Why Dramix® SFRC

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Dramix® ’s application to industry floor

Dramix® SFRC generals

A. Why using steel fibre in concrete

B. Why using Dramix®

C. Dramix® advantages over rebar/mesh

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Dramix® - steel fibre

Plain concrete

- ✓ High compressive strength
- ✓ Brittle material
- ✓ Low tensile strength

Tensile bending stresses can be taken up

- ✓ Either by bar/mesh
- ✓ Either by pre-stressing
- ✓ Either by fibre reinforcement

Dramix® INSIDE

Dramix®, an innovative reinforcement

Floor

Road bridge
Pavement

Pre-cast Lining

Shotcrete

Pre-cast pipe

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A. Why using steel fibre in concrete

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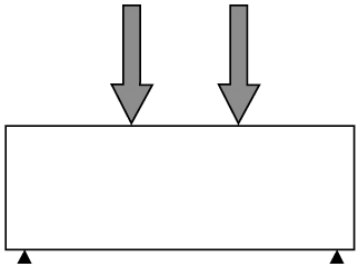
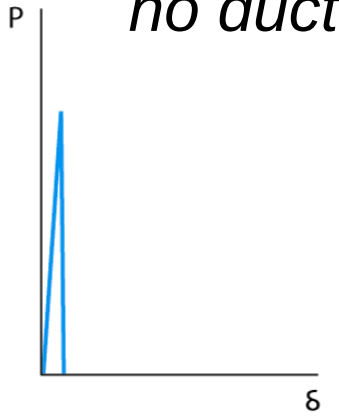
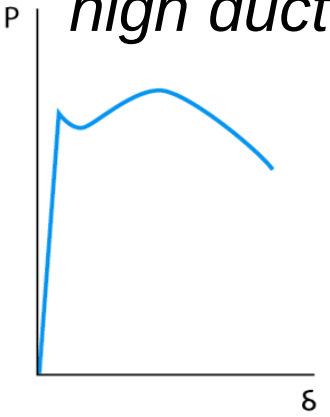
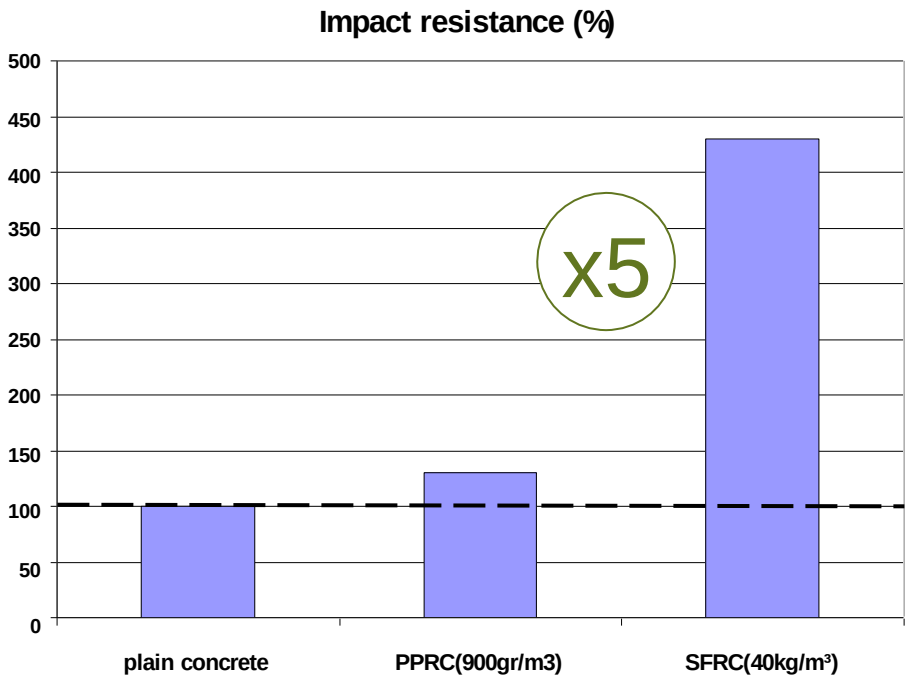
A. Why using steel fibre in concrete

1. Increase toughness-flexural strength
2. Impact resistance
3. Resist crack formation
4. Shear strength
5. Energy absorption
6. Fatigue resistance
7. Durability

1 Increase toughness-flexural strength

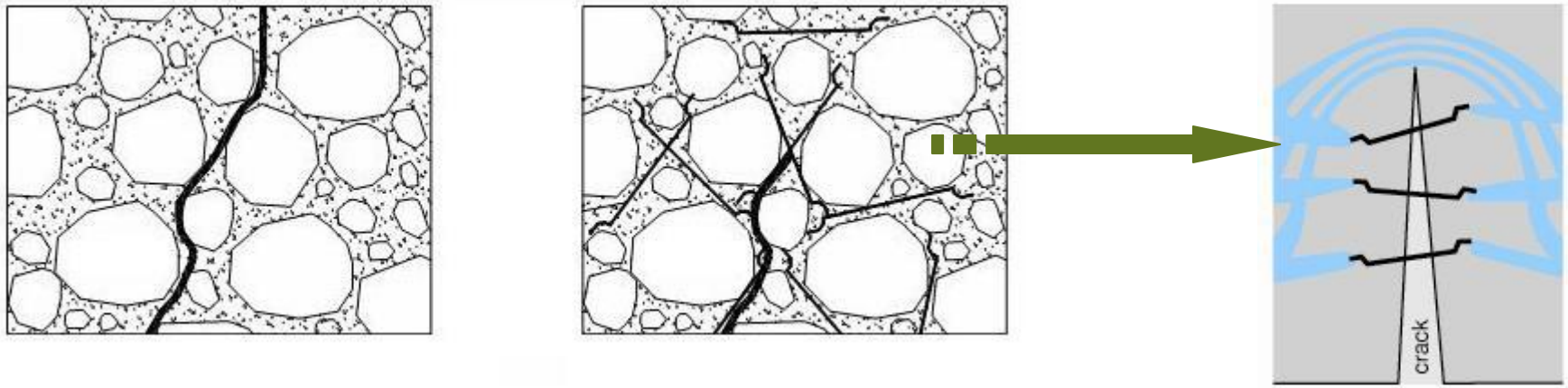
Test set-up	Plain concrete	Dramix® concrete
beam-test 	*no ductility* 	*high ductility* 

