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Passerelle Trumpf, Ditzingen

Webinar : L'inox en structure dans la construction.
14.06.21
Herminie Metzger / Mathias Nier

Portée globale : env. **28 m**
Portée de la coque : env 20 m en longueur, 10 m en largeur
Épaisseur de la tôle : **2 cm**
Matériau de la coque : acier inoxydable (duplex, 1.4462, nuance S460)
Largeur du tablier piétonnier : **2.20 m**

Garde-corps : hauteur 1.10m / Verre feuilleté trempé 2x10mm
Gabarit routier : 4.70 m
Livraison : 2019

Designer : **sbp**
Ingénieurs structure : sbp
Éclairage : sbp
Consultants architectes : Barkow Leibinger Architects
Entreprises : Prebeck, Outokumpu, Ostseestaal
Client : Groupe Trumpf

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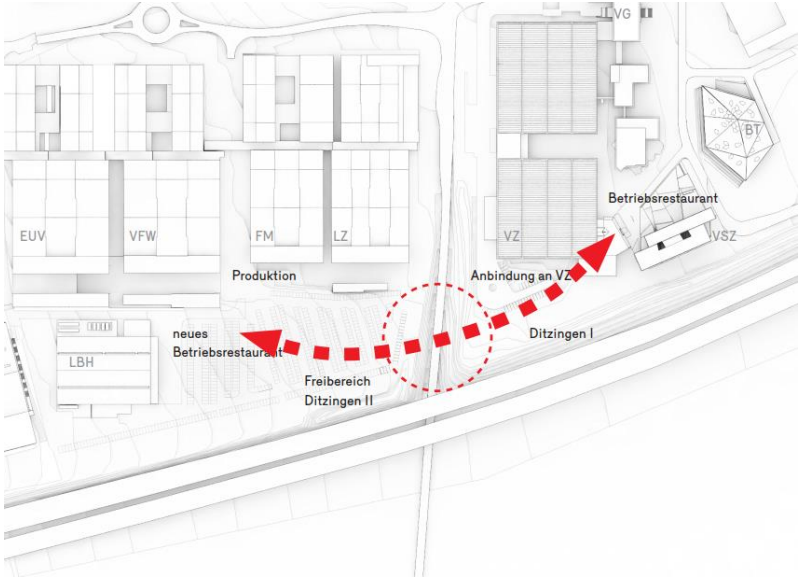
Chiffres clefs



Localisation – Siège de l’entreprise Trumpf à Ditzingen (Schwabenlaendle)

TRUMPF

Leader du marché et de la technologie des machines-outils et des lasers de production industrielle

Barkow Leibinger

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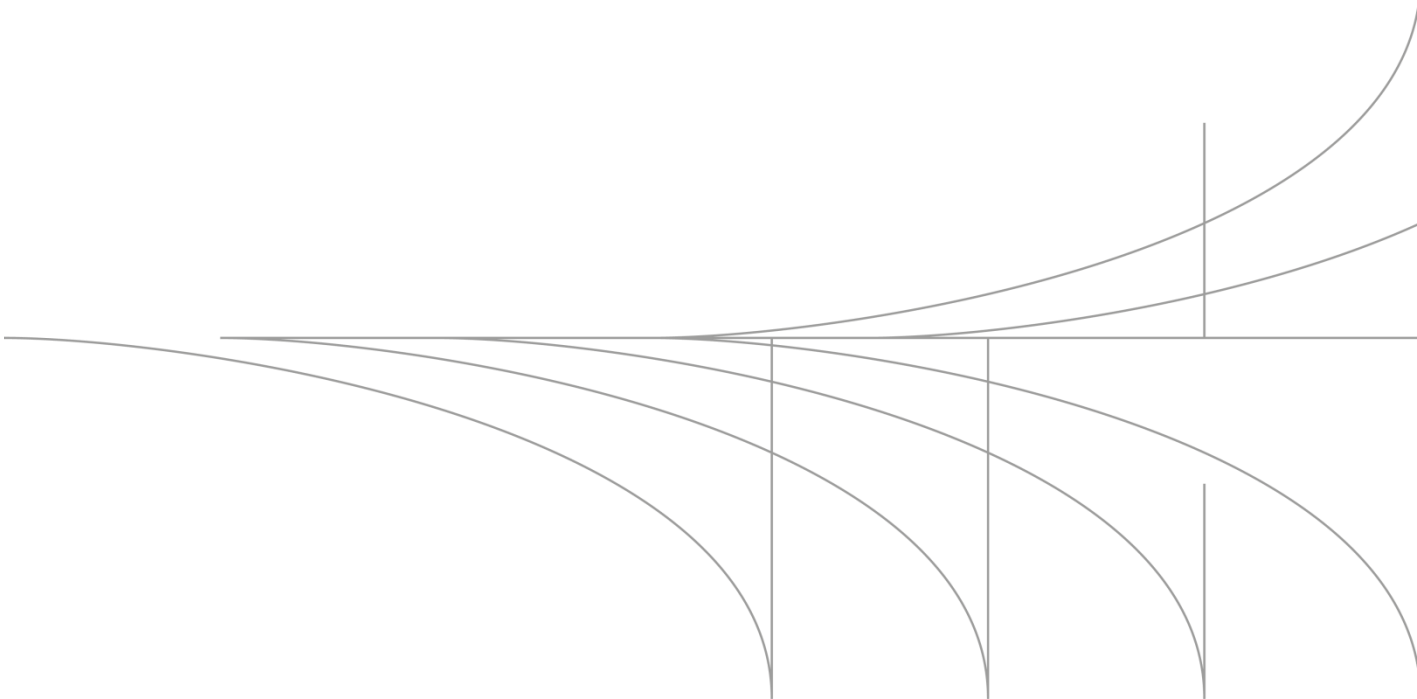
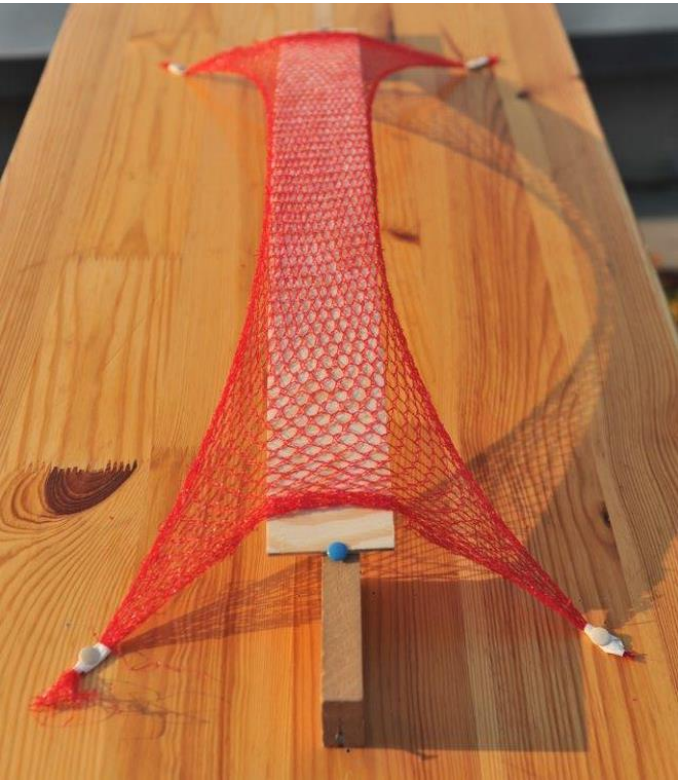
Conception





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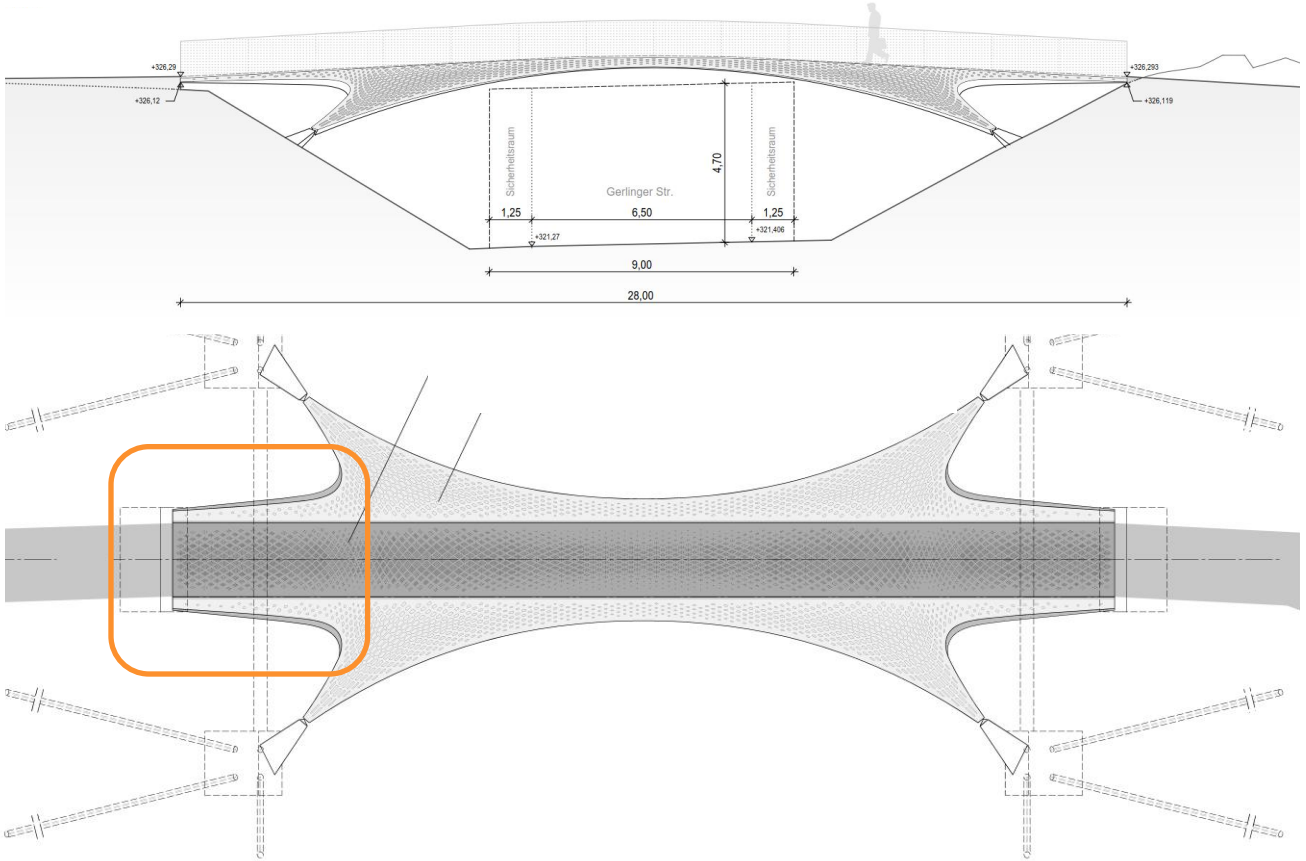
Premières Idées de Mike Schlaich – the « Orange net model »



Conception de la passerelle, extension de la bande circulable

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Dimensions principales : élévation

