



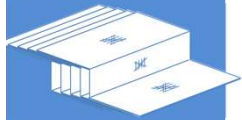
Cost-effective lightweight FRP solutions based on the InfraCore Inside Technology

Laurent Morel

Manager Operations, Infracore Company

5

InfraCore^{company}



LIGHTer
International
Conference
GÖTEBURG 20-21 NOV
19

StrengthBond
Offshore

RAMSSES

MANAGEMENTSYSTEM CERTIFICATE
DNV·GL
ISO 9001

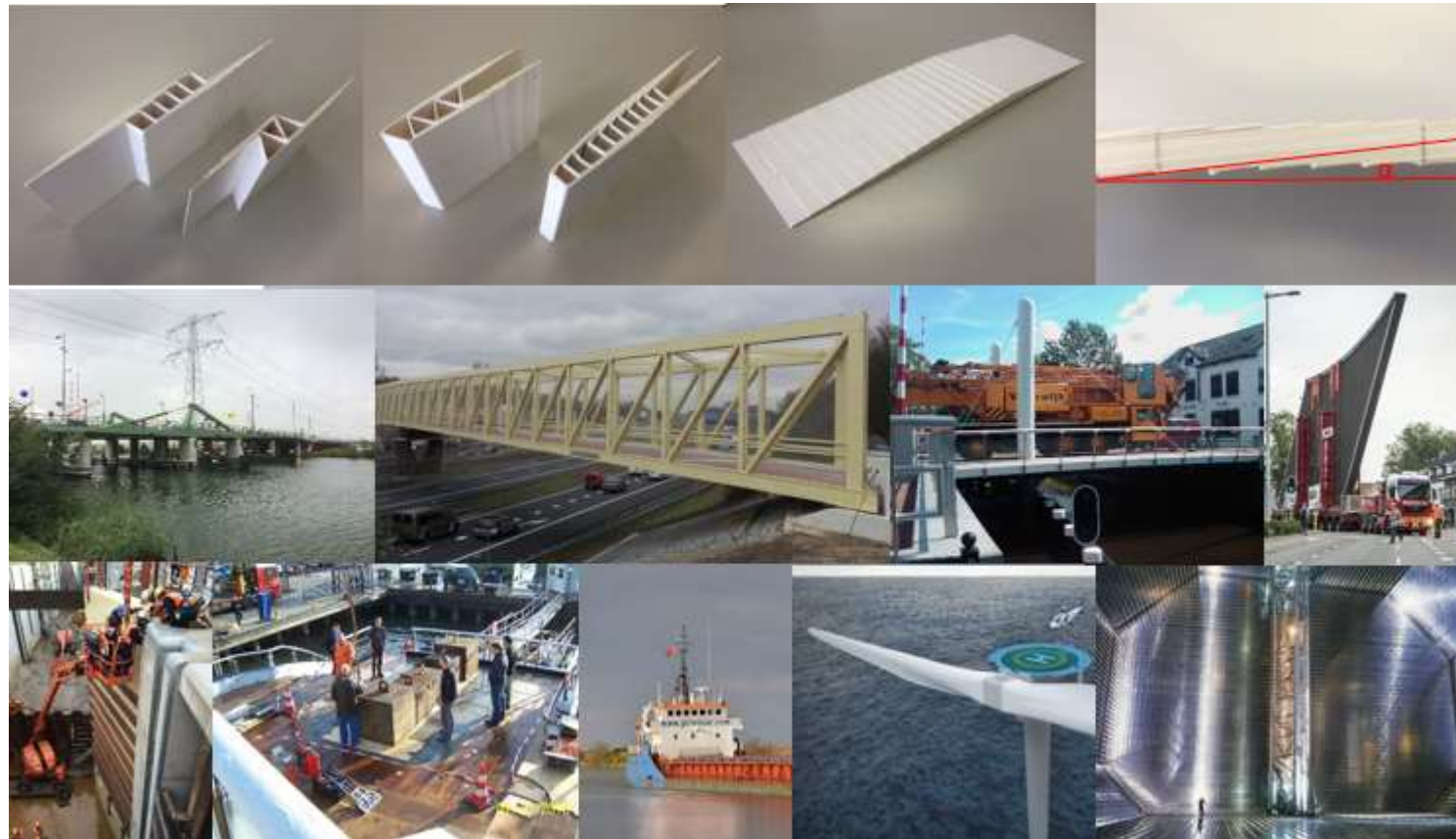
CompositesNL

E-LASS

FiberCore
europe

InfraCore[®]inside

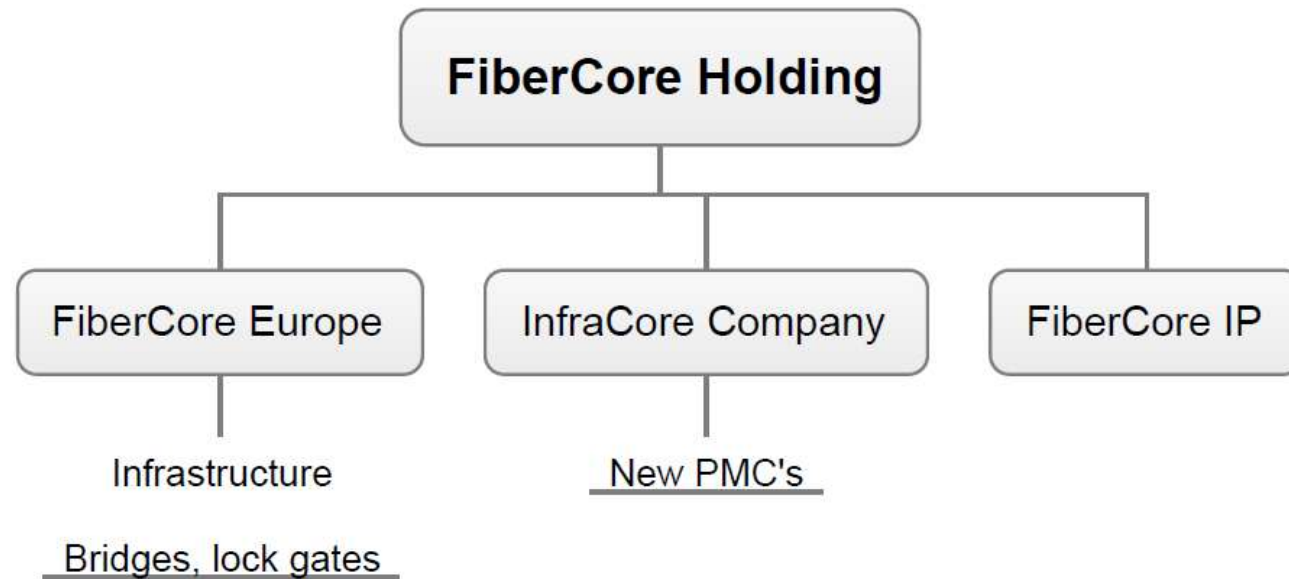
Heavy duty, load bearing FRP structures Proven technology



Worldwide patented / Licenses available



InfraCore[®]inside Company

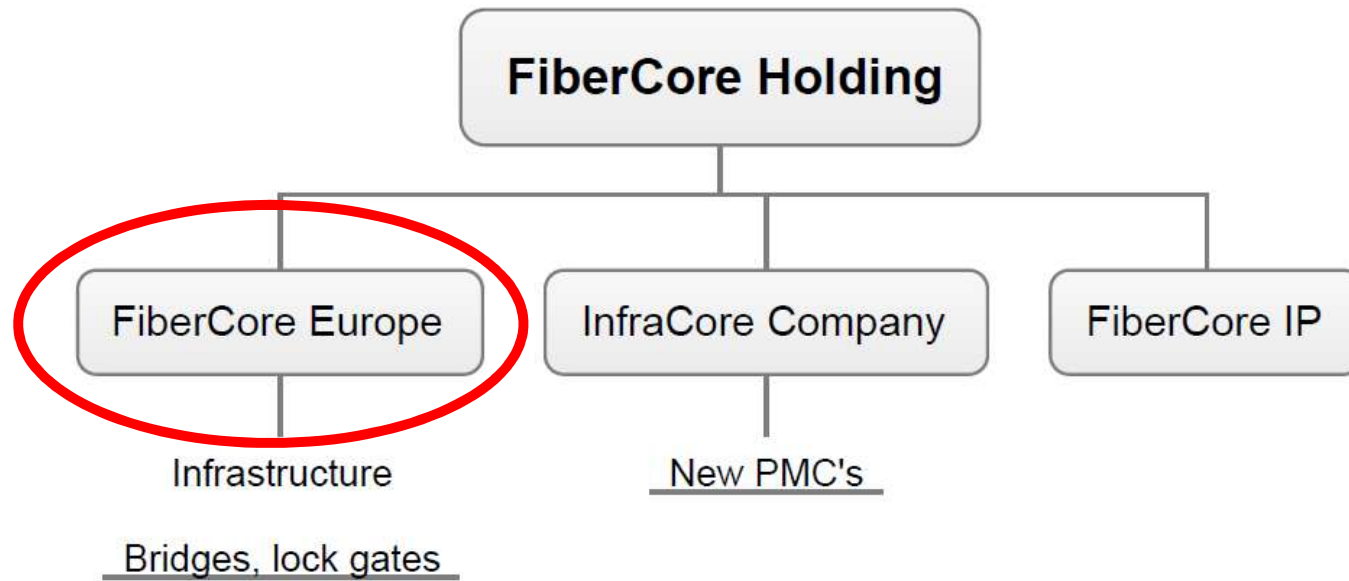


PMC: Product Market Combinations

FiberCore IP: worldwide patents on brand, technology & production.



InfraCore[®]inside Company



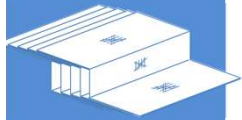
PMC: Product Market Combinations

FiberCore IP: worldwide patents on brand, technology & production.

InfraCore company

InfraCore[®]inside

FiberCore[®]
europe



LIGHTer
International
Conference
GOTHENBURG 26-27 NOV

19

StrengthBond
Offshore



CompositesNL

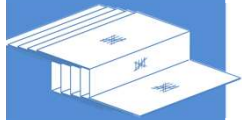
E-LASS

FiberCore
europe



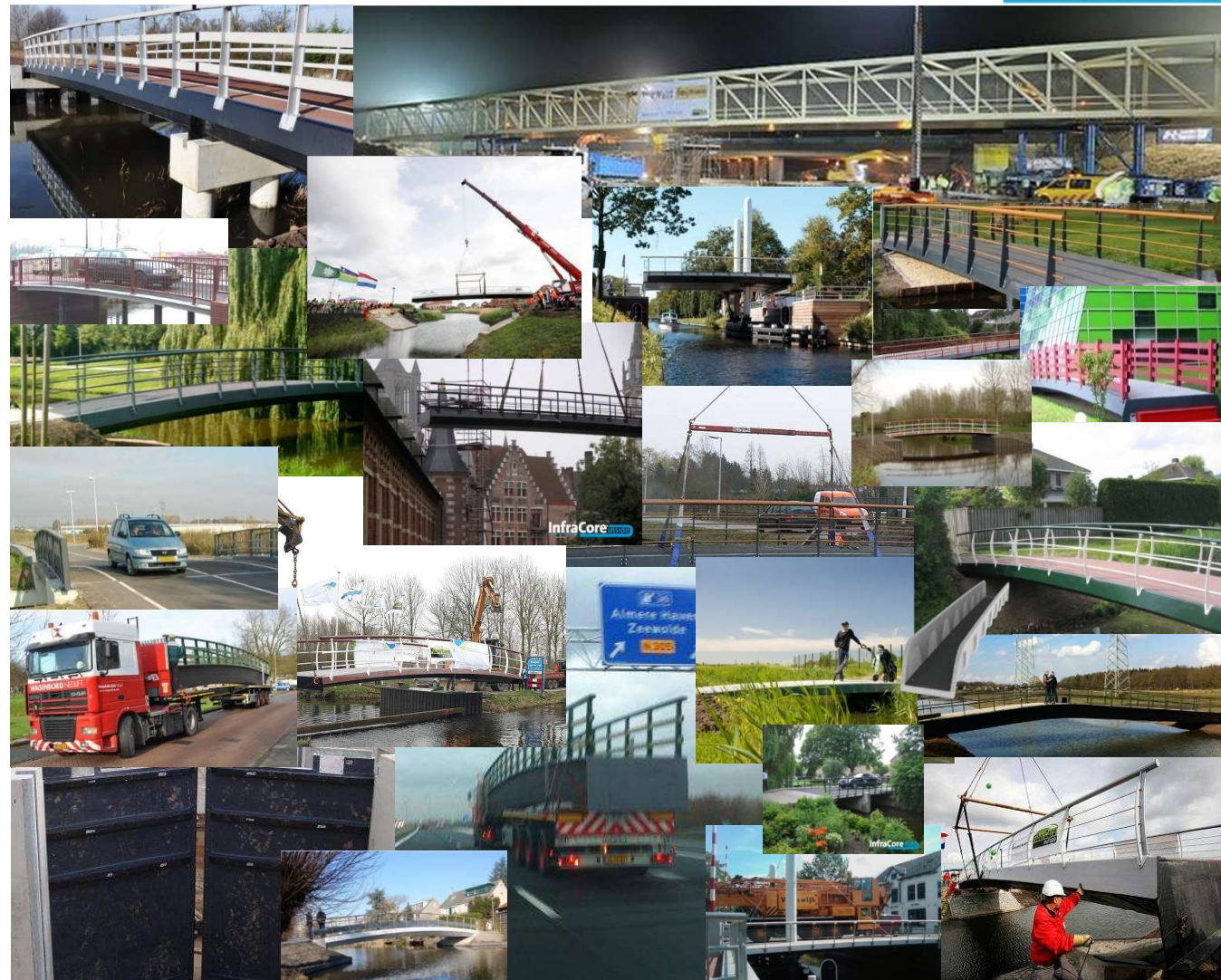
Engineering & Industrial Production (6000 m²): Rotterdam/NL

