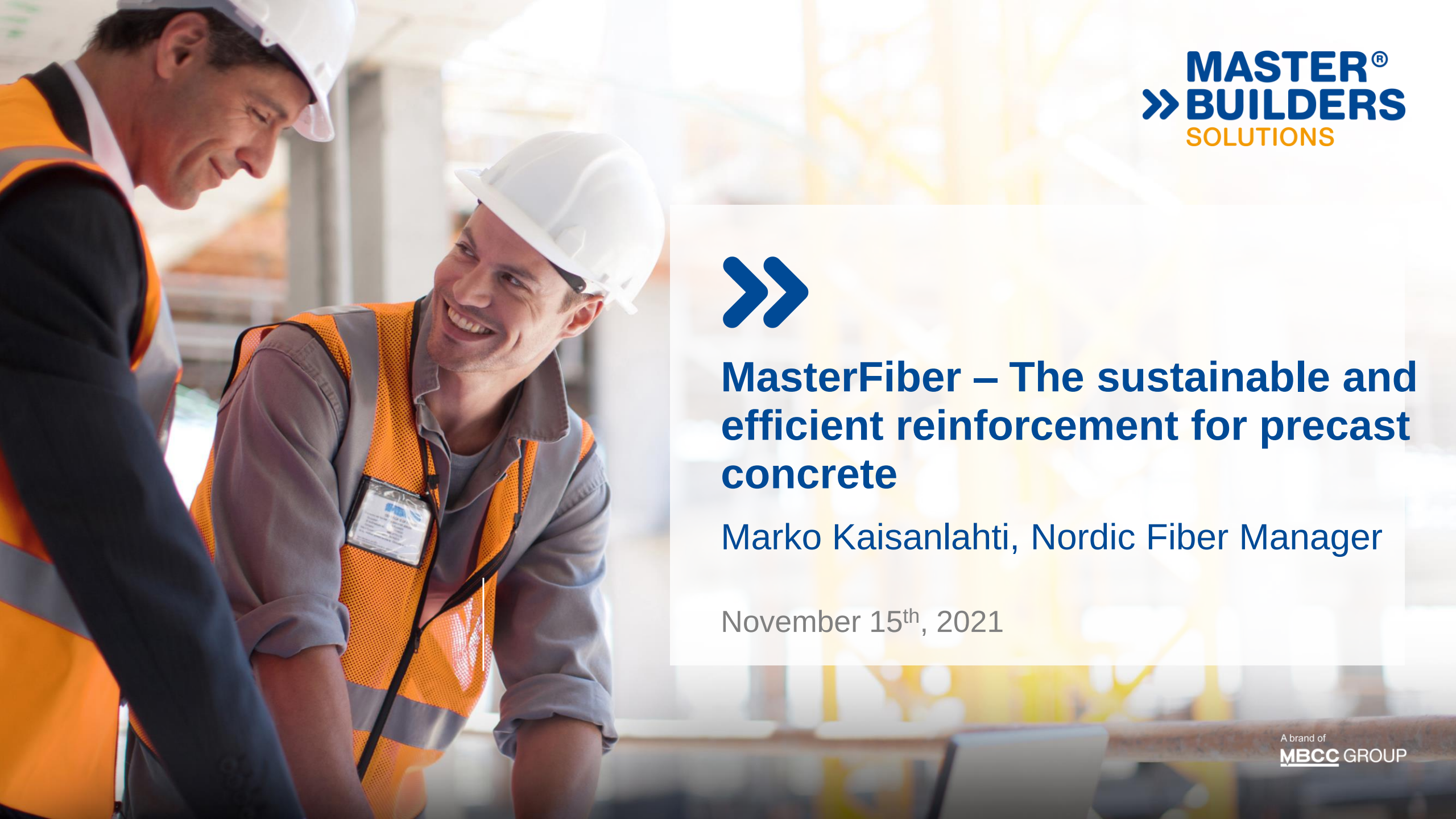

MasterFiber – The sustainable and efficient reinforcement for precast concrete

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Contents

MasterFiber: Introduction

- **Lower environmental impact:**
  - The use of PP fibers reduces CO_2 footprint
- **Enhance durability**
  - Smaller crack width due to stress redistribution
  - Lower risk of oxidation due to mesh removal
- **Three-dimensional reinforcement:**
  - Reinforcement throughout the concrete section since the fiber is distributed throughout the mass
- **Improved aesthetics**
  - No mesh -> no risk of surface marks, affecting pavement's aesthetics
  - Lower probability of oxidation points.
- **Greater impact resistance**
  - The presence of fiber in the entire mass of the concrete enhances resistance to impact, especially in areas sensitive to fracture such as corners
- **Cracking control at early ages:**
  - The presence of the fibers in the concrete matrix reduces crack width at early stages.