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Dimensions principales : vue en plan

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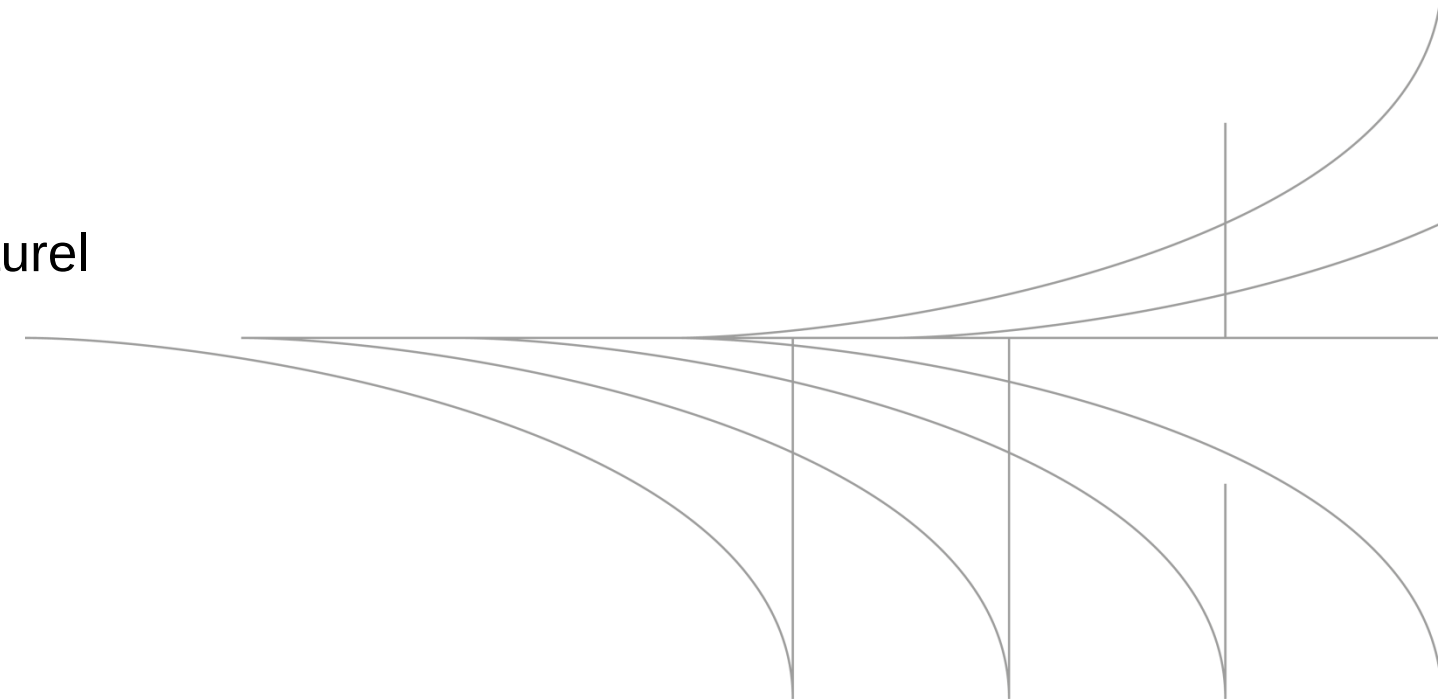
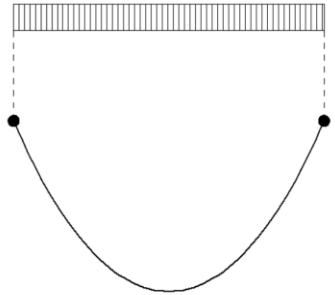
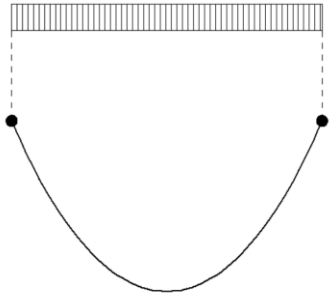
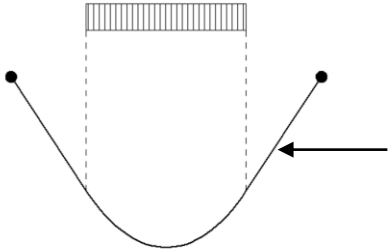
Calcul structurel



