

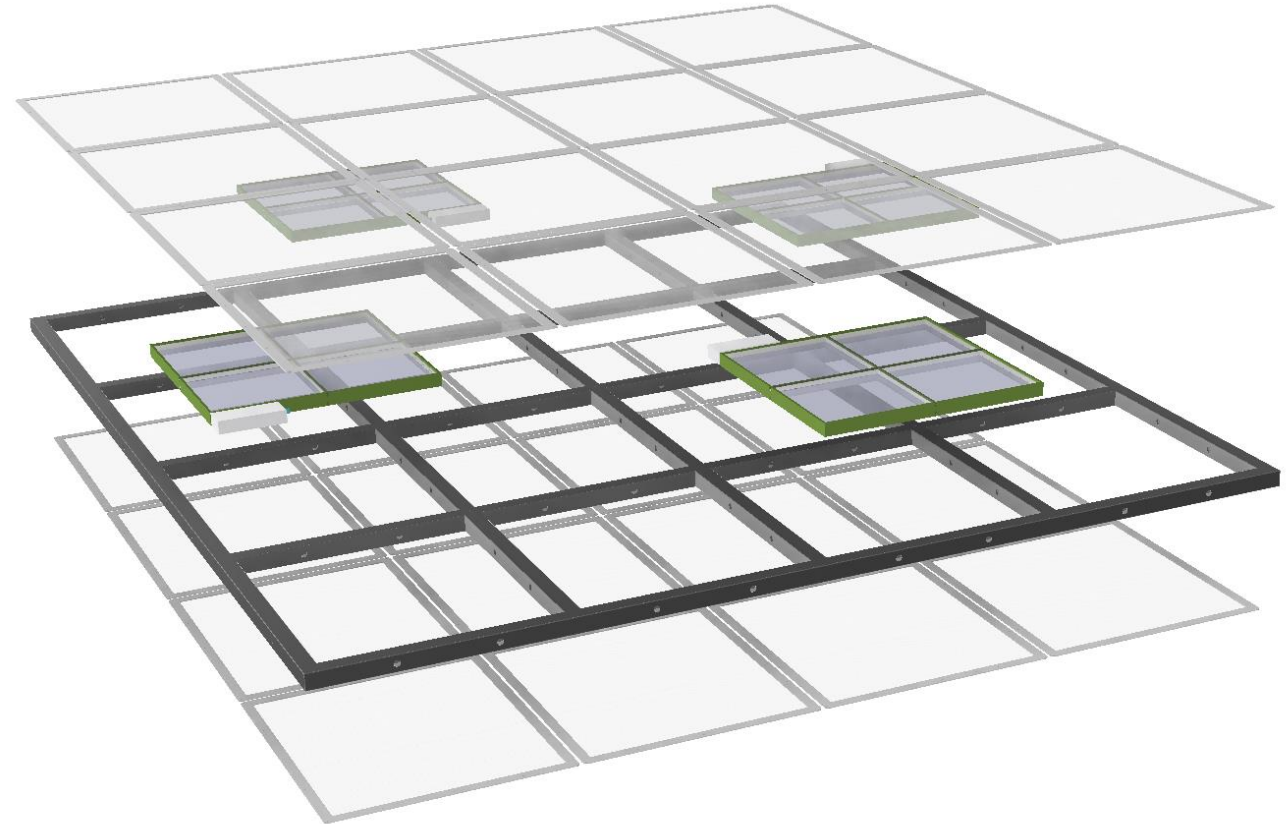


Cathode Design

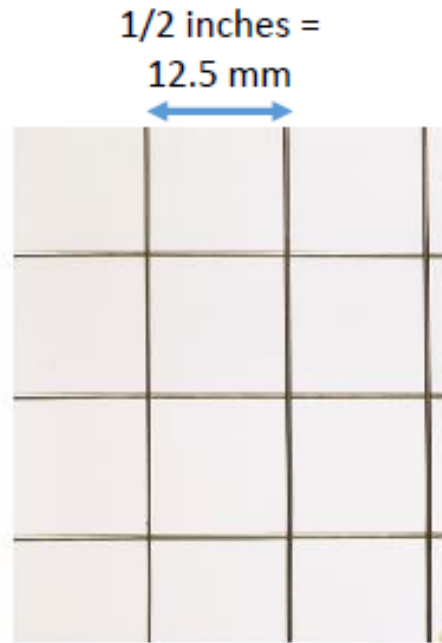
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Requirements

