Pervious concrete, an environmentally friendly material for roads: applications on construction sites in France

EUPAVE workshop , Bruxelles, October 20th 2021

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Holcim at a glance

Global
footprint

2,300
operating sites

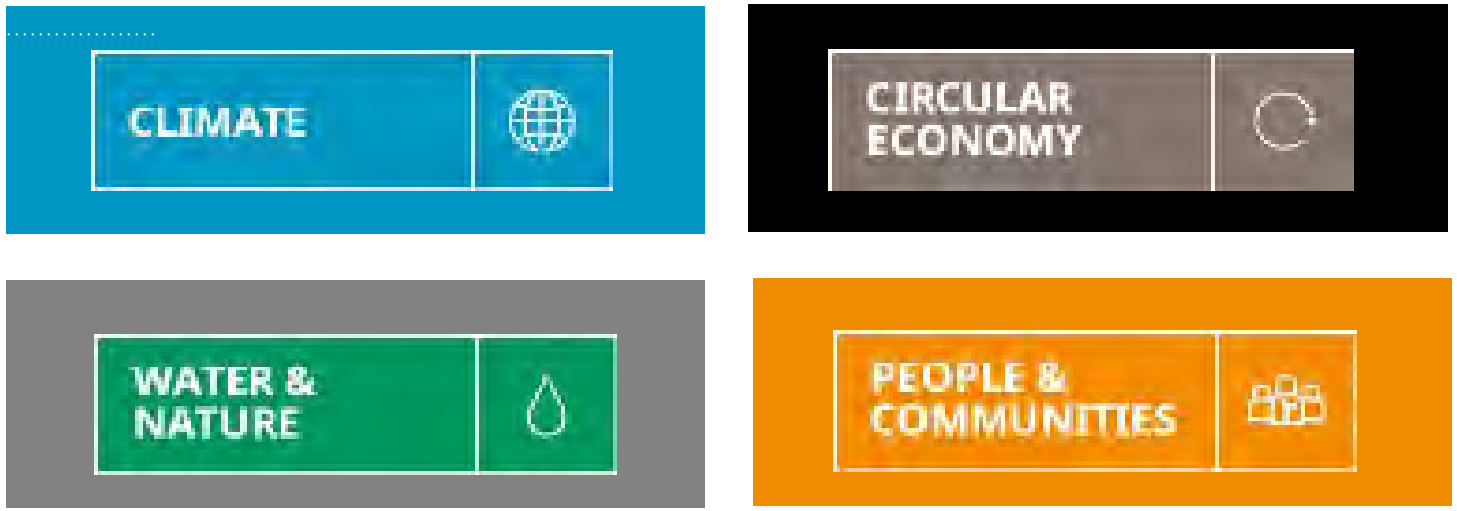
26.9
billion CHF net sales

81,000
employees

Listed on **SIX and Euronext**

Our contribution to sustainability: The 2030 Plan

- **The 2030 Plan** reflects our view of sustainability as both responsibility and business opportunity. It lays out our roadmap to improve the sustainability of our operations and industry.
- **The 2030 Plan focuses our efforts on 4 areas** where we can make the biggest contribution.



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Five megatrends driving our market

Global population growth

Urbanization and megacities

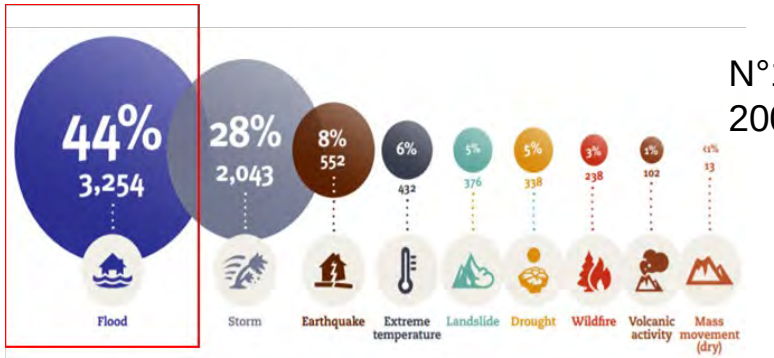
Increased demand for better living standards

Digitalization

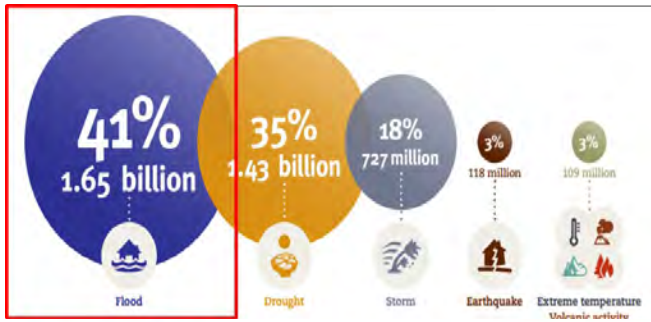
Increased demand for sustainable construction solutions

