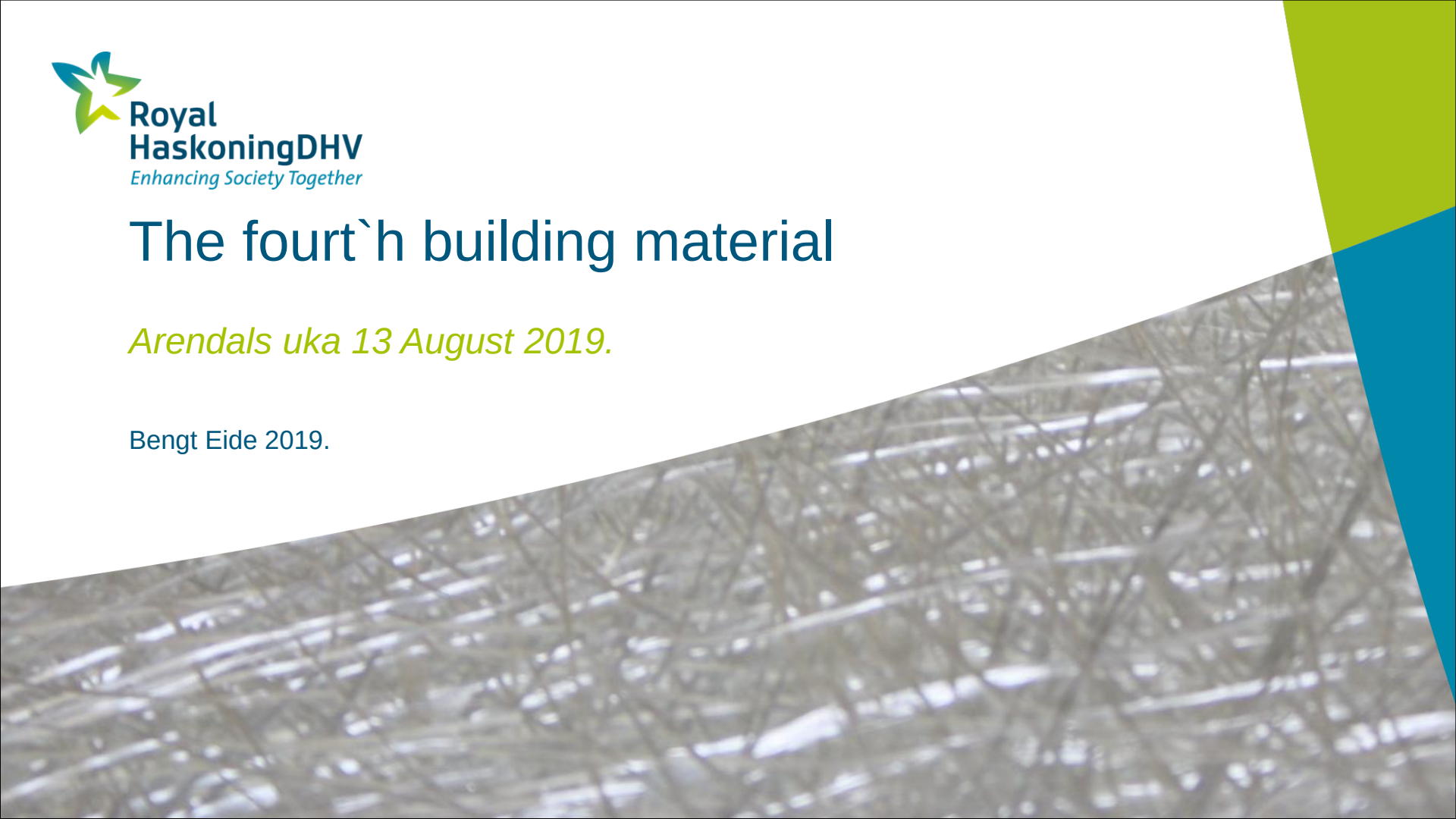
Royal HaskoningDHV
Enhancing Society Together

The fourt`h building material

Arendals uka 13 August 2019.

Bengt Eide 2019.