2 Increase impact resistance



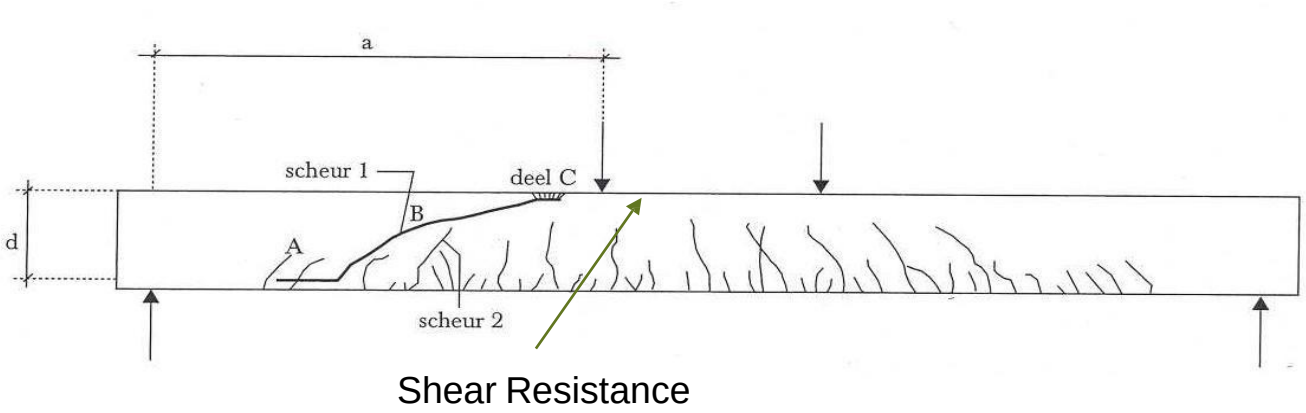
Postpone and reduce the crack happening and increase the post-crack stiffness and load carrying capacity.

3 Resist crack formation



- ✓ High quantity and dispersion, make concrete ductility.
- ✓ A good ductility resist crack arising by temperature and shrinkage stress.
- ✓ High tensile strength ≥1100MPa and long anchorage.
- ✓ Well redistribute stress and keep crack fine.

4 Increase shear strength



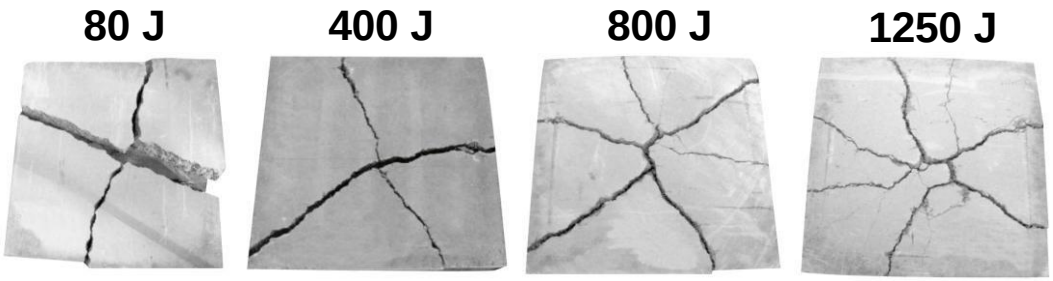
Shear Resistance

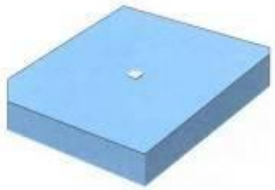
CECS38-2004

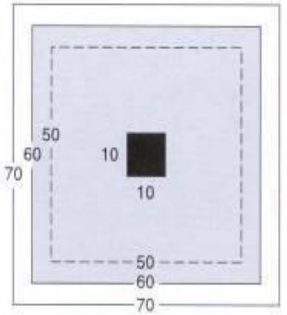
$$Vfcs = Vfc + Vsv - Vfc = Vc\,(1+\beta_v+\lambda_f)$$

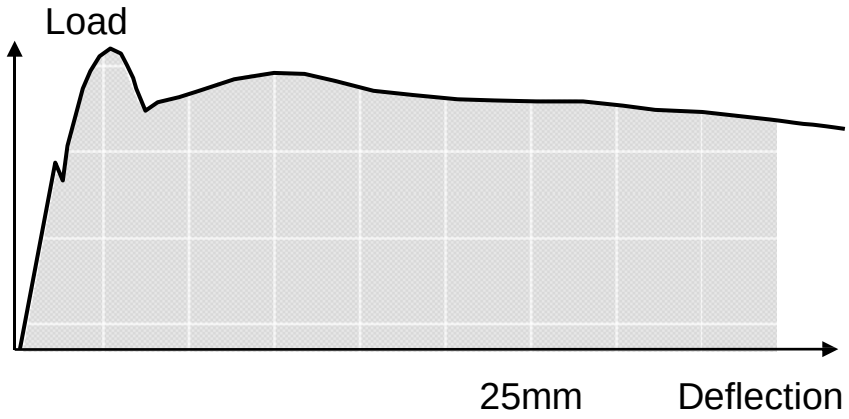
20kg/m³ (0.25%), RC80/60BN, 12% increase!

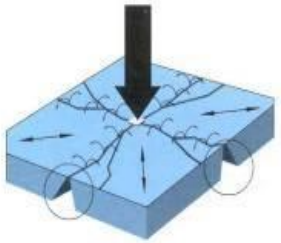
5 Increase energy absorption - Test set-up Efnarc-panel