- Dimension : 3000 mm x 3375 mm x 50 (max) mm
- Weight < 10 kg/m² in air (including Arapuca 2.8 kg/m²)
- Bending < 20 mm in Lar
- Mesh transparency > 85%
- Mesh pitch < 30 mm



The Mesh

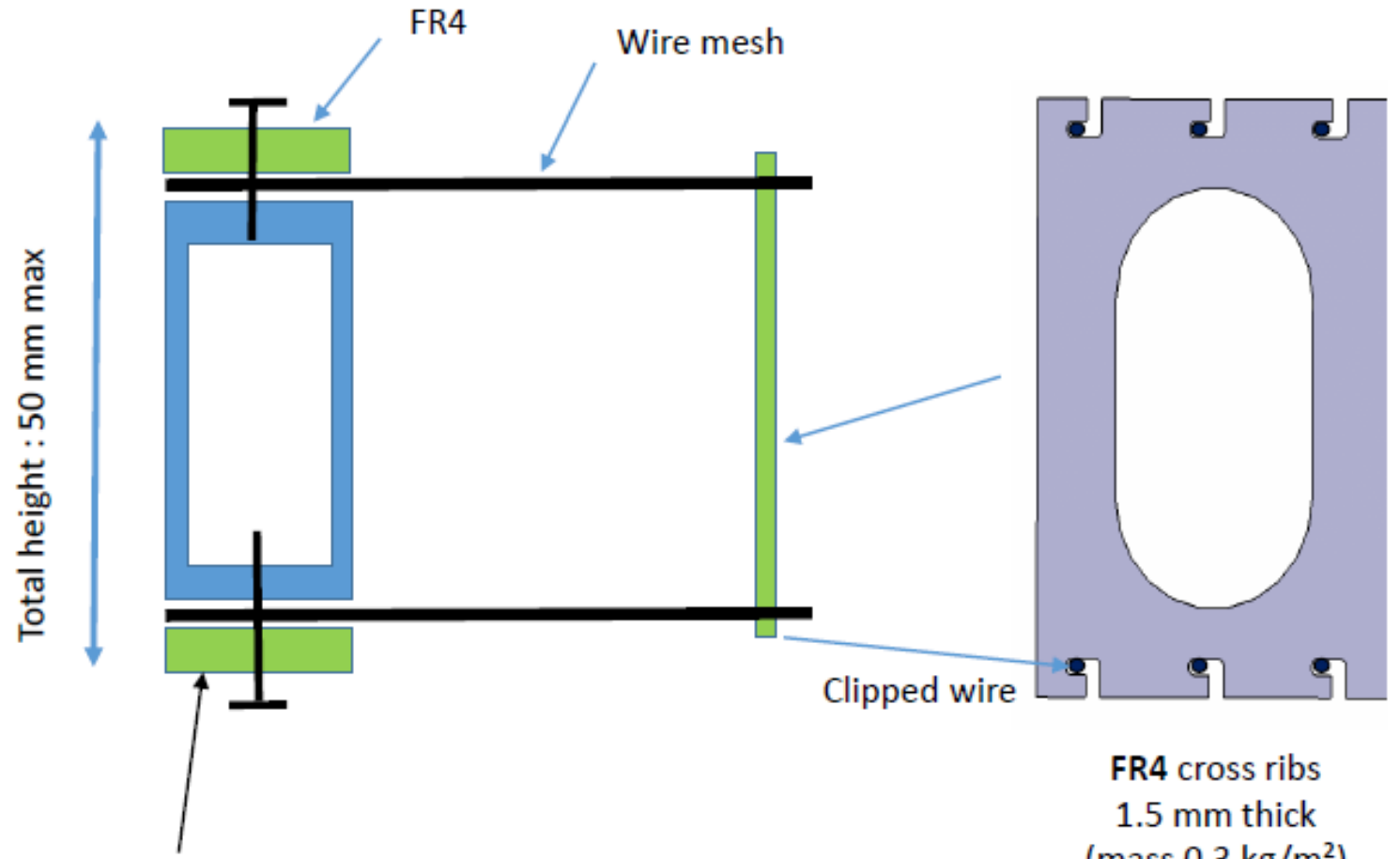


WELDED WIRE MESH