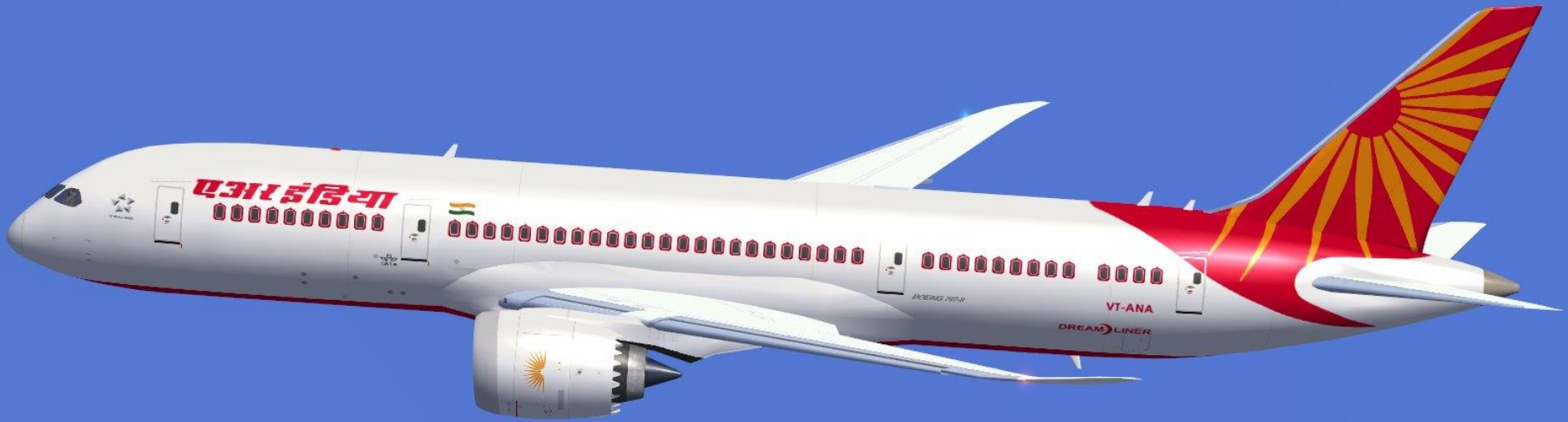
“Since 2018 have we gone from 2 to 7 FRP bridges in Norway and its expectance as a sustainable material is increasing.

Royal HaskoningDHV

Its not about F1 racing cars.

Source: forceindiaf1.com

Its not about plane body or its wings.