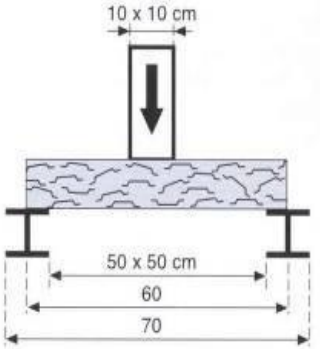




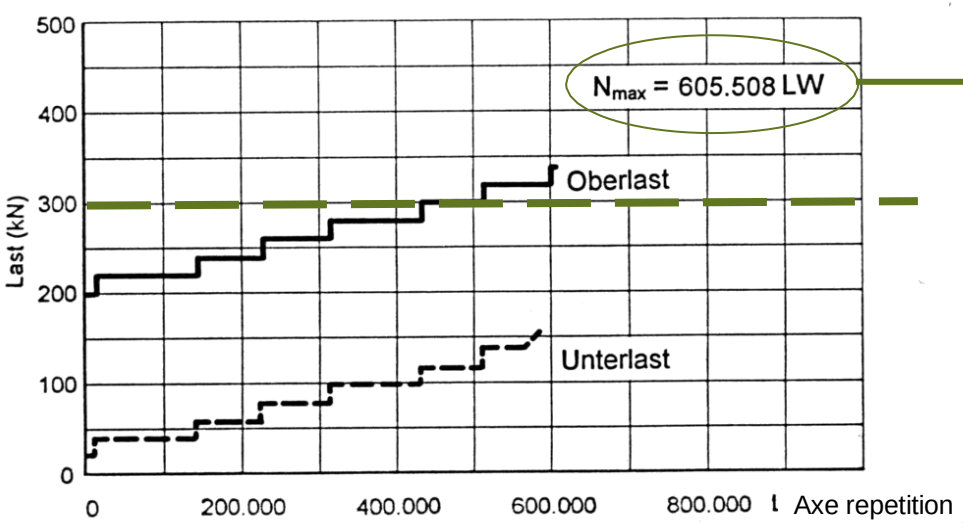






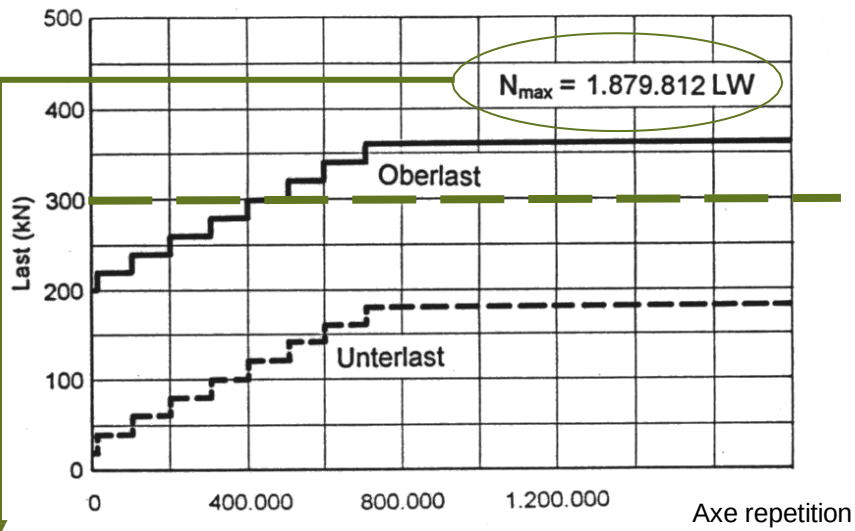


6 Increase fatigue resistance



Plain concrete road pavement

x3



Dramix® reinforced road pavement

3x more Axe repetition

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7 Increase durability

- ✓ Small crack width avoids chloride ion penetration
- ✓ No concrete spalling problems due to small increase in volume if corroded fibres

30 years old Dramix® galvanised fibres prove:

- ✓ no rust
- ✓ no spalling

Testpanels
Decomo, Belgium
Since 1980

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A. Why using steel fibre in concrete

B. Why use Dramix®

C. Dramix® advantages over rebar/mesh

B. Why using Dramix®

Cold drawn steel fibre

Loose Steel Fibres

Shaved cold drawn wire

Different Type…

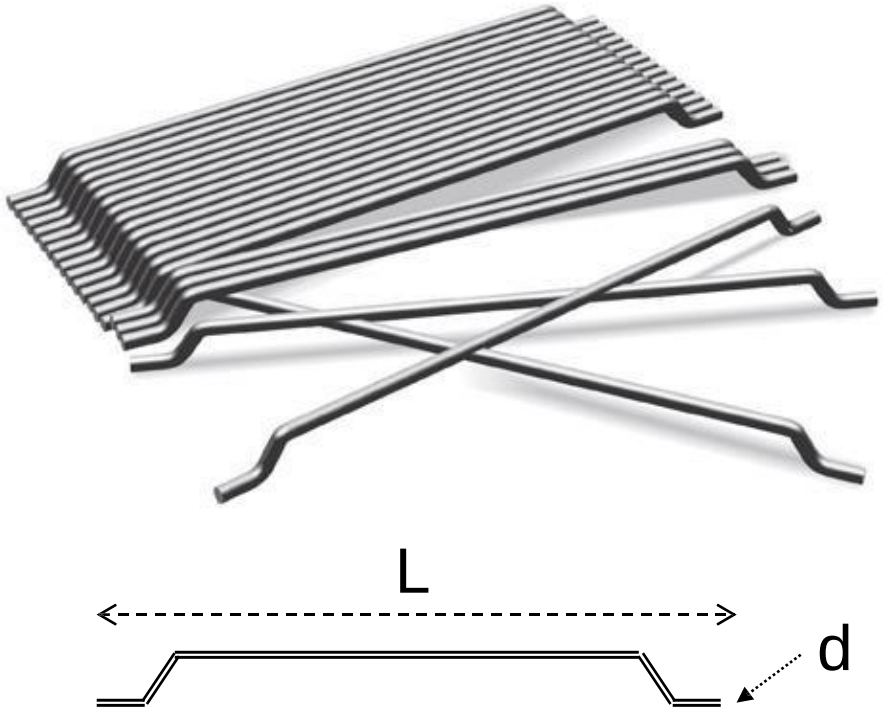
Different quality…

Why Dramix®?

B. Why using Dramix®

1. “Best in class” performance
2. Easy mixing due to glued concept
3. Stable Quality creates safety

1 “Best in Class” Performance

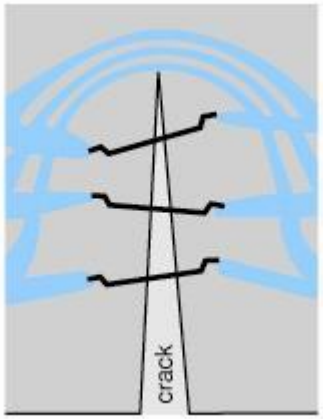


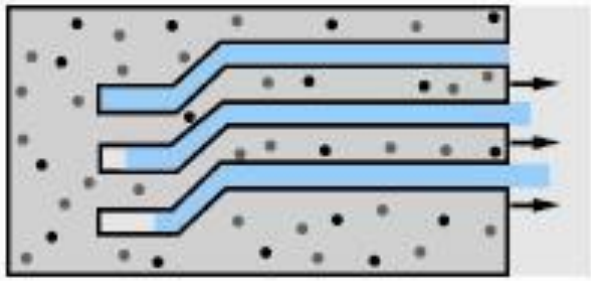
Dramix® fibres have a high l/d ratio, and therefore a high performance:

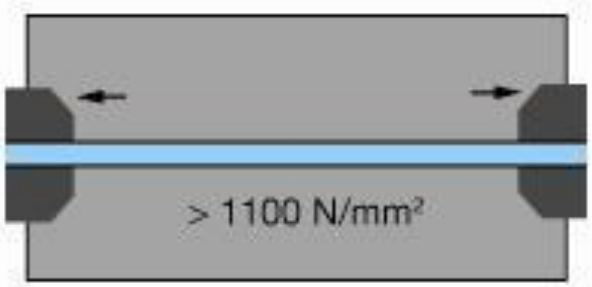
The higher the length, the more difficult to pull the fibres out of the concrete

The lower the diameter, the more fibres in 1 m^3, the denser the network.

1 “Best in Class” Performance







Hooked ends controlled pull-out (due to deformation of the hook).

High tensile strength.

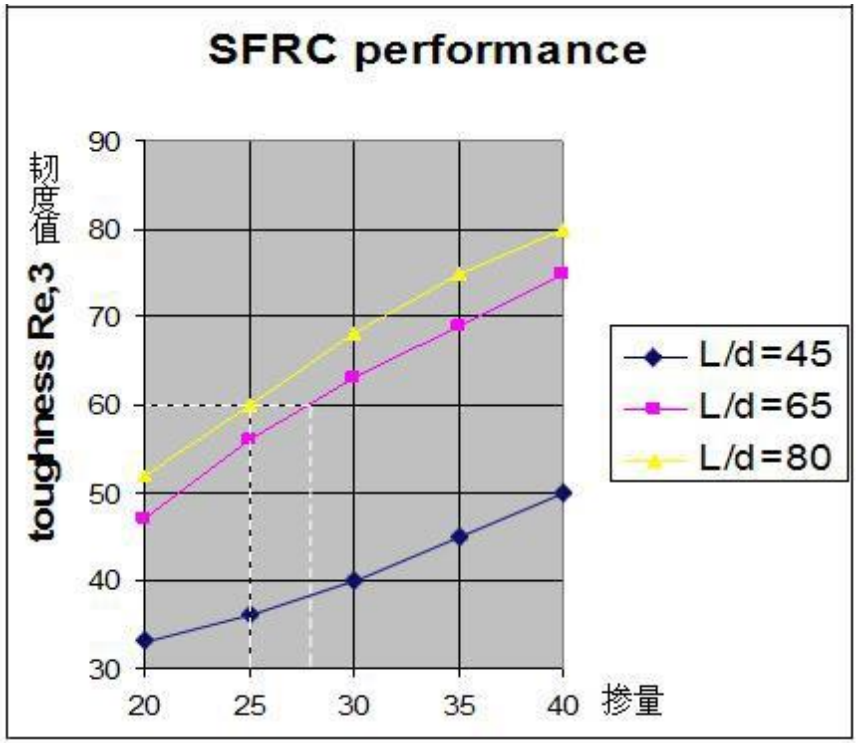
1 “Best in Class” Performance

RC-65/60-BN- l/d = 65 L = 200 m / kg

RC-80/60-BN- l/d = 80 L = 288 m / kg

Same performance

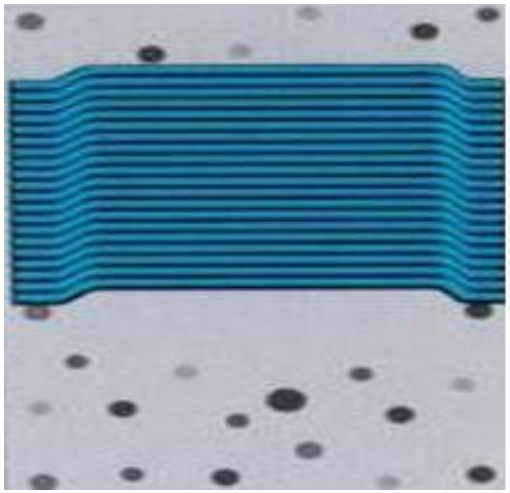
- ✓ **25 kg** RC-**80**/60-BN
- ✓ 28 kg RC65/60-BN
- ✓ >40 kg RL45/50-BN

