COMPOSITES IN BC&I AND FUTURE SMART CITIES

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Regional Sales SA&P

Exel Composites

Introduction

Exel Composites is a world-leading composite profile manufacturer with over 60 years history of growth and innovation

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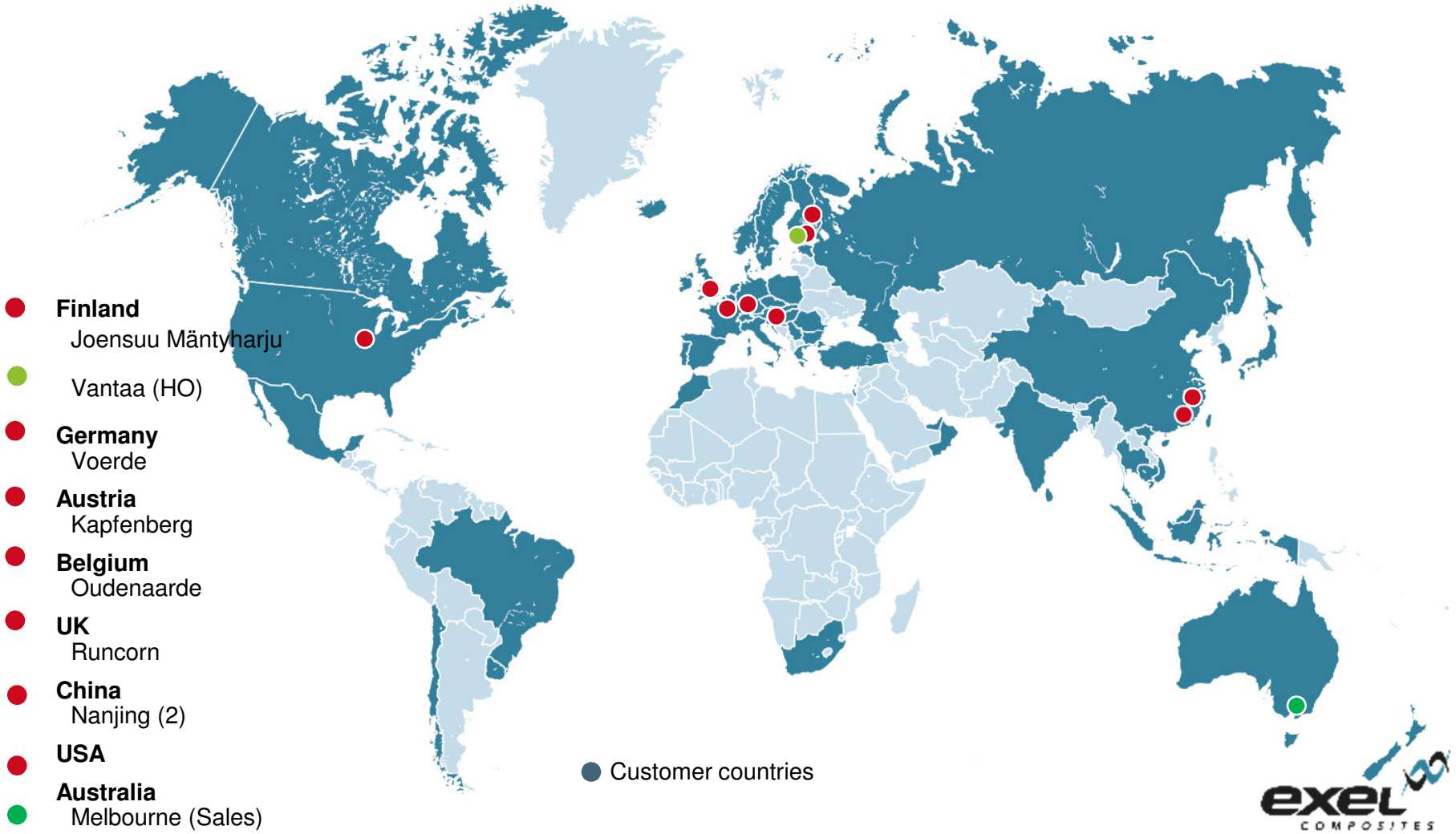
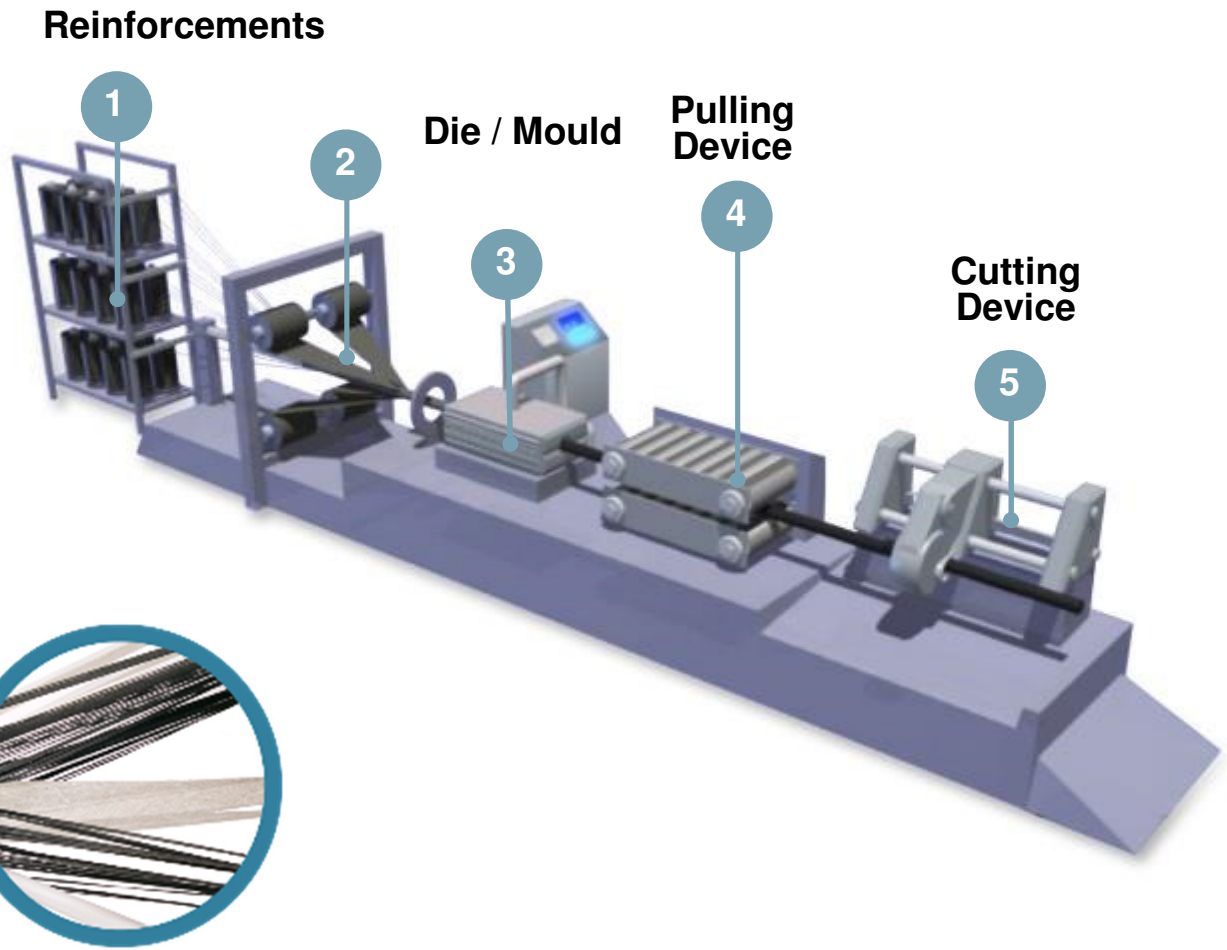
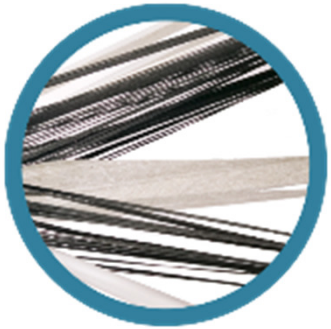
Manufacturing units in 7 countries, customers in more than 50 countries