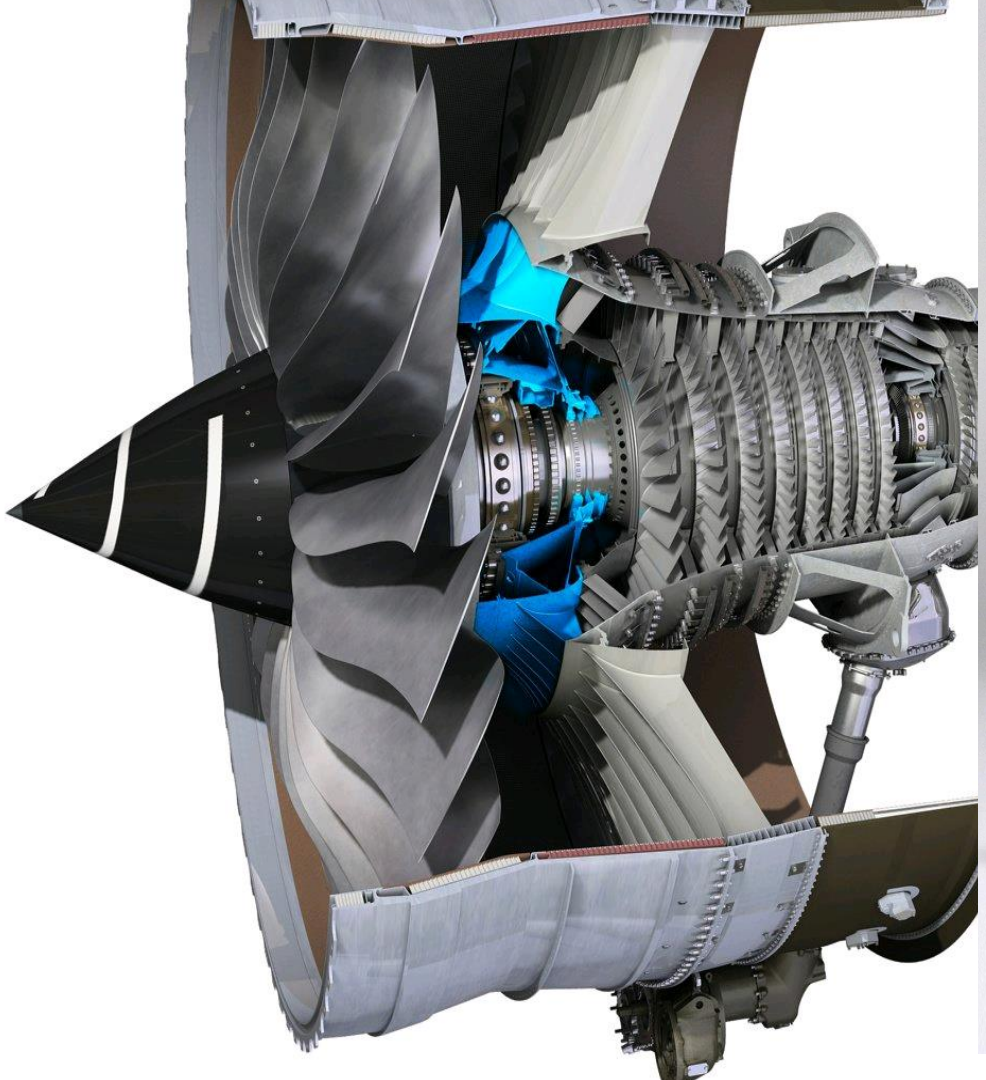
Source: flyawaysimulation.com

Its not about carbon tennis rackets

Source: tennis-warehouse.com

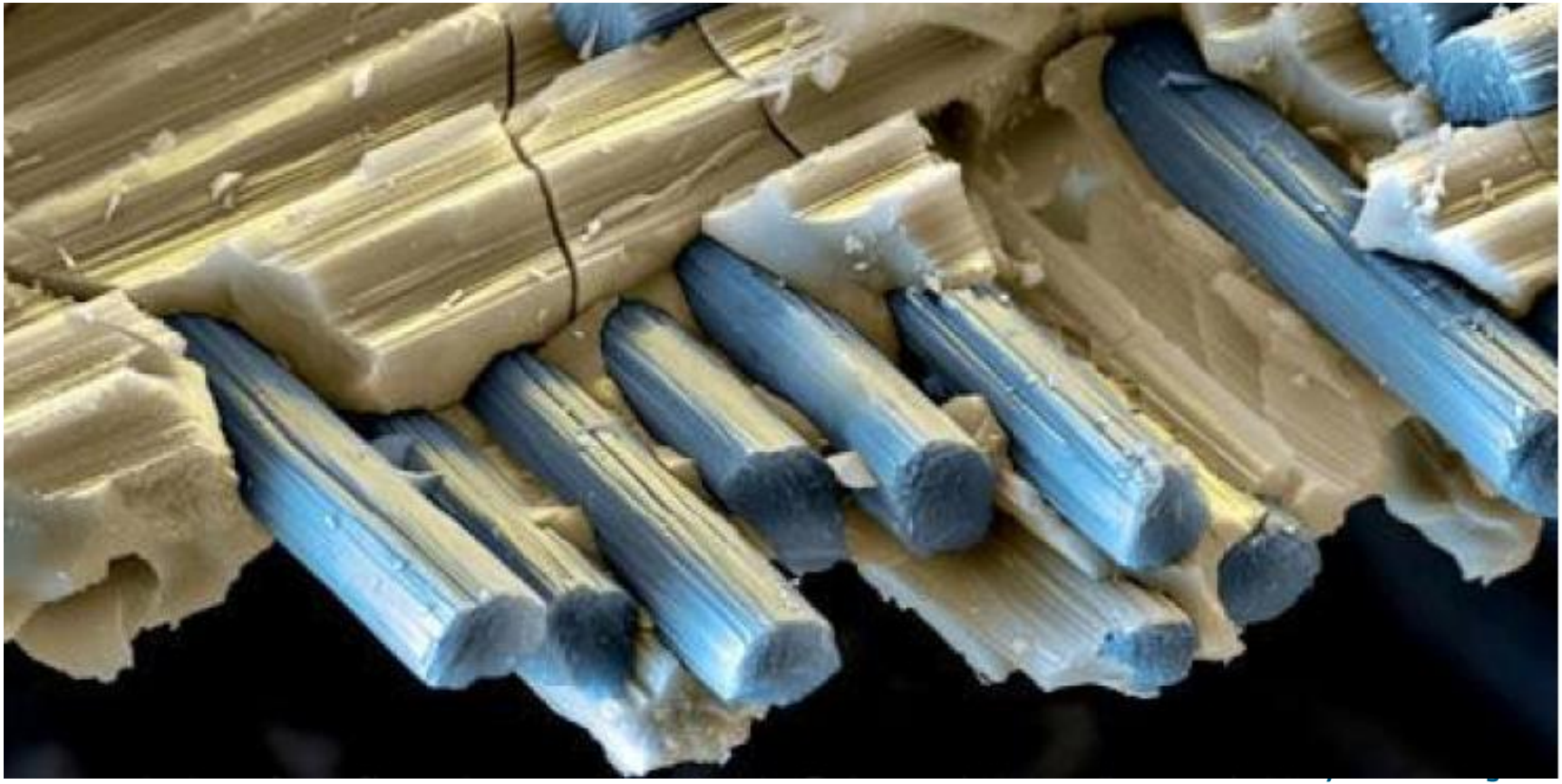
Photo: Nicolas Claris

Source: pexels.com



Its not about Turbine blades in Carb

But… what do they have in common?