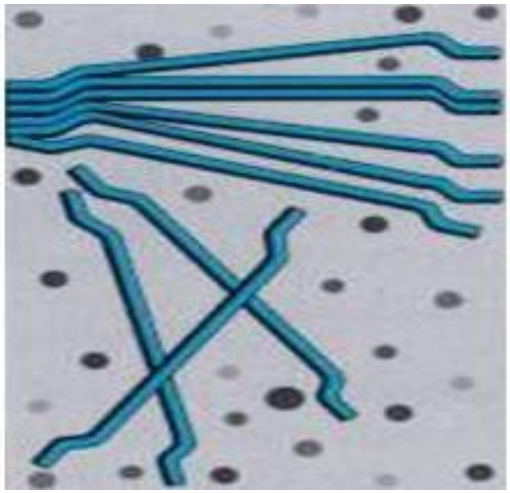


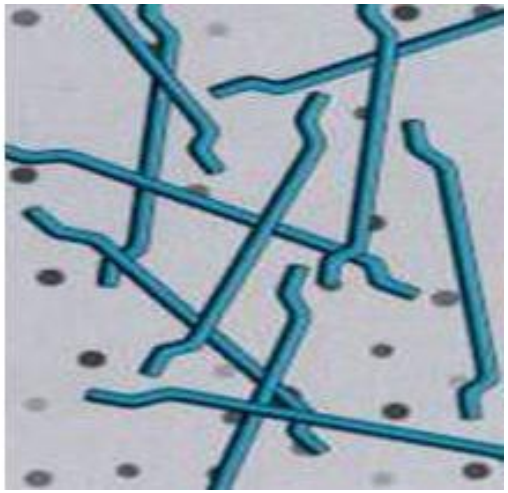
2 Easy mixing due to glued concept

2 Easy mixing due to glued concept

How to Separate Uniformly







2 Easy mixing due to glued concept

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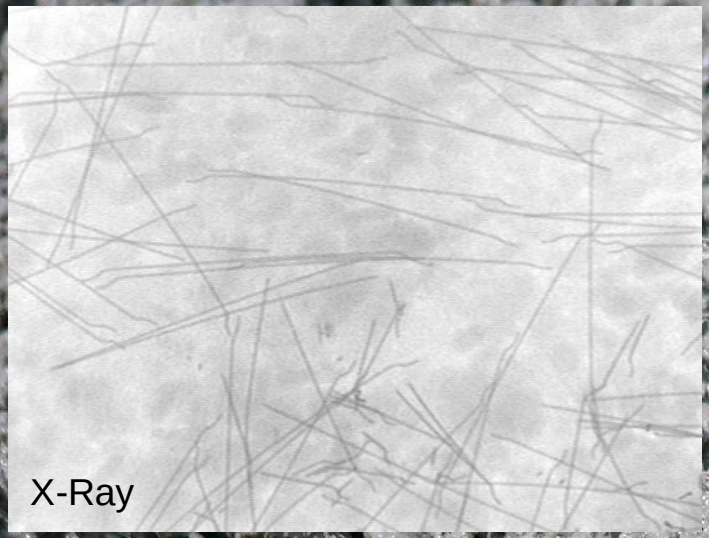
Loose fibre:
balling in mixing,
non-uniformly dispersion

2 Easy mixing due to glued concept



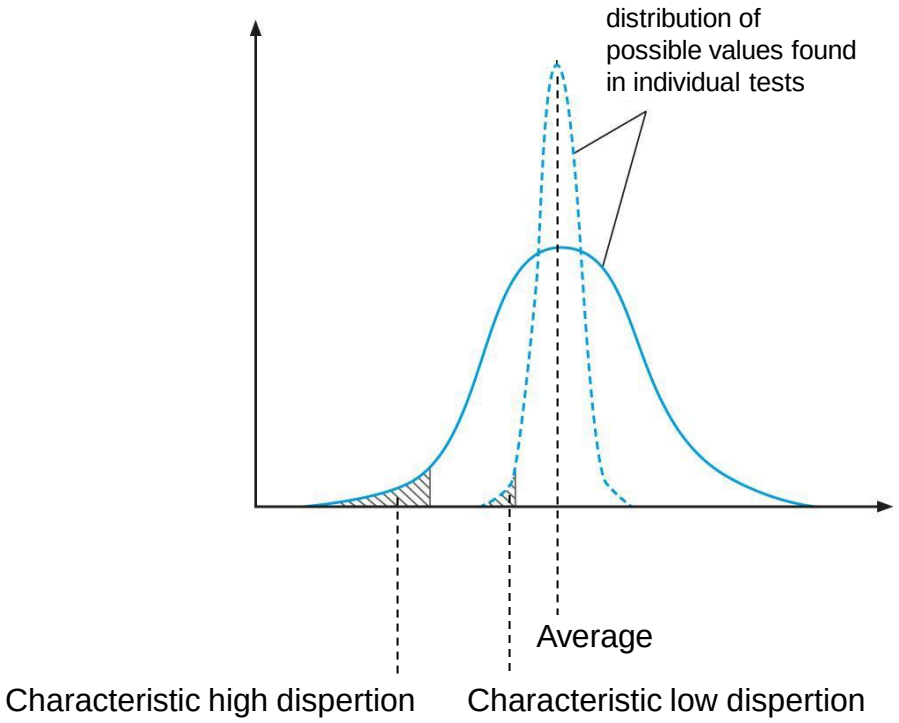
Homogeneously mixed fibres due to glued concept

3 Stable quality creates safety

- ✓ ISO 9001 production proces
- ✓ CE certified products with low tolerances

Translated in lower dispertion on test results

This allows to have higher characteristic design values



❸ Stable quality creates safety

Class 1	The difference between class 1 and class 3	Class 3

Field of use

Structural use
"Structural use of fibres is where the addition of fibres is designed to contribute to the load bearing capacity of a concrete element" (Copyright EN 14889-1)

Non structural use

Quality control

Initial type Testing (ITT) under the responsibility of the Notified certification Body

Initial and **Annually** Factory Production Control (FPC) assessment **by Notified Body**

Certification institute → "**Certificate of Conformity**"

Initial Type Testing by a Notified Laboratory

Factory Production Control (FPC) under responsibility of **the manufacturer**

The manufacturer creates and signs a "**Declaration of conformity**

3 Stable quality creates safety

CE

0749-CPD

EN 14889-1
06

Certificate: BC1 - 251 - 0024 - 004 - 001

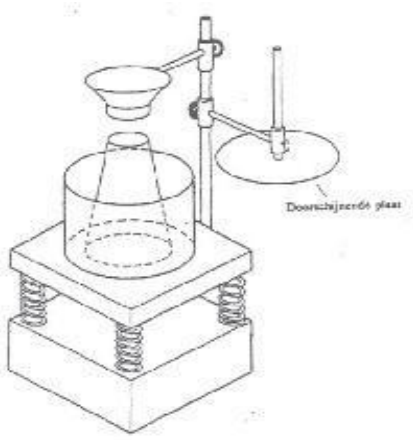
DRAMIX® RC-65/35-BN
Steel fibres for structural use in concrete, mortar and grout
Group 1: cold-drawn wire

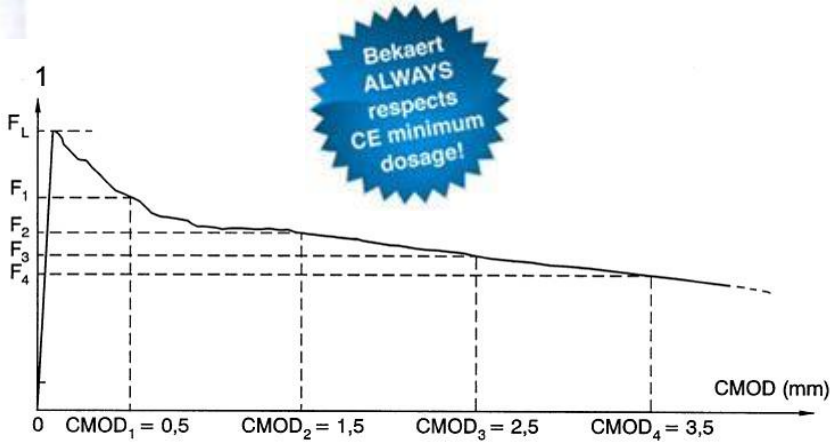
Information and regulated characteristics