- FRP-experts in building & infra (pioneer 1996)
- product- & process development
- R&D, engineering & production
- > 900 heavy duty structures installed



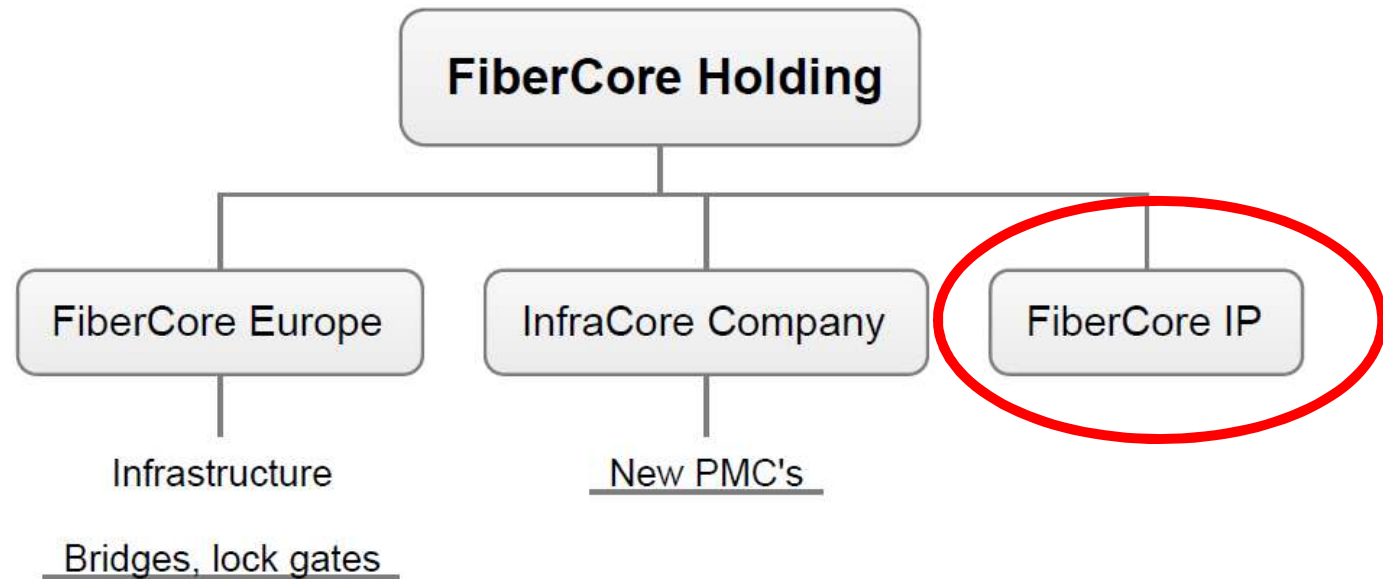
FiberCore[®] europe

> 900 structures with **InfraCore[®]inside**



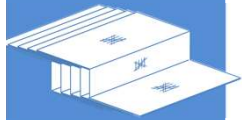


InfraCore[®]inside Company



PMC: Product Market Combinations

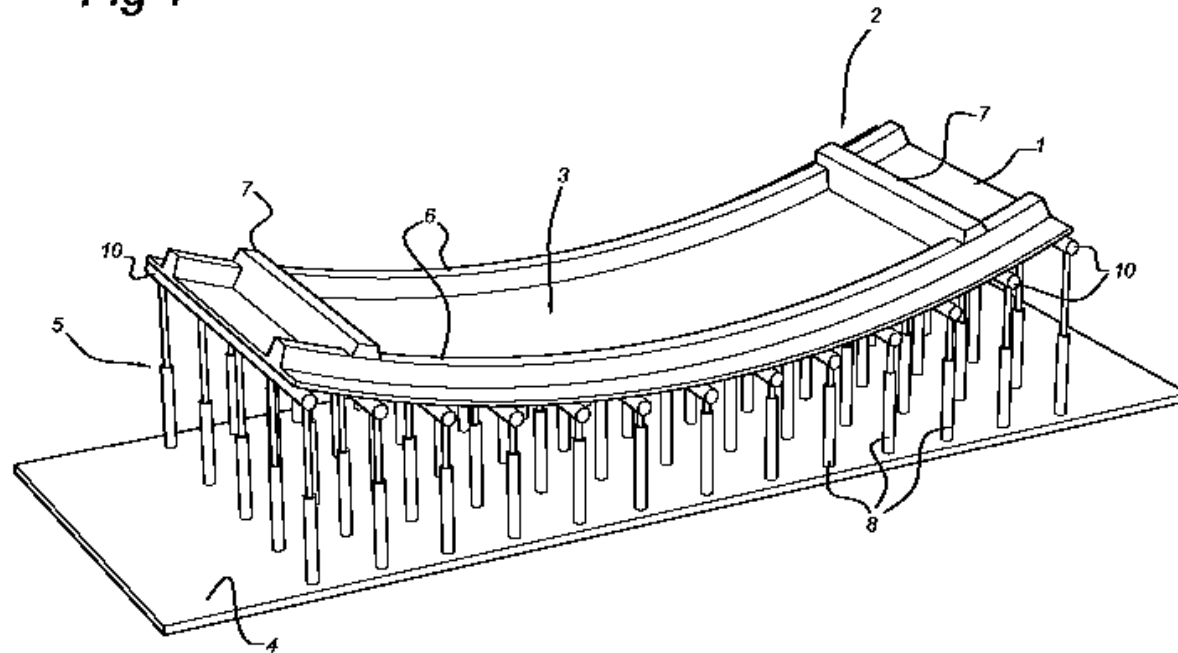
FiberCore IP: worldwide patents on brand, technology & production.



InfraCore[®]inside

Company: FiberCore IP

Fig 1

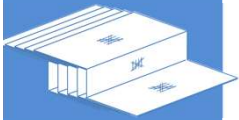


W/O 2010/14946

1/4

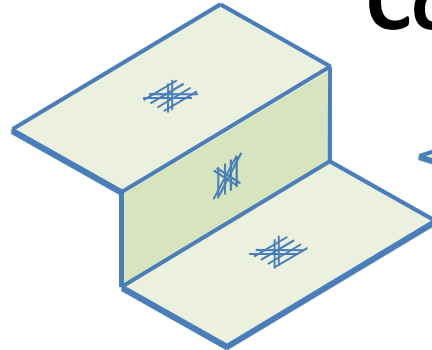
PC/NL2010M50344

**worldwide patent: Reconfigurable mould system,
incl. flexible mould edge system**

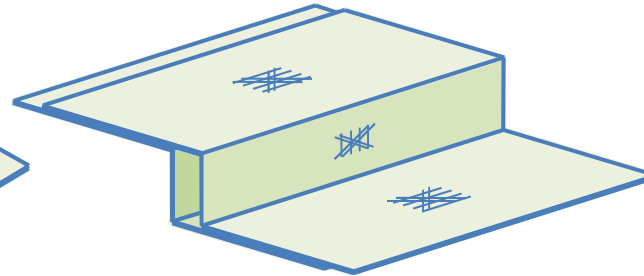


InfraCore[®]inside

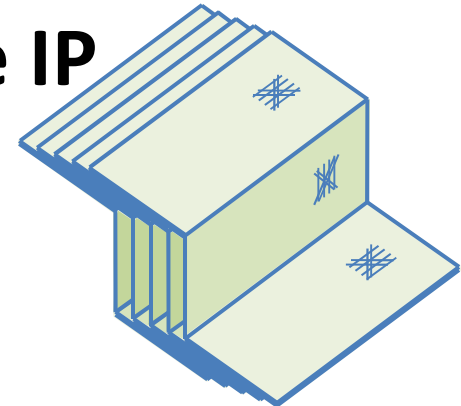
Company: FiberCore IP



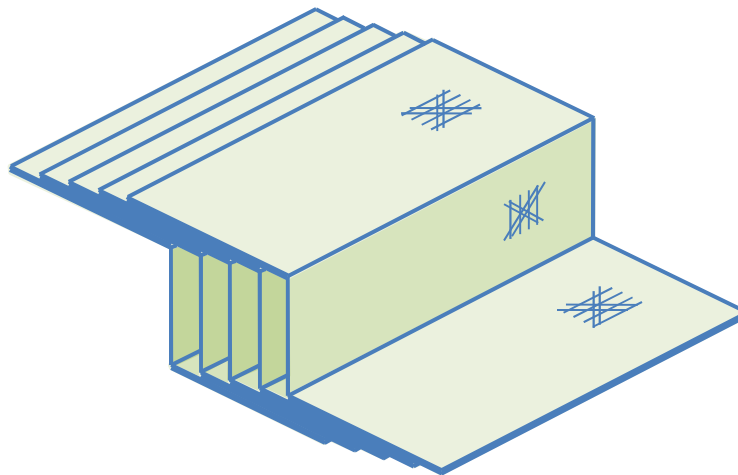
(Glass) Fibre Fabric beam box:
Flanges, connected by webs
Flanges 0°/ ±45° fabric, webs 90°/±45° fabric
Non-structural core



(Glass) Fibre Fabric multi-beam box
Beams are self-contained
Little shear transfer between beams
Impact damage = local delamination



(Glass) Fibre Fabric multi-beam box
Sandwich plate
Interlaminar cracking is inconsequential



**Multiple impact damage + fatigue
= local delamination, no damage growth**

Extreme robustness



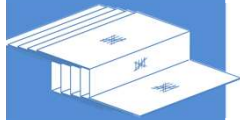
**worldwide patent: Structural FRP technology InfraCore[®]
Development of 'Oblique Layered Material'**

InfraCore Technology is proven

2015: Real scale test at WMC & TNO

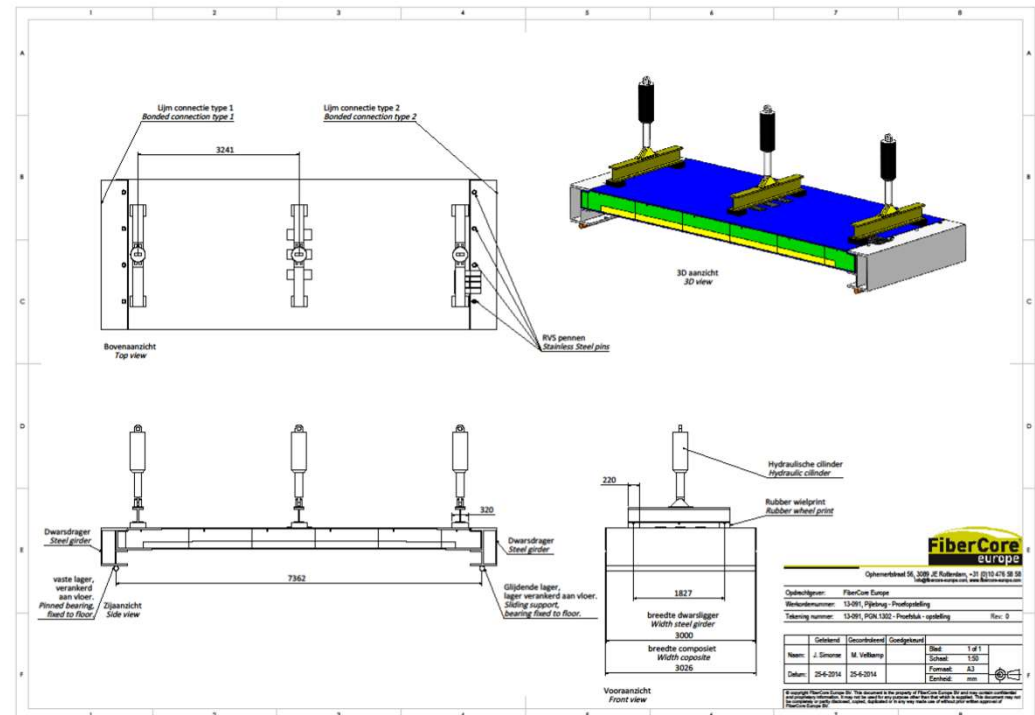
**Eurocode InfraCore traffic deck 3m x 7m
30 M cycles 60 tons after serious impact**

No fatigue, no structural damage propagation...



**Bridge installed
with 50 years of
Future Lifetime,
without repair**

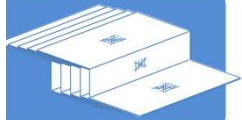
Witnessed by DNV-GL



Main problems in heavy duty FRP structures

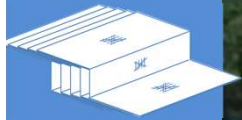
solved:

Delamination & interlaminar cracking!



