END CAP

Calcul composite

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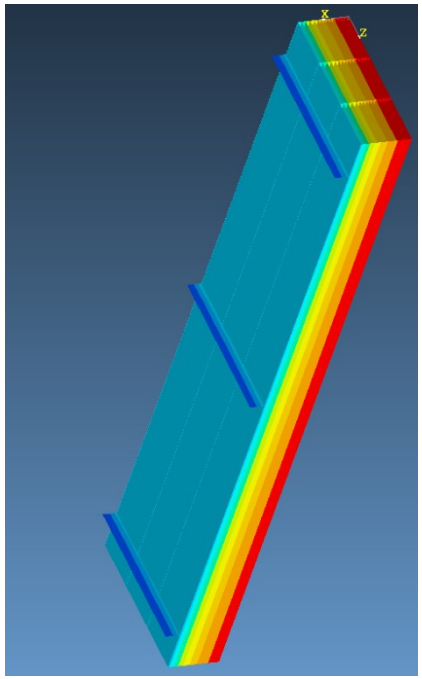
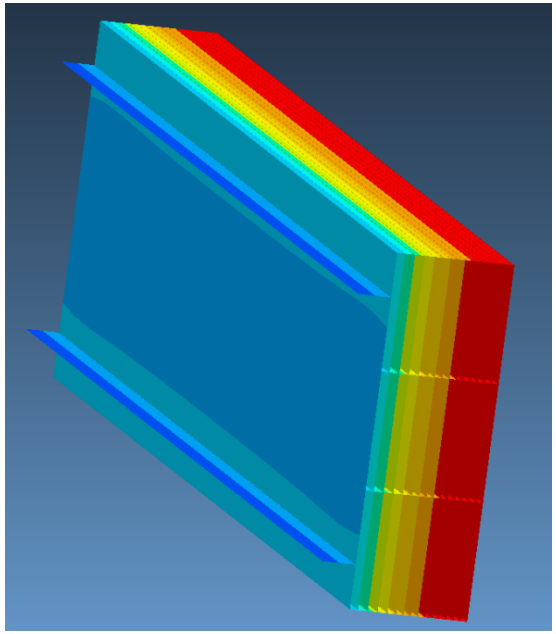
End Cap : global simulation

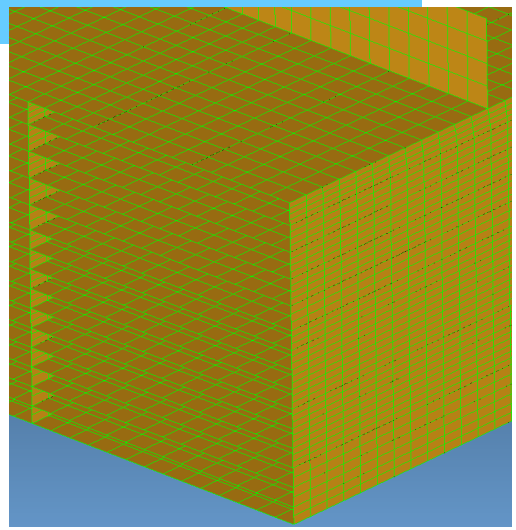
Finite element End Cap simulation :
2.5 m long / 3 cells of 187 mm / position 0° and 90°
⇒Goal of these simulations:
Influence of the position / number of fastening systems on the mechanical behaviour (displacement / stress)



90° configuration



0° configuration



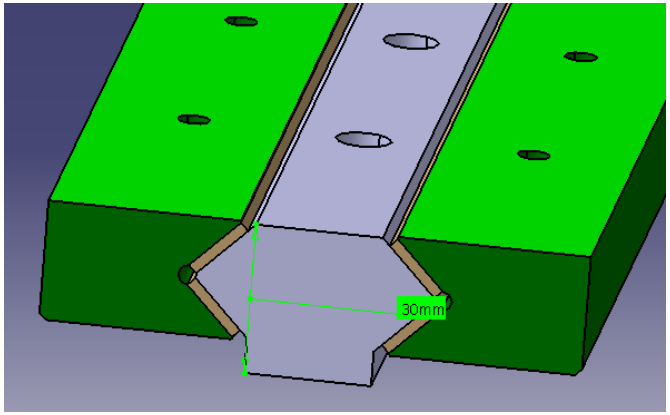
Refine mesh => representative (flexion) for 0° configuration

