



PrīmX road to net zero concrete slab

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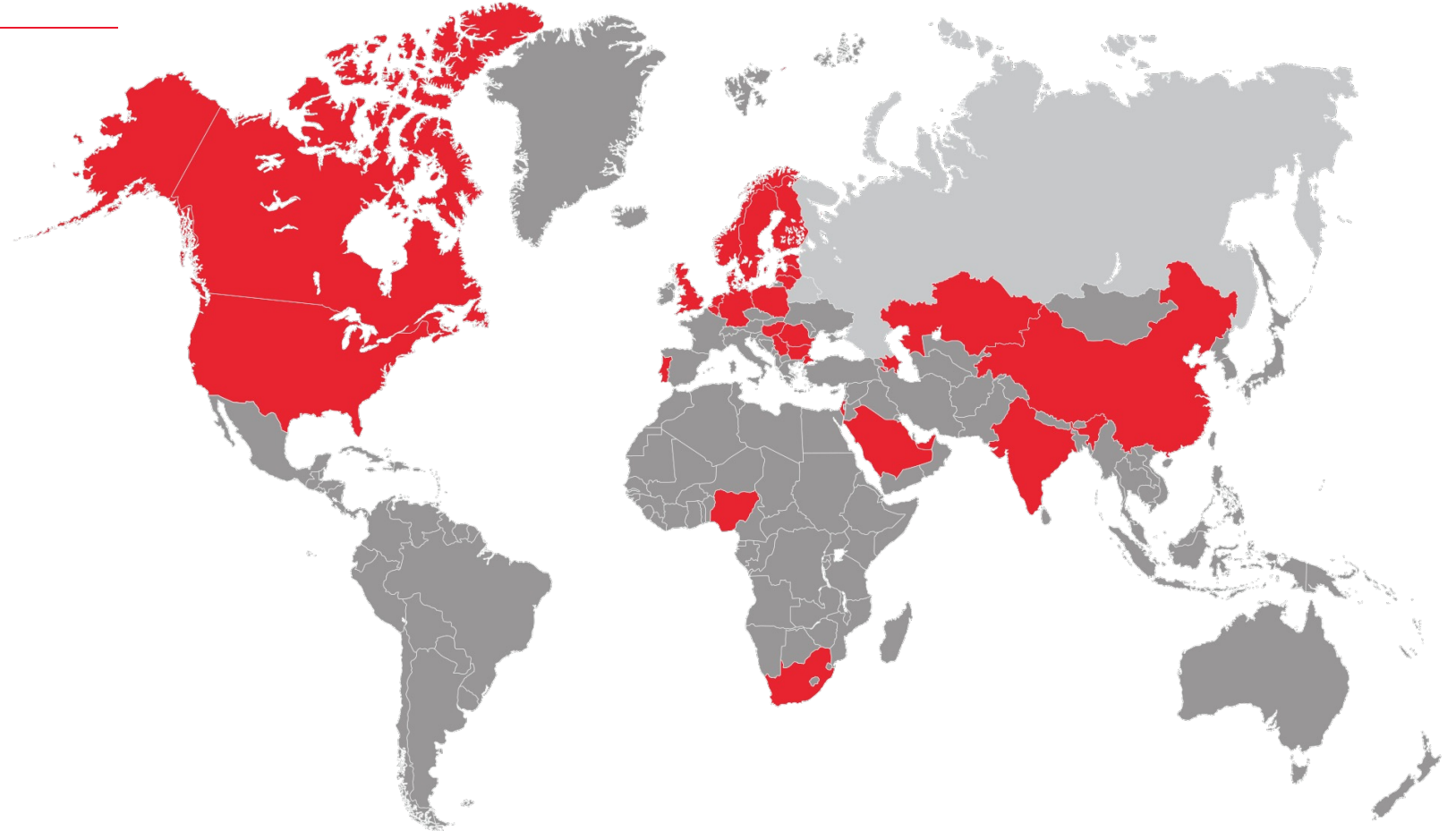
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Agenda