> 900 heavy duty structures realized

- cost-effective
- damage tolerant: extreme robustness
- fatigue after impact
- delamination is inconsequential
- structural capacity under fire

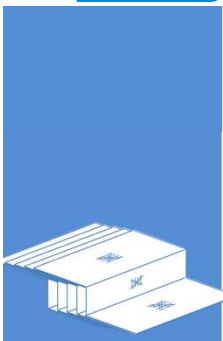


LIGHTer
International
Conference
GÖTTERBURG 25-27 NOV

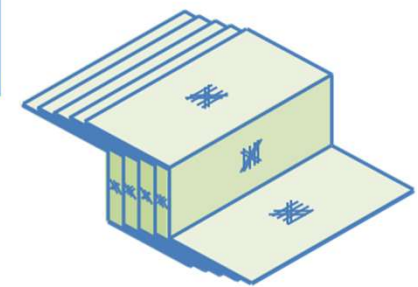
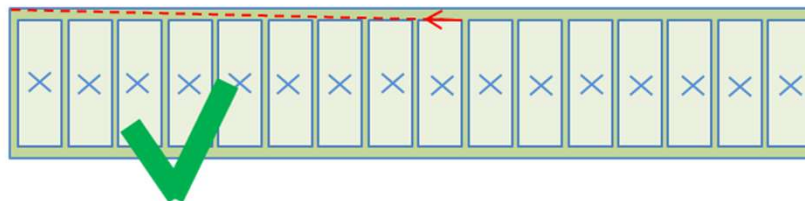
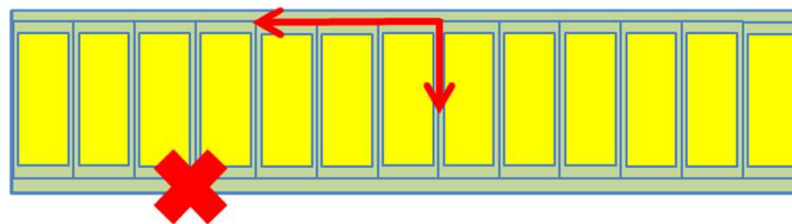
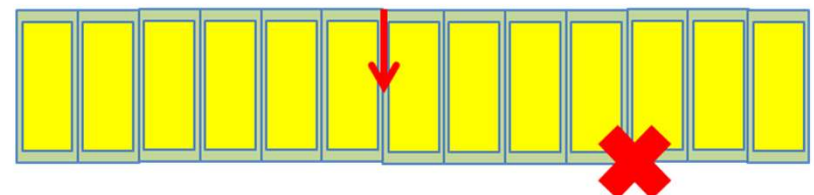
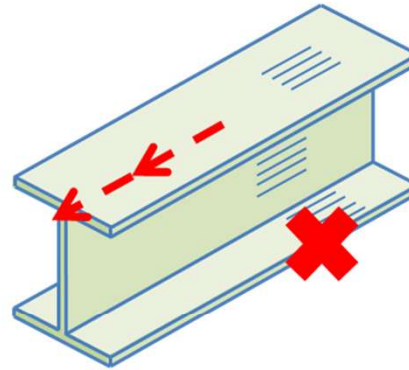
19



Structural
load capacity
under fire

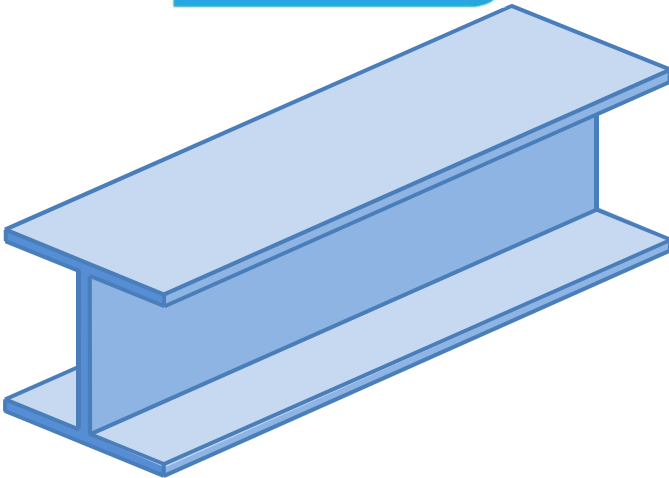
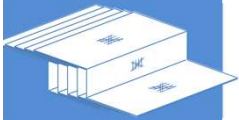


InfraCore[®]inside

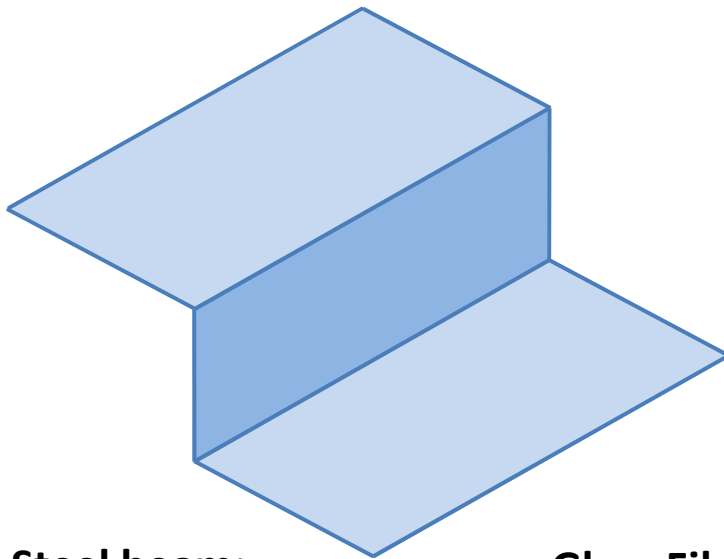


InfraCore[®]inside

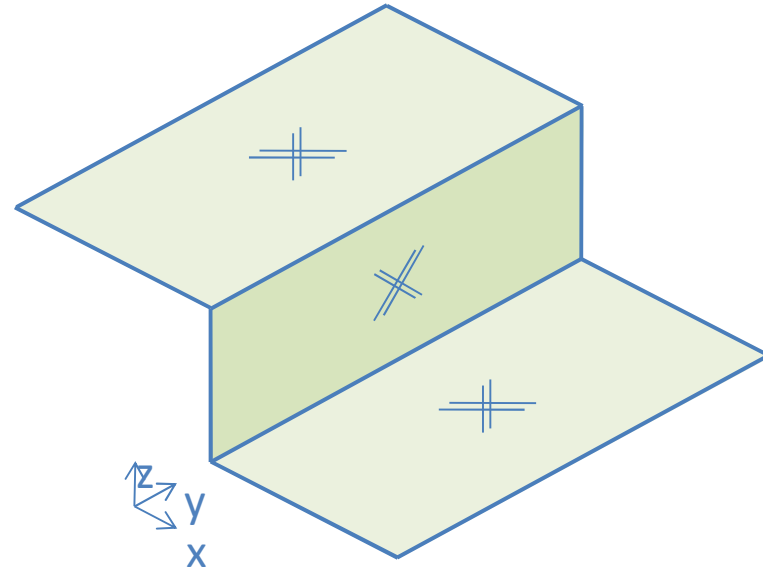
**Glass Fibre Fabric box beam:
Extreme robustness**



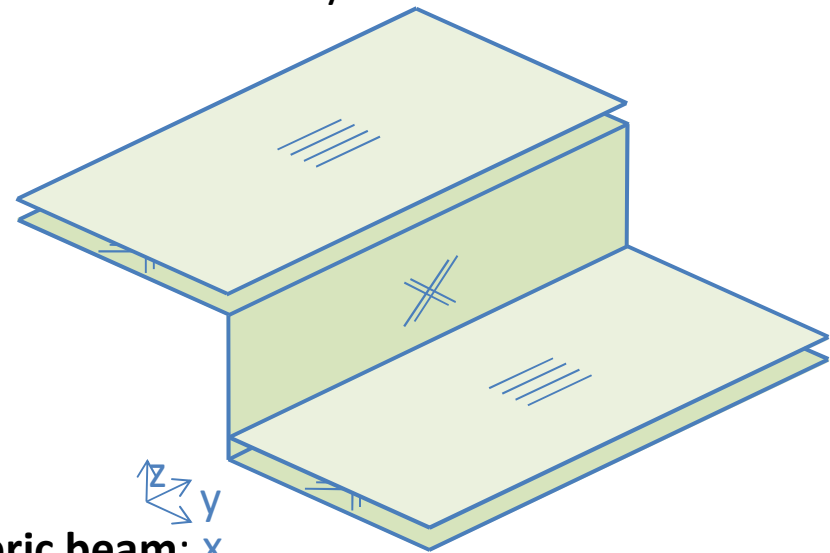
Steel beam:
Two flanges, connected by a web



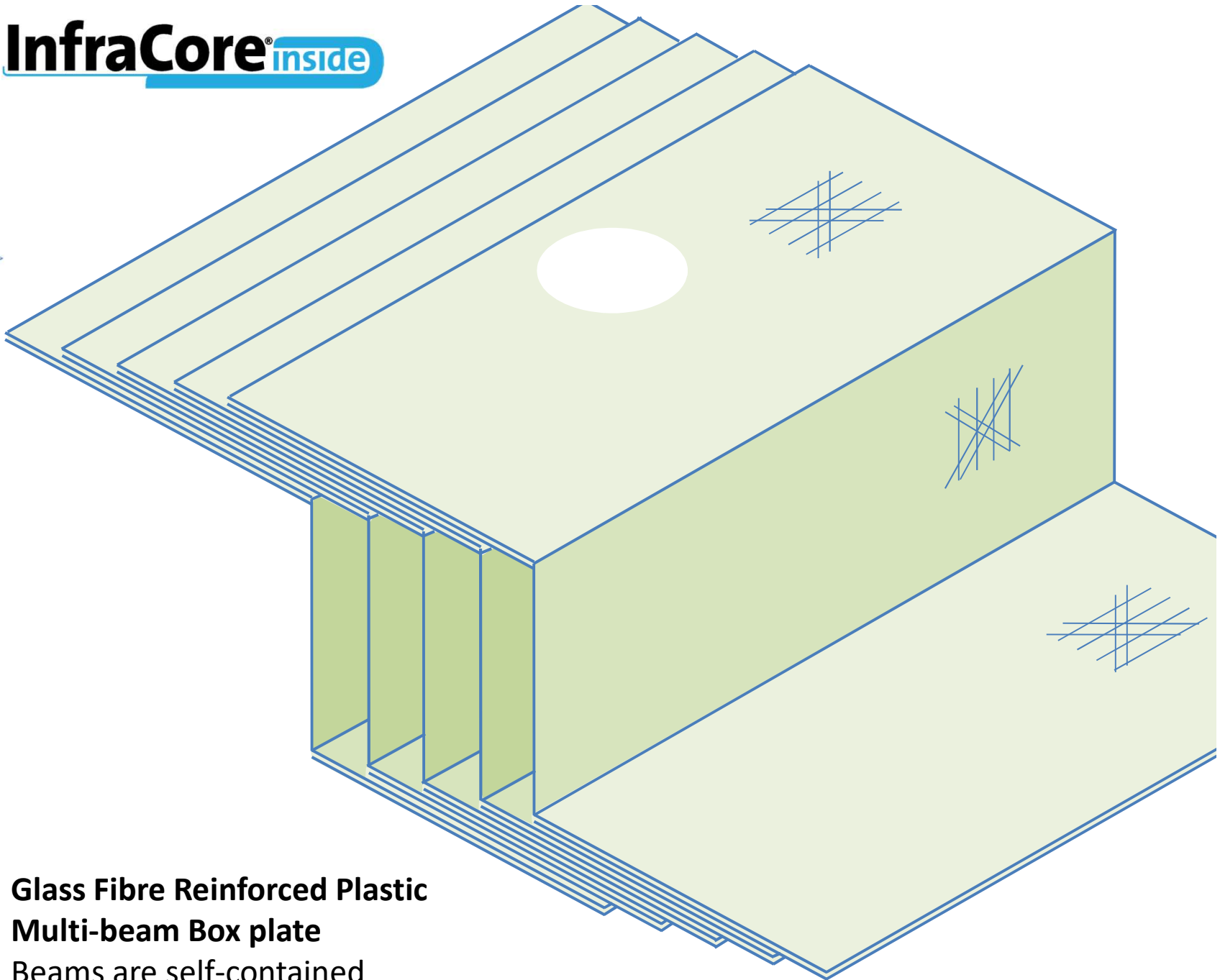
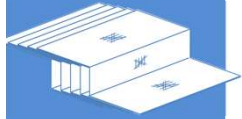
Steel beam:
Two flanges, connected by a web



Glass Fibre Fabric beam:
Two flanges, connected by a web
One layer of $\pm 45^\circ$ fabric



Glass Fibre Fabric beam:
Two flanges, connected by a web
One layer of $\pm 45^\circ$ fabric + one layer of 0° fabric on flanges