Flooding: Facts

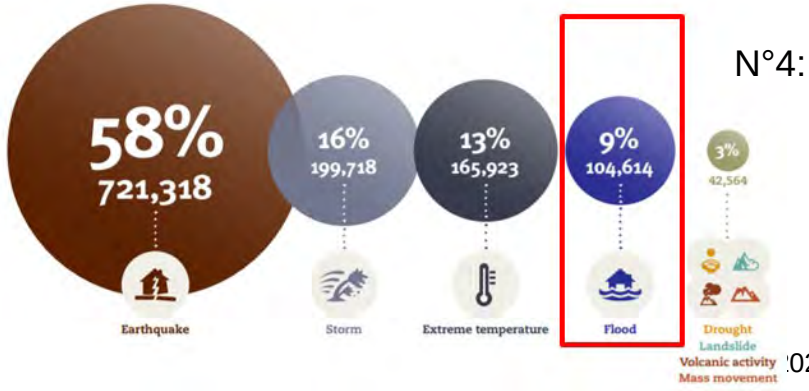
Overall (coastal, river…) floodings



N°1: Percentage of occurrences 2000-2019



N°1: Numbers of people affected (death excluded) 2000-2019



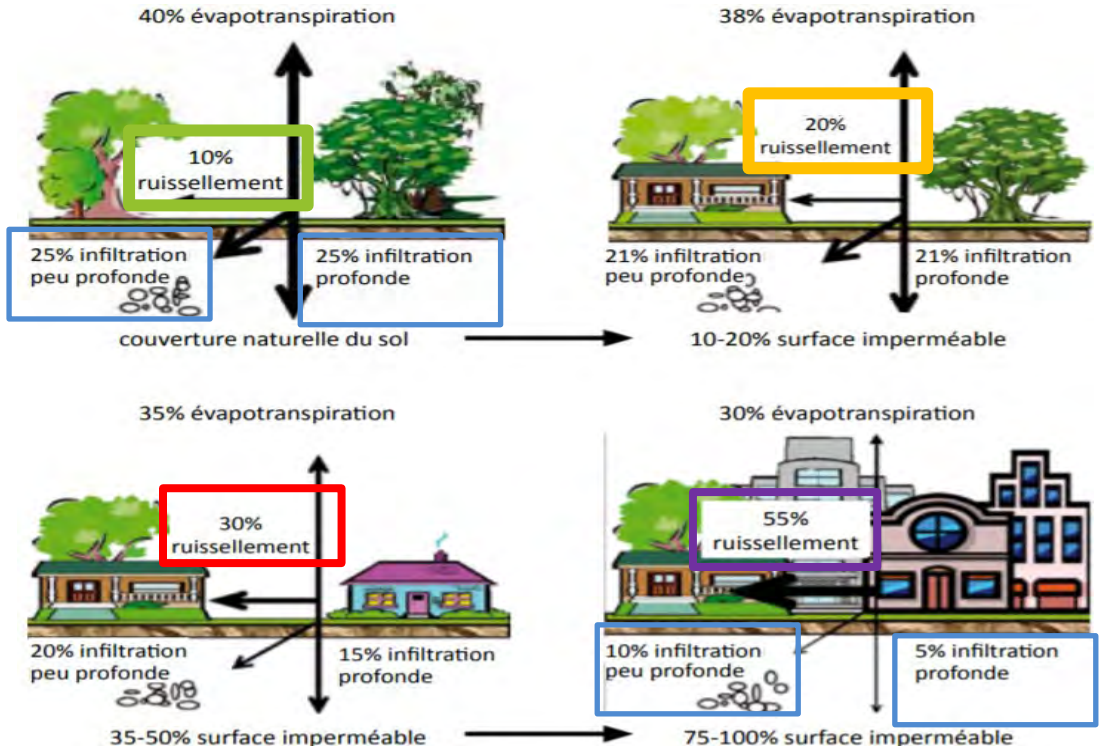
N°4: Numbers of death 2000-2019
(500,000 from 1984)