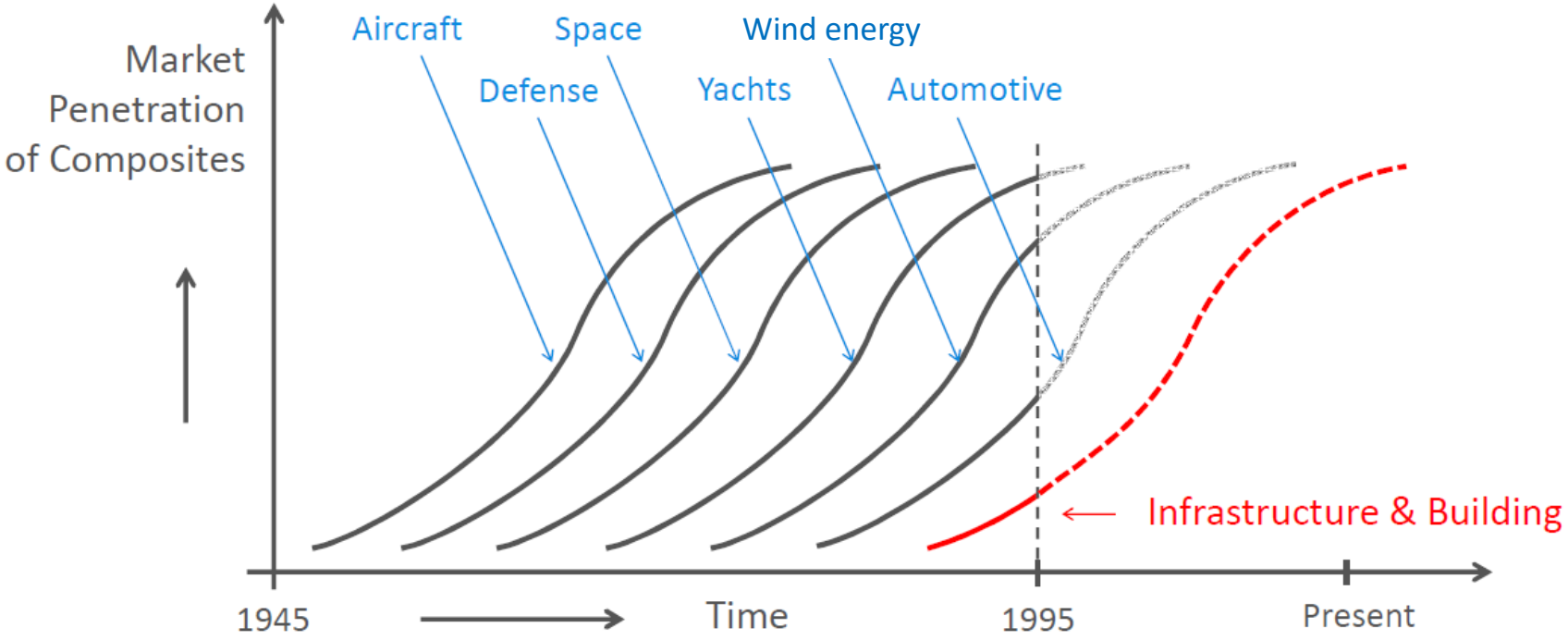


“You have to know the past to understand the present.”

Carl Sagan



Nothing new!