About Primekss

PrīmX concrete technology

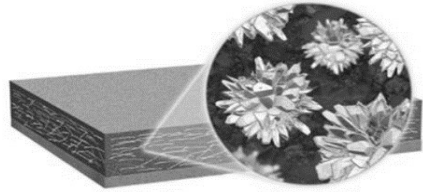
PrīmX road to net zero concrete slab



FOUNDED	1997
TURNOVER Y22	>90 Mln. EUR
EMPLOYEES	>350
LICENSING PARTNERS	22
SATISFIED CUSTOMERS	1000 +
R&D Center	~400m ²

More than **21 600 000 m²** of indoor, outdoor slabs and structural constructions

- Latvia • Lithuania • Estonia • Sweden • Norway • Denmark • Finland • Israel • Germany • United Kingdom • Netherlands
- Poland • Belgium • Bulgaria • Hungary • Serbia • Kazakhstan • Saudi Arabia • United Arab Emirates • Azerbaijan • India • United States • Canada
- Portugal • Georgia • Nigeria • South Africa • China • Romania



Improved, Efficient **Materials**

- 3 types of admixtures in a patented system
- Steel fibers

Design – Build Approach, Own Concrete R&D Center

- Lab testing of cement, and aggregates for reactivity and compatibility with the admixtures
- Advanced, customized mix-design preparation according to project needs
- Design, engineering assistance



Specialized Equipment & Training



Special Online Quality System: PrīmX Quality

- End-to-end online quality system
- Monitoring of 21 parameters at the jobsite
- Controlled by Primekss engineers



Future-proof for Robots and Automation



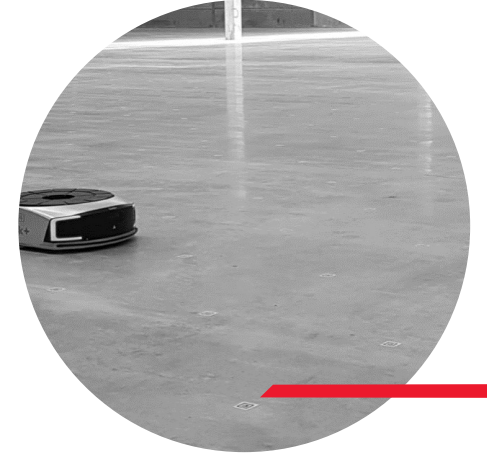
Automated Guided Vehicle (AGV)