Urban flooding

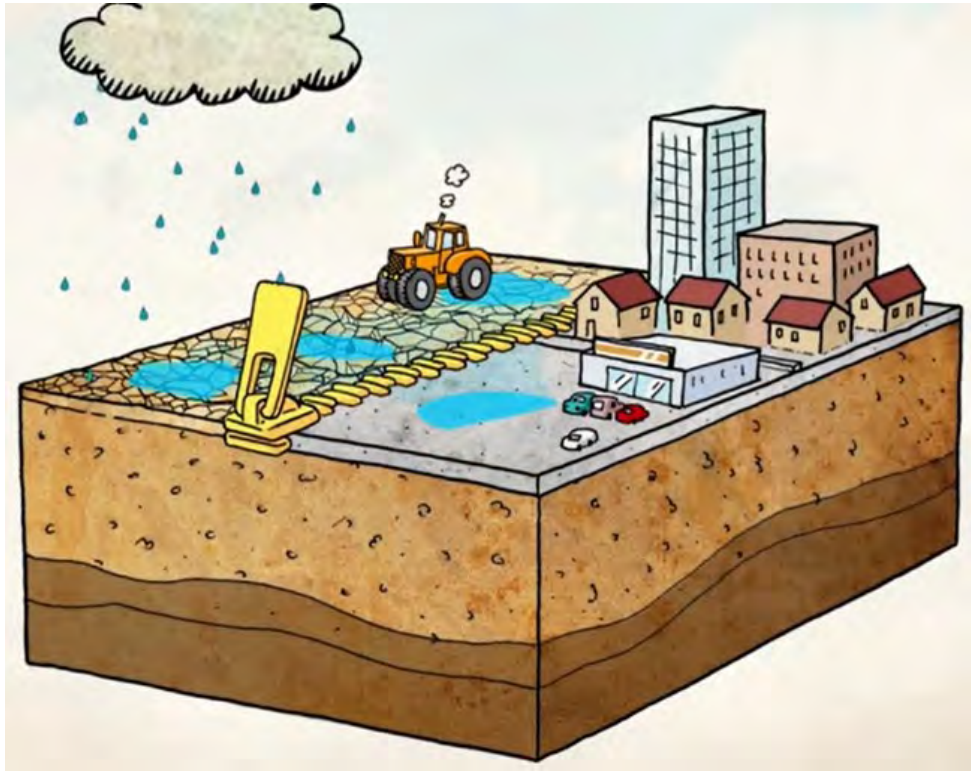
Flooding: Causes and Solution

Climate change but also Soil waterproofing in the city

lack of drainage in an urban area



15 to 30% of city total surface which represents roads and parking lots can be made permeable



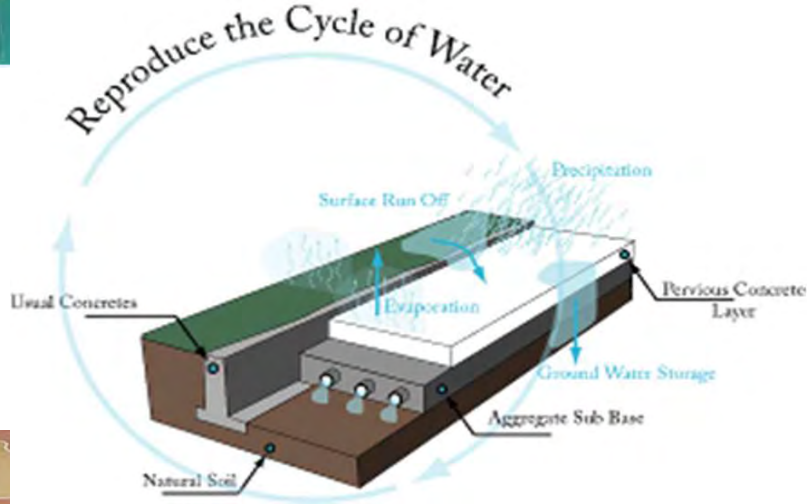
What is HYDROMEDIA®and Where it can be used?

Hydromedia is:

- **Engineered material:** a special RMX concrete with a high degree of permeability, which allows a rapid water drainage

Hydromedia can be used like a :

- **System:** as a front-face of complex drainage systems, which facilitate rapid evacuation of the waters, limiting risk of flash flooding or landslide. These waters can be simply filtered down, retained and driven or recovered for reuse.



- **Construction solution:** as an attractive architectural material and new construction concepts have been developed

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HYDROMEDIA® Construction Solutions

Water drainage

- Traditional surface/ sub-base
- Standard system design
- **Only drainage functionality**

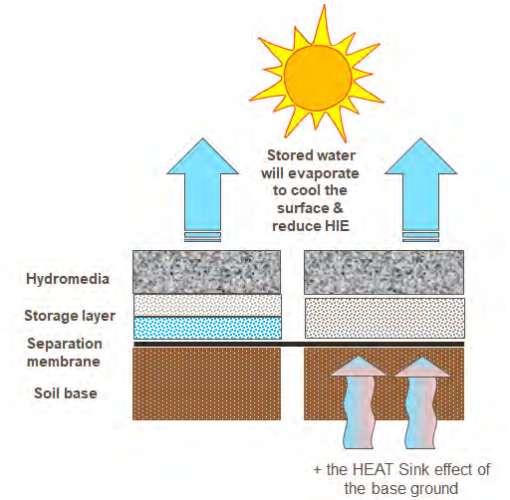
Water capture

- Hybrid system approach through partnerships
- **Water draining & capture**
- Sewer system simplification
- RoofTop Duo