Pultrusion & Pullwinding
Custom linear profiles





Agenda

- Telecommunication & evolution of 5G
- How this will influence composites in building & construction of future smart cities
- Existing cases of Composite applications in Architecture & Construction

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What are the main challenges future cities are faced with?

Key challenges for Smart Cities

- Smart cities need digital service infrastructure to improve & manage safety, energy efficiency, air quality, affectivity of transportation networks and quality of living.
- However, the capacity of mobile networks will be far too insufficient due to the increased number of users and new digital services built and planned.
- The problem can only be solved by using small cell 5G radio frequency technology & higher frequencies.
- The 5G signal does not travel as far as 4G this requires dense networks of antennas.

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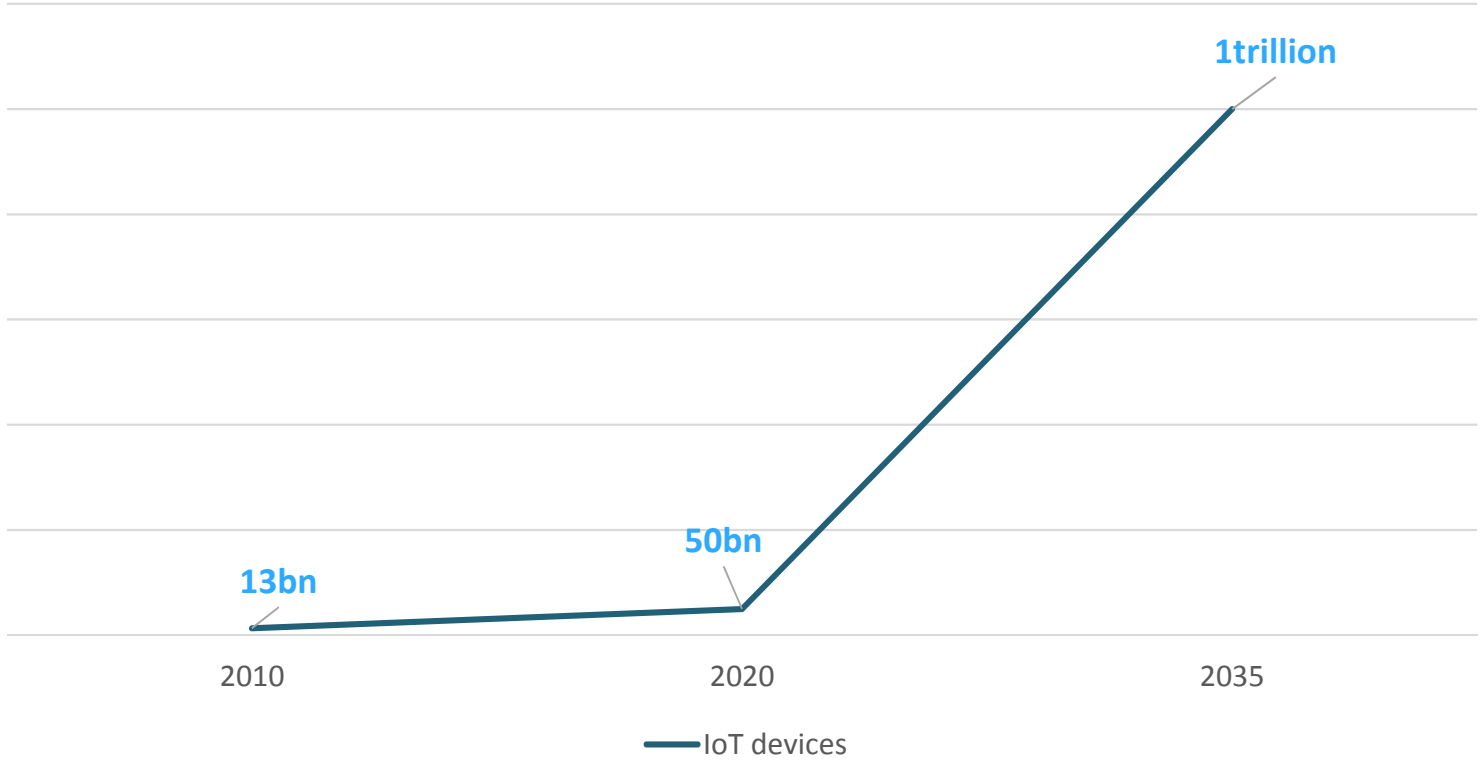
IoT (Internet of Things) devices in the world*



*referring to Sofbank Corp. and Cisco

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5G in brief

- 5G will change the whole telecom market and infrastructure (millimeter wave; 3,5Ghz-78Ghz)
- Data transmission one hundred times faster than current 4G/LTE (up to 10 GB/s)
- Latency less than 1ms (faster than human reactions)

Most dense networks require up to150 antennas/km²

Thousands of antennas and sensors will be integrated to the infrastructure

Probability for 5G? 100%

The challenge of 5G

Every pole mounted cellular antenna uses an RF transparent electromagnetic window (Radome) to protect the antenna from the environment.