High Bay AS/RS Racking system for automated storage



AutoStore™



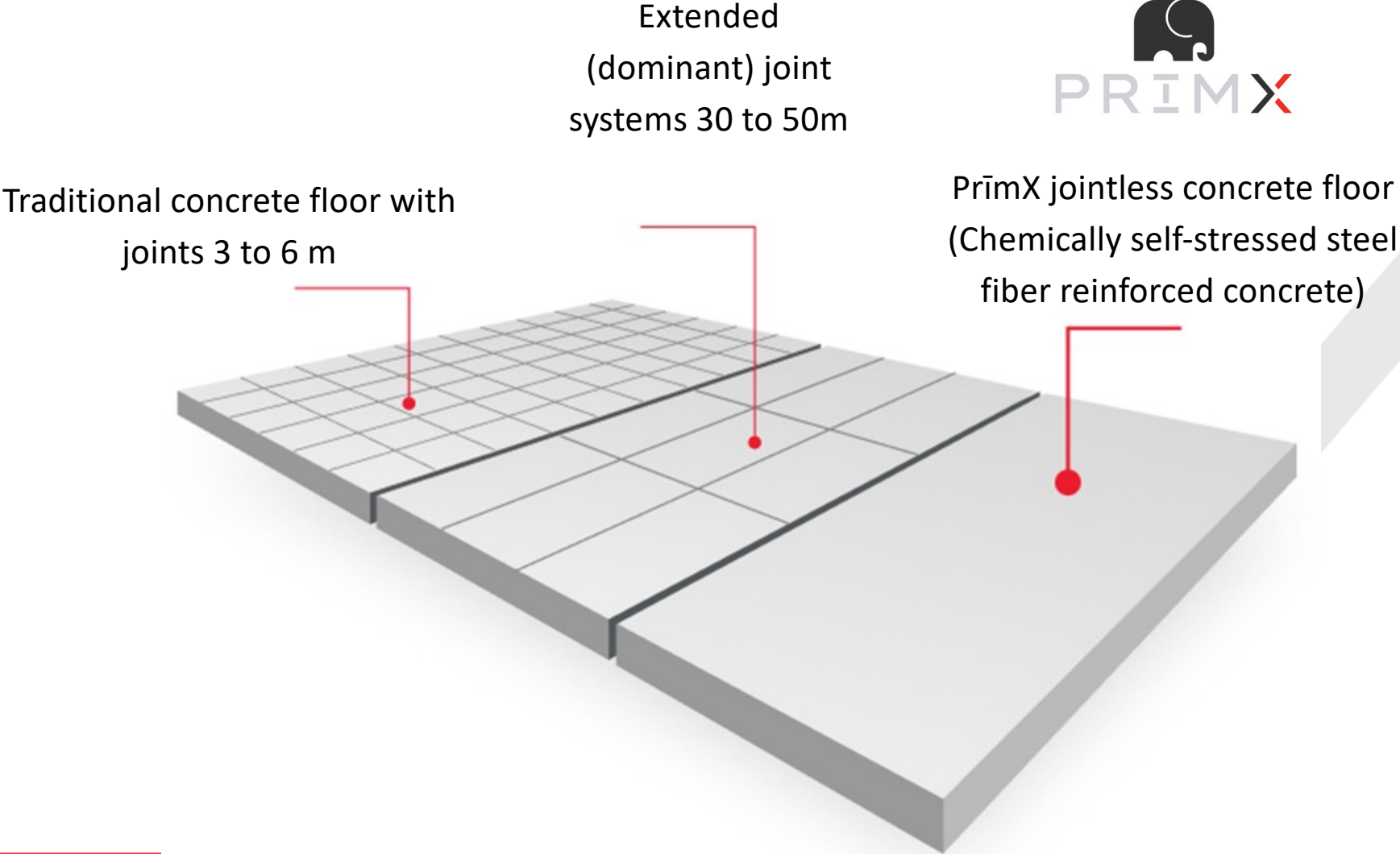
Autonomous Mobile Robots (AMRs)

and many others

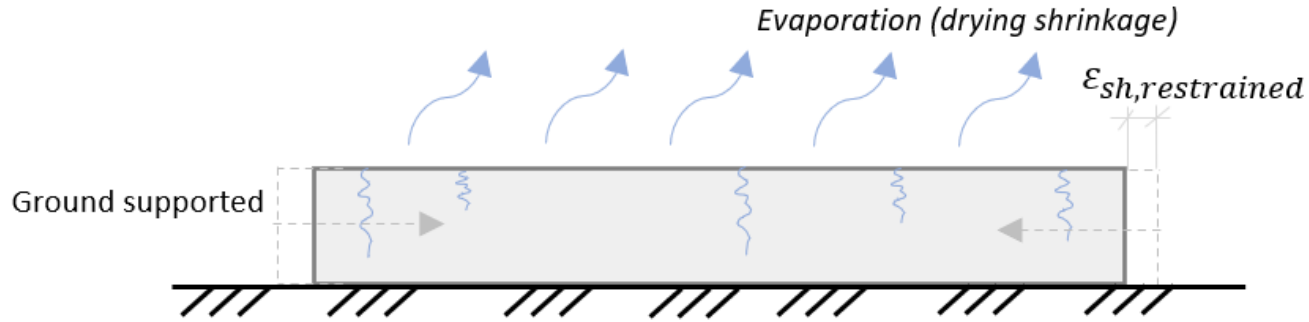
- ❑ Logistics & Distribution Centers
- ❑ Manufacturing, Automotive
- ❑ Production & Storage
- ❑ Cold Storage/Freezers
- ❑ Data Centers