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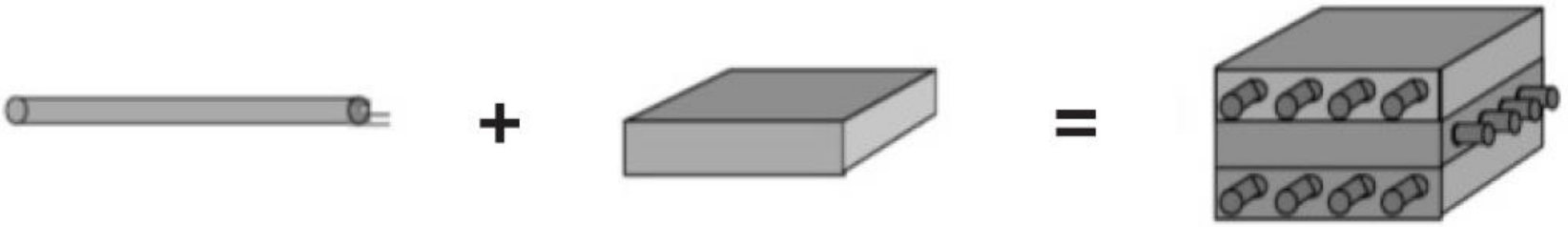
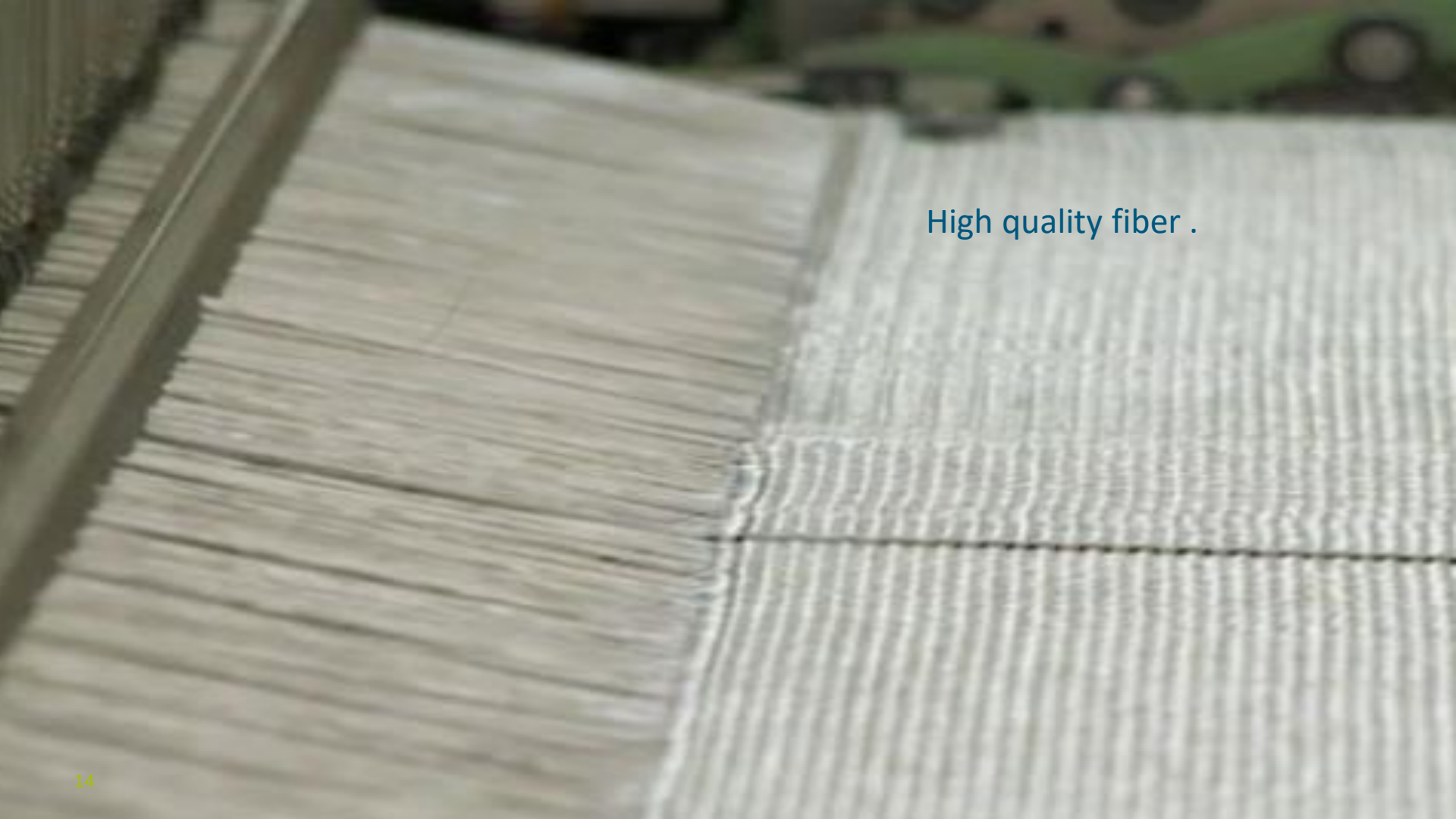
Back to the basics



