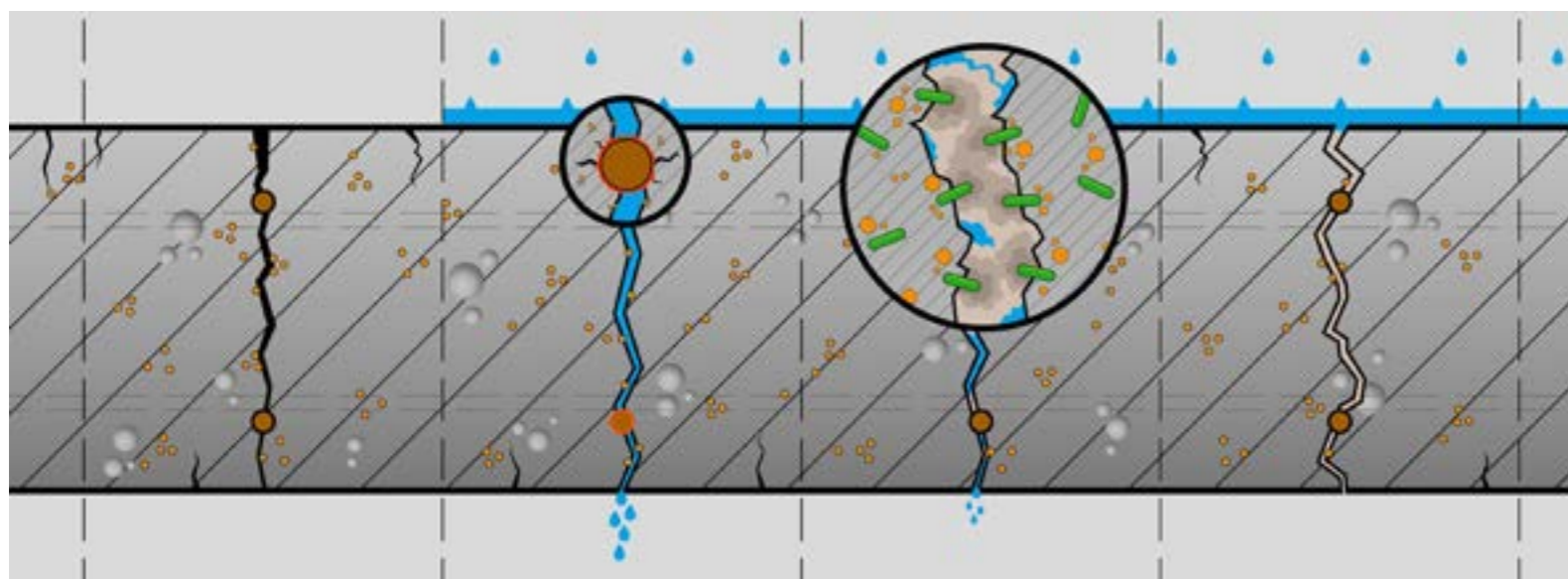
(Reinforced) concrete, cementitious binders, composites, glass, bituminous materials, natural resources, bio-materials...



3D concrete printing

Self Healing Concrete

Bio-based
construction materials
research

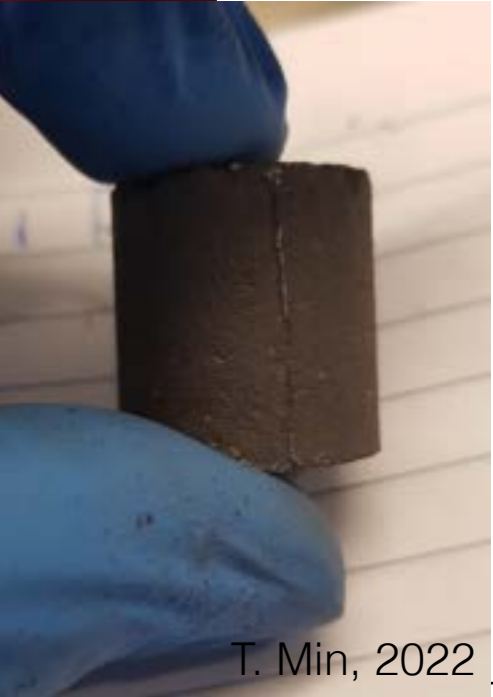


Prof. H. Jonkers

Getting ready for the future

Research on Manufacturing Construction Materials on Mars

Spark plasma sintering (SPS)