Shape	deformed
Bundling	glued
Coating	-
Fibre Length (mm)	35
Diameter (mm)	0.55
Aspect Ratio	64
Tensile strength (N/mm²)	1345
E-modulus (N/mm²)	185000

Consistence with 15 kg/m³ fibres
-> Vebe time = 8 s

Effect on strength of concrete with 15 kg/m³
to obtain: 1.5 N/mm² at CMOD = 0.5 mm and
1.0 N/mm² at COMD = 3.5 mm





Vebe test

Beam test EN 14651

Minimum dosage to respect CE requirements

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Dramix® ’s application to industry floor

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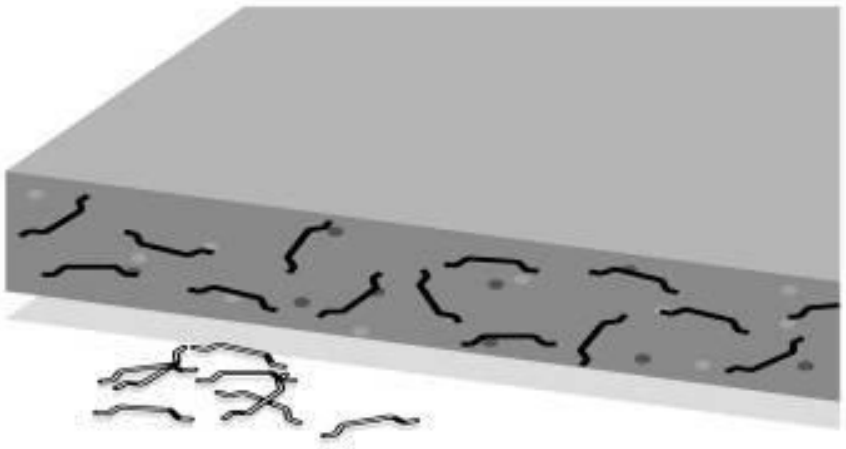
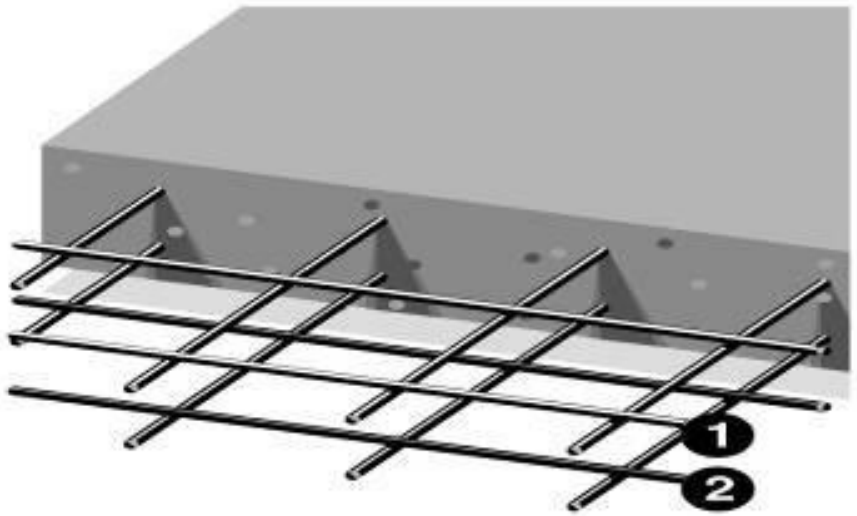
Advantage of steel fibre floor compared with rebar/mesh

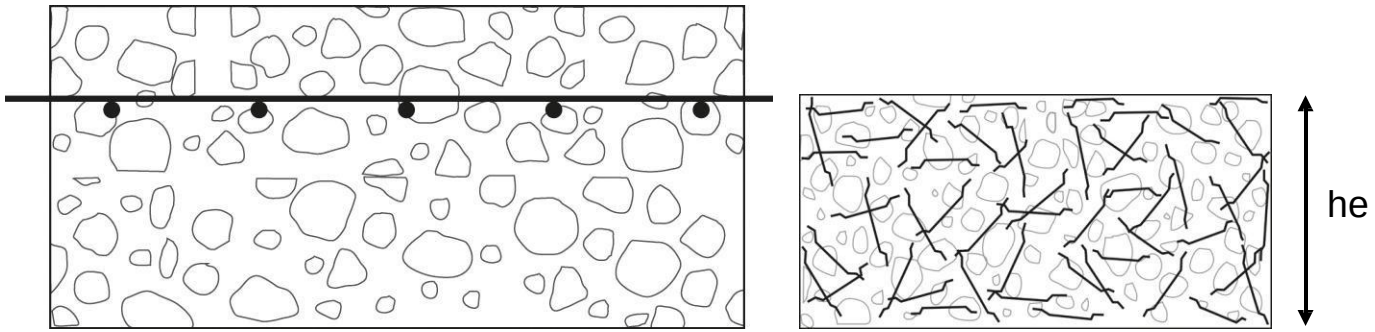




- ✓ Make a thinner floor
- ✓ Make a better floor
- ✓ Faster execution
- ✓ Greener floor