- ❑ Anywhere Floor Systems Impact Productivity

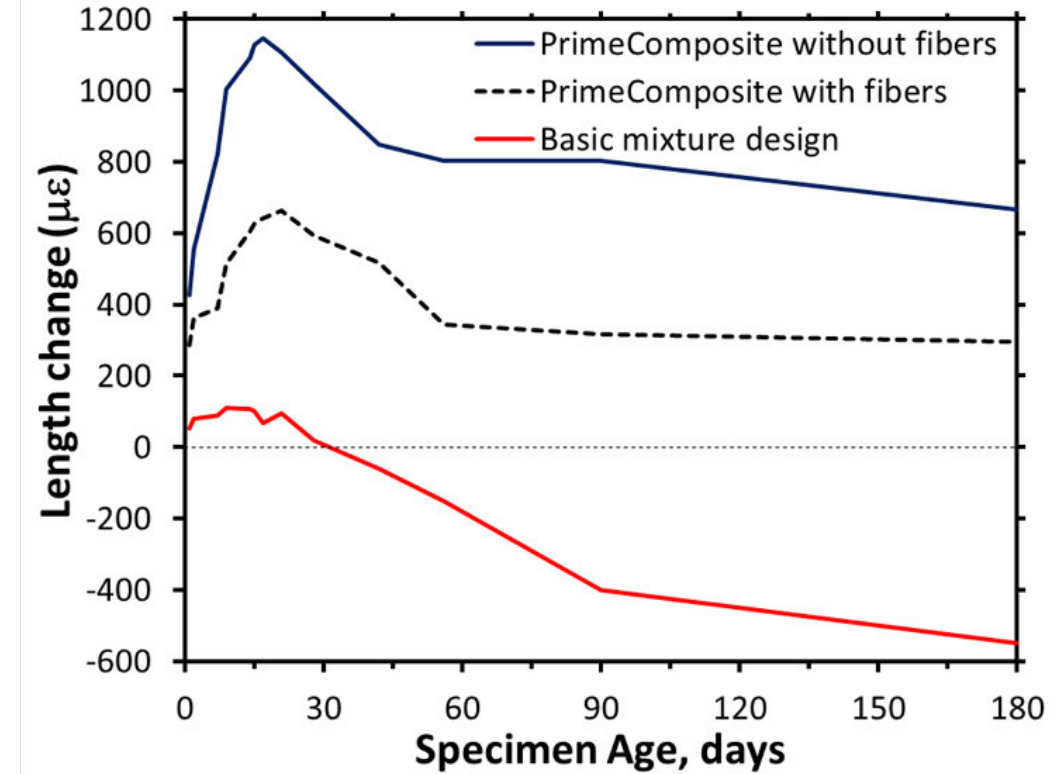
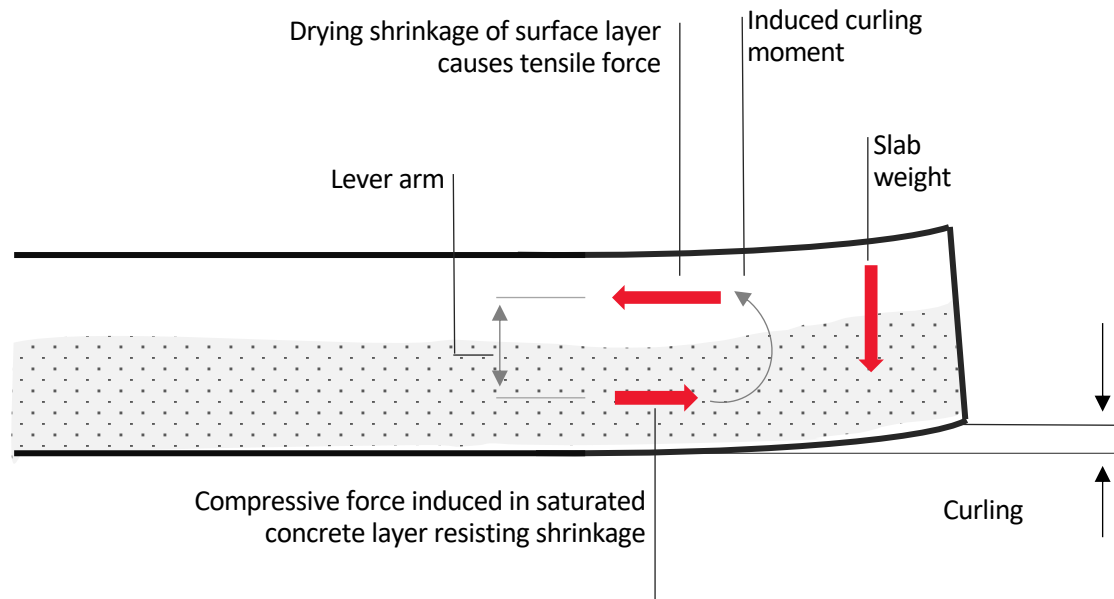
PrīmX technology