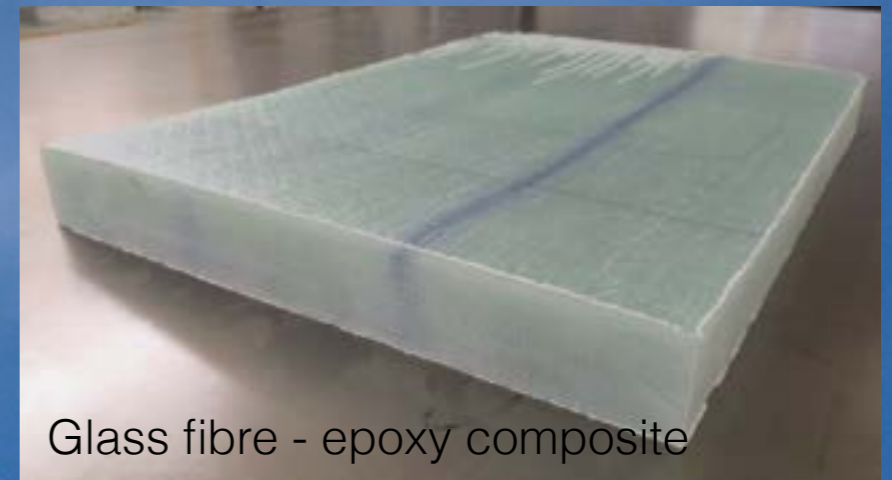


T. Min, 2022

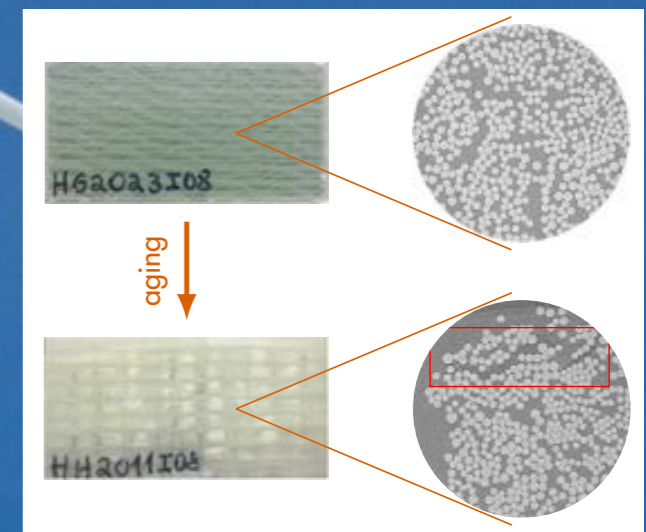
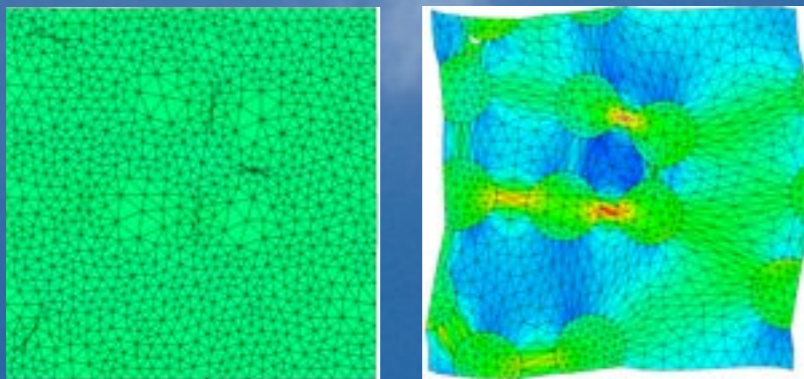
Hydrothermal aging of fiber-reinforced polymers