Advantage of steel fibre floor compared with rebar/mesh

Make a thinner and CHEAPER floor than rebar reinforced



Need no concrete cover with SFRC

↓

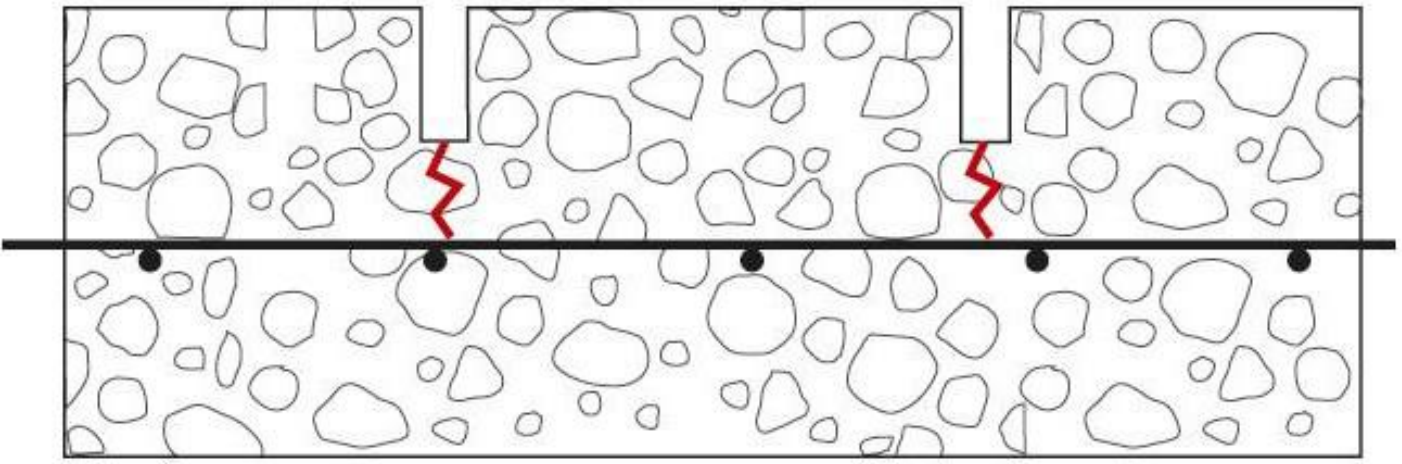
a thinner & cheaper floor for a given load

Advantage of steel fibre floor compared with rebar/mesh

Make a BETTER floor than rebar reinforced

1. A single mesh in the bottom is not working to avoid crack formation
2. Dramix® delivers reinforcement everywhere
3. No unreinforced toplayer
4. No problems at joints
5. Creating durable floors
6. Avoid fixing problems afterwords

1 A single mesh in the bottom is not working to avoid crack formation



Reinforcement mesh is continue, joint is not working

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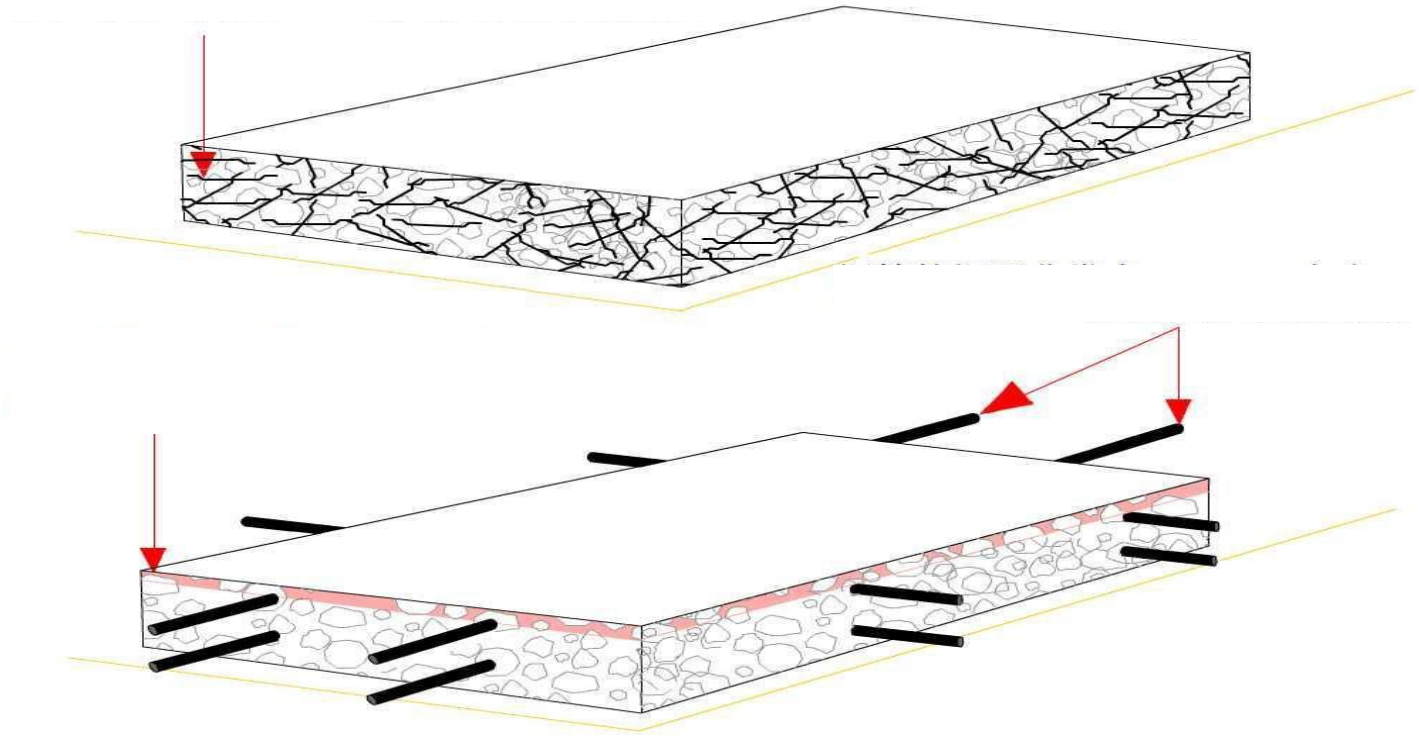
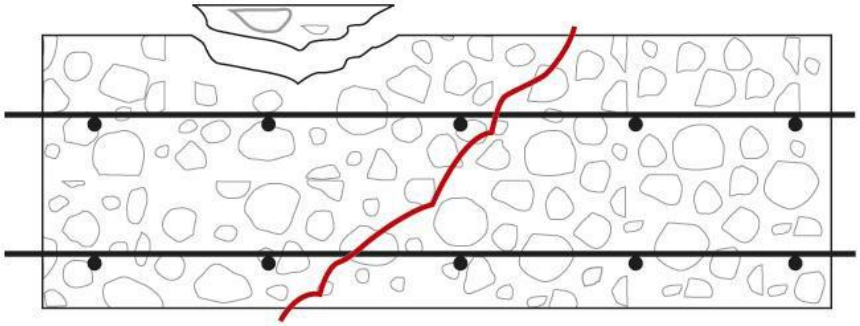
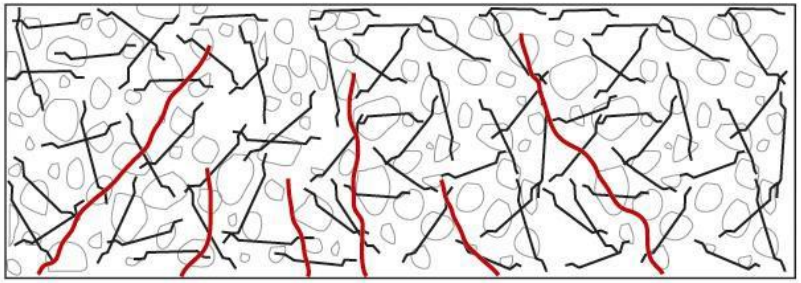
allows uncontrolled cracks