MasterFiber: Production efficiency and sustainability

MasterFiber: Production efficiency and sustainability

10%

MORE EFFICIENT PRODUCTION PROCESSES

The amount of steel is limited to the technical optimum using the existing steel mesh section and the complementary contribution of PP fibers in tensile strength and crack width reduction. This saves steel and energy. Less steel saves time and money.

20%

LOWER ENERGY COSTS

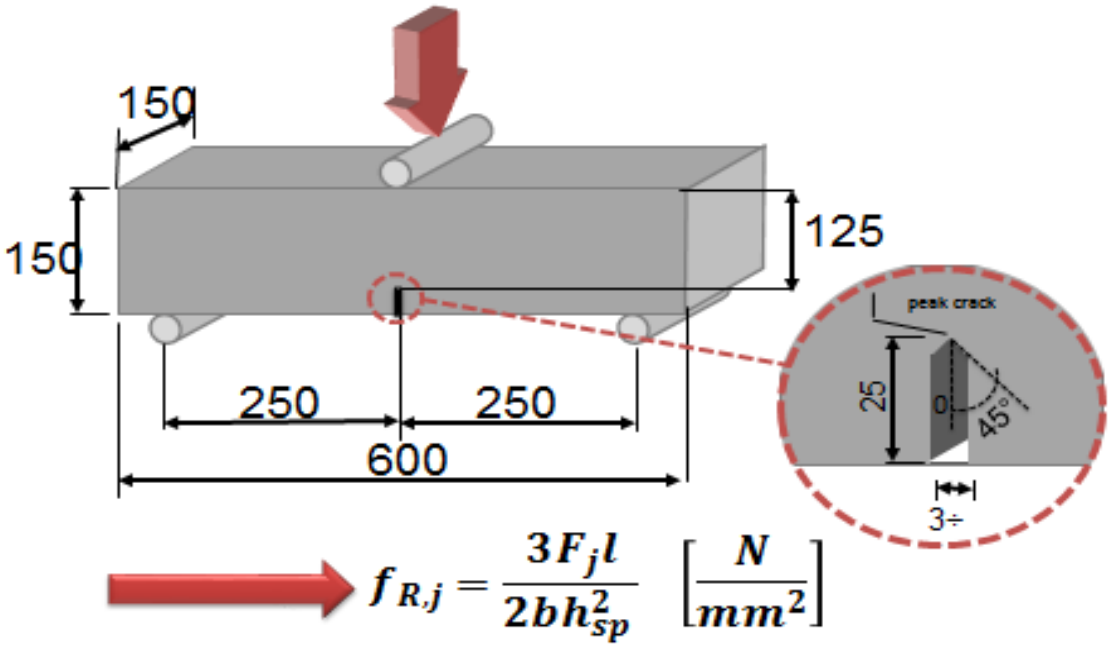
Up to 20% less steel is needed while providing the required strength properties with improved crack behavior.

REDUCED CO_2 FOOTPRINT

Less steel weight significantly reduces CO_2 emissions. Similar benefit can be observed for the other environmental impact categories like POCP (Photochemical Ozone Creation Potential), AP (Acidification Potential) and Total Resource Depletion.