Hydromedia

Future

- Looking into biodiversity concrete
- Fighting air pollution (air cleaning technology)
- **Ongoing feasibility**



Water use

- Extension of the Sponge City Concept
- Part of rainfall water storage
- Helps fighting HEAT ISLAND EFFECT
- **Ongoing feasibility**

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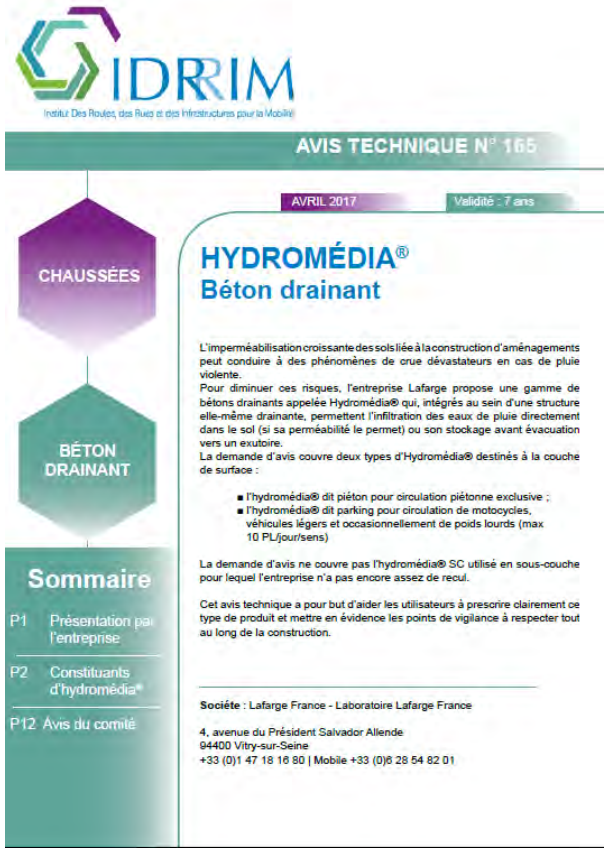
HYDROMEDIA® The Certification & Min. Specification

- **HYDROMEDIA®is a certified materials!**
- **HYDROMEDIA®**received its technical No. 165 certification from French Institute of Roads, Streets and Infrastructure for Mobility (IDRRIM)



IDRRIM

Institut Des Routes, des Rues et des Infrastructures pour la Mobilité

AVIS TECHNIQUE N° 165

AVRIL 2017 | Validité : 7 ans

CHAUSSÉES

BÉTON DRAINANT

HYDROMÉDIA®

Béton drainant

L'imperméabilisation croissante des sols liée à la construction d'aménagements peut conduire à des phénomènes de crue dévastateurs en cas de pluie violente.
Pour diminuer ces risques, l'entreprise Lafarge propose une gamme de bétons drainants appelée Hydromédia® qui, intégrés au sein d'une structure elle-même drainante, permettent l'infiltration des eaux de pluie directement dans le sol (si sa perméabilité le permet) ou son stockage avant évacuation vers un exutoire.
La demande d'avis couvre deux types d'Hydromédia® destinés à la couche de surface :

- l'hydromédia® dit piéton pour circulation piétonne exclusive ;
- l'hydromédia® dit parking pour circulation de motocycles, véhicules légers et occasionnellement de poids lourds (max 10 PL/jour/sens)

La demande d'avis ne couvre pas l'hydromédia® SC utilisé en sous-couche pour lequel l'entreprise n'a pas encore assez de recul.

Cet avis technique a pour but d'aider les utilisateurs à prescrire clairement ce type de produit et mettre en évidence les points de vigilance à respecter tout au long de la construction.

Sommaire

P1 Présentation par l'entreprise

P2 Constituants d'hydromédia®

P12 Avis du comité

Société : Lafarge France - Laboratoire Lafarge France

4, avenue du Président Salvador Allende
94400 Vitry-sur-Seine
+33 (0)1 47 18 16 80 | Mobile +33 (0)6 28 54 82 01

Minimum Declared Performance

Property*	Performance
Drainability	min. 180 L/m2/min
Porosity	min. 15 %
Compressive strength after 28 days	min. 10 MPa
Flexural strength after 28 days	min. 1.0 MPa
* Test methods available in the Technical specification No.165	

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HYDROMEDIA® Product Range (Wearing layer)