Steel Fiber Reinforced Chemically Self-Stressed Concrete (SFRCSSC)

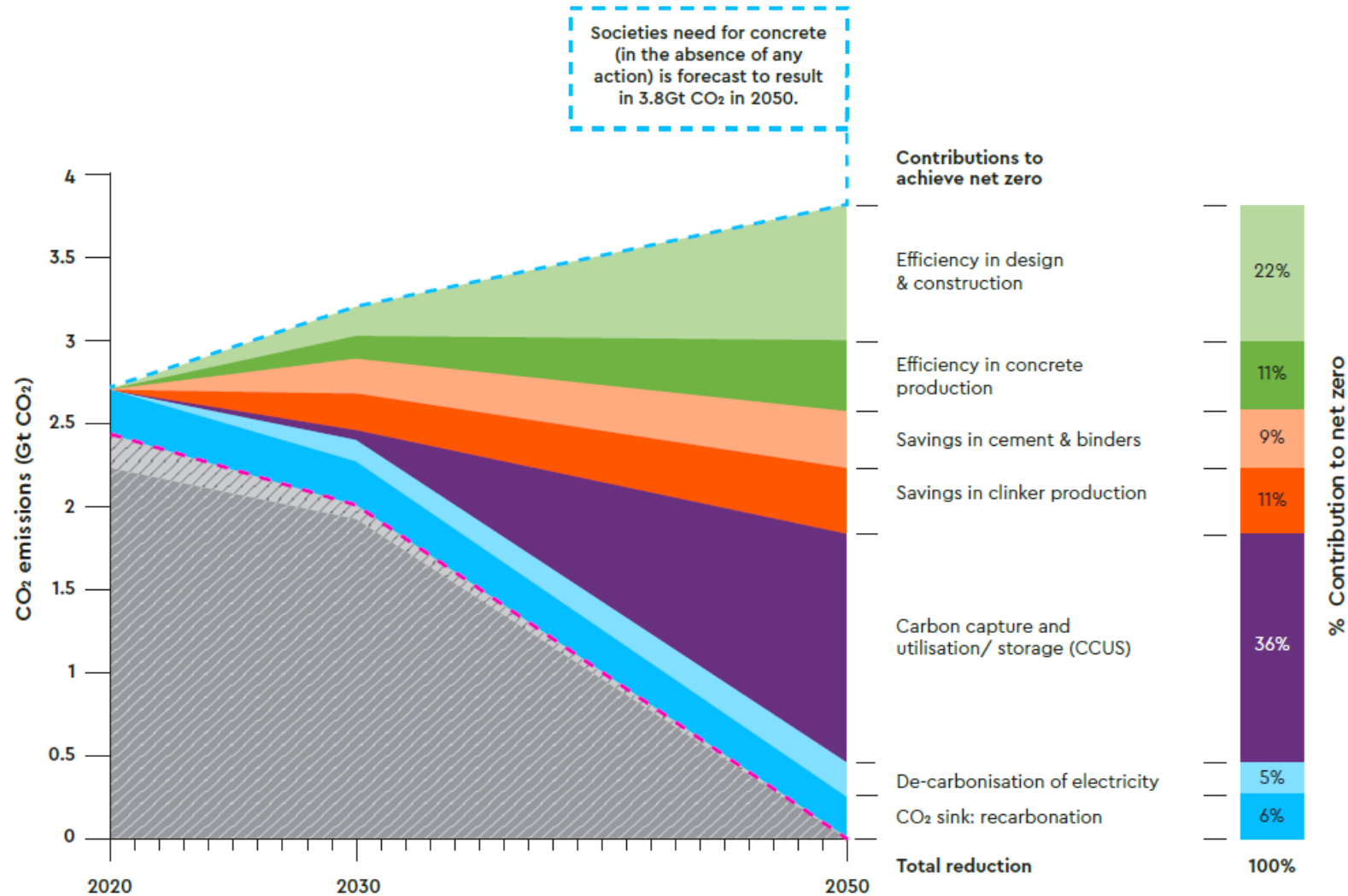


If tensile stress > tensile strength of concrete = slab cracks



Zero CO₂ emission fiber reinforced concrete floor technology development

The Global Cement and Concrete Association (GCCA) 2050 Cement and Concrete Industry Roadmap for Net Zero Concrete: the net zero pathway



PrīmX road to net zero concrete slab

1. Efficiency in design & construction:

- Primekss principles for designing structures is **based on optimized geometry, material efficient use** with a target to increase composite material application in structures;
- Primekss foster **use of high-performance materials with high strength and stiffness properties**;
- Conventional steel bar reinforcement is replaced with **steel fibers, zero carbon footprint steel fibers, polymeric fibers** or other high performance fibers;
- **More reliable characteristic values** used for design calculations (plate testing versus EN beam testing);
- **In-situ structure monitoring** on site;
- **Sate of the art slab installation**;
- **Ahead** of standard requirements;