Wire diameter = 0.9 mm

Transparency = 86.5 %

Mass = $0.8 \text{ kg/m}^2 \times 2 \text{ faces}$



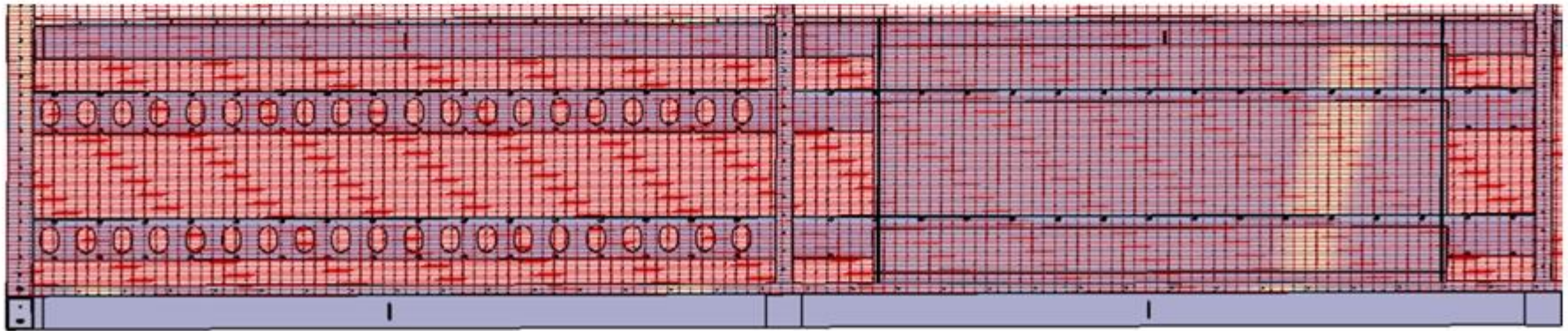
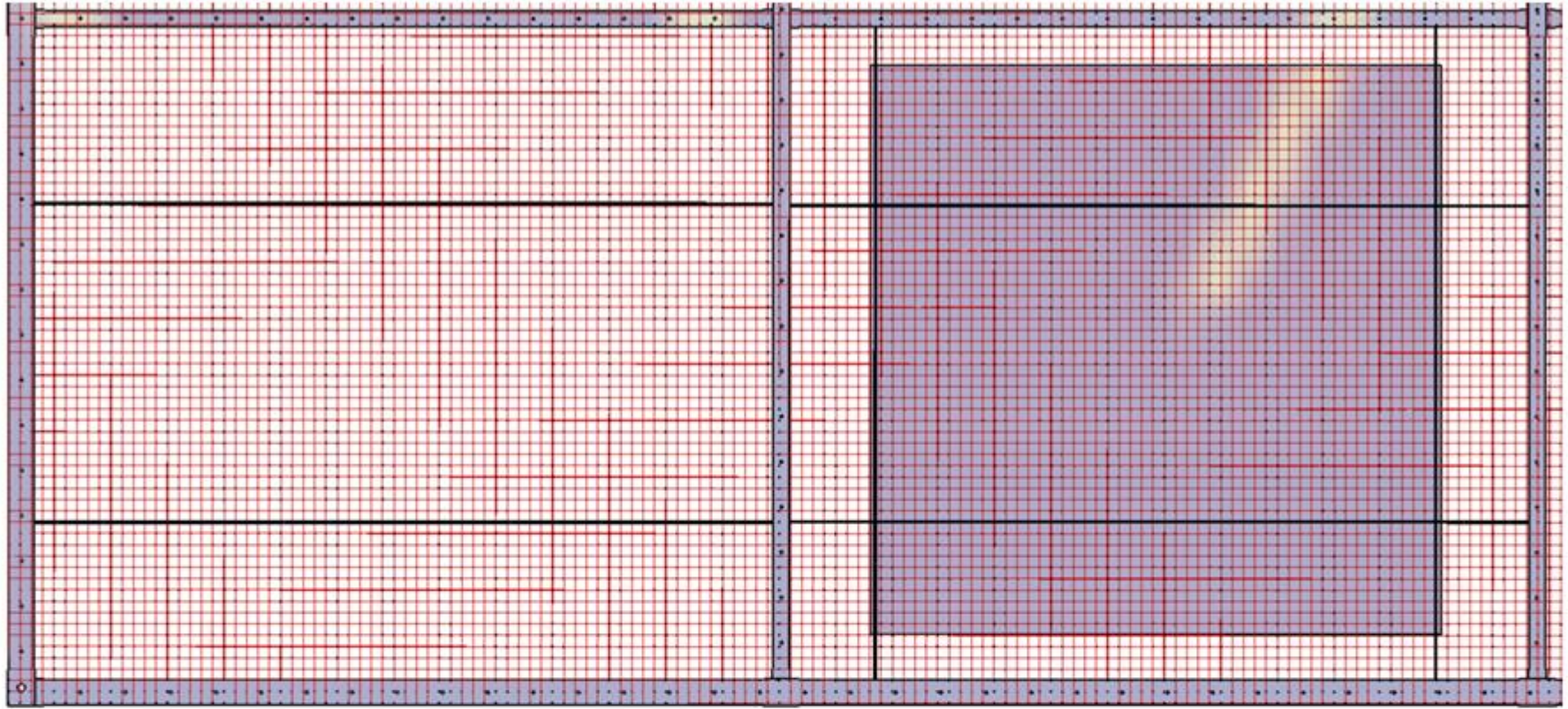
Fixing device = possible removal for mounting and maintenance