Hydromedia pedestrian

No traffic applications

Applications	Characteristics	Placing method
• Urban jobs (plazas, podiums, etc.) • Alleyways/pedestrian alleys • School yards • Cycleways • Sport or recreational areas • Residential jobs (terrasses, swimming pool decks, etc.)	• Compressive strength ~10MPa • Porosity from 15 à 35 % depending on placing technique • High aesthetical expectations, product possibly coloured	• Manual screeding • Manual roller • Vbrating plate on wooden plank • Motorised roller • Possible use of pan float finish

Hydromedia car park

Very light traffic conditions

Applications	Characteristics	Placing method
• Light vehicle car parks (< 3,5T) • Side walks • Residential driveways • Occasional traffic >3.5T (max 10/day), only after validation by Commercial Performance and/or Country central lab	• Compressive strength ~15MPa • Porosity from 15 à 35 % depending on placing technique • Average to high aesthetical expectations, product possibly coloured • Prevention of ravelling (use relevant mix design & placing technique)	→ **Compaction required :** • Heavy manual or mechanical roller • Vibrating plate on wooden plank • Possible use of pan float

HYDROMEDIA® Product Range (Base and subbase layers)

Hydromedia – underlayer without traffic

Used as underlayer for non-traffic applications

Applications	Characteristics	Placing methods
• Urban jobs (plazas, podiums, etc.) • Alleyways/pedestrian alleys • School yards • Cycleways • Sport or recreational areas • Residential jobs (terrasses, swimming pool decks, etc.)	• Compressive strength ~10MPa • Porosity from 15 à 35 % depending on placing technique • No aesthetical expectations	• Manual screeding • Vibrating plate directly on concrete • Mechanical roller • Manual roller

Hydromedia – underlayer with traffic

Used as underlayer with light traffic

Applications	Characteristics	Placing methods
• Car parks • Side walks • Driveways • Urban jobs (plazas, podiums, etc.) • Residential applications	• Compressive strength ~15MPa • Porosity from 15 à 35 % depending on placing technique • No aesthetical expectations	→ **Compaction required** : • Vibrating plate directly on concrete • Heavy manual roller

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HYDROMEDIA® Example Applications

Walkway

Sub-base for paving blocks

Basketball court

Parking

HYDROMEDIA black : Albigny 2019

HYDROMEDIA Mineral : Oullins – Berges de l'Yseron
4 000 m² - 2018

HYDROMEDIA subbase : La Part Dieu Lyon

HYDROMEDIA subbase: Lyon Gerland

HYDROMEDIA®RoofTop Duo Concept

Nightmares of modern cities:

- Unused or non-adapted roofs
- Rainfall water management
- Increasing Heat Island Effect

Solution:

- Can we adapt unused roof spaces?
- Can we store rainfall water and reuse it?
- Can we simplify design and save money?

ROOFTOP duo

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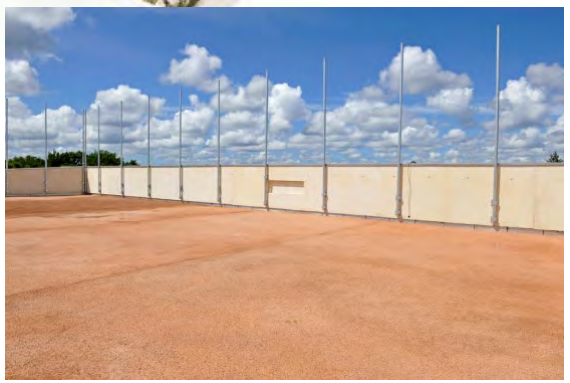
HYDROMEDIA®RoofTop Duo Projects

- Adaptation of roof for playground (2019)
- School Emmanuel d`Alzon in Saint-Medard-en- Jalles (33)
- Estimated area = 430 m²



- Sportcomplex de Rueil Malmaison
- School courtyard in Montpellier

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ROOF TOP DUO
Scolar group in Saint Medard (33) – 400 m²
August 2019

ROOF TOP DUO : School Restanque Montpellier
1 600 m²

HYDROMEDIA® Take Away Messages!