Problem: Strength loss upon exposure to water

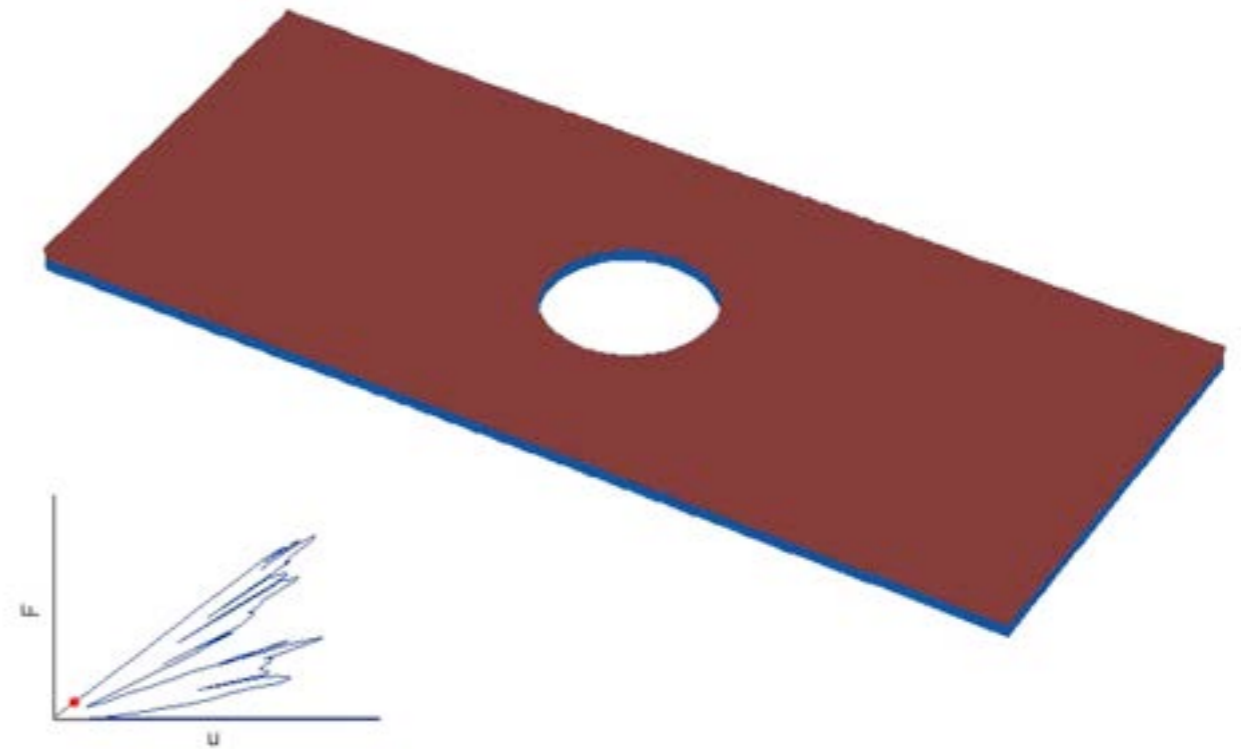
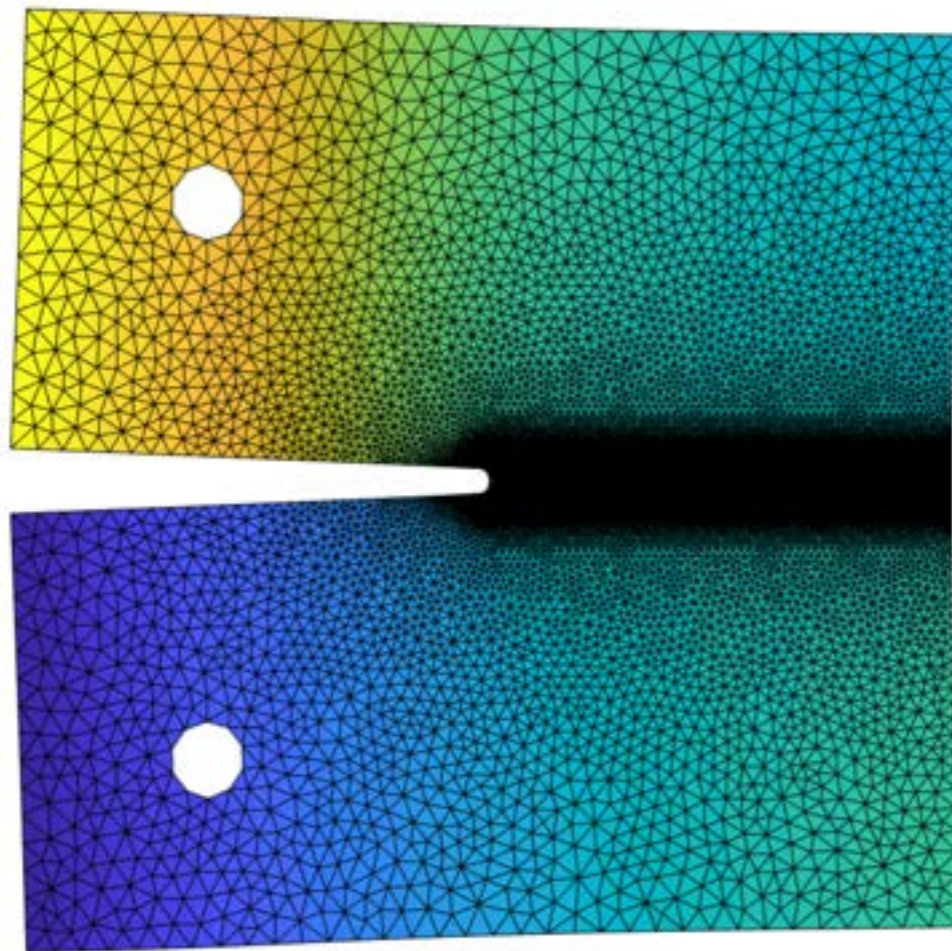
Goal: Make the wind turbine blades last longer