Mass can be up to $0.4 \text{ kg/m}^2 \times 2 \text{ faces}$

FR4 cross ribs
1.5 mm thick
(mass 0.3 kg/m^2)

Total Weight: $2,7 \text{ kg/m}^2 \Rightarrow$ we suppose 3 kg/m^2 in the design

The Mesh

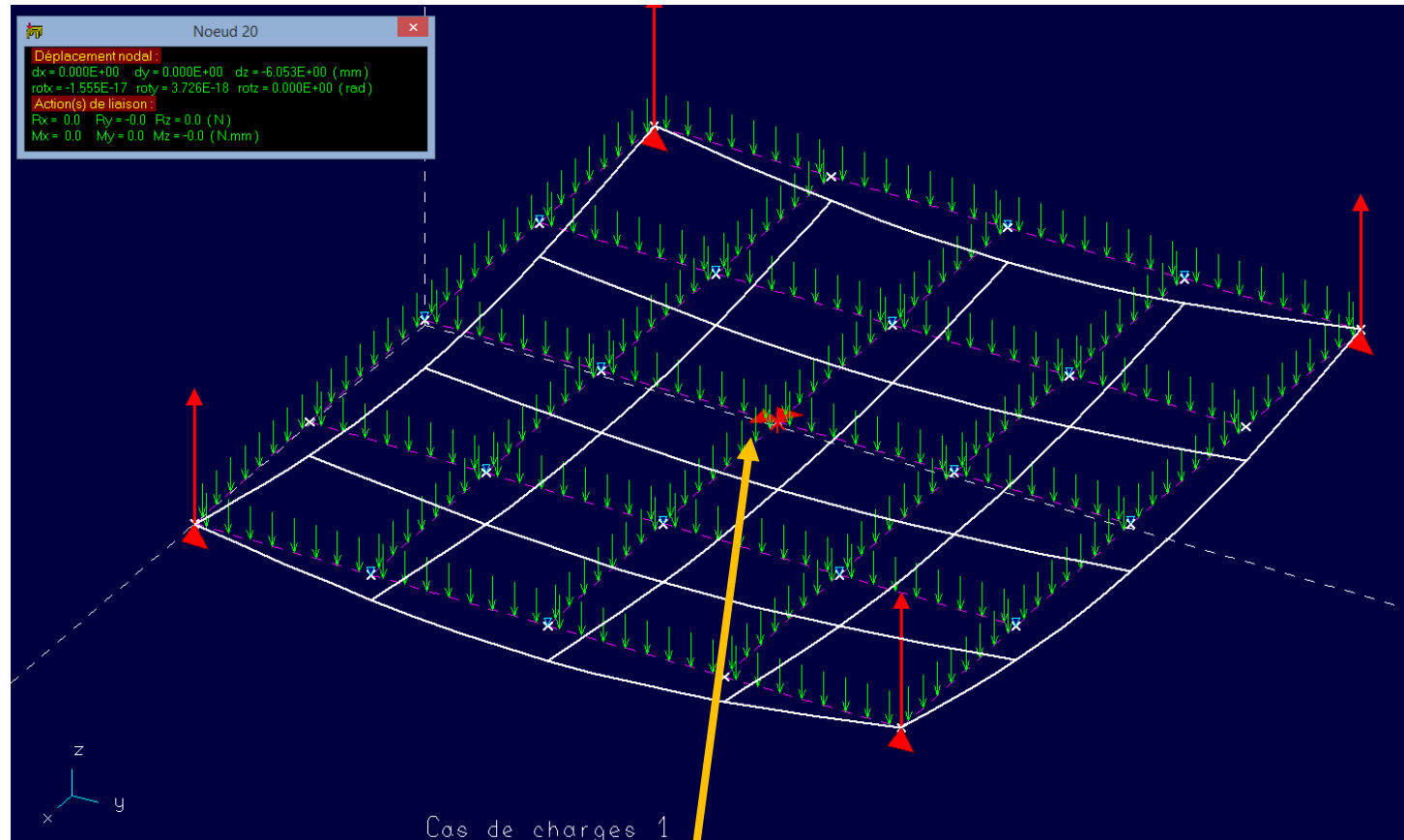


Frame Deformation

Material	Tube Size	Total Weight in Air	Total Weight in LAr	Max Deflection