- Structure designed for **50 years** of serviceability.





PrīmX road to net zero concrete slab

2. Efficiency in concrete production:

- CEM II used for 95 % of projects;
- Effective aggregate packaging density;
- Use of SCMs;
- Use of effective concrete additives;
- Tailor made mix design for each project;
- Work on new zero emission materials and mix designs.
- Full scale testing.

Full scale tests to be sure about structure design limitations

Autumn, 2023 Jelgava, Latvia



Thickness for both slabs 150 mm.

Youtube: PRIMX Full-Scale Test Jelgava

<https://youtu.be/xNQqO1uQPZQ?si=hm3XFfjBsx25hhIB>



Full scale tests to be sure about structure design limitations 2

SFRC



SFRC failure load **159t**
SFRC crack opening **9 mm**

SFRCSSC



SFRSSC failure load **211t**
SFRSSC crack opening **6 mm**

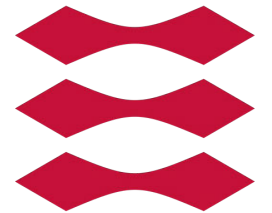
- 33% larger load at failure
- 33% lower deflections at the same loads
- 3x less linear feet of cracks and each crack had 50% less opening

Collaboration



Latvijas
Biozinātņu un tehnoloģiju
universitāte

DTU



LATVIJAS
UNIVERSITĀTE



irCer

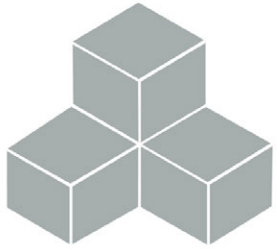
institut de recherche
sur les céramiques