Exel is a leading supplier of 4G Radomes globally

For 5G and the migration to much higher cellular frequencies and extreme broadband signals, the materials used at current frequencies cannot provide adequate low loss and broad bandwidth performance.

Materials matter more than ever

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Opportunities for composites

- For better radio signal permeability through walls and windows (inside and outside) building materials will need to have low di-electricity and loss tangent.
- For better signal flow outdoors the infrastructure needs to be ”transparent” as possible.
- 5G roll out coming to big cities 2020 onwards.

Most dense networks require up to150 antennas/km²

Thousands of antennas and sensors will be integrated to the infrastructure, walls, window frames, bus shelters etc…

Exel is developing new materials with greater transparency to the 5G signal

Luxturrim5G – Telcom lighting pole. Other examples could be building facades, street furniture, discreet alternatives.

Existing Composite applications Architecture & Construction

1. Hogeschool Gent Building Belgium

SADAR+VUGA

STRABAG

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Hogeschool Gent SOAG Building Belgium

Main feature is the appearance (mat structure that the architect wanted) the look of the surface like the inside of a canoe!

Composite solution provided a cheap building solution to produce the curves.
Produced in straight sections designed to bend the required distance. Assembly onto the (predefined) steel structure behind, flexed to suit during installation.

Advantages: cheaper steel structure behind, fluid natural shape due to flex of the material (note that the forces stay applied after installation!) and desired surface finish.

Main threads of the case: ensure that load needed to flex the profiles is low enough (installation with 2 people) and that the profile can withstand 3 (drunk) people who climb on it

STRABAG
SADAR+VUGA
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Application: Roof Structure:

- Architect: S-Squared
- Location: Byron Bay, Australia
- Products: Pultruded composite tubes in three different diameters
- Material supplier: Exel Composites

2. Byron Bay Resort: Roof Purlins to replicate sand dunes

BENEFITS WITH PULTRUDED COMPOSITE TUBES:

- Lightweight structure
- Reduced construction time
- 3 dimensional shaped on site
- Bending Radius down to 6 meters
- Coastal environment - Corrosion Resistance

Byron Bay Resort Roof Purlins

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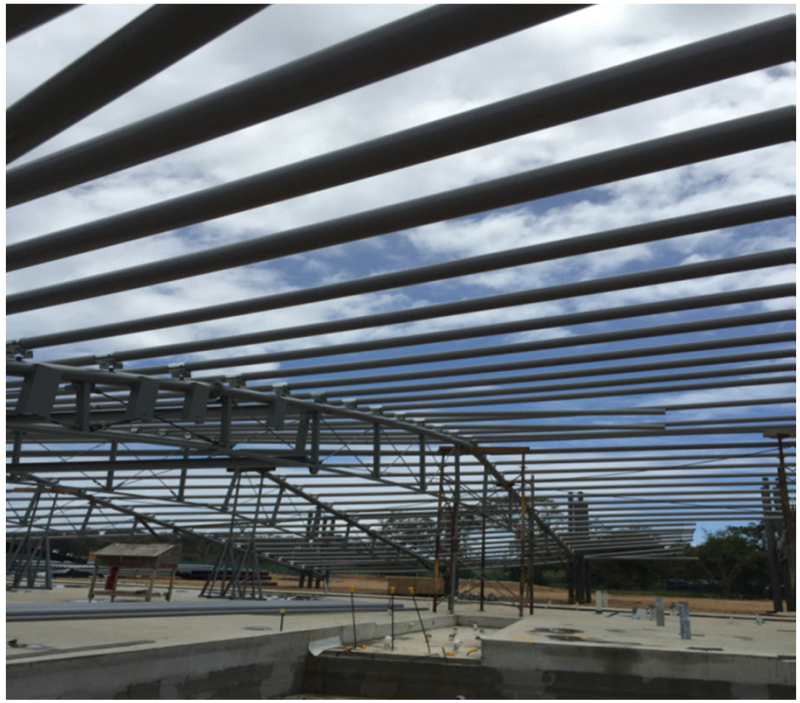
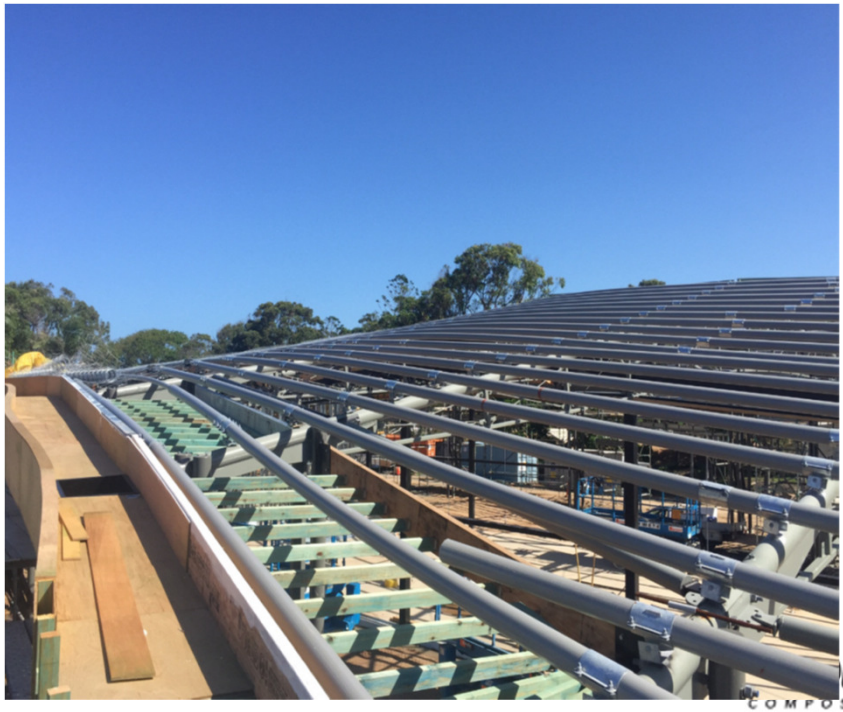
Byron Bay Resort Roof Purlins