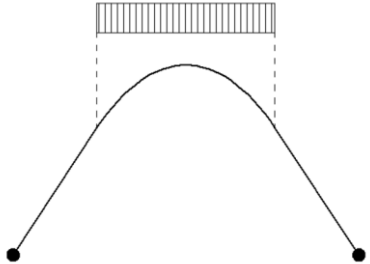


Recherche de forme

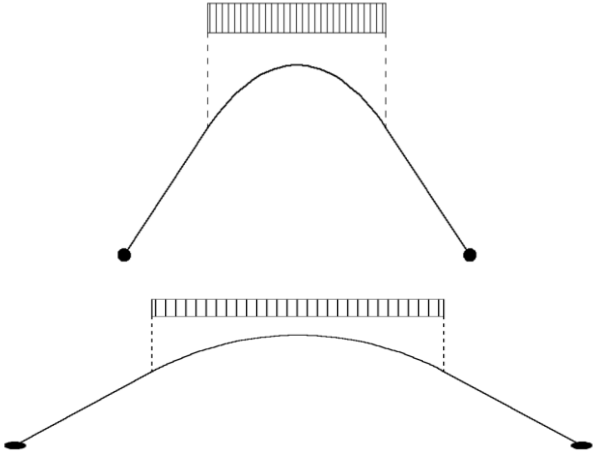



Charges d‘Exploitation
Partie rectiligne

Bande circulable

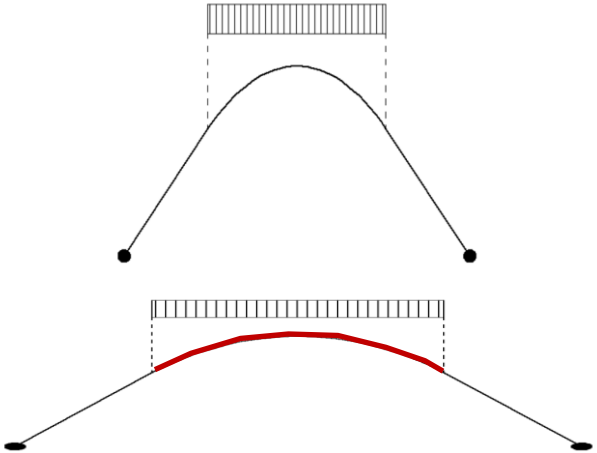


Bande circulable



Mise à l‘échelle du projet

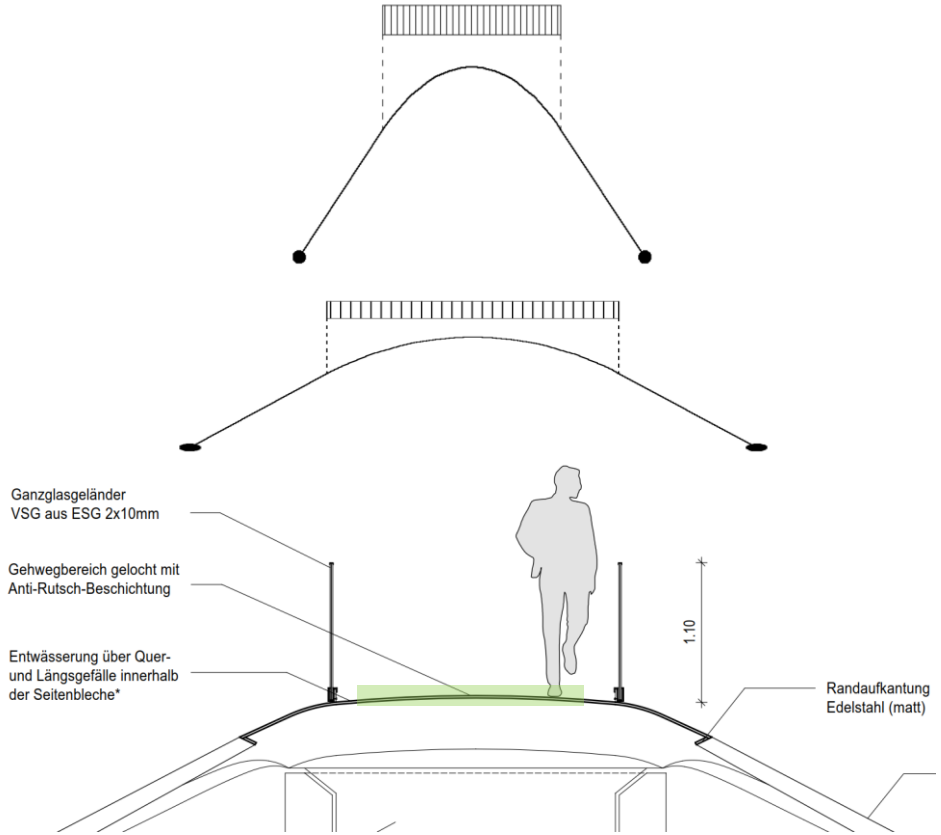
Bande circulable



Mise à l‘échelle du projet

Pente maximale transversale = max 10%
-> hauteur de l‘arche limitée

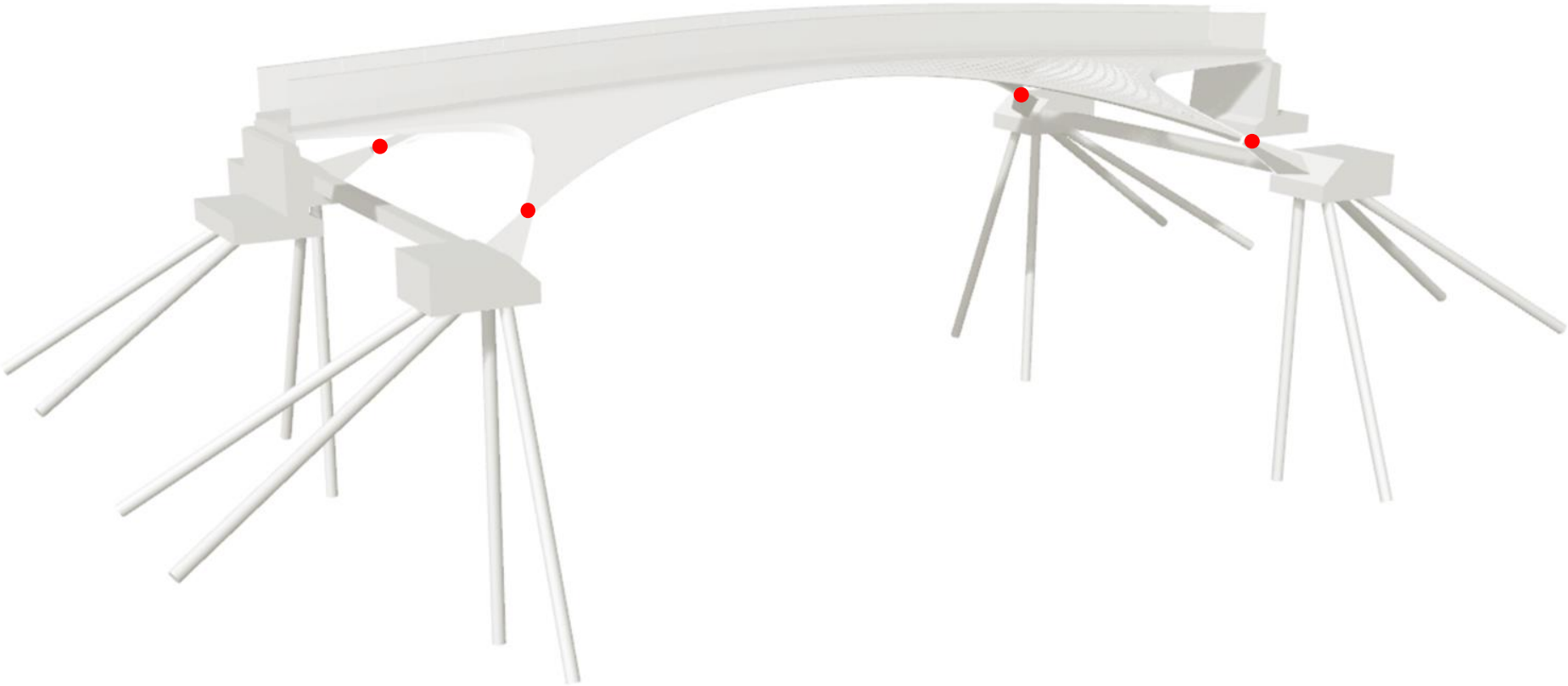
Bande circulable



Aplatissement de l‘arche

Confort des usagers
vs.
Forme optimale de l‘arche

Recherche de forme



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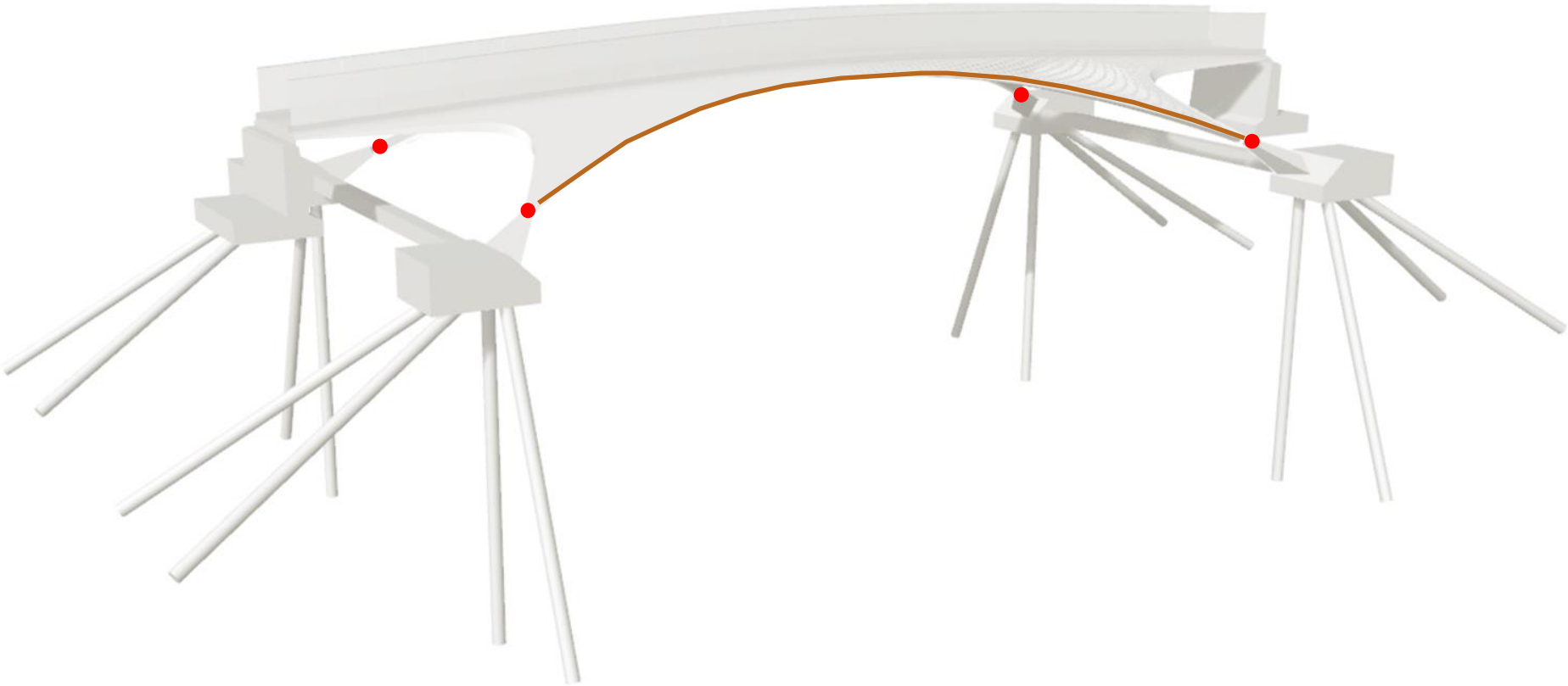
Schema statique



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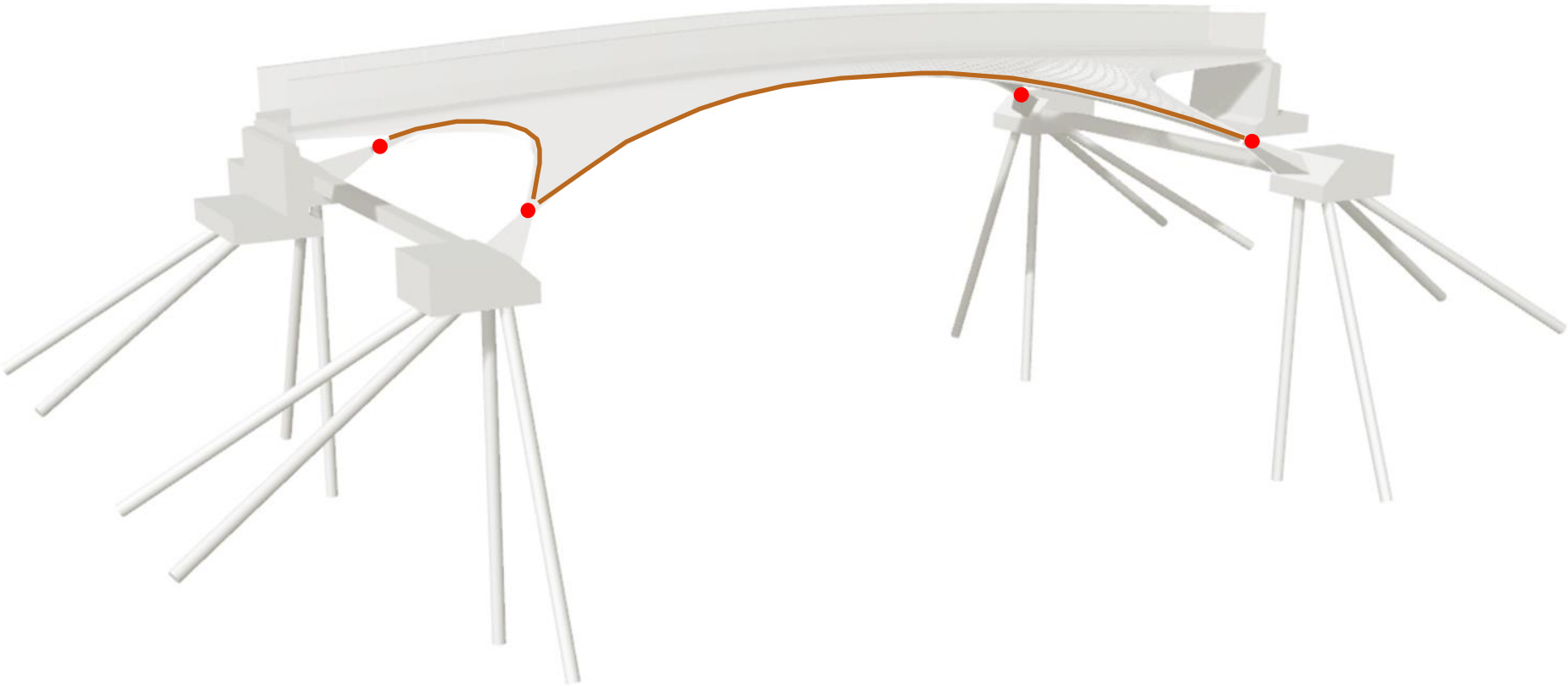
Schema statique