RĪGAS TEHNISKĀ
UNIVERSITĀTE



Membership



Latvijas
Betona
Savienība

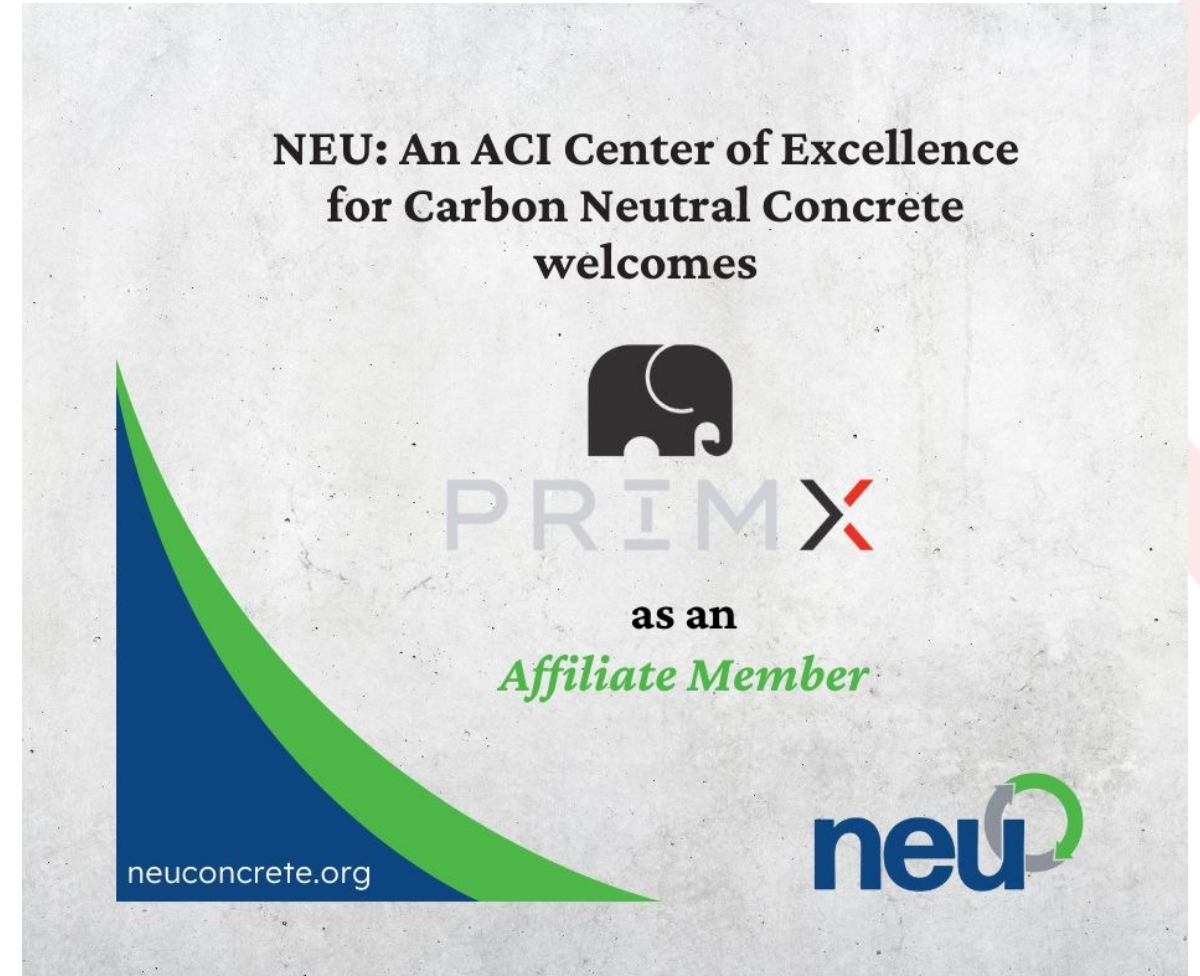


Eesti betooniühing



American Concrete Institute
Always advancing

- ACI 223 Shrinkage-compensating concrete
- ACI 302 Construction of concrete floors
- ACI 360 Design slabs on ground
- ACI 544 Fiber reinforced concrete
- ACI 376 Concrete structures for refrigerated liquefied gas containment