in Air (cathode only)	Max Deflection in Air (supercathode)	Max Deflection in Lar (supercathode)
FRP	50x50x2.5x5 mm	1040 N	520 N	28 mm	22 mm	15 mm
Stainless Steel	40x20/30x1x2 mm	1020 N	659 N	16 mm	11 mm	9 mm

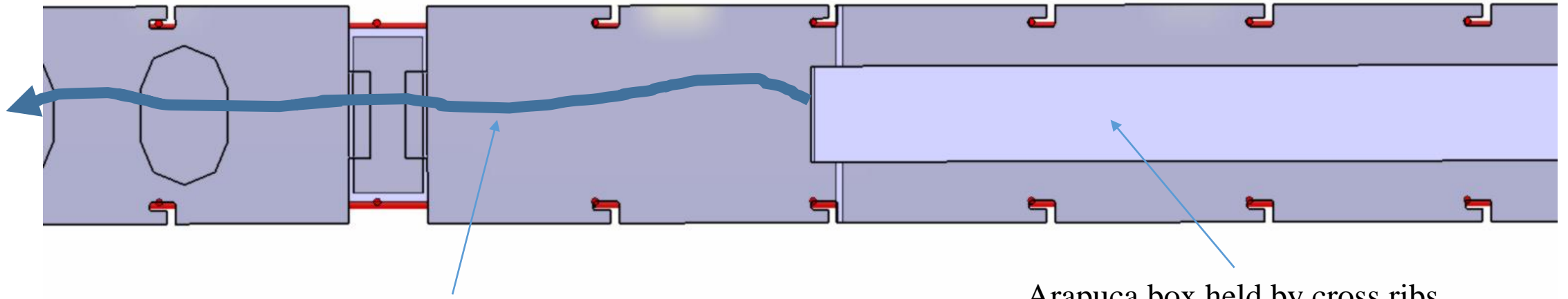
Boundary conditions : the 4 corners of the cathode blocked in vertical movement