FEM for water diffusion and mechanical equilibrium



Predicting the failure behavior of construction materials

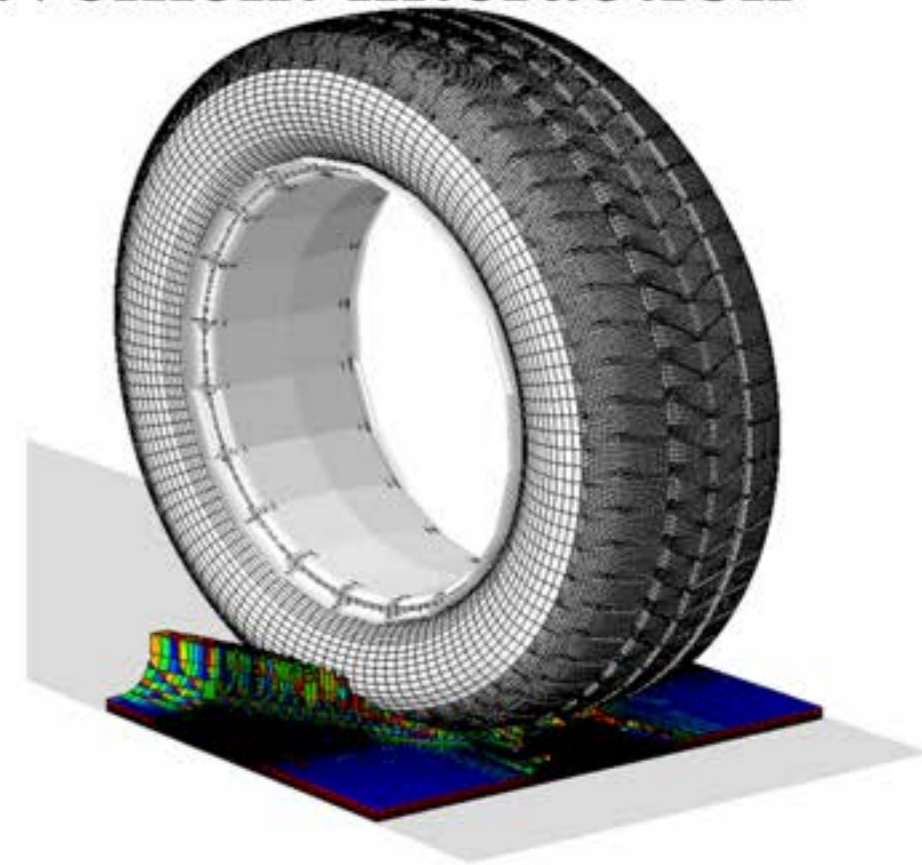


Dr. F. v.d. Meer