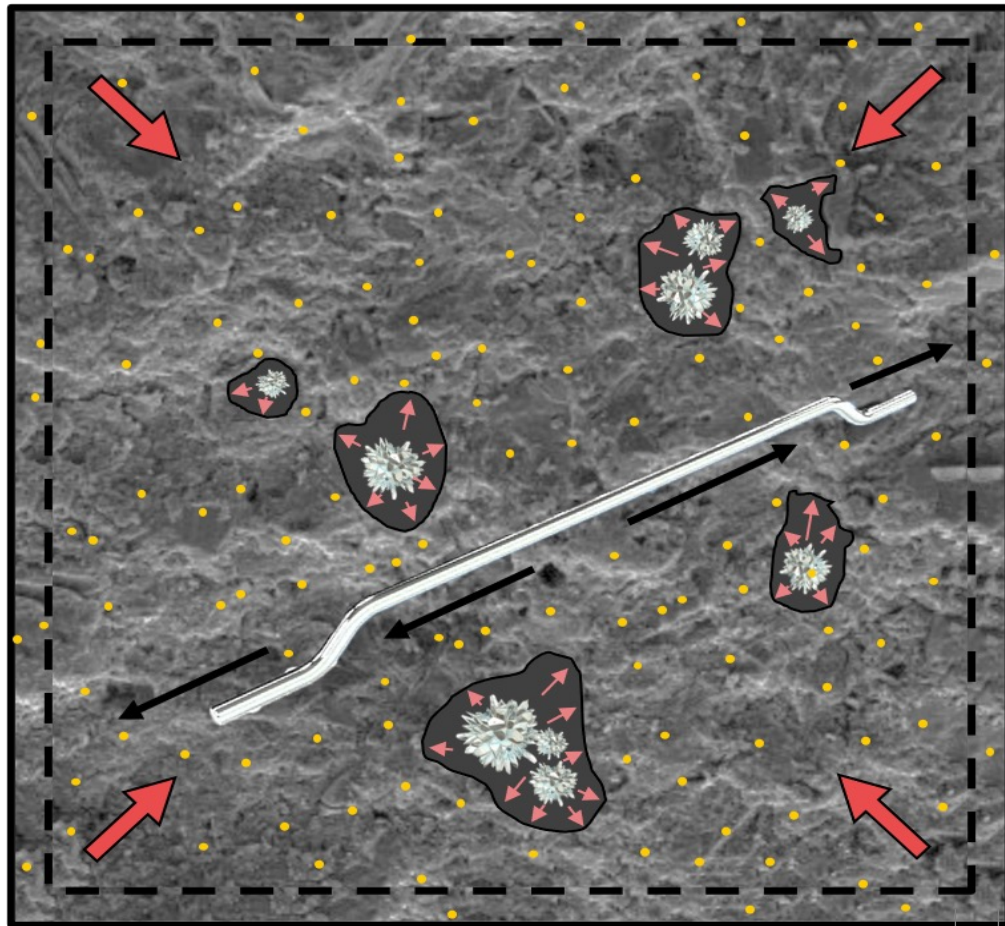
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



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Chemical self-stress in concrete (PrīmX concrete)



-  PrīmX DC expansive force
-  PrīmX concrete matrix resistance (self-stress) force
-  Steel fiber tensioning (restraint) force
-  PrīmX concrete matrix pore space
-  Ettringite & other PrīmX DC reaction products
-  Initial volume unit of PrīmX SFRSSC (0 days)
-  Expanded volume unit of PrīmX SFRSSC (14 days)
-  PrīmX CPEA

NB! NOT TO SCALE

$\epsilon_{exp, restrained}$