Frame Deformation



Displacement max in air = 28 mm

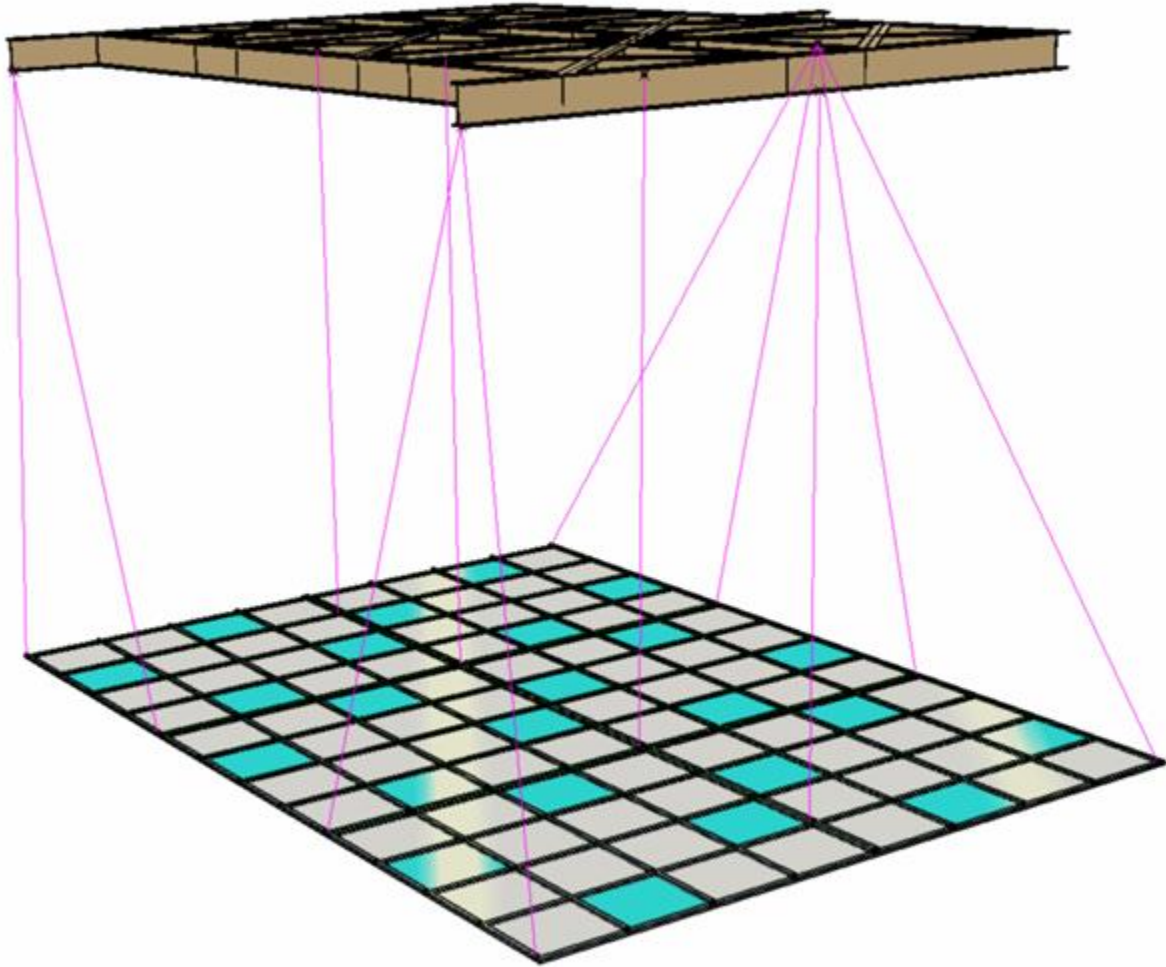