Schema statique

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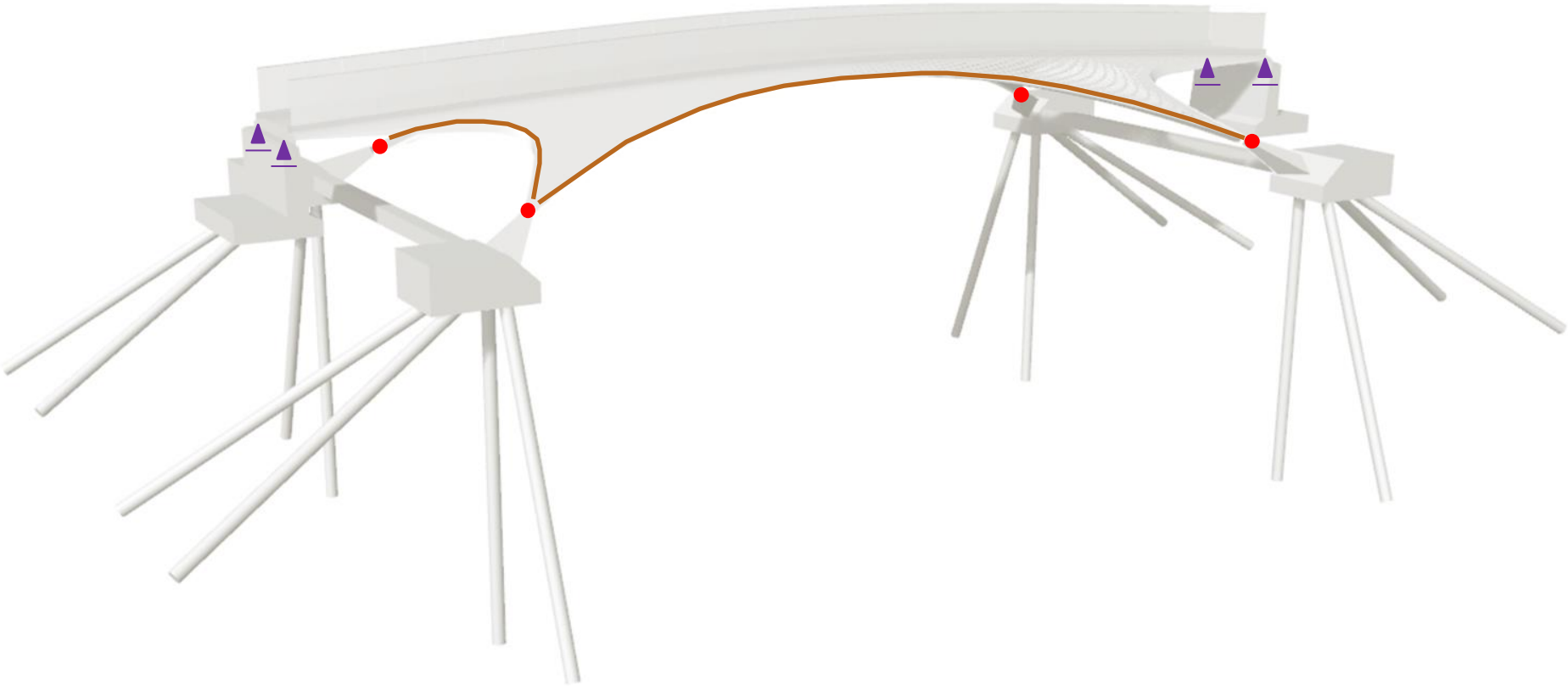
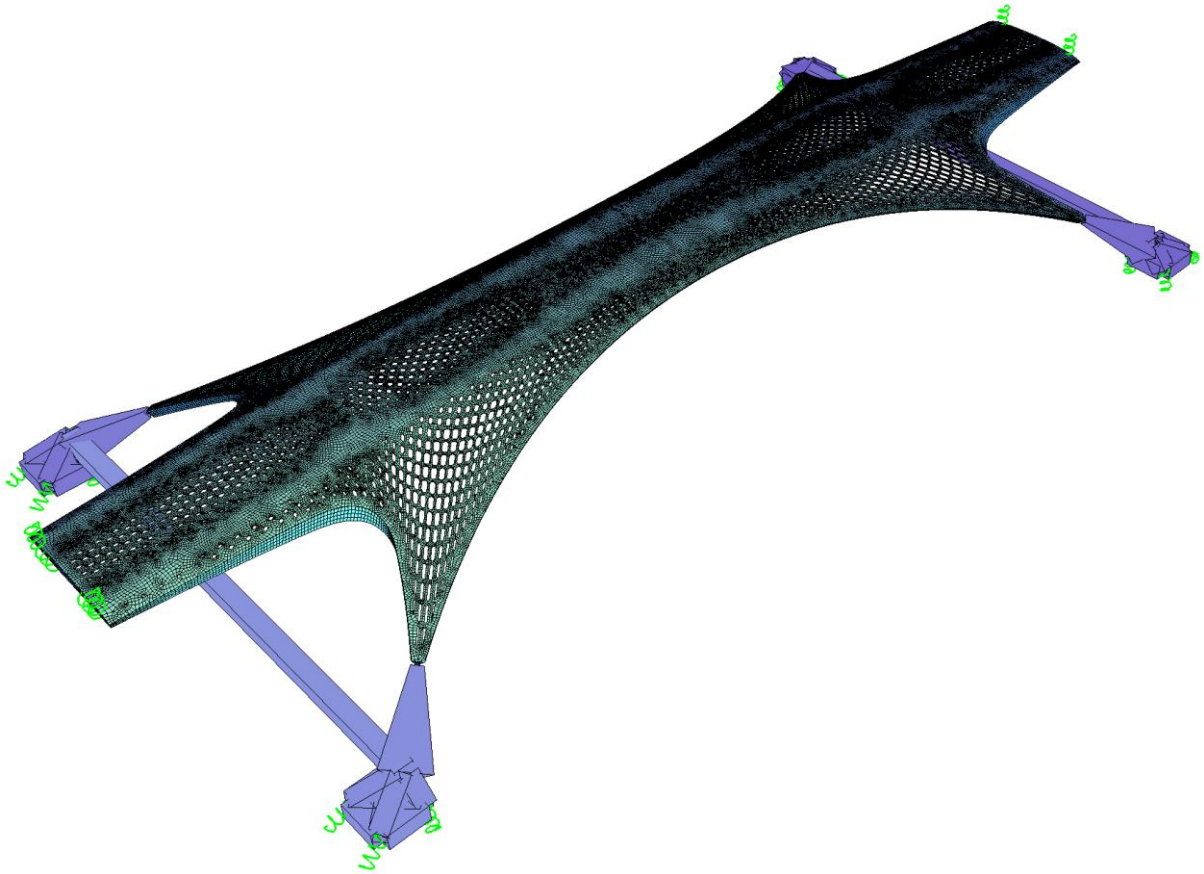
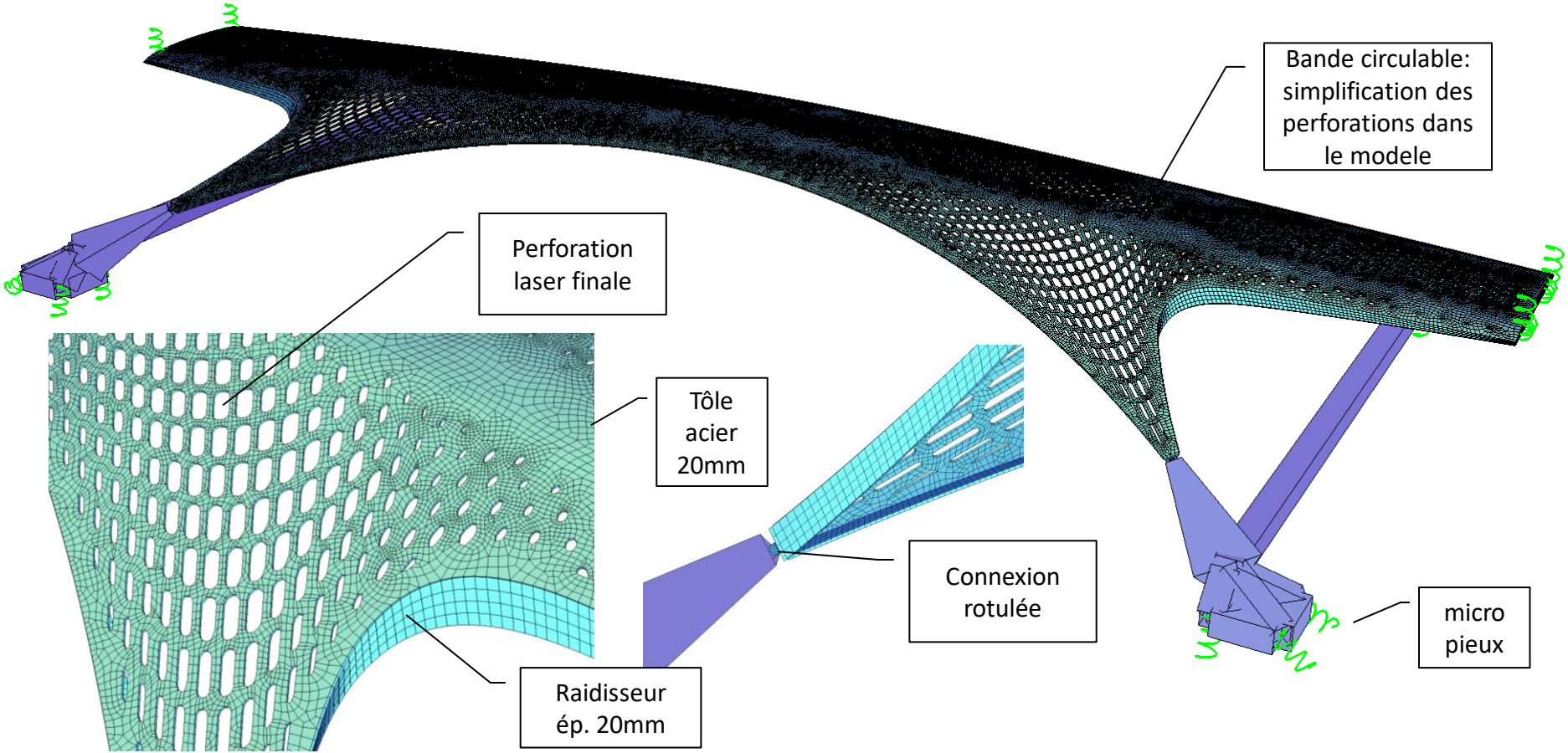


Schema statique



Modele aux elements finis – Sofistik structural elements



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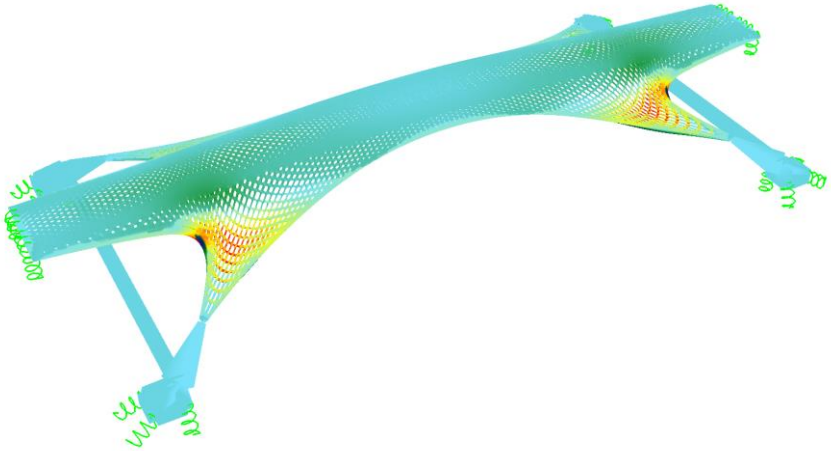
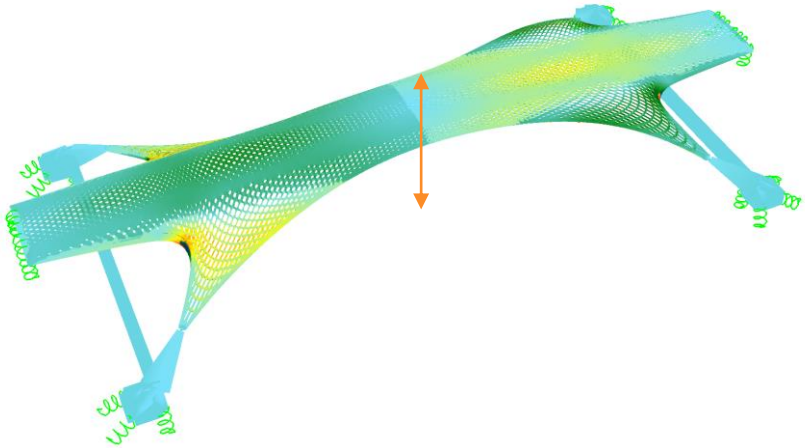
Modèle aux éléments finis - Details



DL+LL(full)



DL+LL(full)+Temp(+)