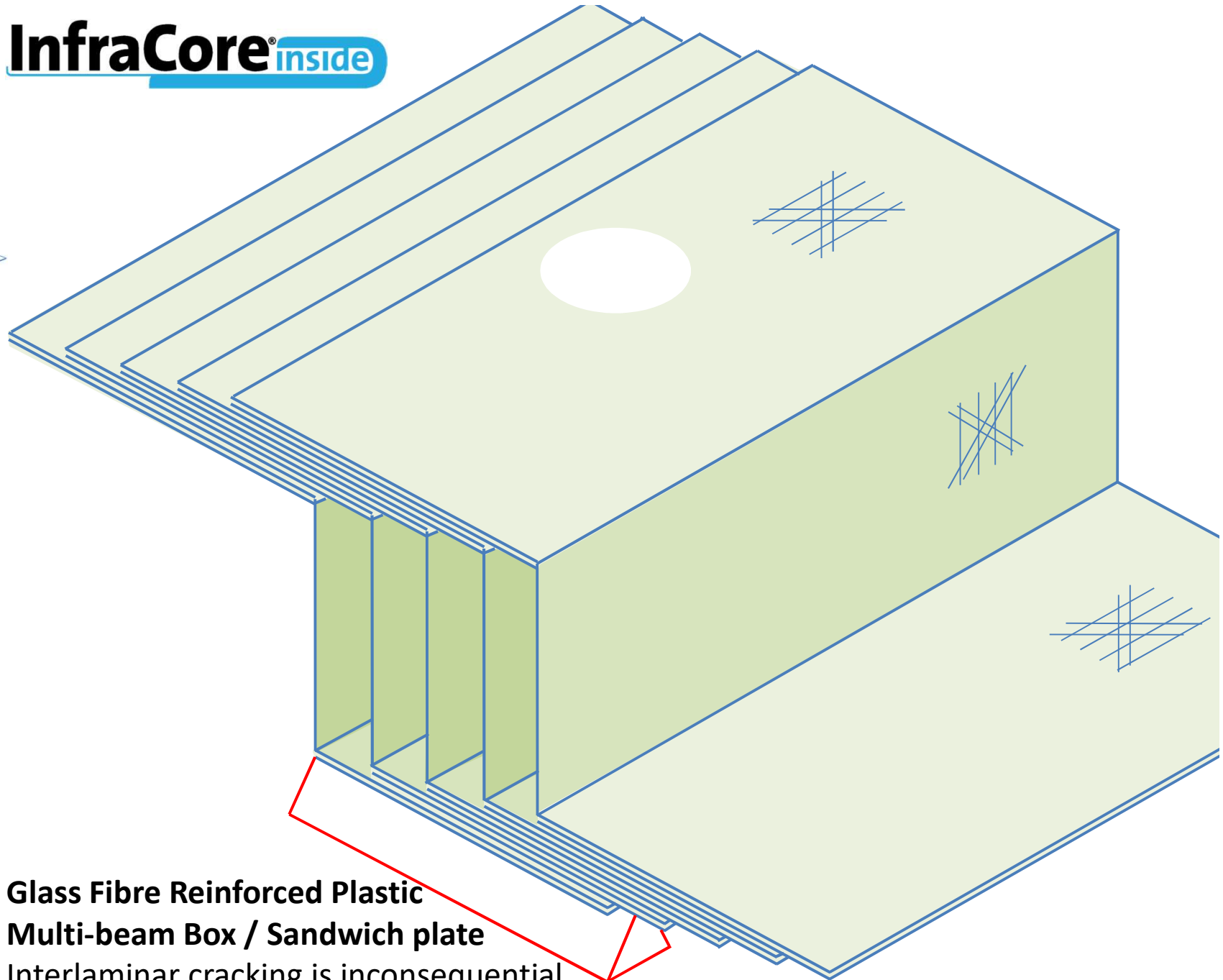
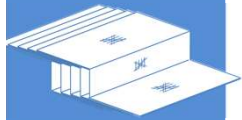


Glass Fibre Reinforced Plastic Multi-beam Box plate

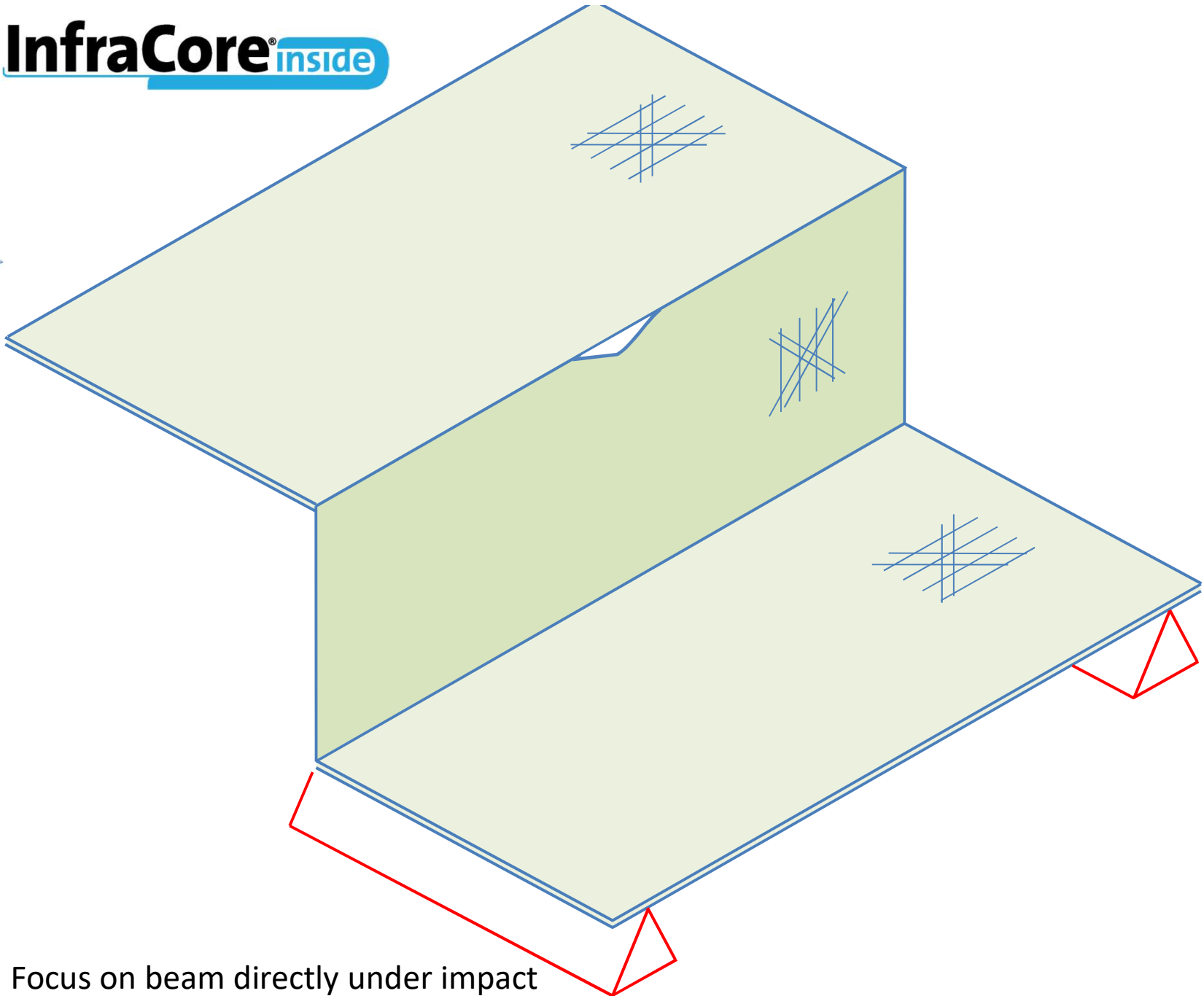
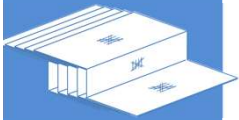
Beams are self-contained

Little shear transfer between beams

Impact damage may occur: local delamination

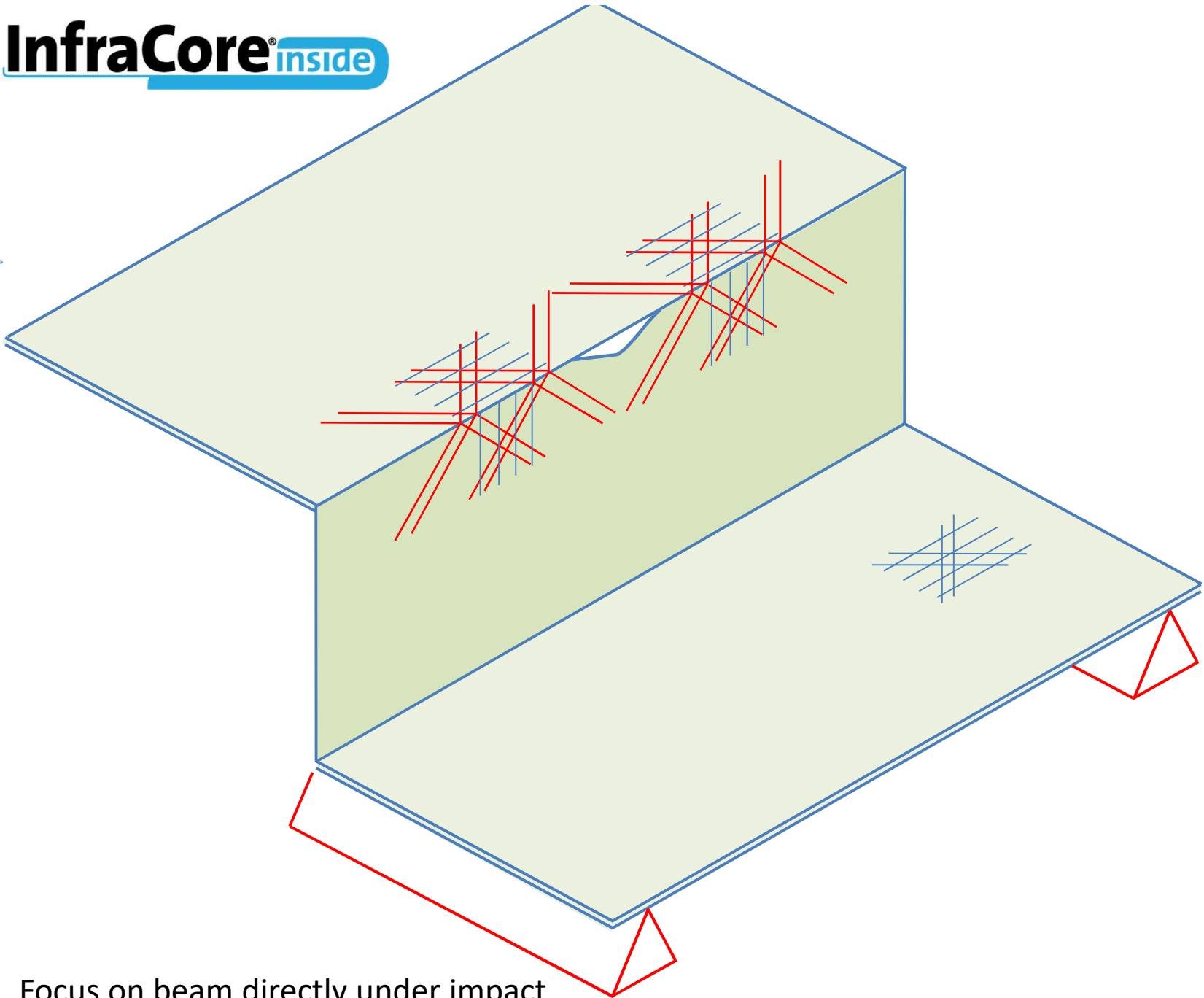
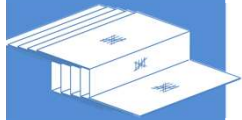


**Glass Fibre Reinforced Plastic
Multi-beam Box / Sandwich plate**
Interlaminar cracking is inconsequential
No skin-core debonding, no damage growth

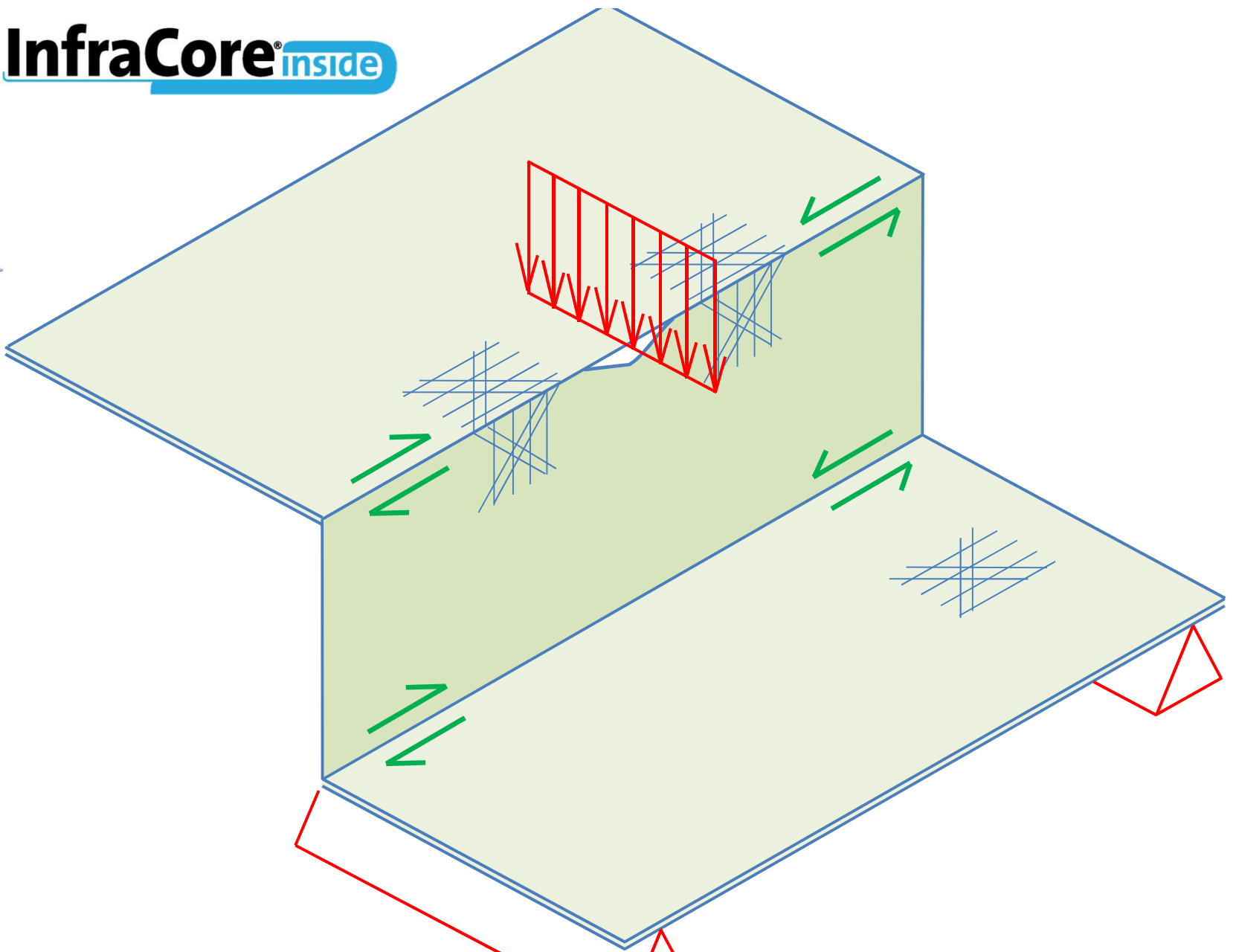
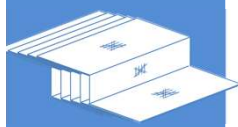