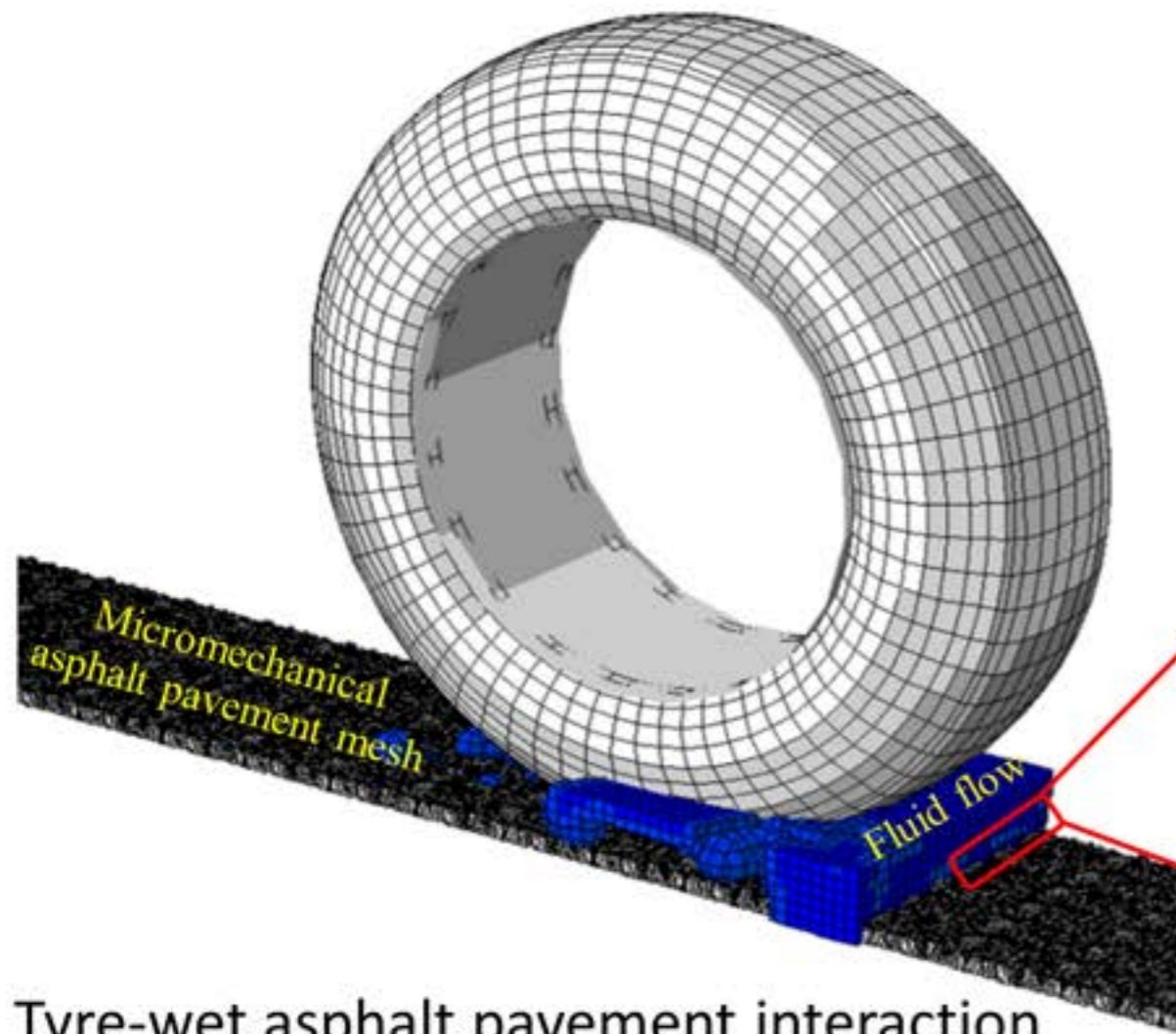
Micro-structural aspects of tire-wet pavement interaction

Research towards the development of micromechanical and multi-physics computational tools to