2 Dramix® delivers reinforcement everywhere



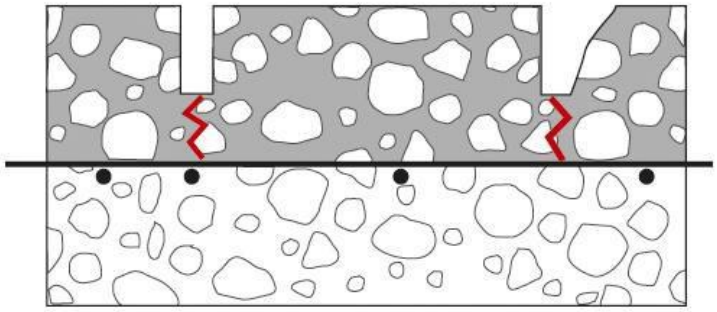
3 No unreinforced toplayer, avoiding spalling

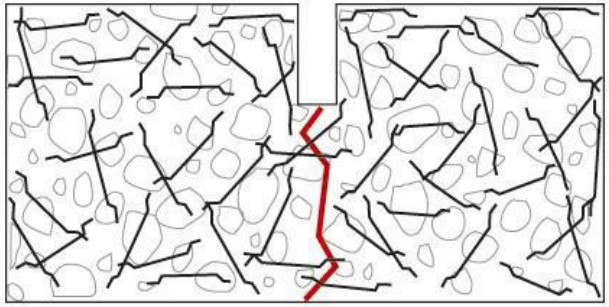




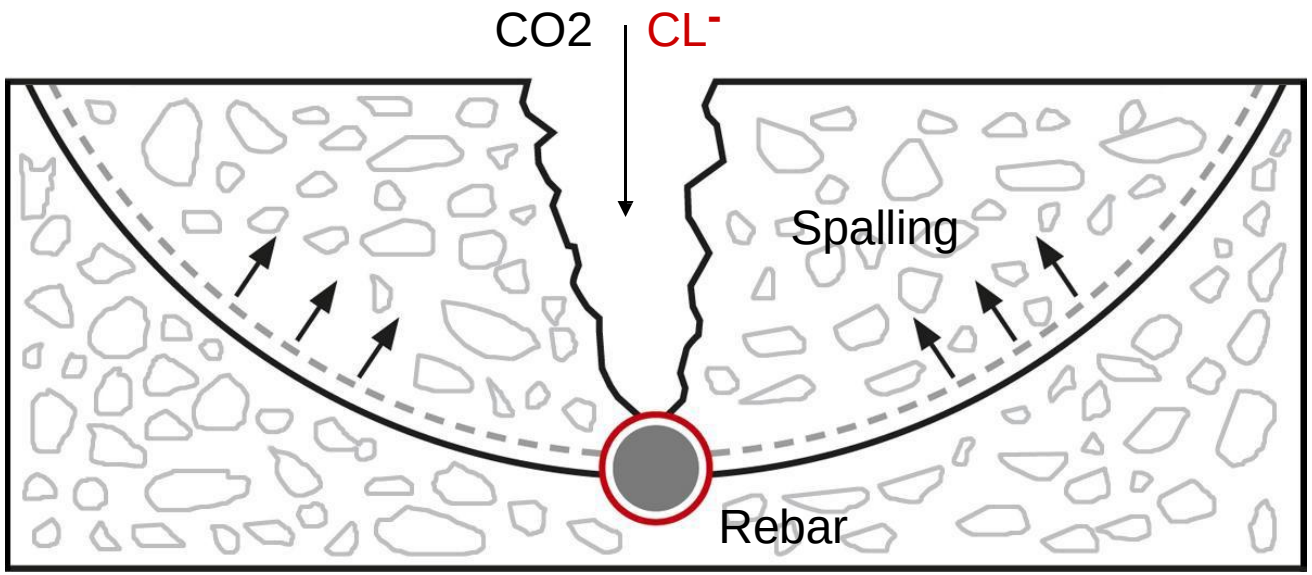
4 Avoid problems at joints

Concrete broken at slab joint





5 Creating durable floors



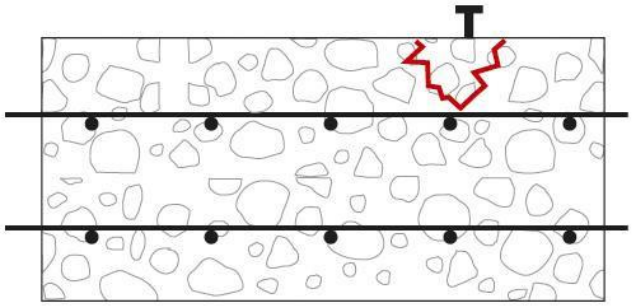
Create durable floors

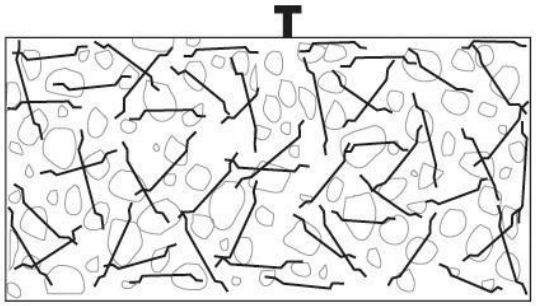
Minimalizing crack widths

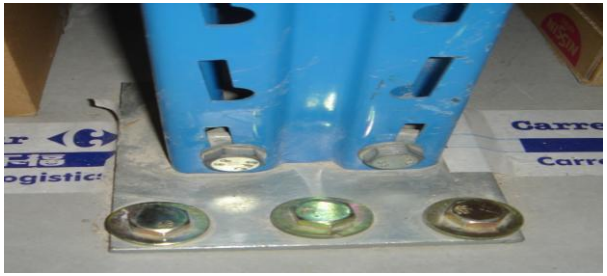
Avoid spalling

6 Avoid fixing problems

Easily install equipment such as rack etc.







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Thank you !

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