- ➔ High efficiency drainage with high durability
- ➔ Easier and faster to cast
- ➔ Reduce the impact of urbanization on the natural cycle of water
- ➔ Decrease ground impermeability
- ➔ Improve urban area comfort: no puddles, roads safety
- ➔ Minimize the effect of Heat Island Effect in cities
- ➔ Reduce structures and maintenance costs : decrease draining channels
- ➔ High aesthetic choice : aggregates, colour and finish aspects
- ➔ Contribute to HQE, BREEAM and LEED certifications
- ➔ Evolving product with more application & functionalities

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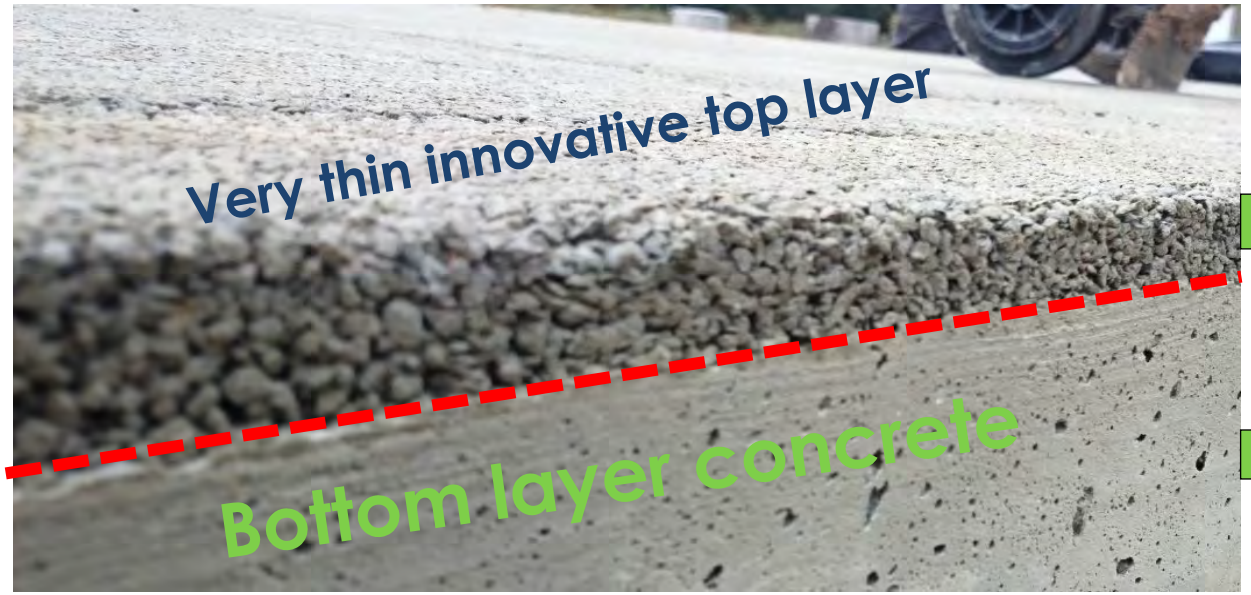
Speaking about pervious …Concept of Innovative Road Coating

Safer	More comfortable	More durable	Cost-effective	Customized colors



Safe and Comfortable riding | Special semi ultra high performance pervious concrete

Long service life under high traffic | Ordinary concrete: JPCP, CRCP, RCC

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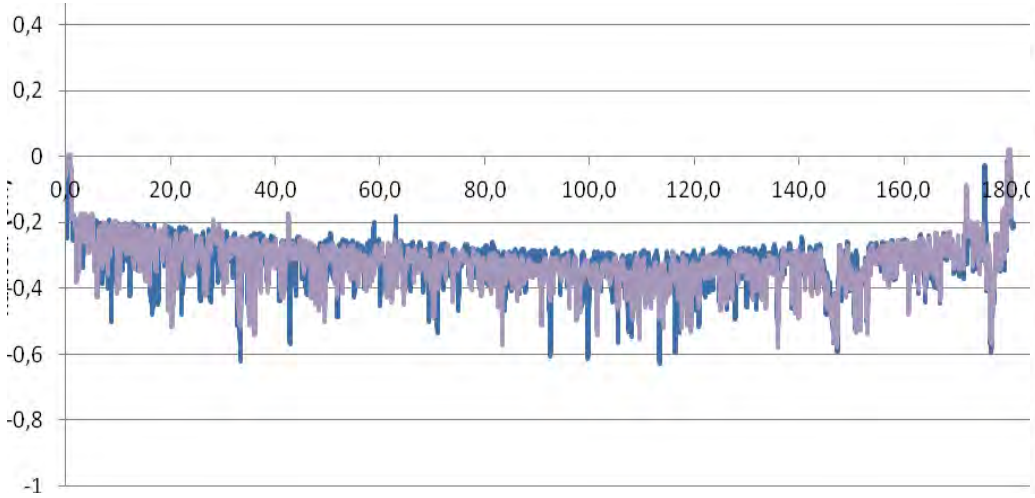
Durability of IRC