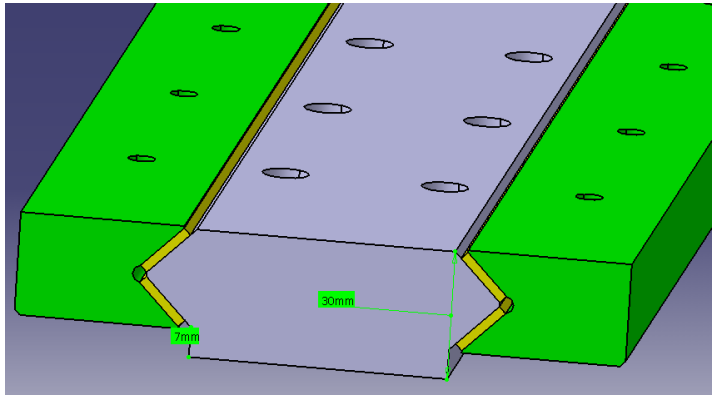
End Cap : Fastening system

3D design of different fastening system

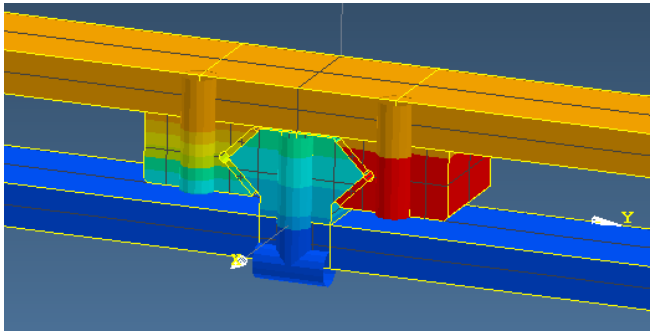
⇒ Thickness 30 mm

⇒ Wide / narrow

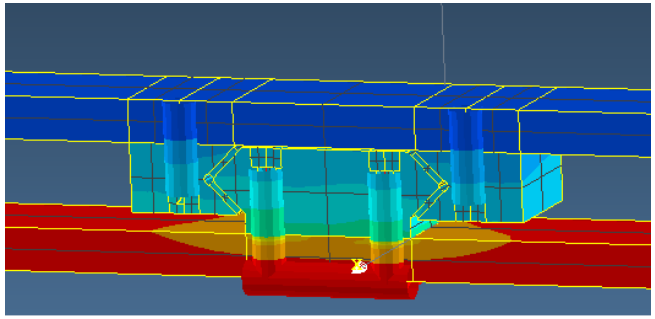




Finite element calculation to determine the stiffness of the rails : Wide / narrow



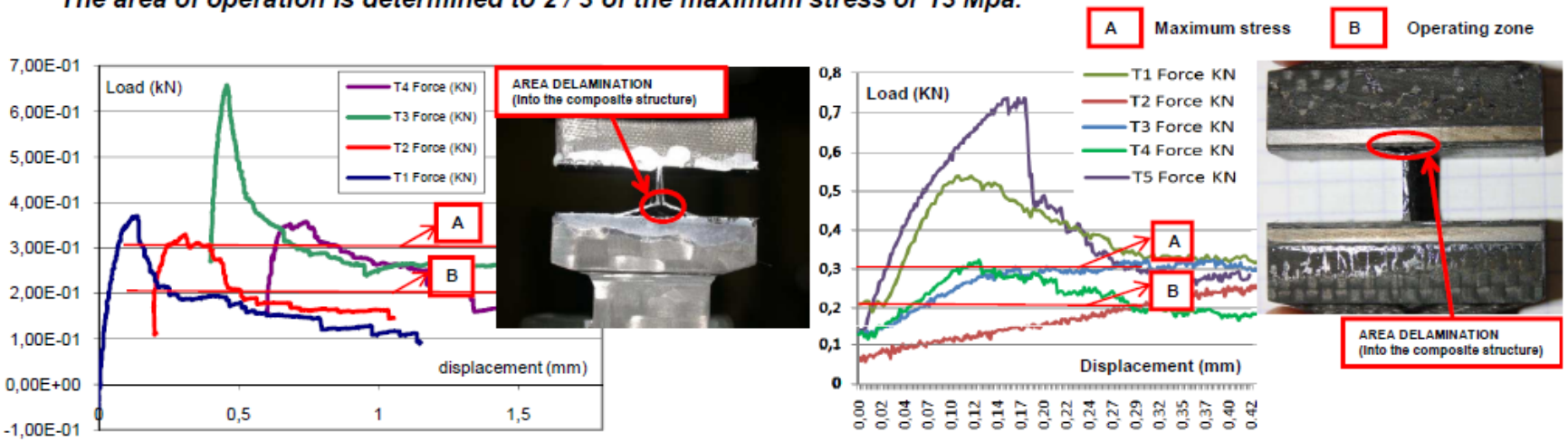
$a = 0{,}166\ mm$



$a = 0{,}0218\ mm$

End Cap : global simulation

The area under stress is 15mm2.
The majority of the sample is broken around or above 0.3 KN or 20Mpa, that why we determined this value as maximum stress.
The area of operation is determined to 2 / 3 of the maximum stress or 13 Mpa.



Rupture entre couche => traction => 20 MPa
Flexion => on peut supposer que cet endommagement ce produire sur la fibre tendue lors d'un phénomène de flexion.

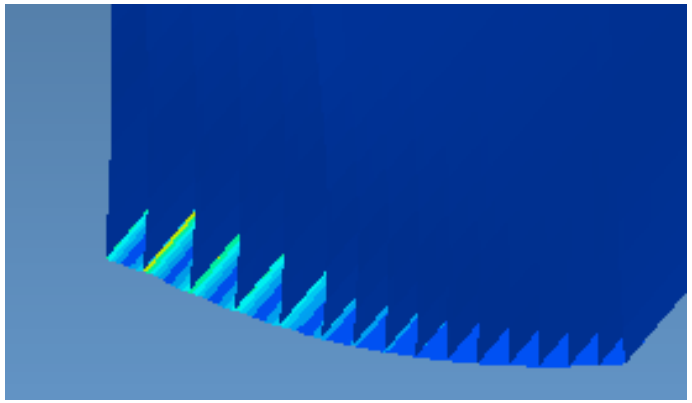
End Cap : global simulation

Cas de simulations réalisés :

- Carbone HR (T 300 3K **2** couches de 0.25 mm)
- Verre => même tissus
- Carbone HR (T 300 3K **3** couches de 0.25 mm)
- Carbone HR (T 300 3K **4** couches de 0.25 mm)

Rapport des module de Young : Carbone / Verre = 57 / 24 = 2.375 => facteur sur le déplacement (contrainte de flexion inchangée).

Contrainte de flexion des peaux inter-alvéoles : 108 MPa (2 couches)
Contrainte de flexion des peaux inter-alvéoles : 55 MPa (3 couches)
Contrainte de flexion des peaux inter-alvéoles : 36 MPa (4 couches)



Critère 13 MPa ……