Fiber Resin Composite

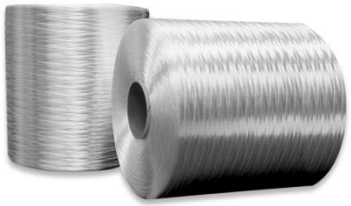


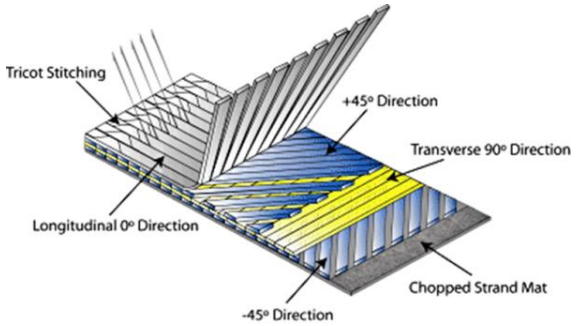
High quality fiber .

Fiber Reinforced Polymer (FRP)

Fiber

Mechanical properties:
stiffness, strength



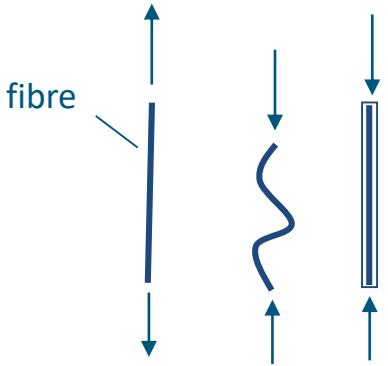


Resin

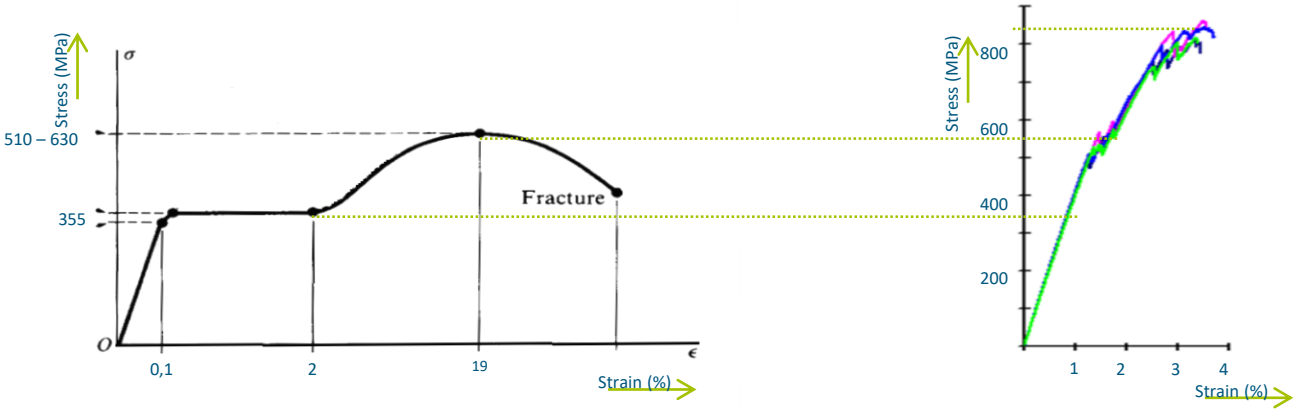
Support fiber in compression

Composite action of plies

Chemical resistance



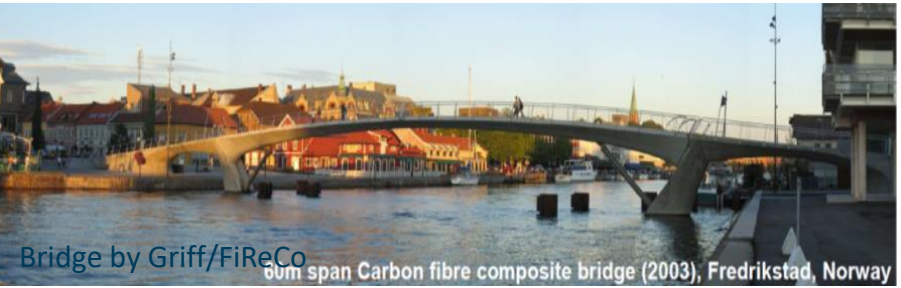
FRP: High strength over stiffness



Stress- strain steel

Stress- strain GFRP UD-fabric

Why FRP in infrastructure?



The 4`th construction material!