Arapuca Cables Path



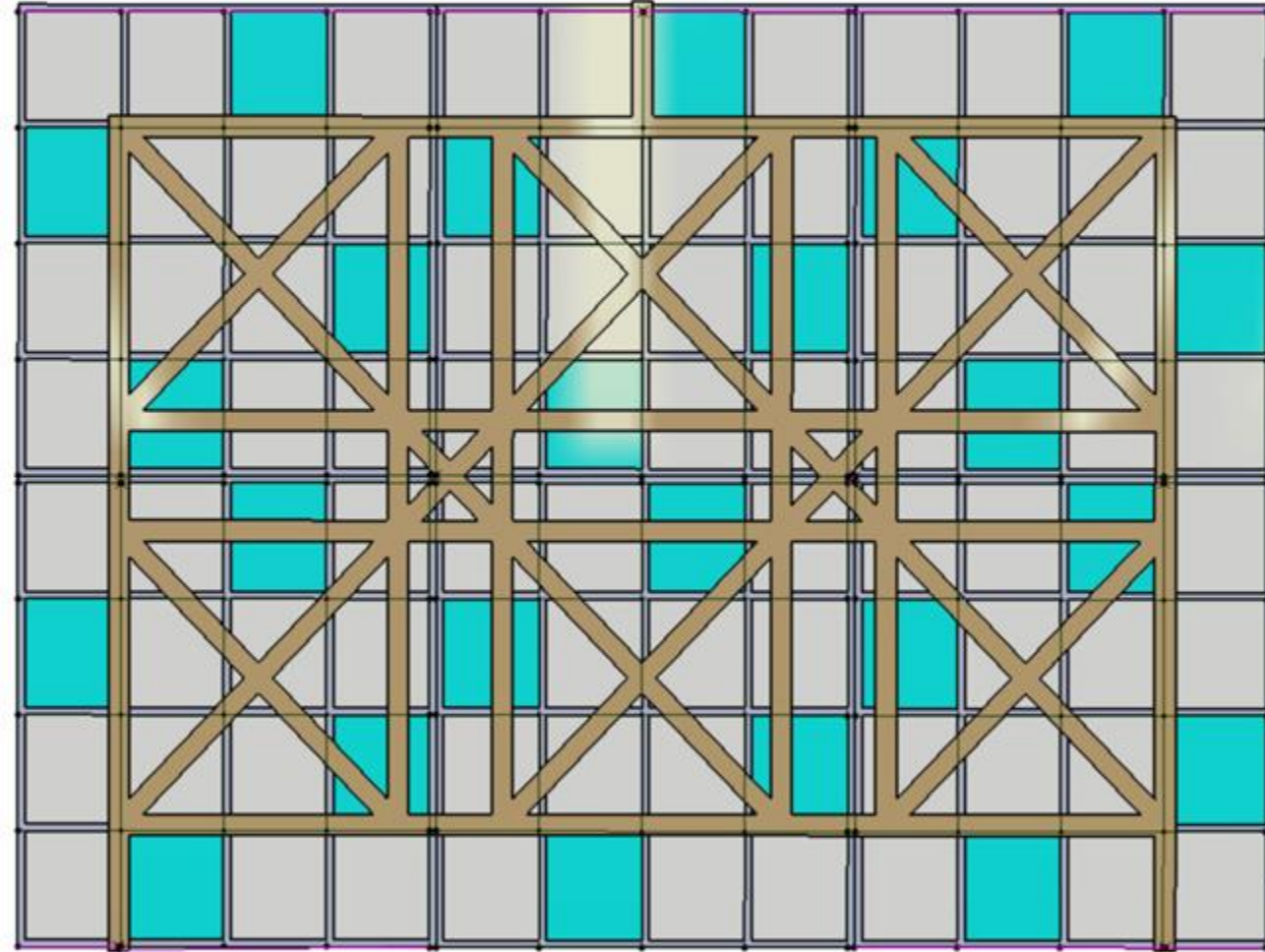
Arapuca cables through tubes
(for thin cables)