Long lifespan face to heavy traffic

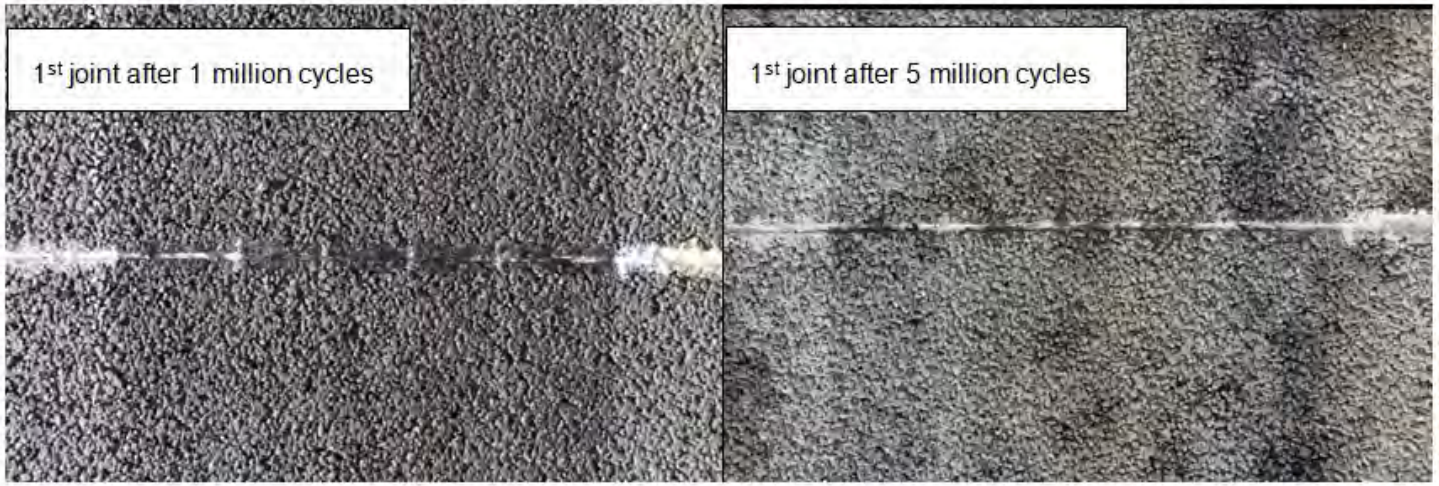
Test was achieved at 5 million cycles loaded

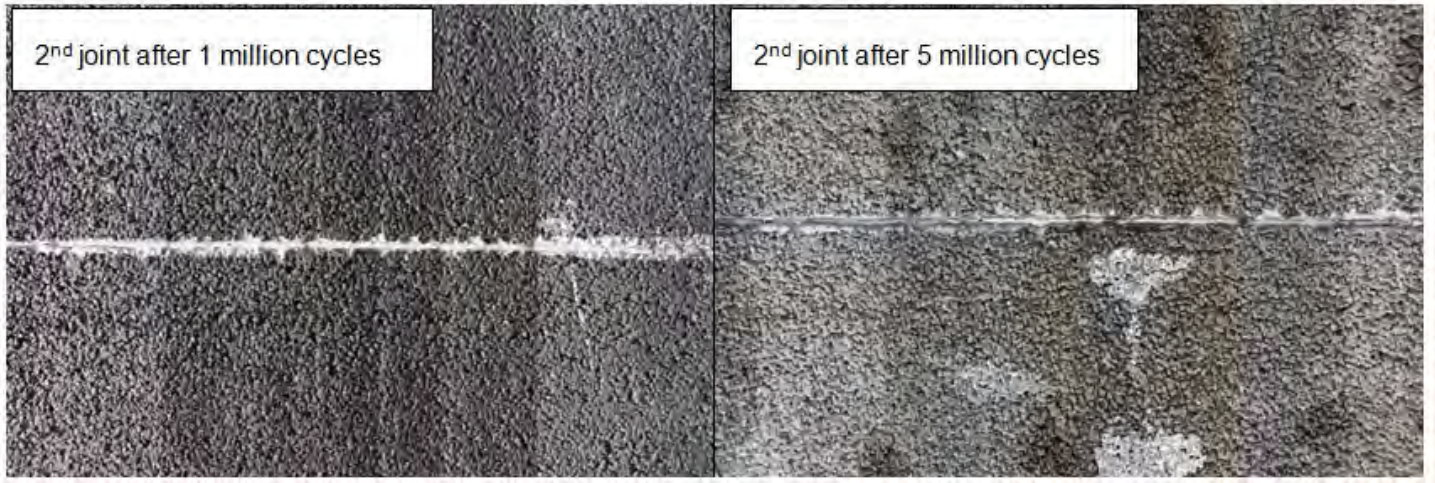
➔ Slab is in good condition without any damage nor rutting