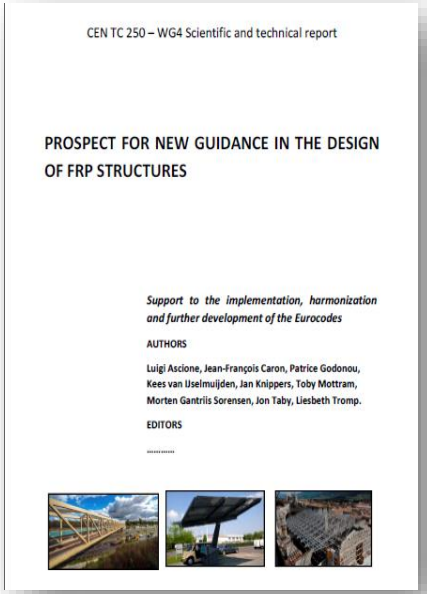
Low Maintenance, Lightweight and Prefabricated, Strong, Durable and Sustainable.

Cost effective, Freedom in form

FRP Design Guidance

International Building Code

CUR96



JRC Technical report

Out from these we can get beautiful bridges.

Design: Royal HaskoningDHV

Prefabricated road structures for heavy traffic loads.

Source: Fibercore Europe

21 Design: Royal HaskoningDHV

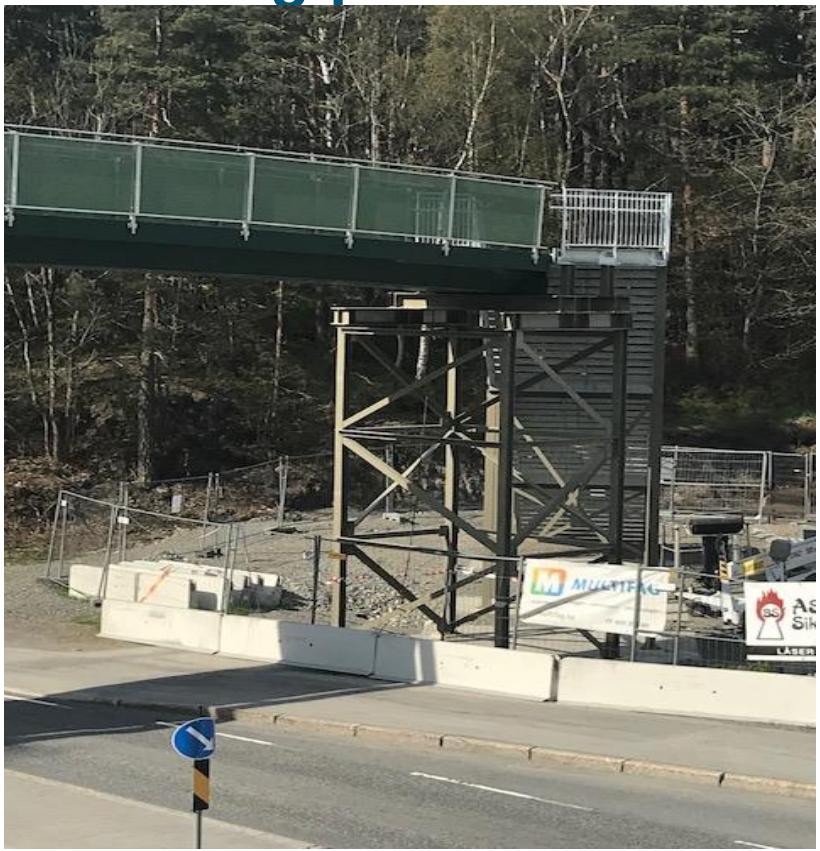
The world largest Gate-Lock in 100% FRP .Rotterdam.

Source: Rien Bakker. Produced by FiberCore

A 34,5 x 3 mtr. 21 Tn. Pedestrian bridge in. Hjelmeland. Norway

Hjelmeland, pedestrian completed. Delivered by MSS as /FC Holland

Brevik Furulunden. (24 x 2,5 mtr. 8 tn) Norway`s first leasing pedestrian Bridge?..



Standard HB – Pedestrian at Gvammen, Seljord. SVV / Telemark. 31 x 1,5 mtr. 8 tn.