Arapuca box held by cross ribs

Suspensions to CRP superstructure

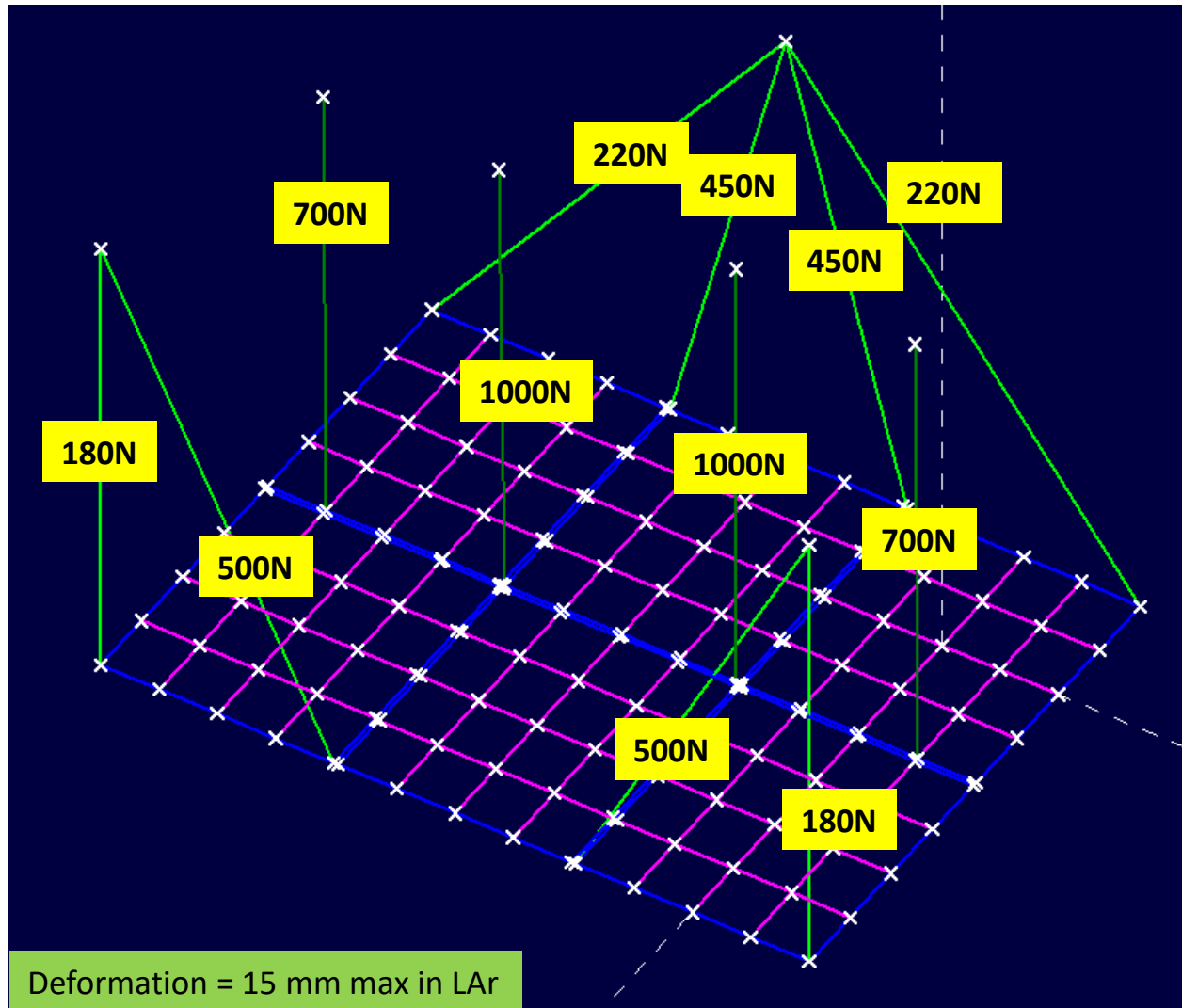


6 anode frames connected together



All wires are in a vertical plane corresponding to a dead zone of the anodes.

Bending of the supercathode



Cable choice :

- Strength in order to have small diameter
- Low creep

=>

Rope Dyneema DM20 (M-RIG max)

Diam.3 mm = 12500 N max

M-Rig Max Standing Rigging

M-Rig Max

Part Nos: TV**** JTV****

- DM20 for Zero Creep
- Construction optimised for strength
- Colour coated with Polyurethane for improved abrasion resistance
- Heat set and super pre-stretched for zero constructional stretch
- Super Lightweight
- Higher strength than wire of the same diameter
- Good resistance to UV and Chemicals
- Easily Terminated with locking D12 Splice

Diameter mm	Mass g/m	Average strength kg	Min strength (spliced) kg	Stretch mm/mm/1000kg
2.5	4.5	902	839	0.04709
3	6.8	1353	1259	0.03141
4	11.1	2224	2069	0.01911
5	15.6	2874	2672	0.01479

Creep at 300MPa = 0.00007%/day

(10 years = 87600 hours = 0.25% = 15 mm)

(here we are at 142 Mpa max in air and 100 Mpa in LAr)