Focus on beam directly under impact

A crack in flange-web zone may occur

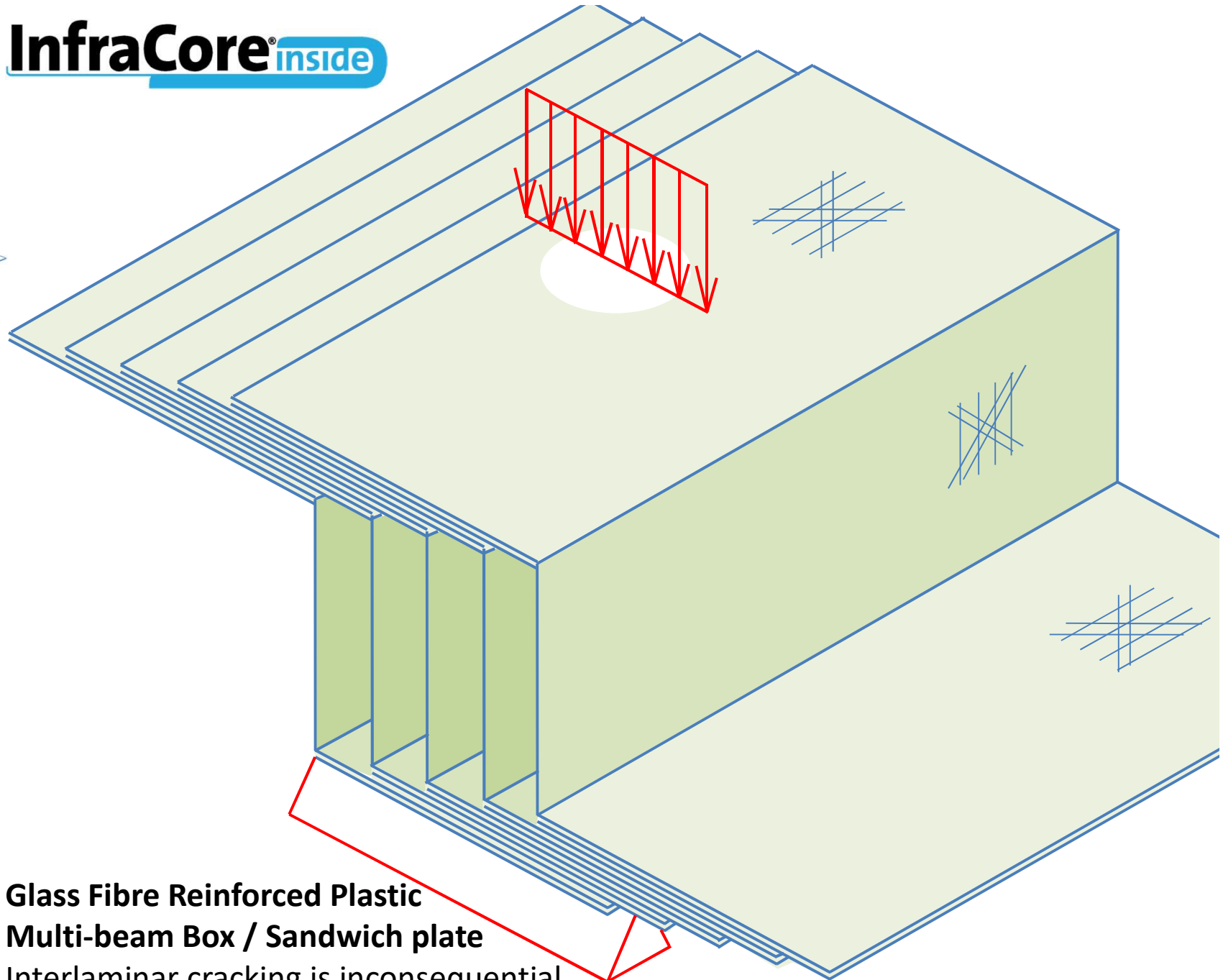
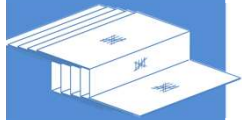


Focus on beam directly under impact
Crack will not grow, constricted by fibres



Focus on beam directly under impact
Beam can carry load despite crack

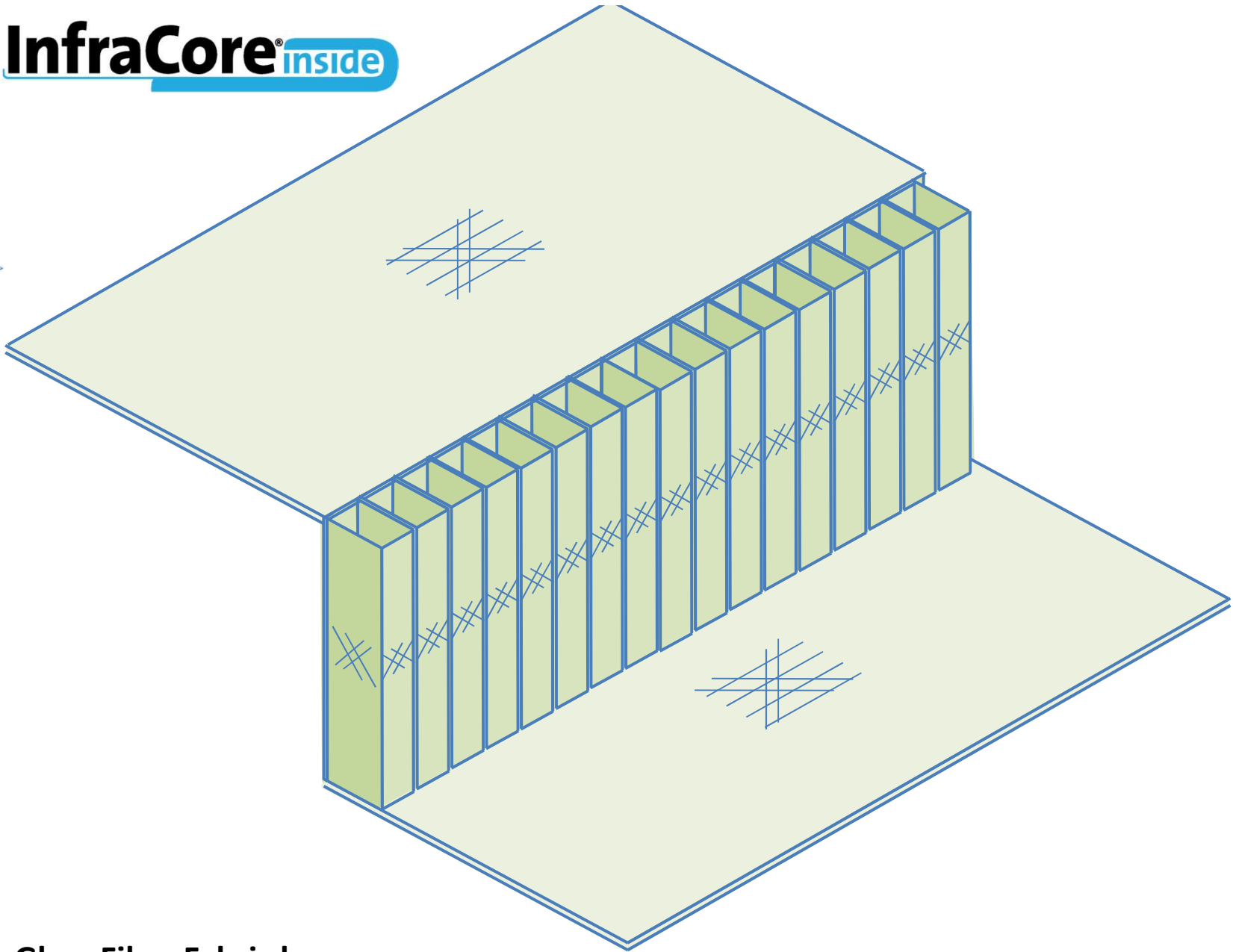
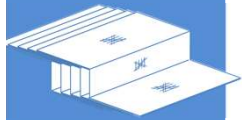
Much residual surface to carry shear loads
Stable situation



**Glass Fibre Reinforced Plastic
Multi-beam Box / Sandwich plate**

Interlaminar cracking is inconsequential

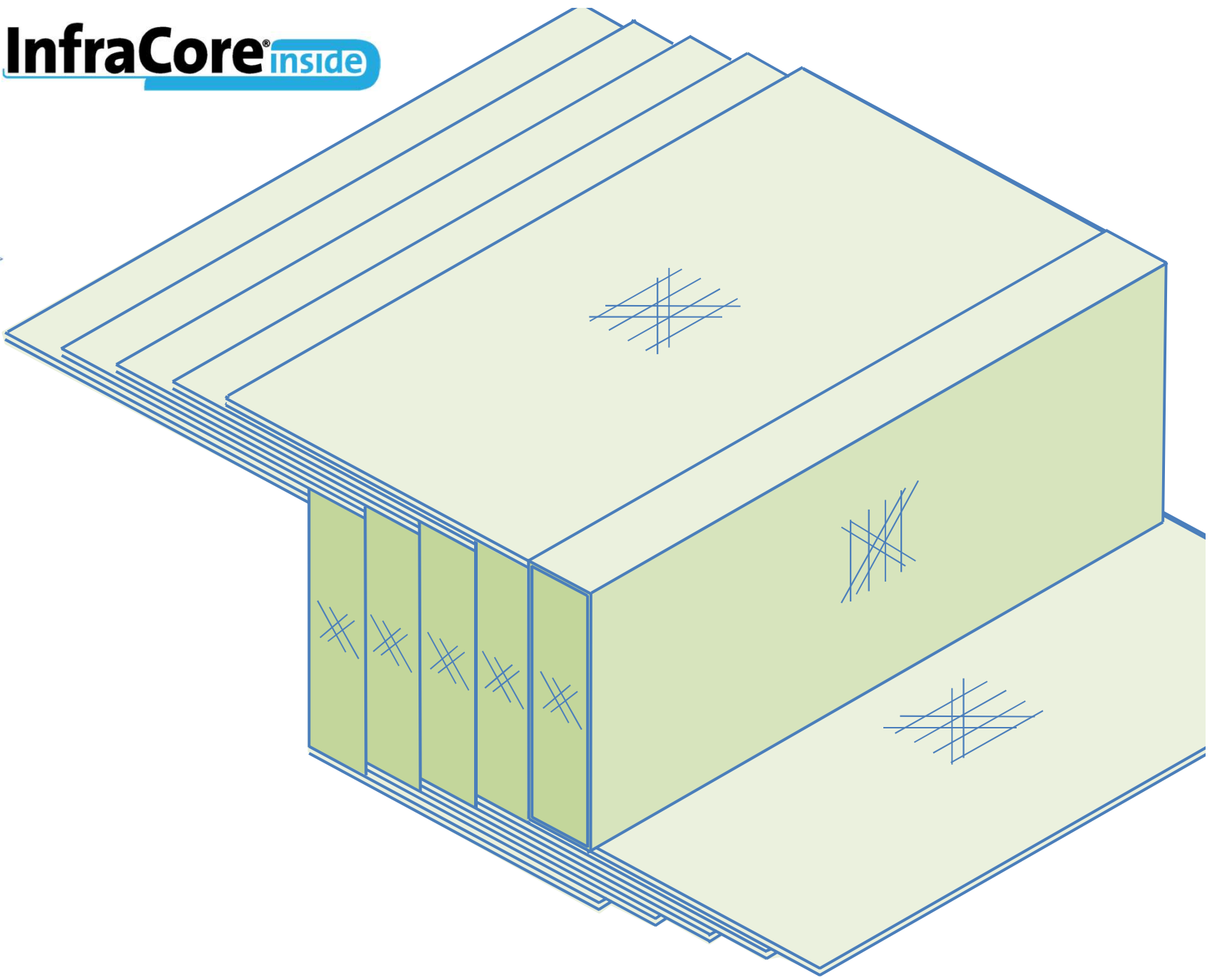
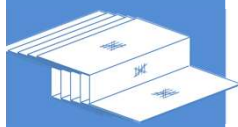
No skin-core debonding → **EXTREMELY ROBUST**



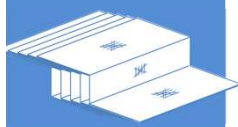
Glass Fibre Fabric beam:

Add shear webs perpendicular to main webs

Made of $\pm 45^\circ$ fabric in box configuration



InfraCore[®]inside



LIGHTer
International
Conference
19
GOTHENBURG 25-27 NOV

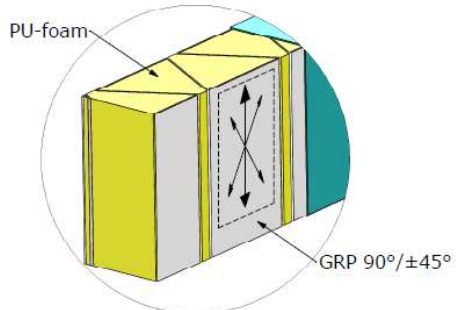
StrengthBond
Offshore



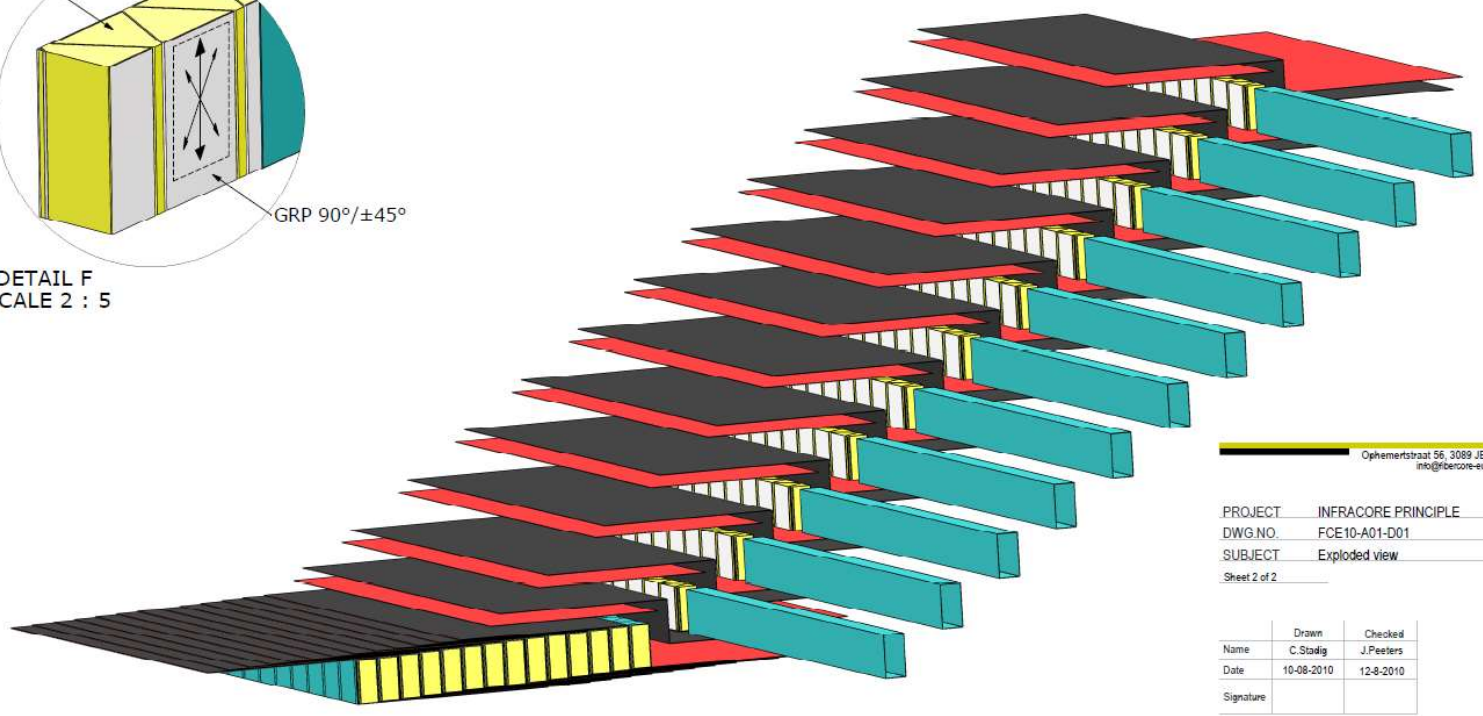
CompositesNL

E-LASS

FiberCore
europe



DETAIL F
SCALE 2 : 5

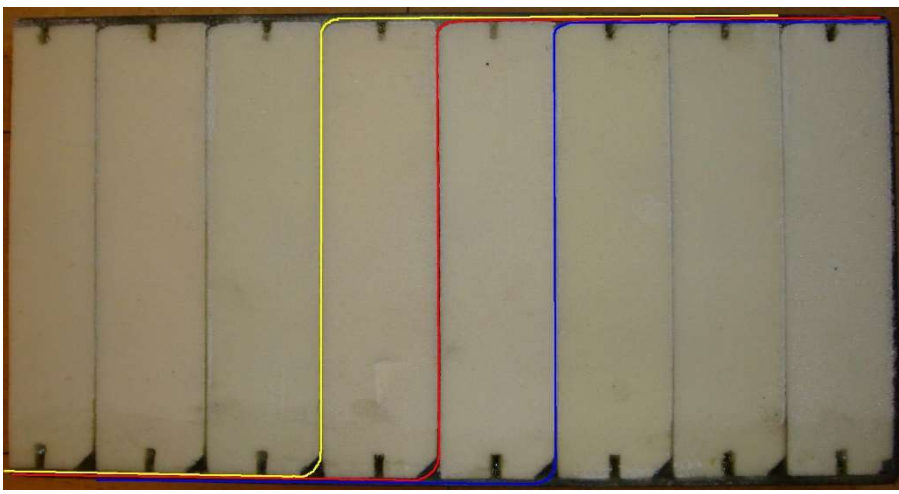


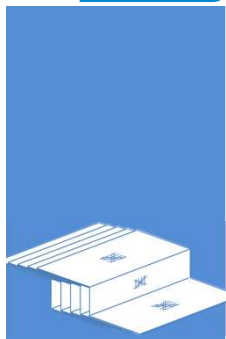
Ophemerstraat 56, 3089 JE Rott
info@fibercore-europe.com

PROJECT: INFRACORE PRINCIPLE
DWG.NO: FCE10-A01-D01
SUBJECT: Exploded view
Sheet 2 of 2

	Drawn	Checked
Name	C.Staig	J.Peeters
Date	10-08-2010	12-8-2010
Signature		

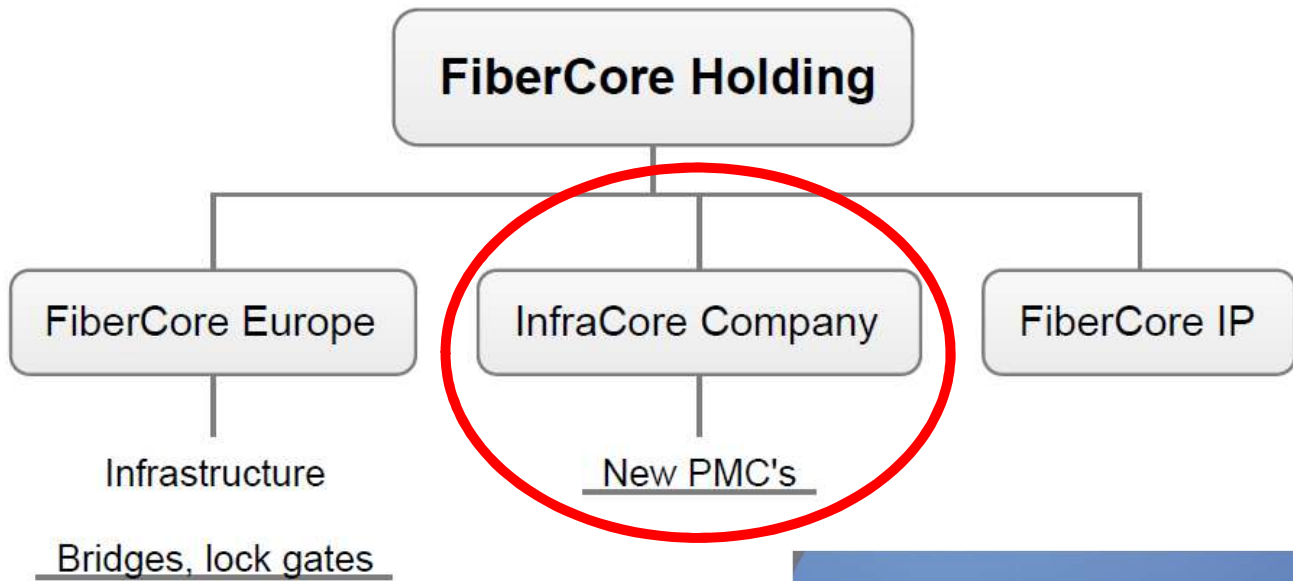
LS
US
LP





InfraCore[®]inside

Company



Headquarter
Fascinatio Boulevard 722
2909 VA Capelle aan den IJssel/NL





Mission

Develop & market new cross-sectoral product-market combinations together with key strategic partners, based on the proven track record of FiberCore Europe & on the worldwide patented InfraCore technology.

Strategy

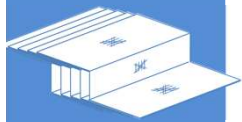
"do what you are best at & cooperate with similar kinds"

Create durable Partnerships/Alliances with credible, certified, independent & essential knowhow in complementary fields of expertise

Commercial Alliances & Licensing

Create & Benefit from complementary collaboration-cooperation

InfraCore^{company}



LIGHTer
International
Conference
GÖTHEBURG 20-21 NOV

19

StrengthBond
Offshore



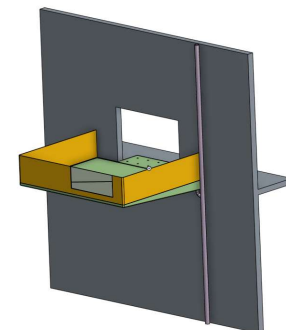
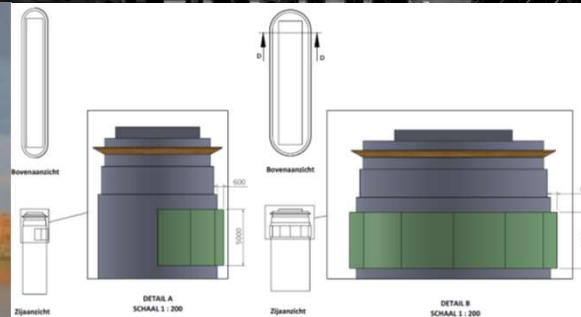
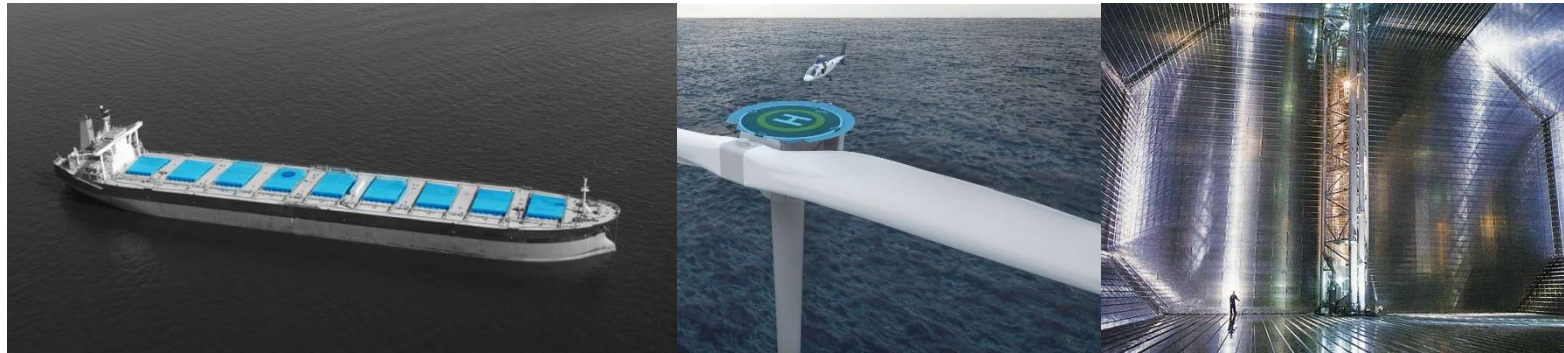
CompositesNL

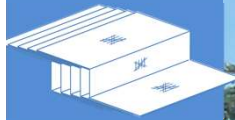
E-LASS

FiberCore
europe

InfraCore[®]inside

FRP solution for all markets





LIGHTer
International
Conference
GOTHENBURG 26-27 NOV

19

StrengthBond
Offshore



CompositesNL

E-LASS

FiberCore
europe



Oosterwolde

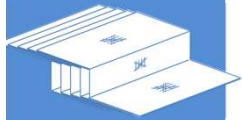
dimensions	: 12,5 x 12,5 m
span	: 12 m
traffic class	: class 600 kN / Eurocodes
year	: 2010