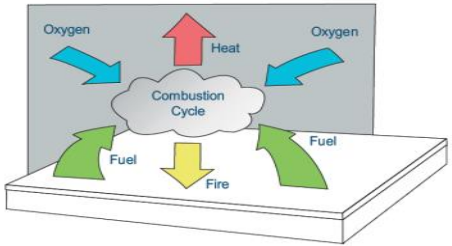
Prospect. Worlds first floating bridge. Single lane / FRP / concrete Hybrid. 280 x 5 meter. Award winner

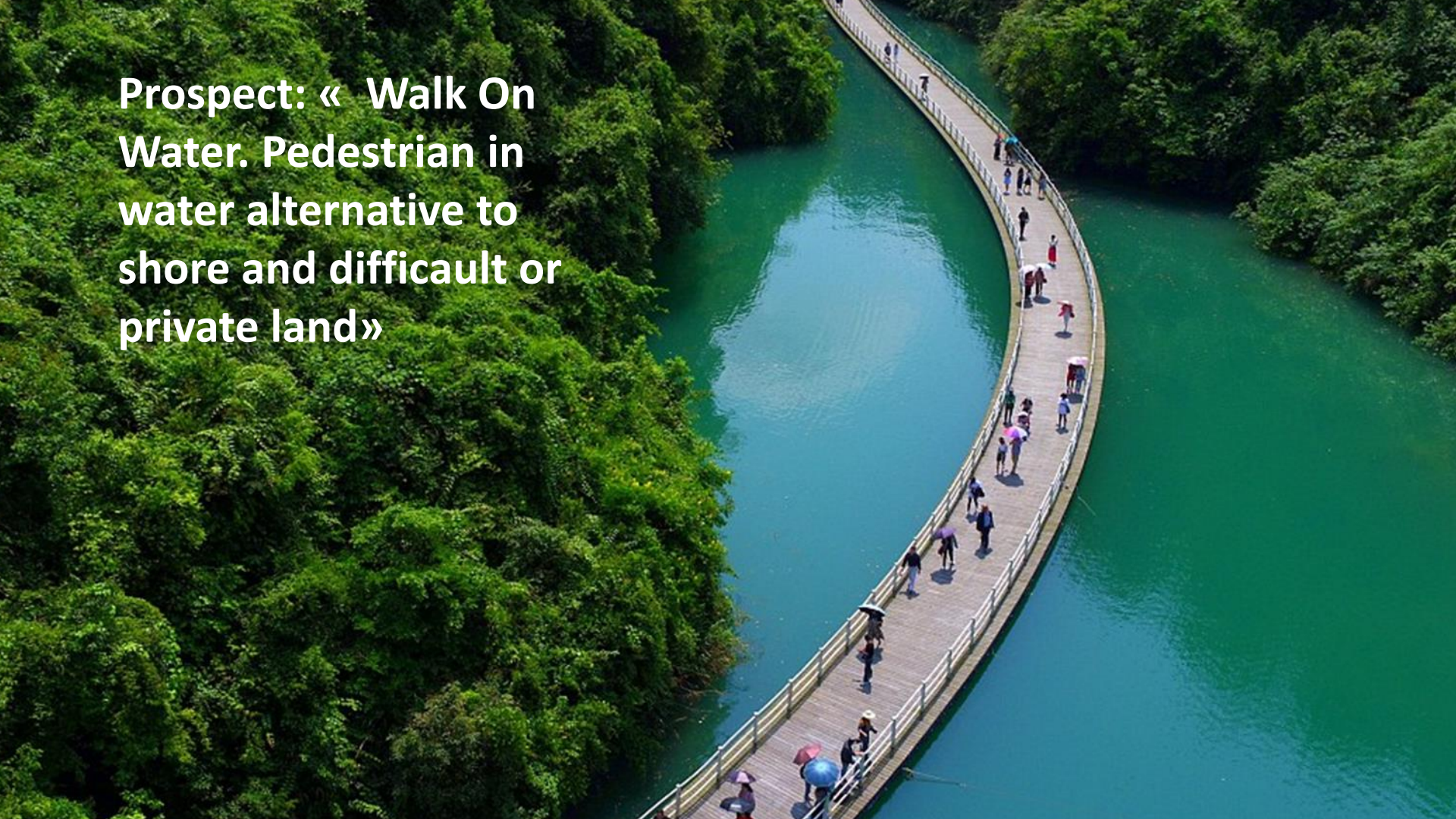
Decided, first Pedestrian in Paradis, Bergen. Approved VD.

Design: Royal HaskoningDHV. Buildt by ……

Flammable?

- Solutions existing for all fire classes:
  - Offshore, maritime, transport
- FRP is not easily flammable.
  - High fiber content gives excellent fire properties
  - Resin burns (partly) fibers prevent in depth penetration (barrier) and retain tensile strength
  - Fireretardant resins (additives, phenolic resins)
- Surface protection:
  - Epoxy bauxite surface layer
  - Fire retardant gel coats
  - Intumescent coatings




Prospect: « Walk On Water. Pedestrian in water alternative to shore and difficault or private land»

Worlds first protype of a free hanging balcony with no need of support.

Thank you for your kind attention.

mss
module solutions & systems

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