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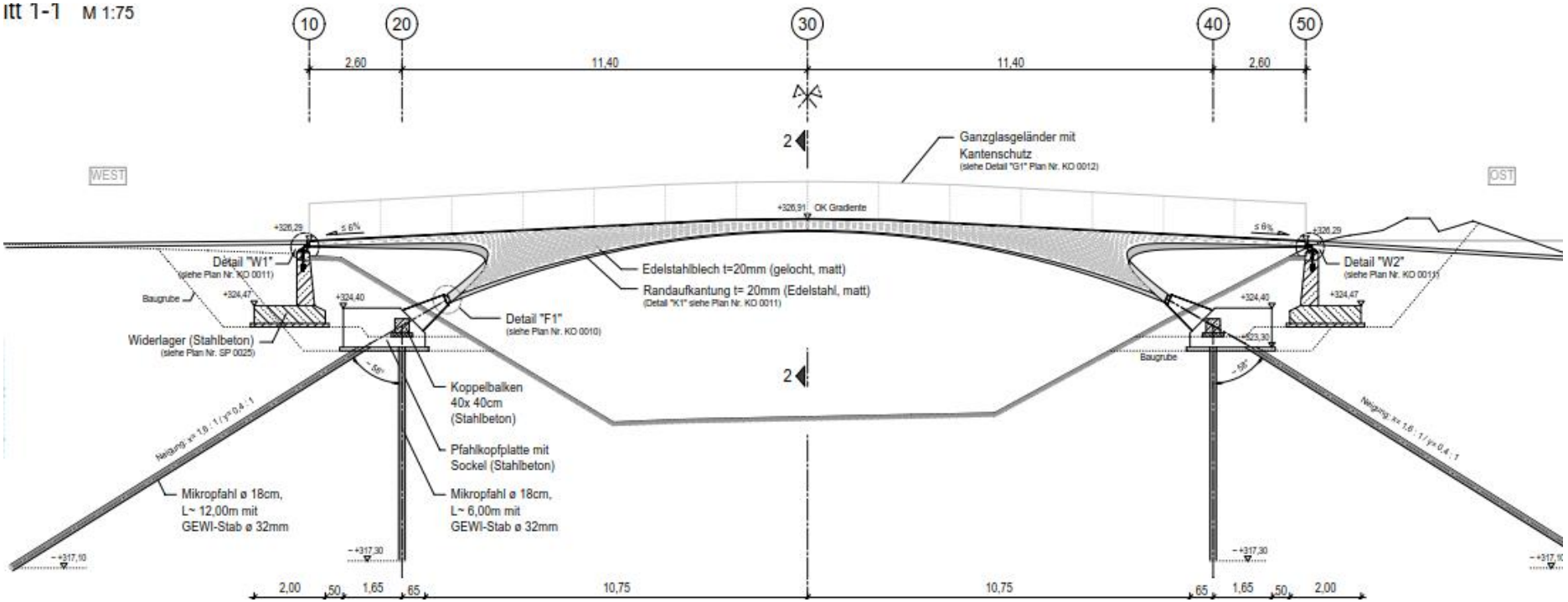
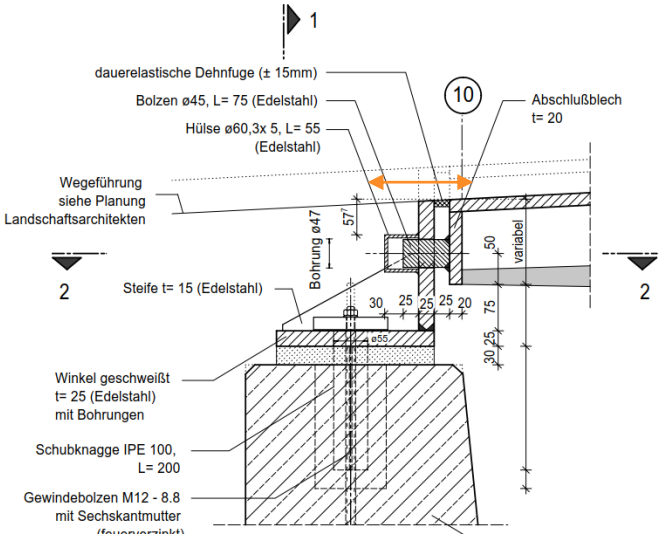
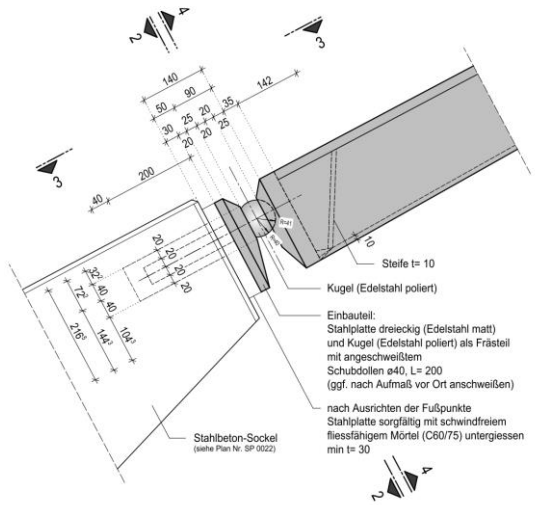
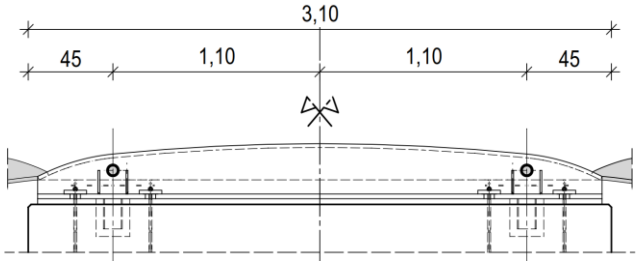
Modes de flambement



Détail au niveau des culées







Détail au niveau des culées

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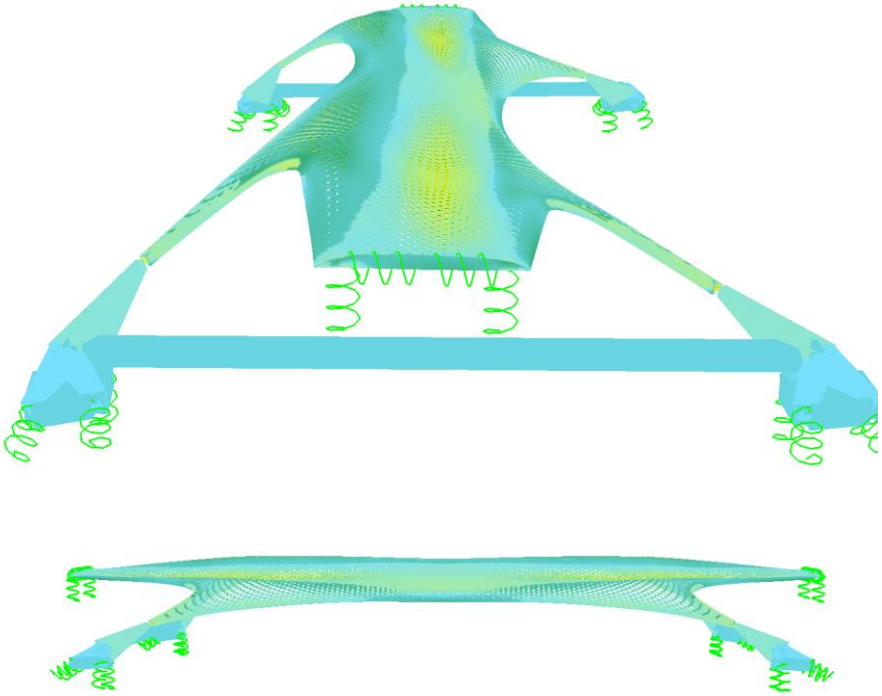
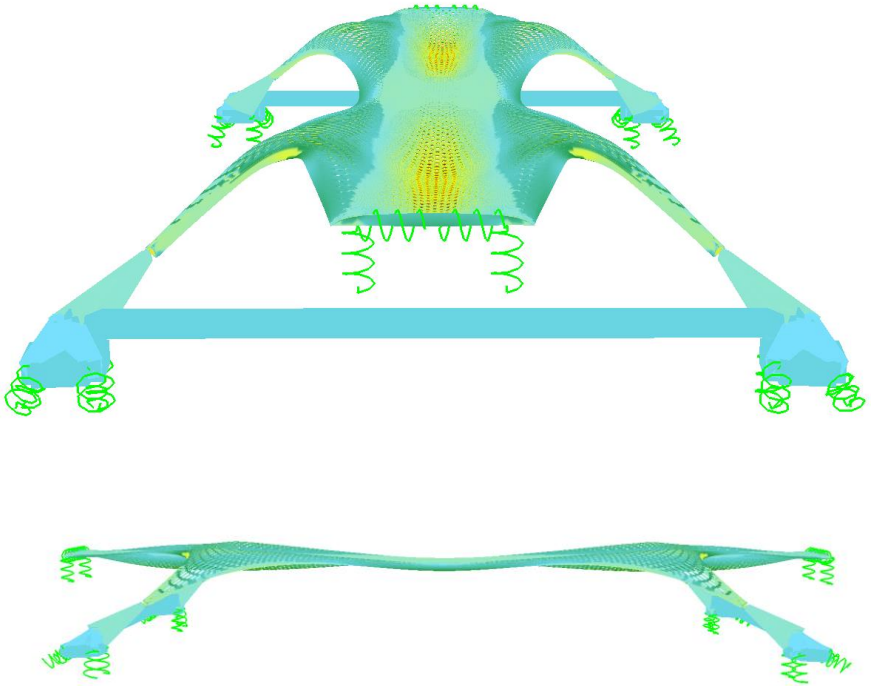
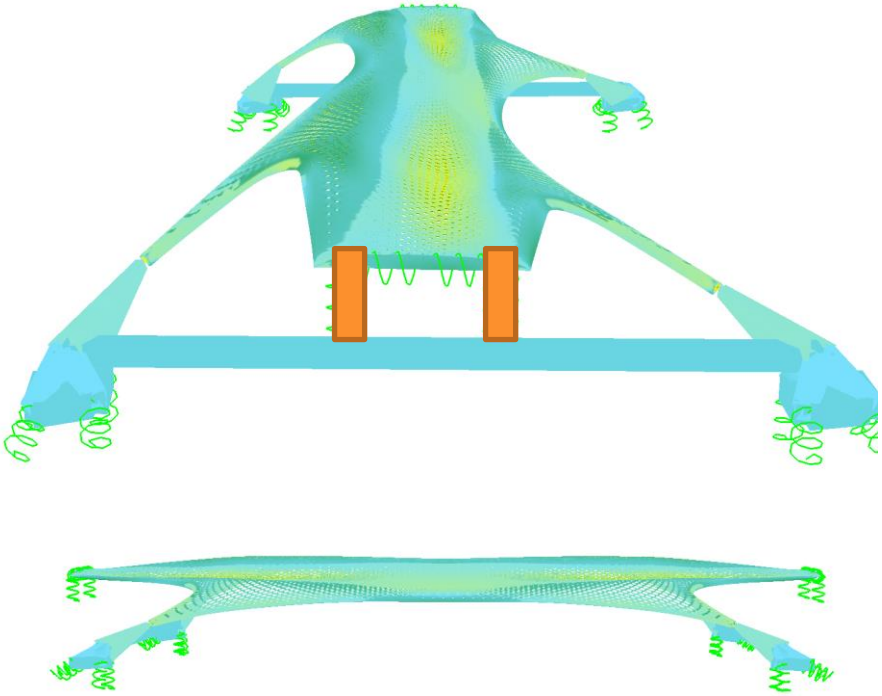
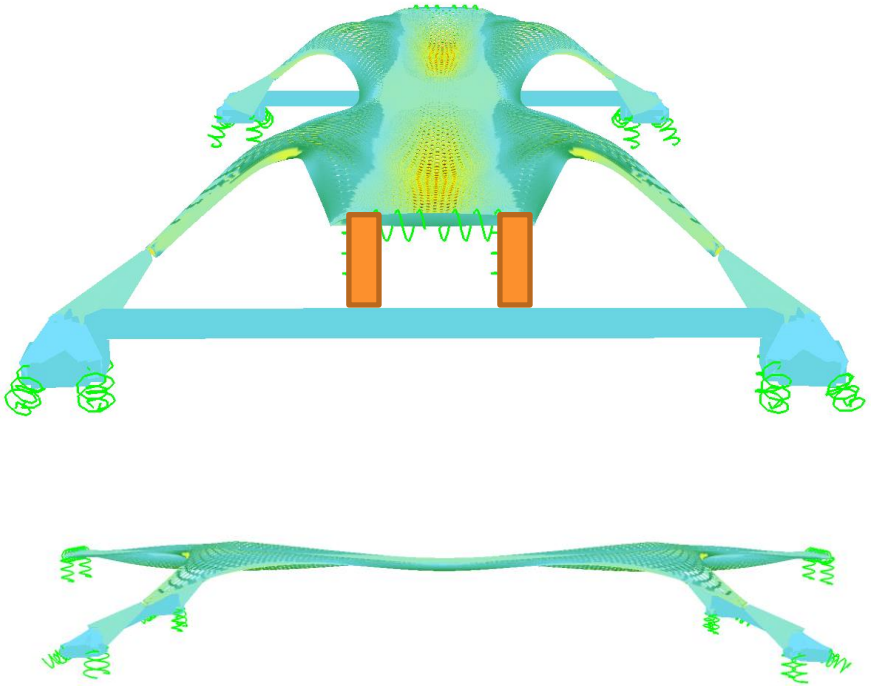