First FRP
traffic bridge
conform Eurocode NEN-
EN 1991-2+C1/NB

InfraCore^{company}

InfraCore[®]inside

FiberCore[®] europe



LIGHTer
International
Conference
19
GOTHENBURG 26-31 NOV

StrengthBond
Offshore



CompositesNL

E-LASS

FiberCore[®]
europe



ProRail

heijmans

HILLEBRAND

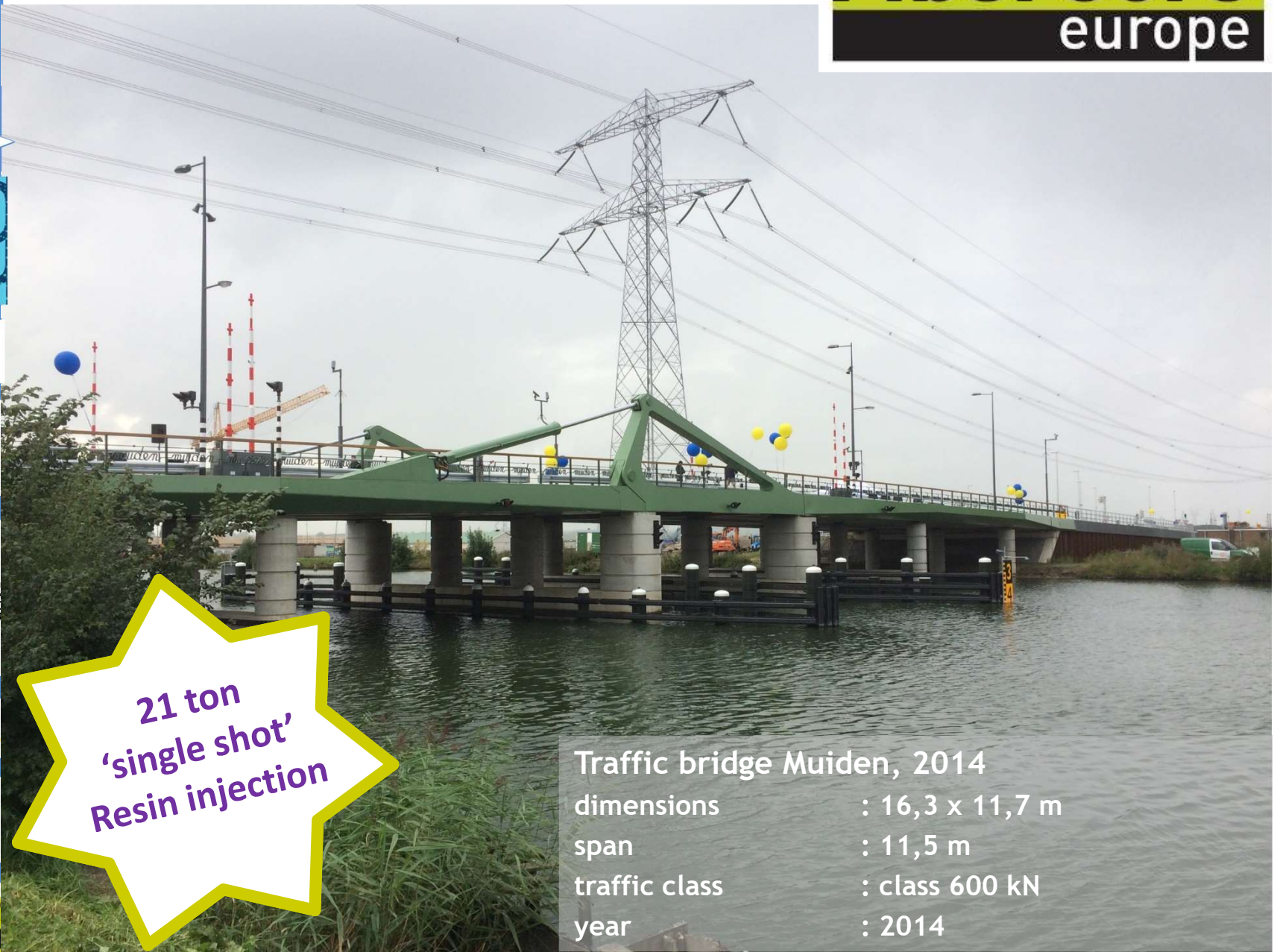
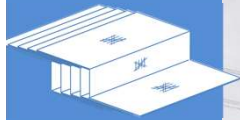
Movares
adviseurs & ingenieurs

FiberCore[®]
europe

Traffic bridge Utrecht, crossing highway A27

dimensions	: 142 x 6,2m
span	: 6,2 m
traffic class	: class 600 kN, Eurocode
year	: 2011-2012





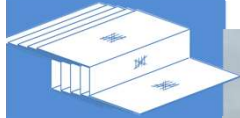
21 ton
'single shot'
Resin injection

Traffic bridge Muiden, 2014
dimensions : 16,3 x 11,7 m
span : 11,5 m
traffic class : class 600 kN
year : 2014

InfraCore company

InfraCore[®]inside

FiberCore[®] europe



LIGHTer
International
Conference
GOTHENBURG 25-27 NOV

19

StrengthBond
Offshore



CompositesNL

E-LASS

FiberCore
europe



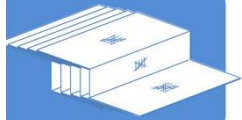
Traffic bridge Utrecht

traffic class : class 600 kN
year : 2015

InfraCore company

InfraCore[®]inside

FiberCore[®] europe



LIGHTer
International
Conference

19

StrengthBond
Offshore



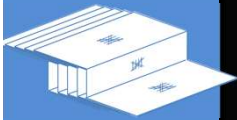
CompositesNL

E-LASS

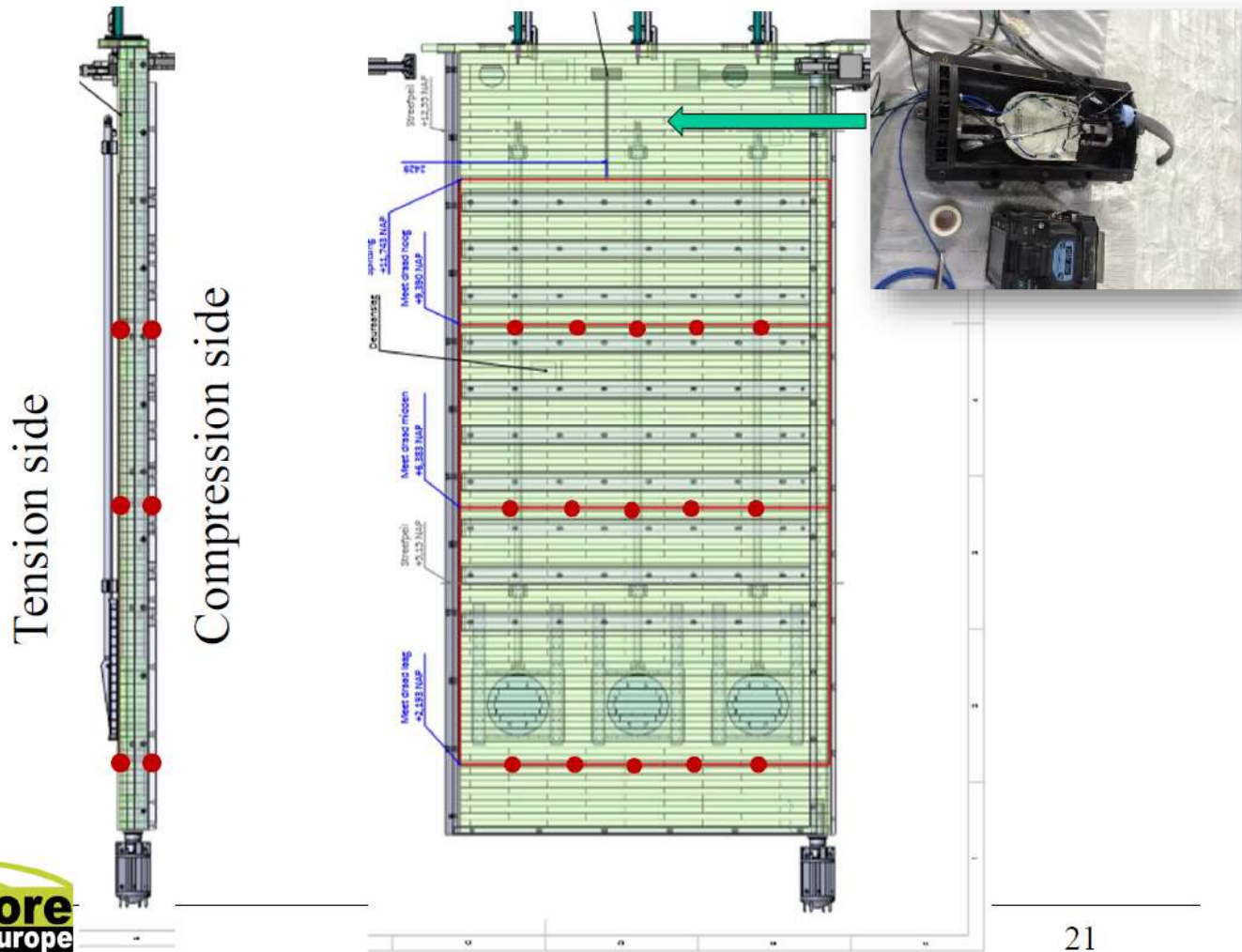
FiberCore
europe



World's
Largest FRP
lock gates



Embedding of sensor lines

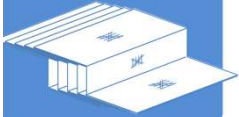


InfraCore^{company}

InfraCore^{inside}

'Harbour bridges'

FiberCore[®] europe



LIGHTer
International
Conference
GÖTTERBURG 20-21 NOV 19

StrengthBond
Offshore

RAMSSES

MANAGEMENTSYSTEEM CERTIFICATE
DNV·GL
ISO 9001

CompositesNL

E-LASS

FiberCore[®]
europe



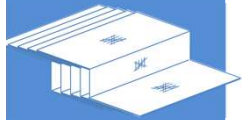
Span = 36 m

InfraCore^{inside}

InfraCore^{company}

InfraCore[®]inside

Industrial component



LIGHTer
International
Conference

19

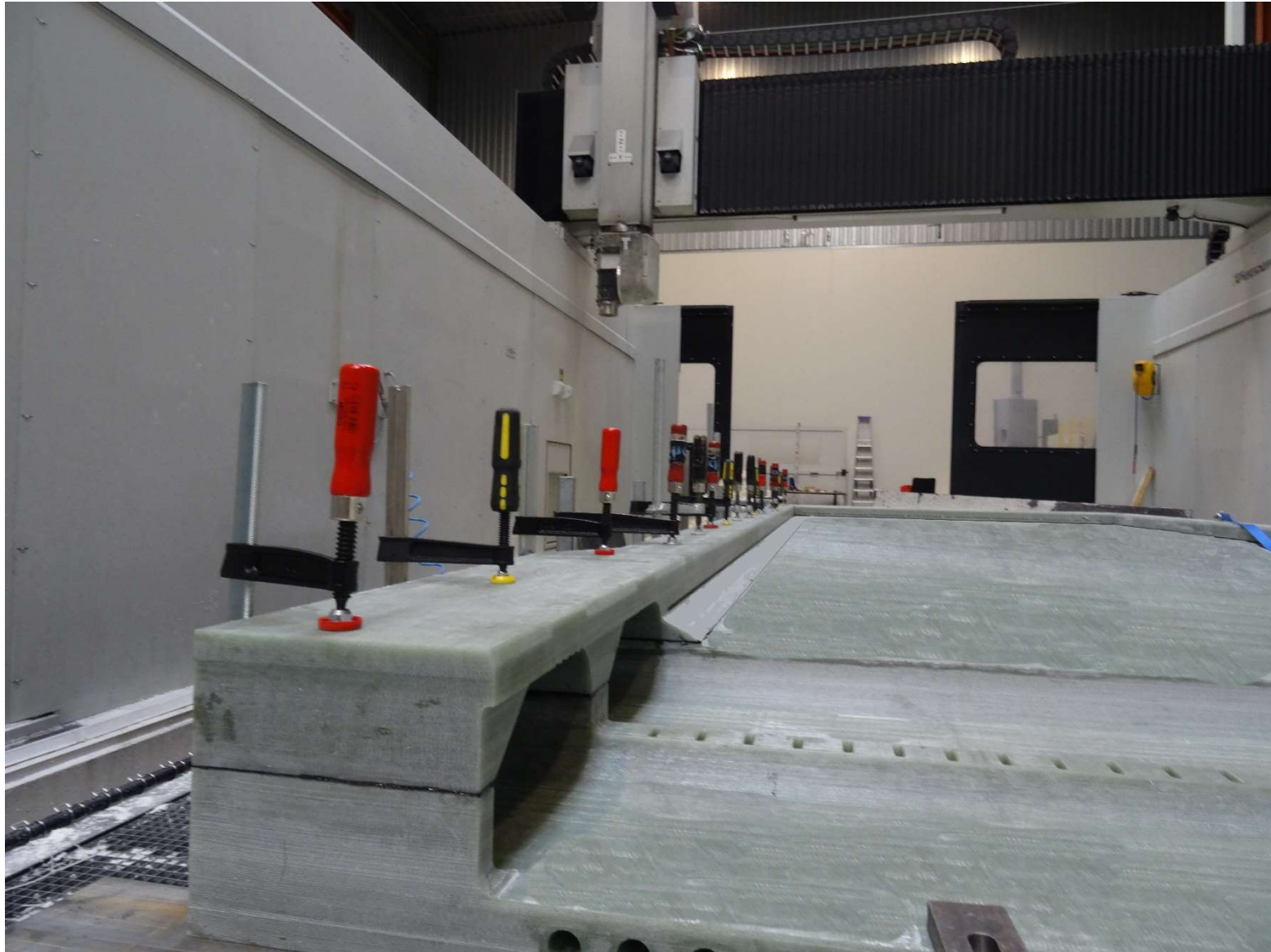
StrengthBond
Offshore



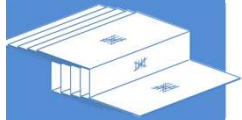
CompositesNL

E-LASS

FiberCore
europe



Helideck Yacht Spielberg



LIGHTer
International
Conference

19

StrengthBond
Offshore



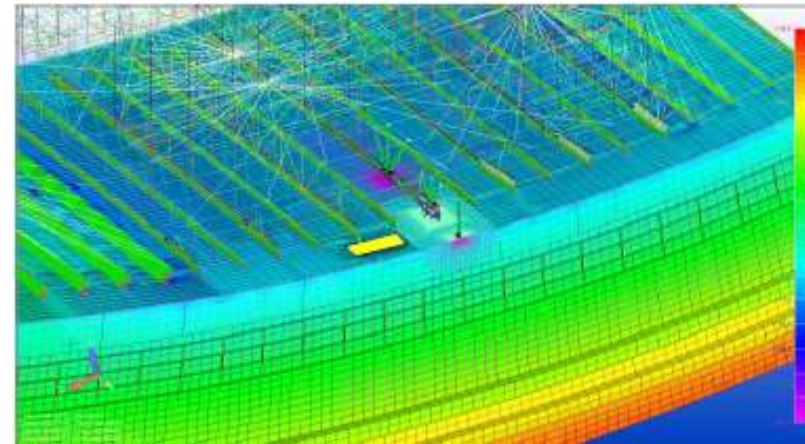
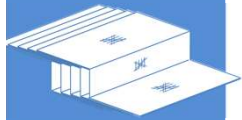
CompositesNL

E-LASS

FiberCore
europe



ICC project task



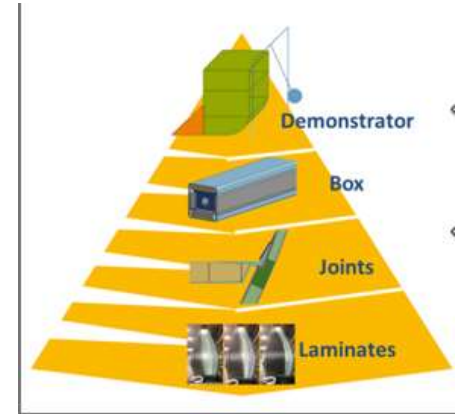
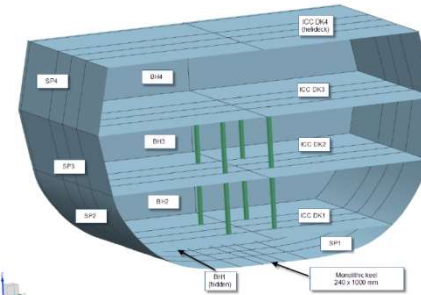
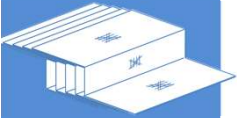
- supplying advice & consultancy on the design, processes and materials relative to the state-of-the-art for offshore repairs

- providing the FRP related materials and test specimens for the different tasks.