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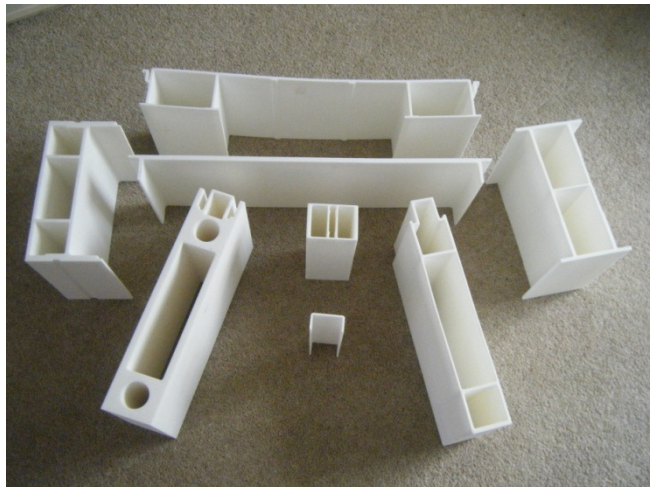
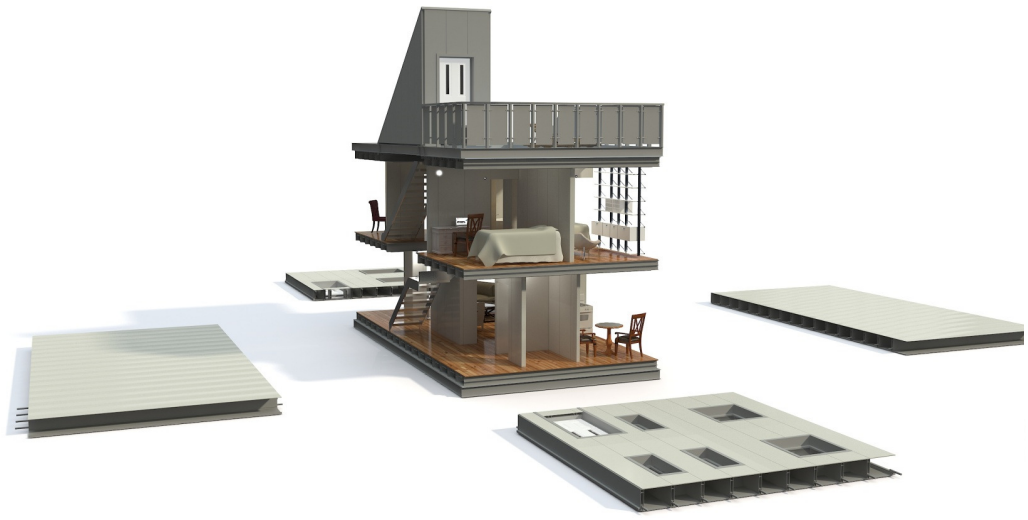
4. Composite Housing System (Startlink Housing - UK)
Fully composte construction using only pultruded sections