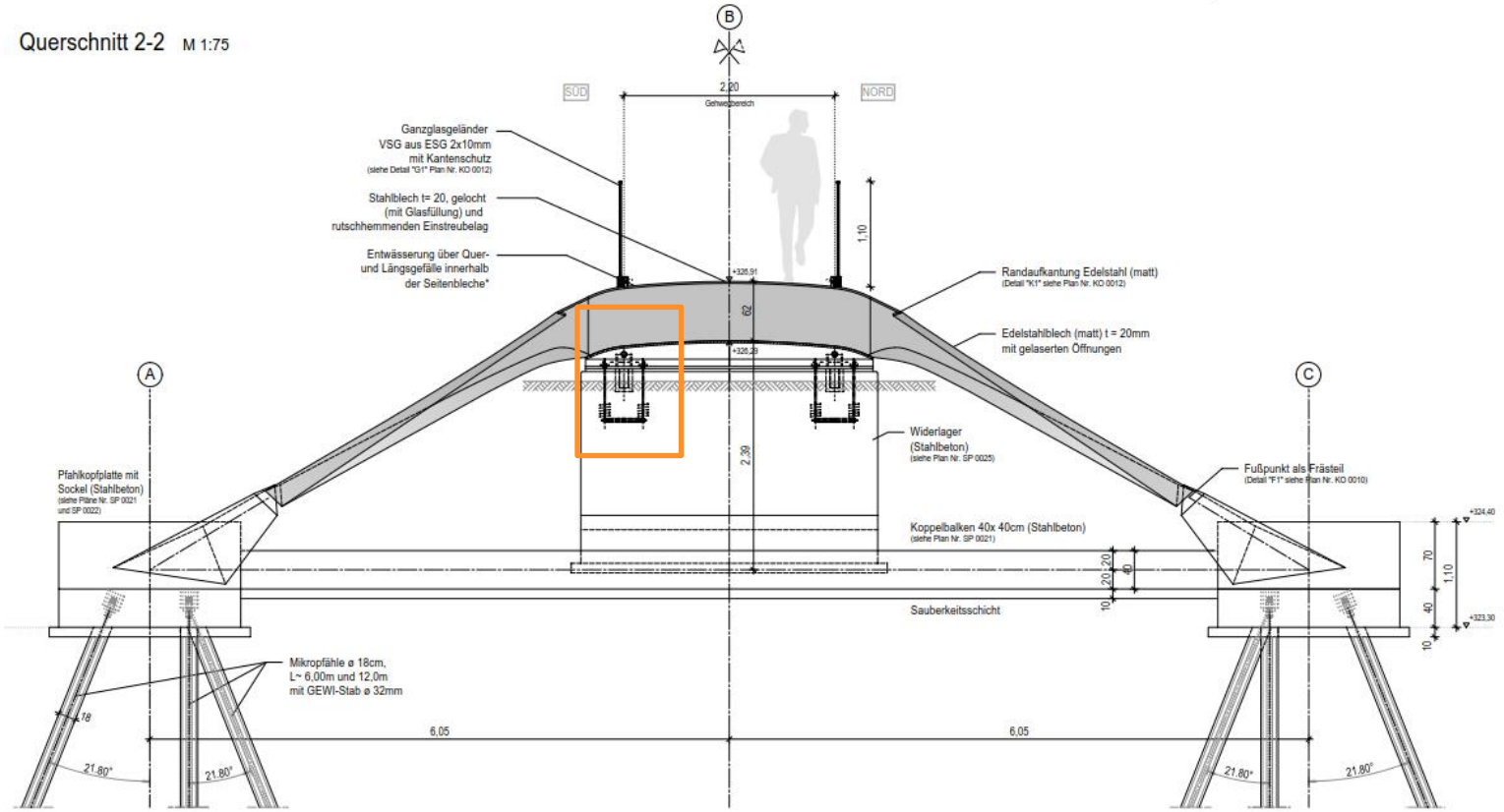


Chargement symmétrique et asymétrique





Chargement symmétrique et asymétrique



Détail au niveau des culées

Ouef vs. Trumpf bridge – Epaisseur de la structure

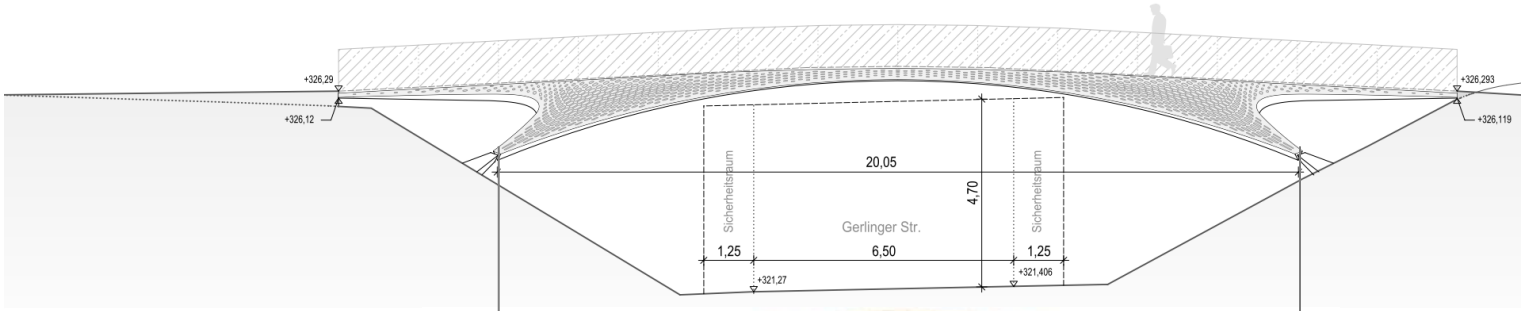
ratio épaisseur de la coque / portée

Oeuf
Épaisseur t = 0,2-0,4 mm
Portée L = 5 cm = 50 mm
t/L = 0,3 / 50 = **1/167**

Trumpf Bridge
shell thickness t = 20 mm
Span L = 20 m = 20000 mm
t/L = 20 / 20000 = 1/1000

-> Factor 1000 / 167 = 6
-> The shell of a chicken egg is 6x thicker!

Ouef vs. Trumpf bridge – Epaisseur de la structure



ratio épaisseur de la coque / portée

Oeuf
Épaisseur t = 0,2-0,4 mm
Portée L = 5 cm = 50 mm
t/L = 0,3 / 50 = **1/167**

Trumpf Bridge
Épaisseur t = 20 mm
Portée L = 20 m = 20000 mm
t/L = 20 / 20000 = **1/1000**

-> Facteur 1000 / 167 = 6
-> A l'échelle, une coquille d'oeuf est 6 fois plus épaisse!

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Ouef vs. Trumpf bridge – Epaisseur de la structure