MasterFiber: Mechanical properties

Characterisation test EN 14651



$$f_{R,j} = \frac{3F_j l}{2bh_{sp}^2} \quad \left[\frac{N}{mm^2}\right]$$

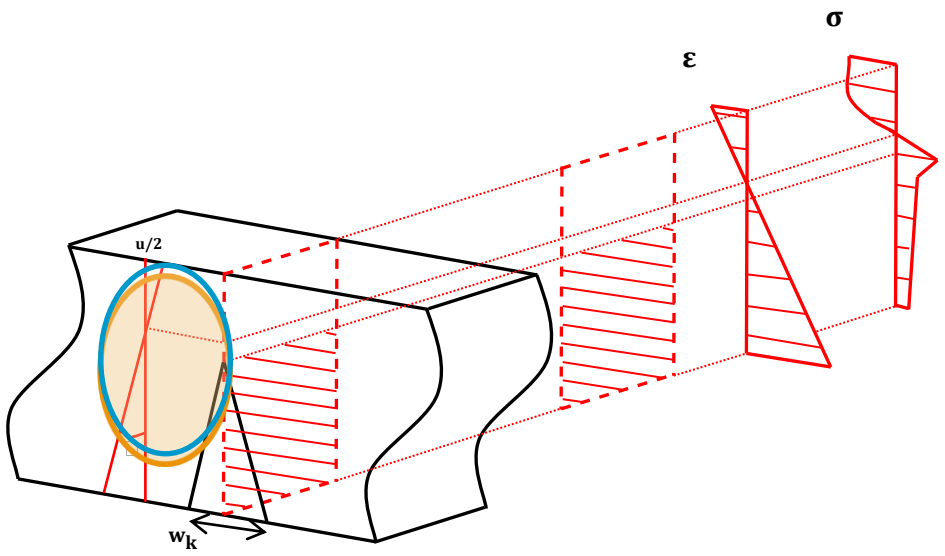
	Cf (kg/m³)										
	4	4,5	5	5,5	6	6,5	7	7,5	8	8,5	9
LOP	3,85	3,90	3,95	3,99	4,04	4,08	4,12	4,16	4,20	4,24	4,28
fR1	1,43	1,44	1,47	1,50	1,55	1,61	1,69	1,78	1,87	1,99	2,11
fR2	1,35	1,40	1,47	1,55	1,66	1,78	1,92	2,08	2,26	2,45	2,67
fR3	1,29	1,38	1,49	1,62	1,76	1,92	2,10	2,30	2,51	2,74	2,99
fR4	1,23	1,35	1,48	1,63	1,79	1,96	2,14	2,34	2,55	2,77	3,01

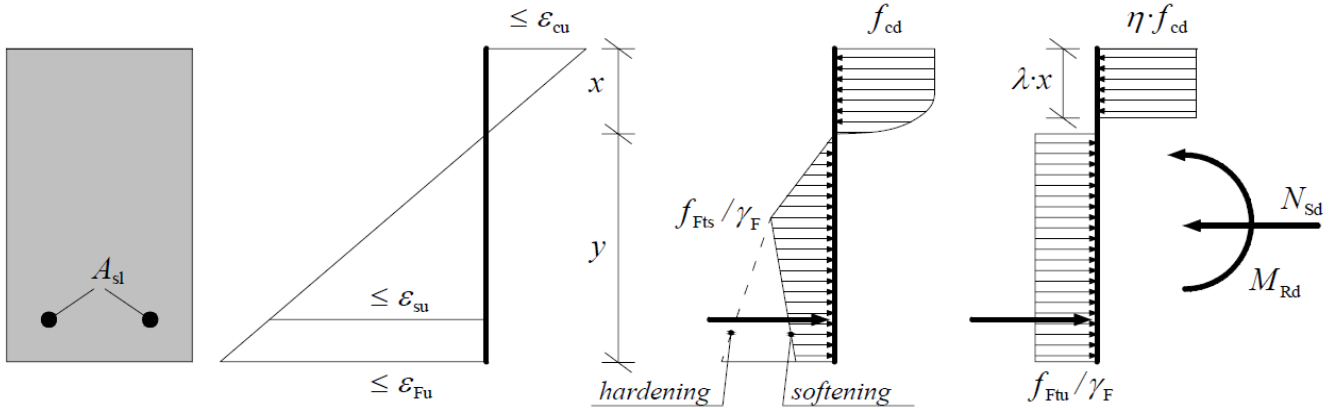
Figure 5. FRC MasterFiber 240 residual strengths values from EN 14651 test (f_R - N/mm²)

Characteristic design strength, $f_{R,1,k}$ and $f_{R,3,k}$, values
Fiber dosage → $\boldsymbol{f_{R,3,k}}$