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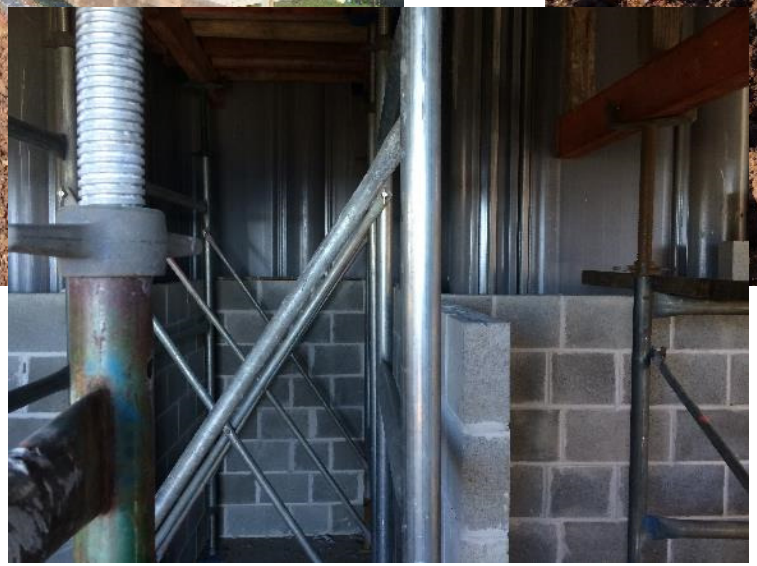
5. Sea Wall / Housing / Land Retaining Wall System



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Full-Scale Testing as Flood Levy at Deltares Flume NL

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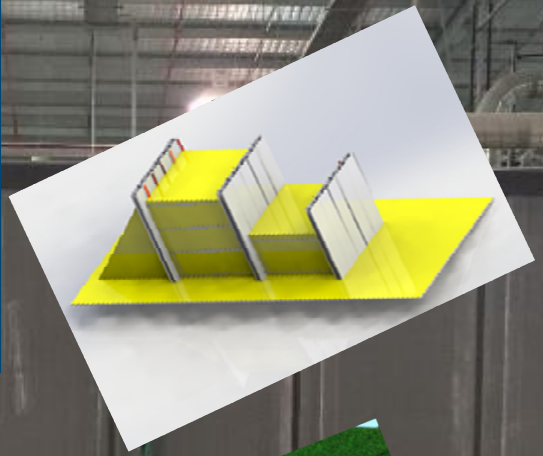
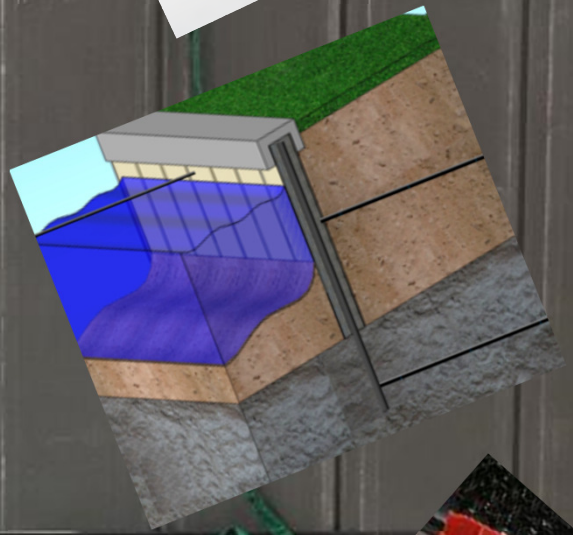
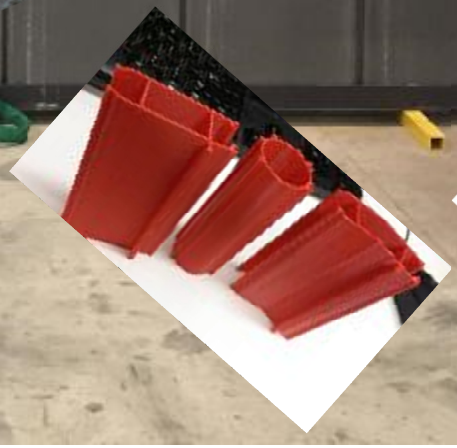
Versatile – Several potential applications & markets







- Markets
  - Landslip
  - Flood Mitigation
  - Sea Walls
  - Housing

Conclusion & Questions

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