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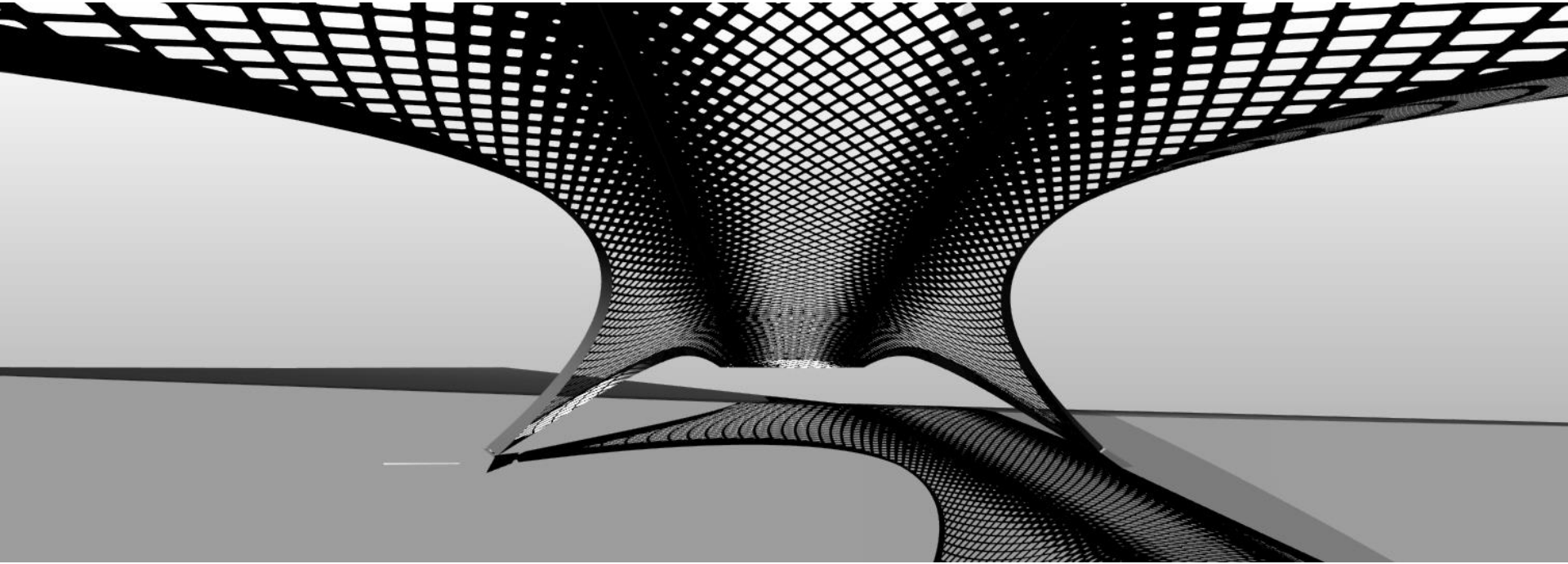
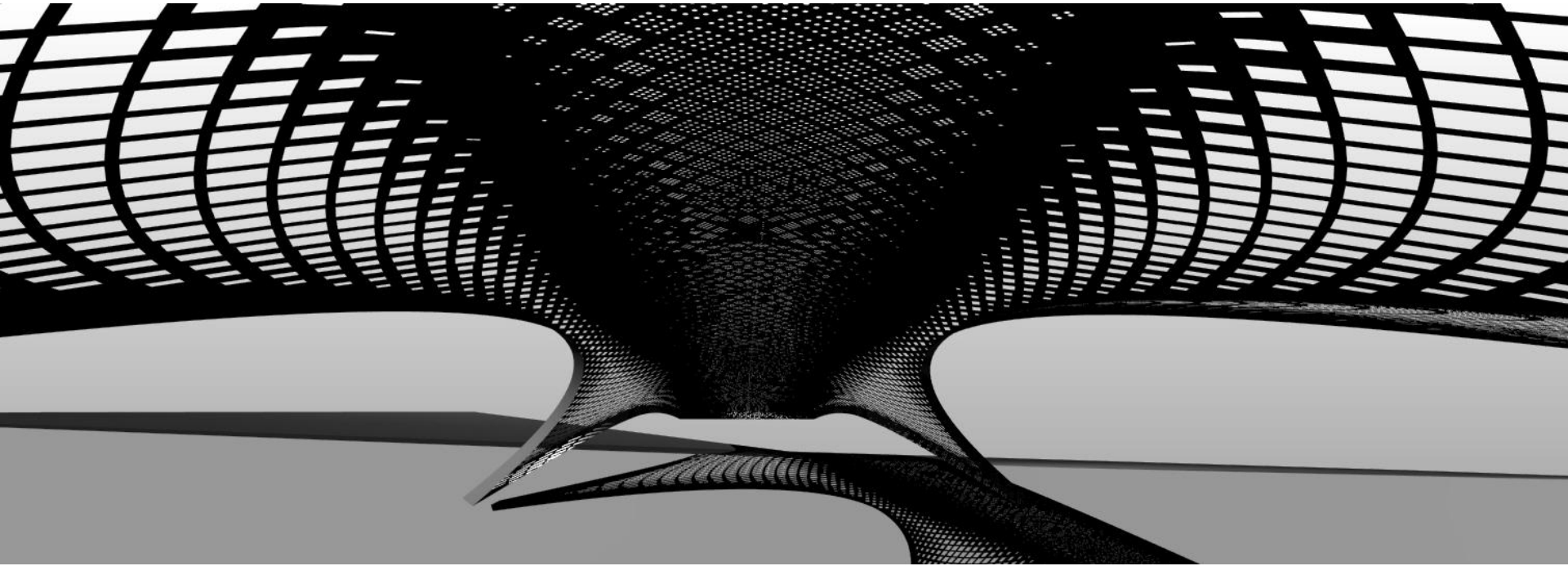
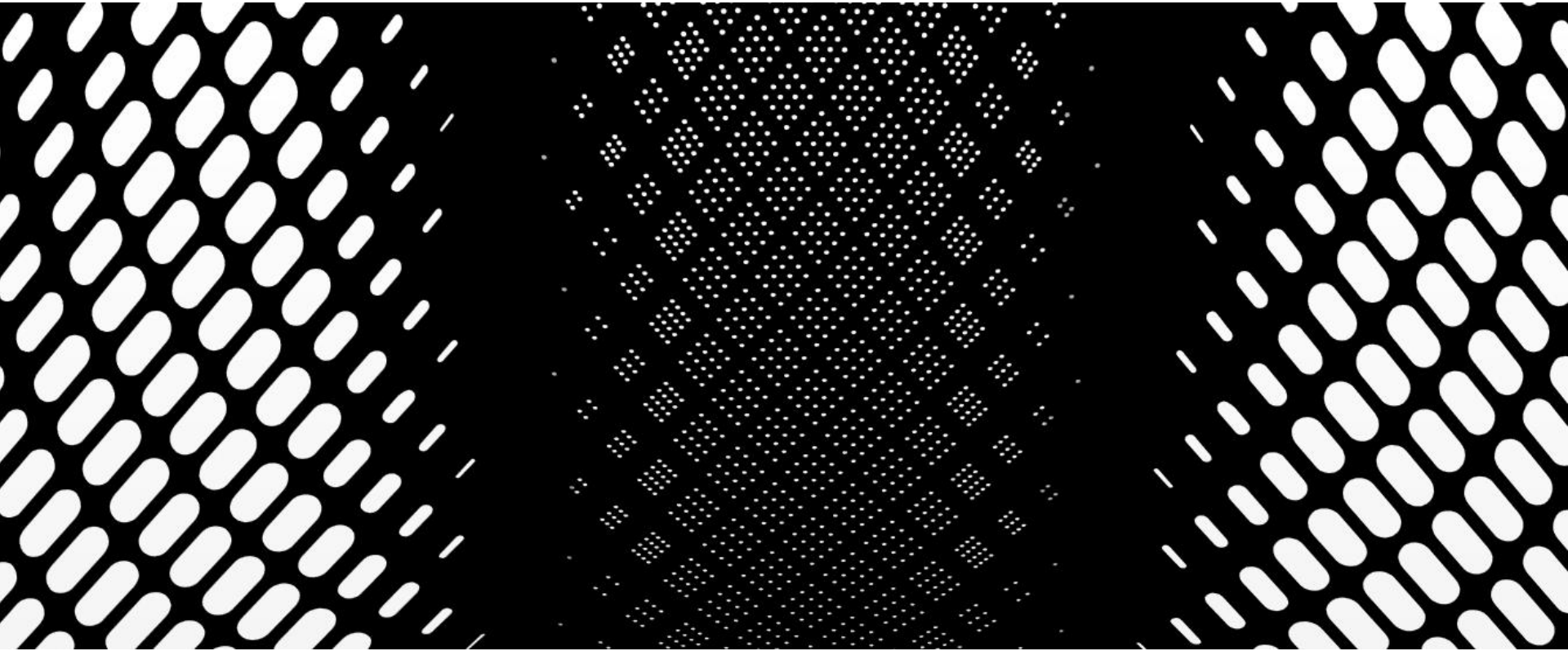
Architecture et détails



Pattern developement – Grasshopper, Kangaroo, Rhino



Pattern developement – Grasshopper, Kangaroo, Rhino



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Perforations – Solution retenue

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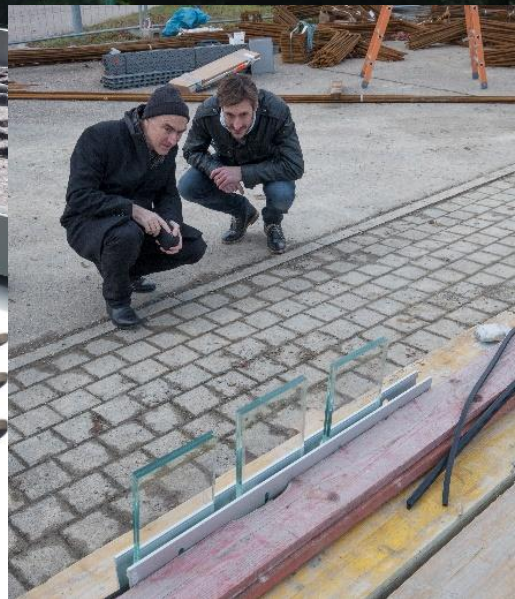
Garde-corps



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Garde corps

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Revêtement tablier

Revêtement tablier

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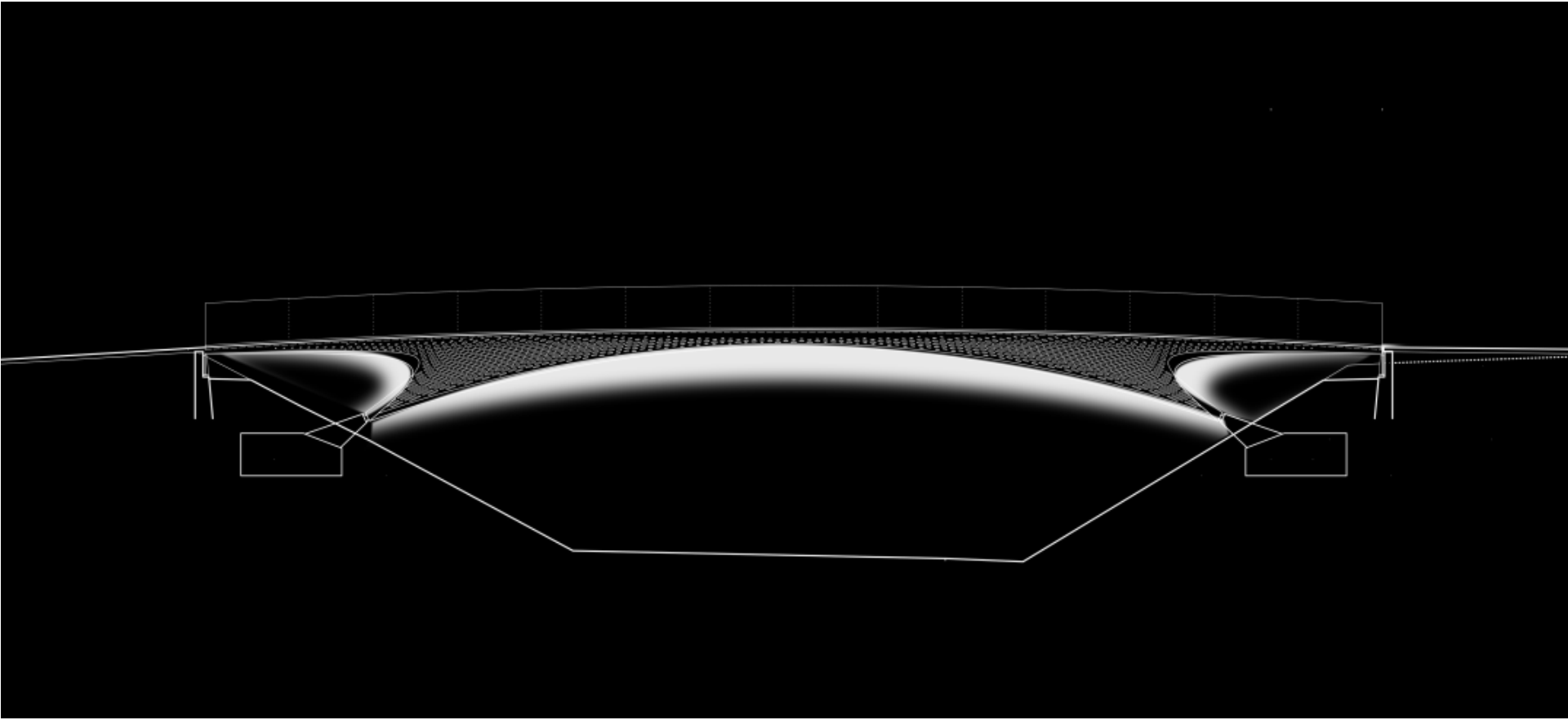
Revêtement tablier