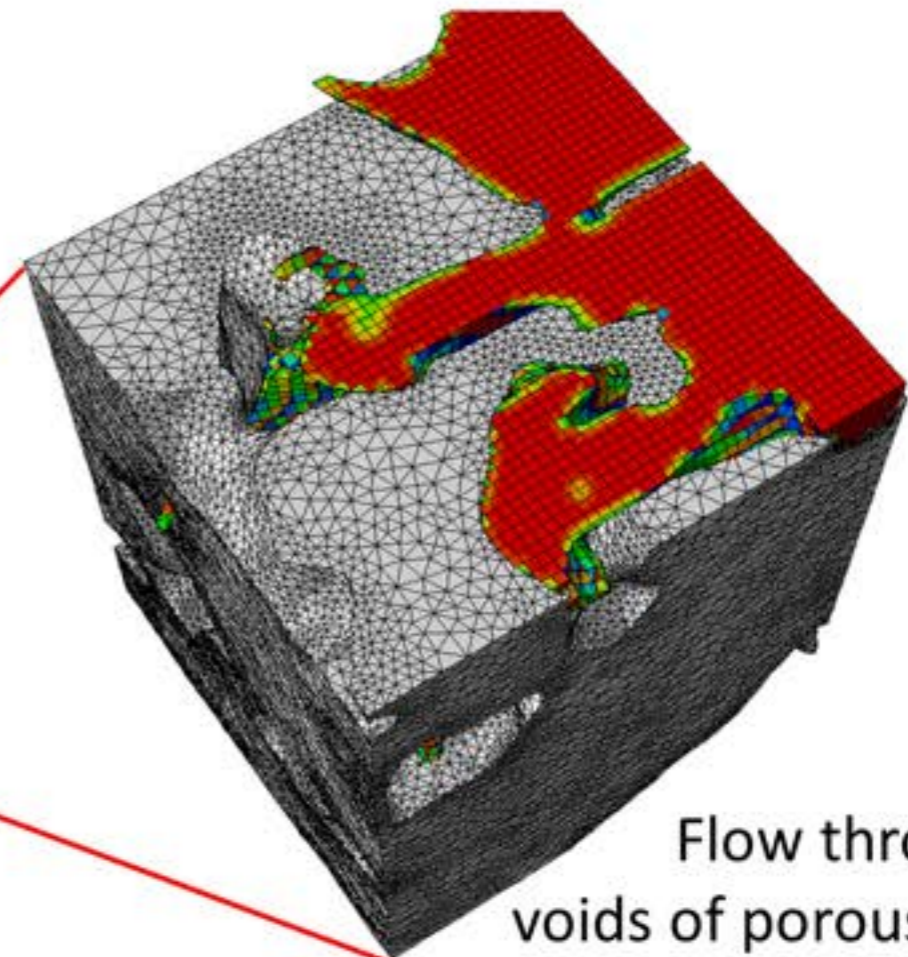
- predict the progressive loss of wet skid resistance at the tyre-pavement interface
- ascertain the relations between mix design and wet skid resistance coefficient
- Develop design rules for safe driving speed limits as a function of asphalt mix and tyre characteristics



Tyre-water interaction



Tyre-wet asphalt pavement interaction



Flow through the voids of porous asphalt

Why Construction Materials Engineering?

You should consider choosing this track if you are interested in:

- **Problem solving**
- **Science and innovation**
- **To be the go-to engineer**
- **Leading a multidisciplinary project team**

An aerial photograph of a university campus, overlaid with a semi-transparent red filter. The image shows a large green lawn, several trees, and a modern building on the left. In the center, the word "UBASE" is written in large, white, sans-serif capital letters. A white horizontal line with small triangles at its ends is positioned below the letters "B" and "A".

UBASE

Join U-BASE !

Register on www.u-base.org
(Scan QR code attached)

Sign the Mandate

Electronically and send it to treasurer@u-base.org
OR manually and give it to one of us

If you don't have a European Bank Account yet, please let us know!

Yearly membership fee: 10€



Thank you

..and all the best with your master studies

Contact:

Dr. O. Çopuroglu
Associate professor section M&E

Room 6.03
o.copuroglu@tudelft.nl