➔ Joints are in good condition without any raveling



profile measurement





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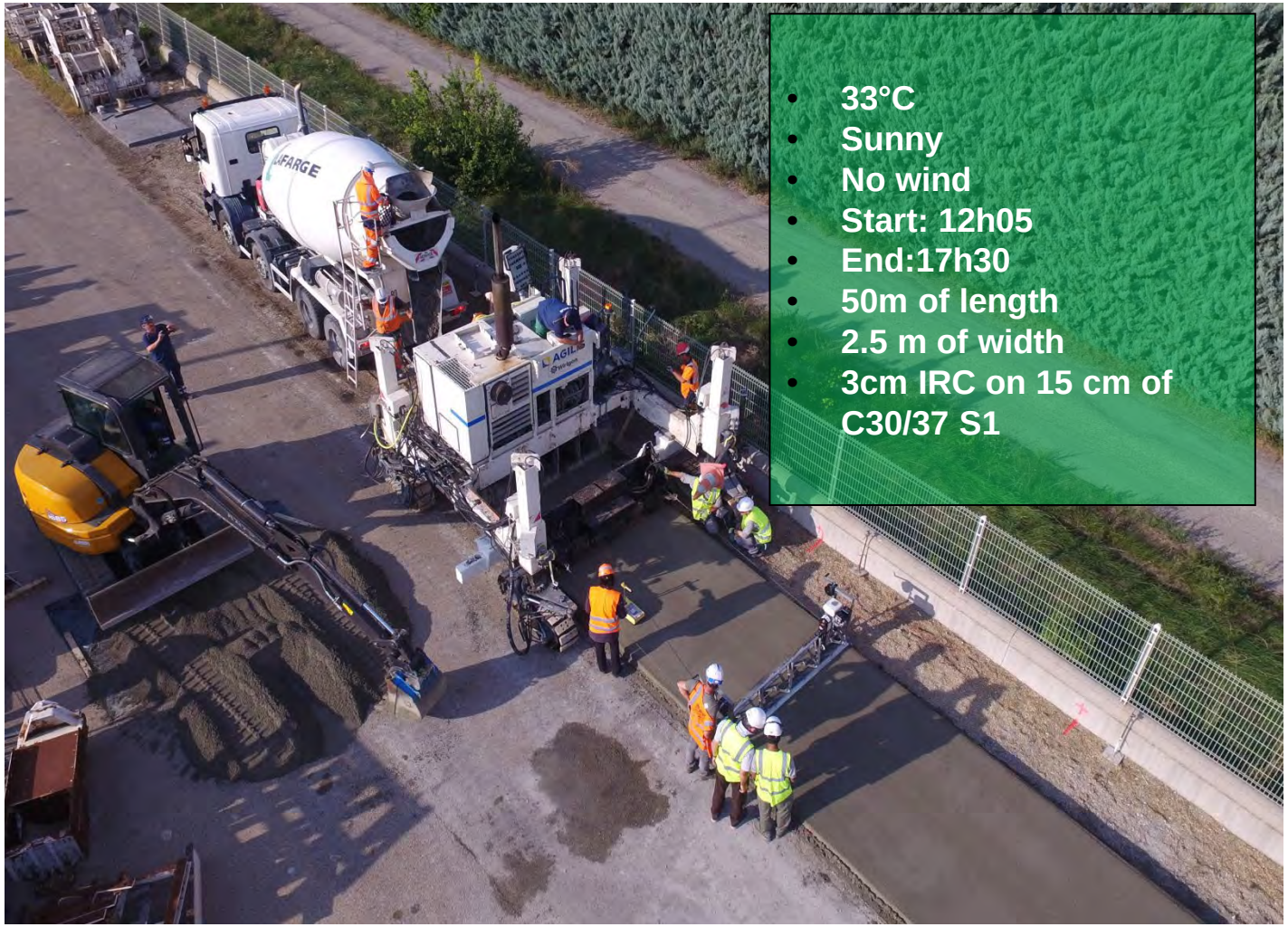
Experimental IRC placement (France)



- 33°C
- Sunny
- No wind
- Start: 12h05
- End:17h30
- 50m of length
- 2.5 m of width
- 3cm IRC on 15 cm of C30/37 S1

Investigate the feasibility of the IRC placement:

- from the **production in mix plant** with special admixture modified concrete
- to the **transport** then to the **placement** with **good coordination** between mix plant and jobsite to ensure the “wet on wet” placement
- to the placement of **2 layers at the same time** with **modified slip form**

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CONCLUSIONS AND PERSPECTIVES FOR IRC

- IRC can be used as a durable and safe wearing course for rigid pavement under a high traffic.
- Possible to place the innovative road coating fresh on fresh with the use of a modified slipform (simpler within Asphalt paver on top of RCC ?)
- Lower impact of IRC compared to the standard asphalt or concrete solutions.

- A real section with high traffic speed is planned for end 2021 in UK

Thank you for your attention !!!
Waiting for questions…


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