MasterFiber: Mechanical properties

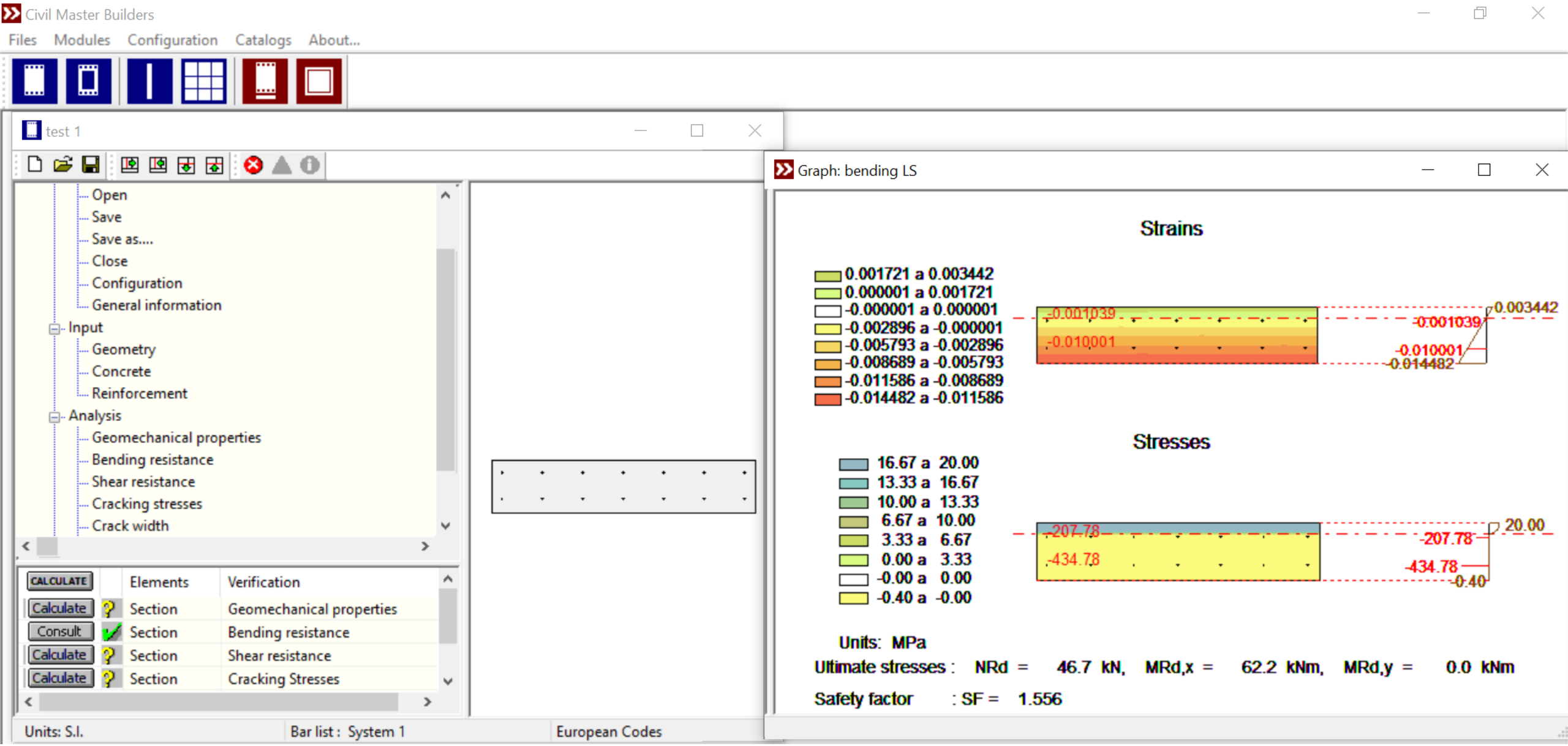
Constitutive model



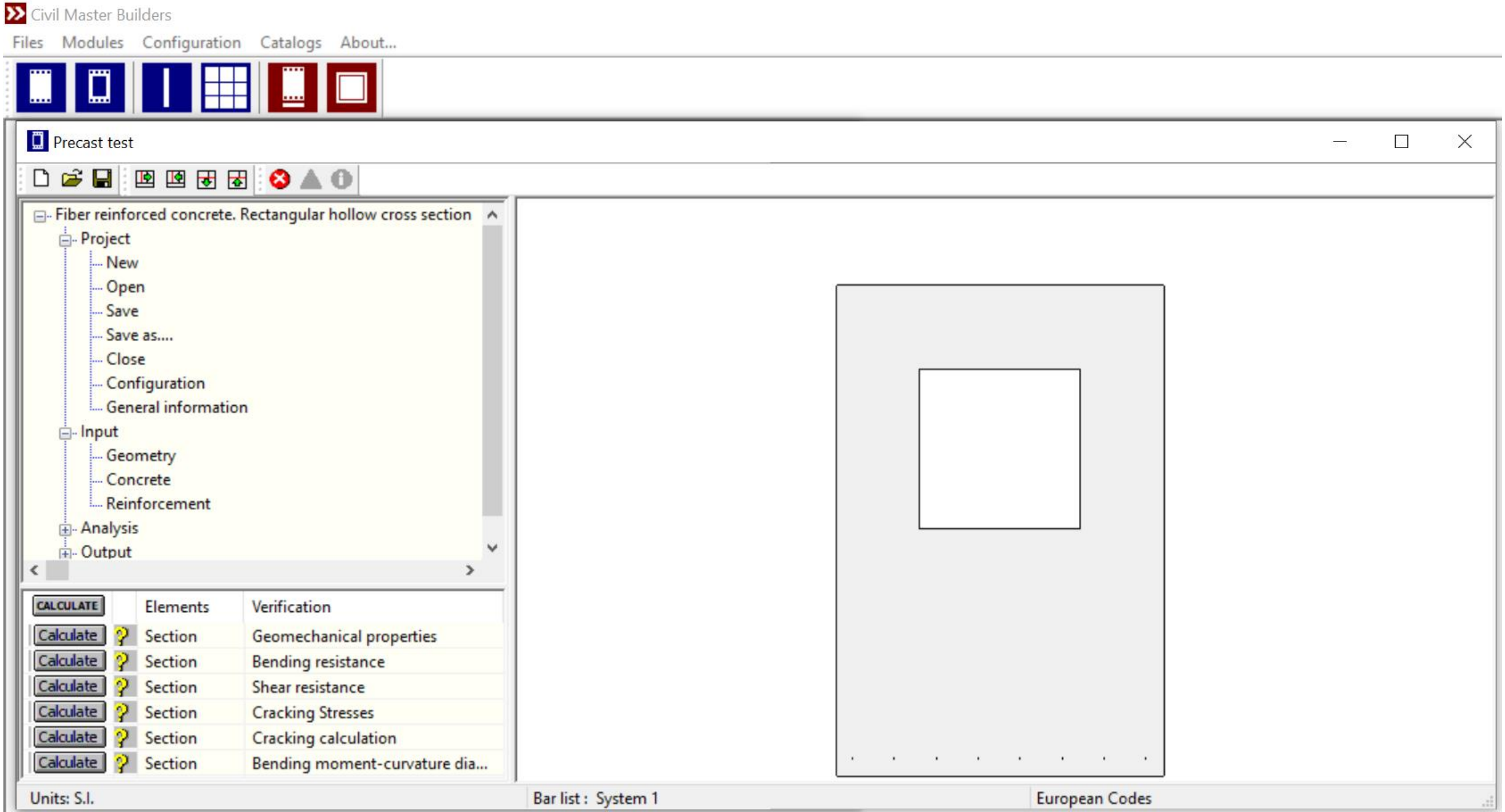


$f_{R,3,k}$ to evaluate sectional equilibrium Bending sectional capacity → $\mathbf{M_u}$ (KNm/m)

MasterFiber: Civil MB design software



MasterFiber: Civil MB design software



MasterFiber: Examples, partial PP fiber reinforcement

Project:
Precast facade panels with fiber reinforced concrete

Place:
Pla Santa Maria

Project deadline:
2020

Precast producer:
Hormipresa

Market sector:
Industrial Precast

Products:
MasterFiber 249

MasterFiber: Examples, partial PP fiber reinforcement

Initial design

- L=7000 mm, W=3000 mm, H=140 mm
- Reinforcement double steel mesh Ø5 #200 mm and lattice girders

Alternative design with MasterFiber

- **1** 2x2 transversal steel bars Ø16 mm
- **2** 2 longitudinal steel bars Ø10 mm
- MasterFiber 248

Key achievements

Sustainability

- Considerable savings of CO_2 emission in pavement, precast and underground construction applications
- Development of **Concrete Manager Tool** for the assessment of concrete mixture sustainability. To compare simultaneously several different mix designs

Market development

- In 2021, close to 750.000 m^2 of precast panel were produced using MasterFiber portfolio.
- In 2021 some 2 100 000 m^2 of pavements were casted with MasterFiber macrofiber. This is equivalent to the size of more than 270 football fields.
- In 2021 in the underground construction 300.000 m^3 of shotcrete has been reinforced with MasterFiber

Market support

- In six years more than 1000 calculation reports have been prepared to support our customers
- Several external trainings have been organized to extend the knowledge of the FRC around Europe
- Civil MB fiber reinforced concrete design software

MASTER®
BUILDERS
SOLUTIONS