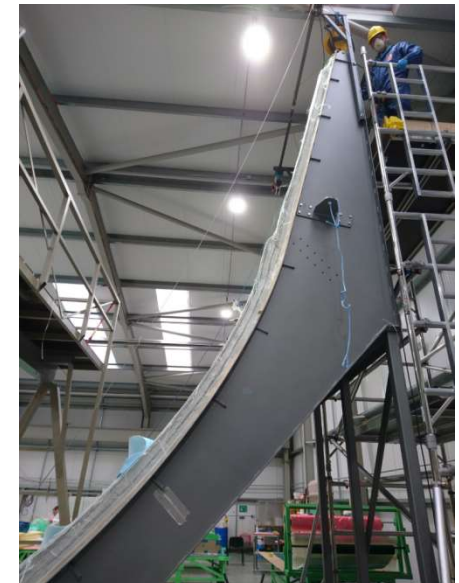
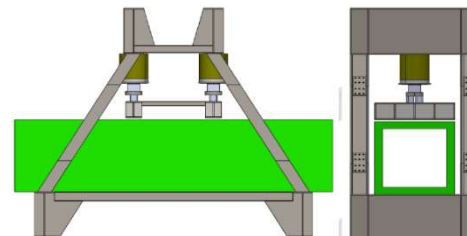
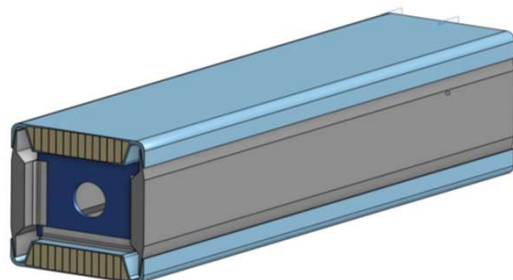
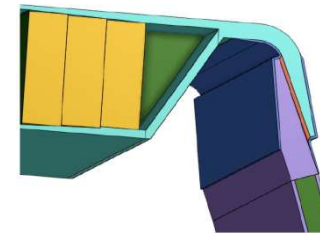
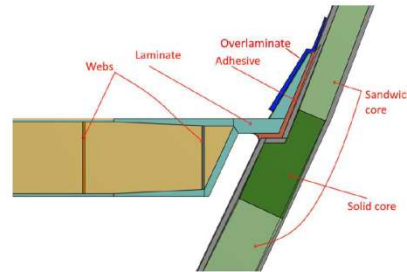
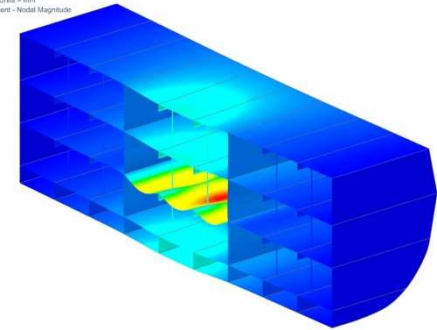




ICC project task

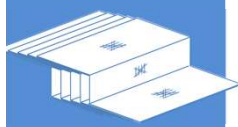


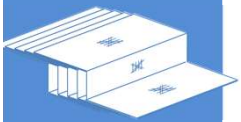
300 x 500 mm
600 - Notch Magnitude



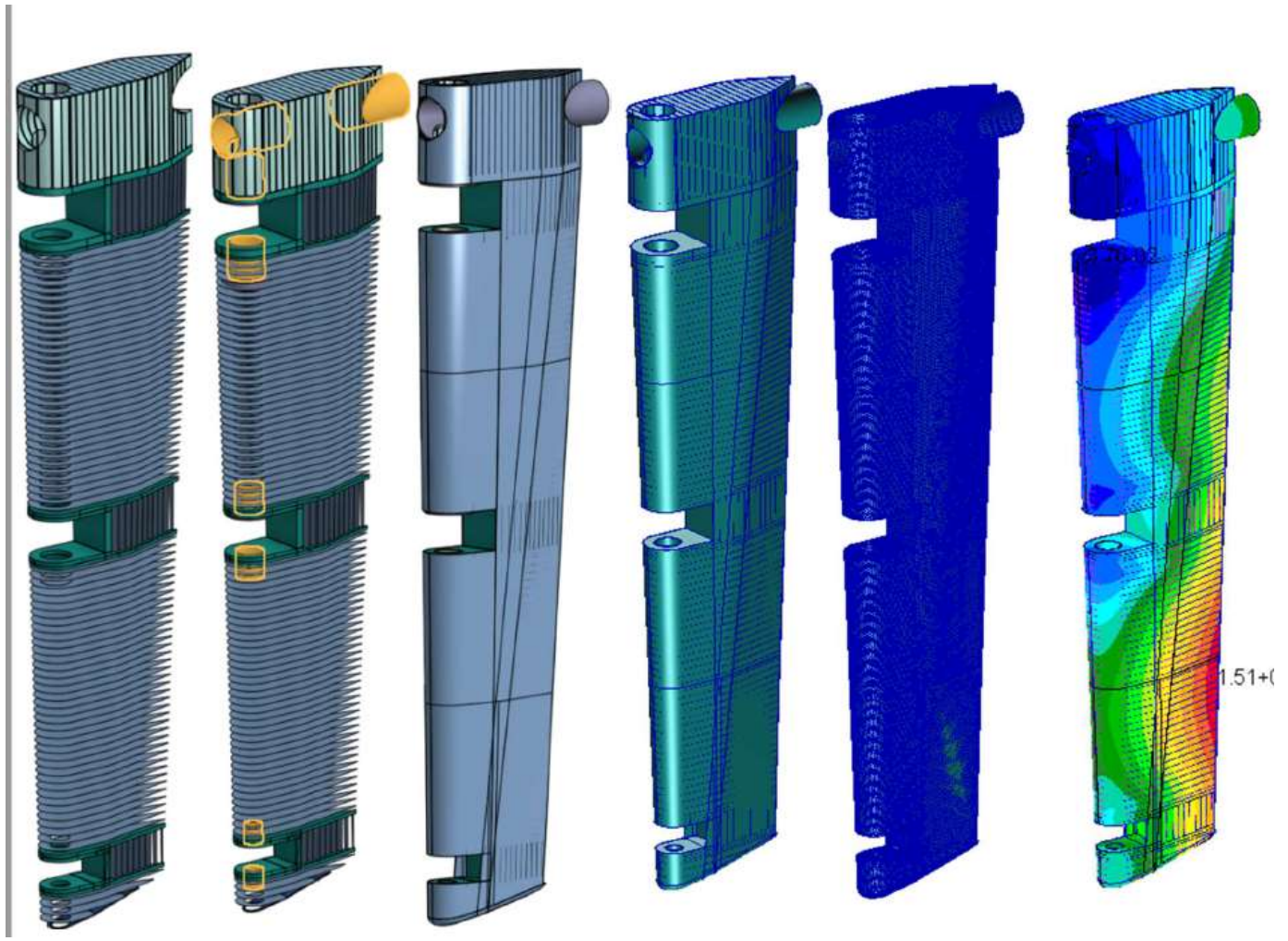


ICC project task

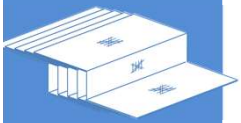




ICC project task



InfraCore company



LIGHTer International Conference 19
GOTHENBURG 20-21 NOV

StrengthBond Offshore



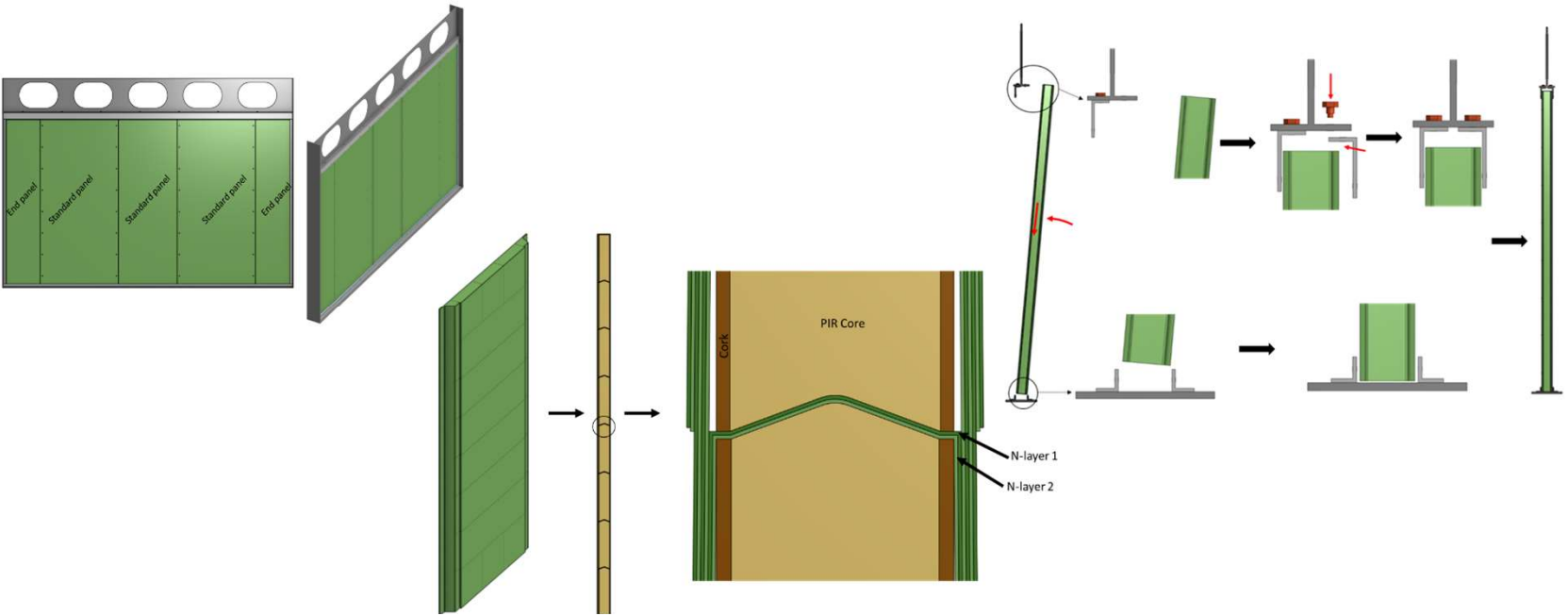
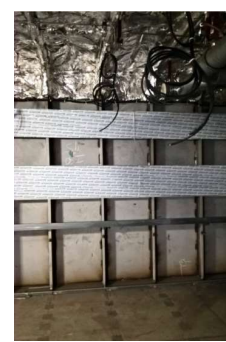
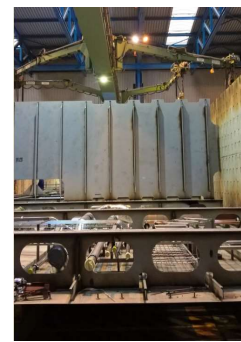
Composites NL

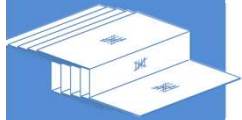
E-LASS

FiberCore europe



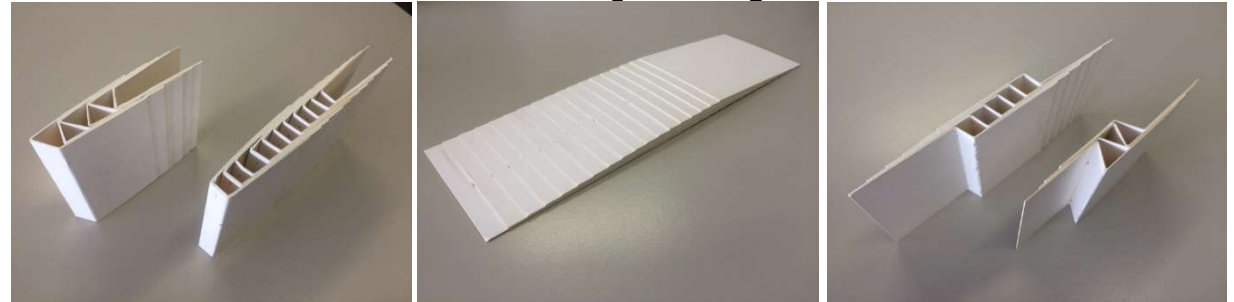
ICC project task





InfraCore Company

Contact



- Postal address: Oostdijk 25, 3077 CP Rotterdam/NL
- Office address: Fascinatio Boulevard 722
2909 VA Capelle aan den IJssel/NL
- Email: info@infracore-company.com
- Internet: www.infracore-company.com
- Phone: [0031-624628868](tel:0031-624628868)