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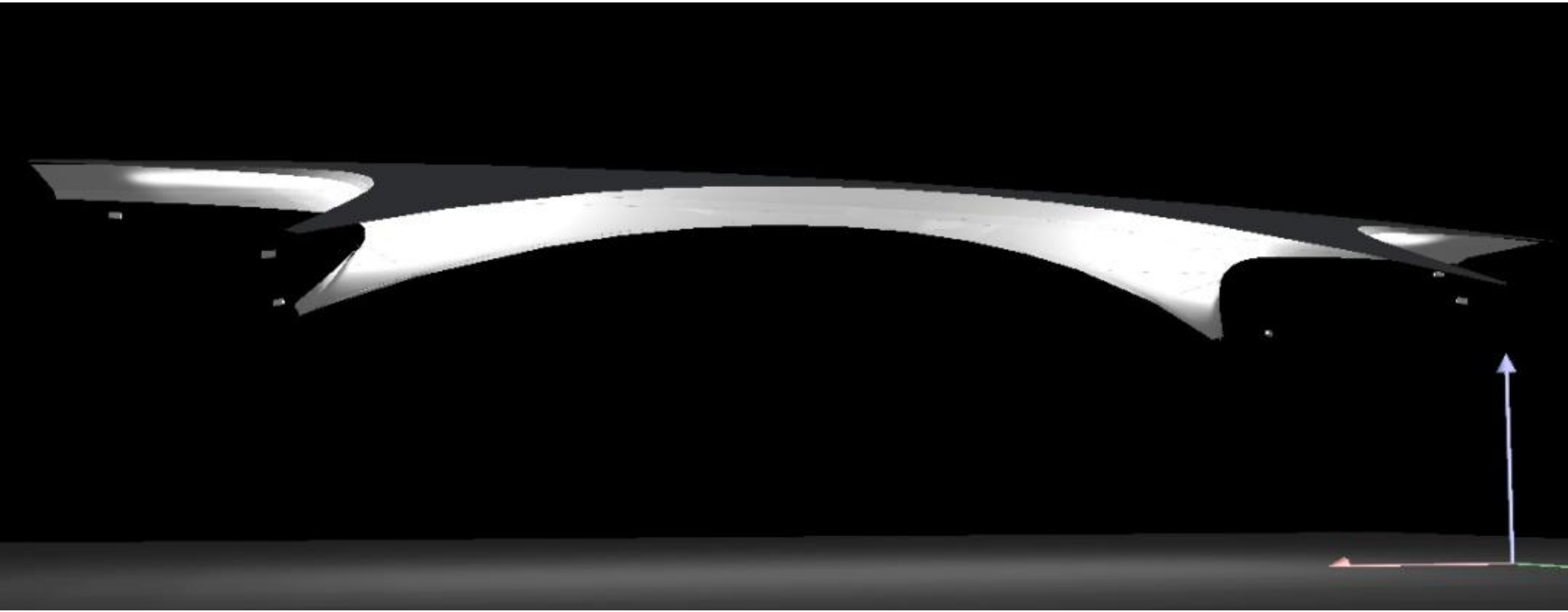
Eclairage



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Eclairage

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Eclairage

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Eclairage

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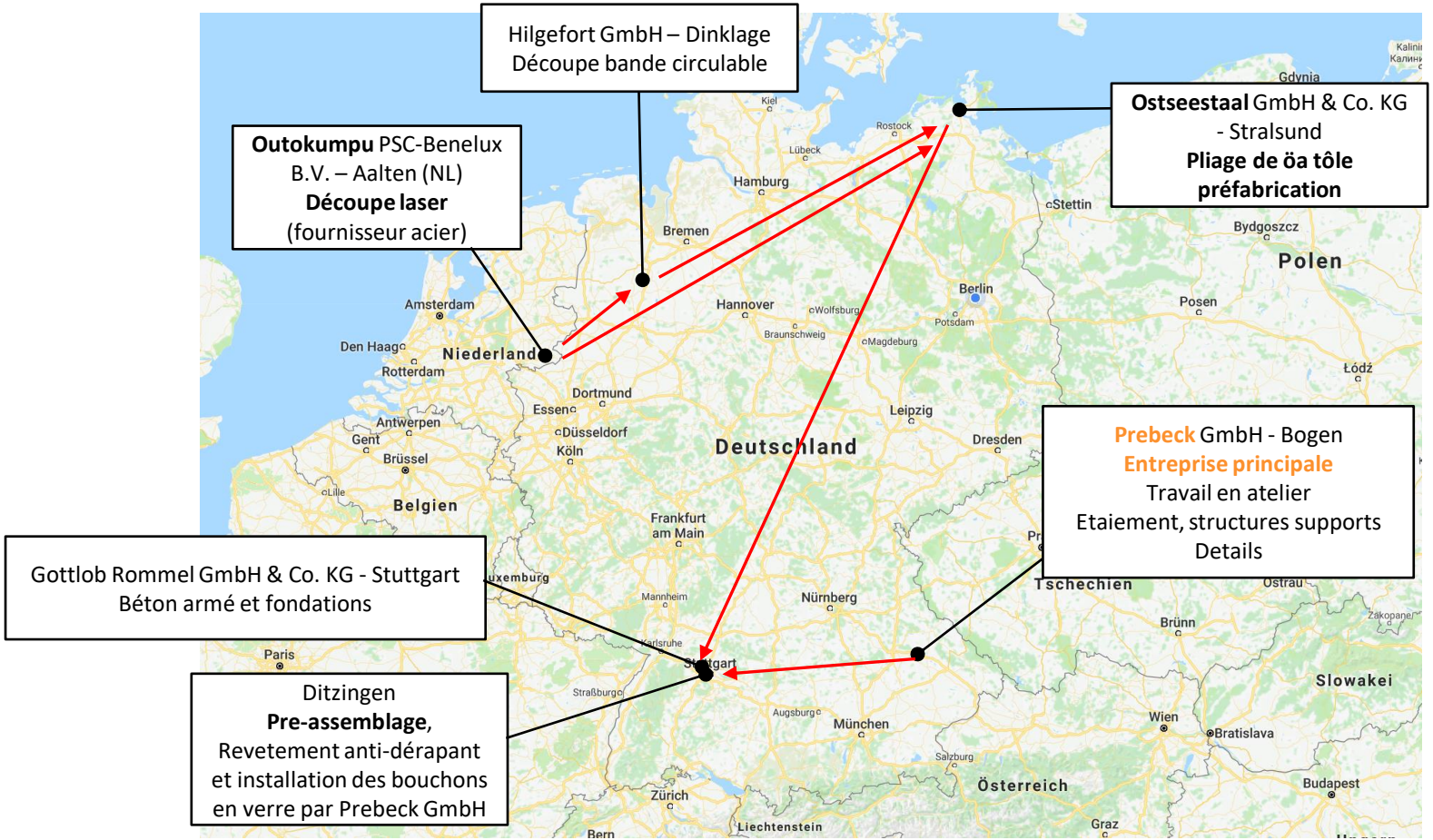
Construction et mise en œuvre



Entreprises impliquées et localisation des ateliers



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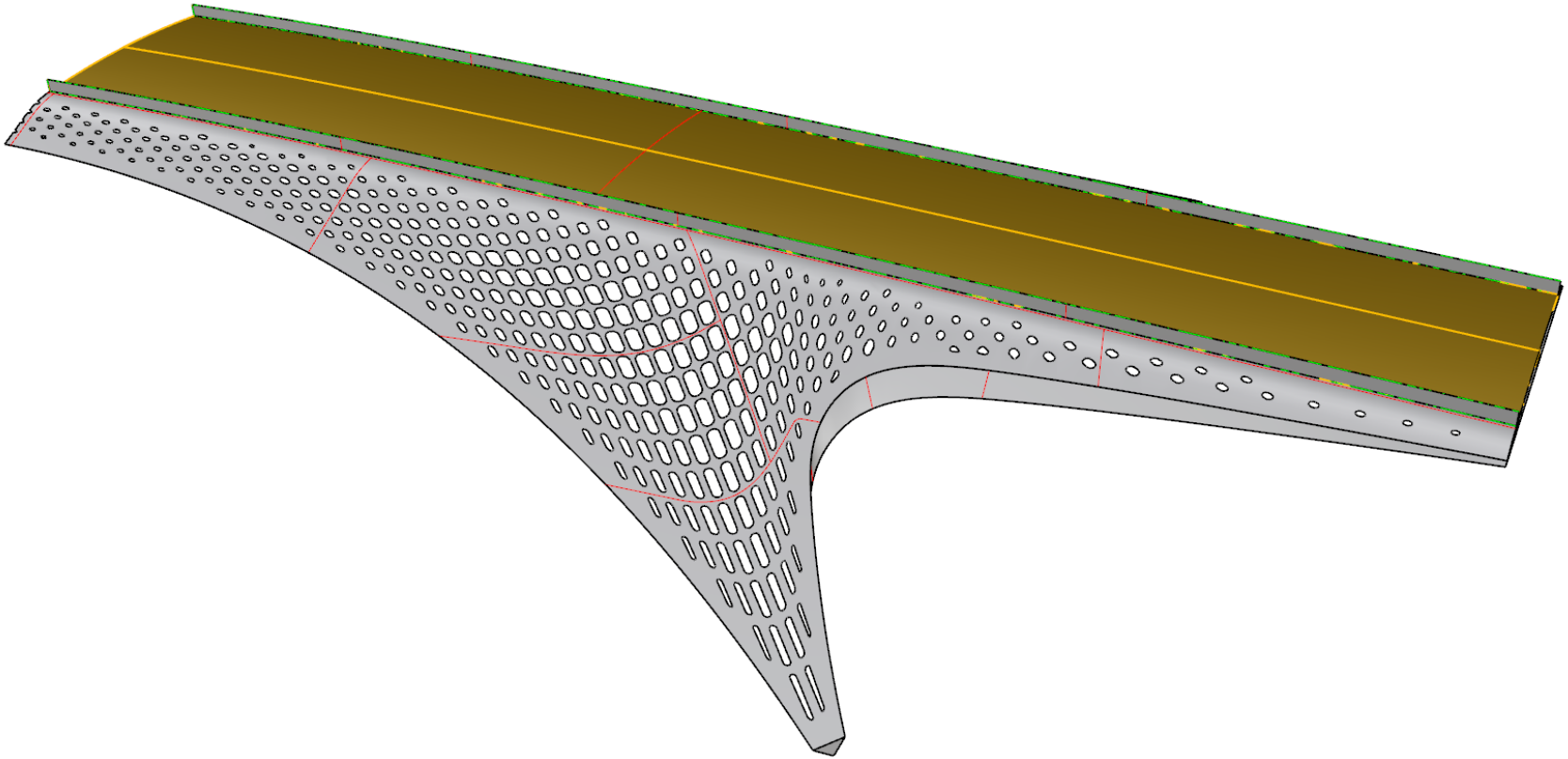
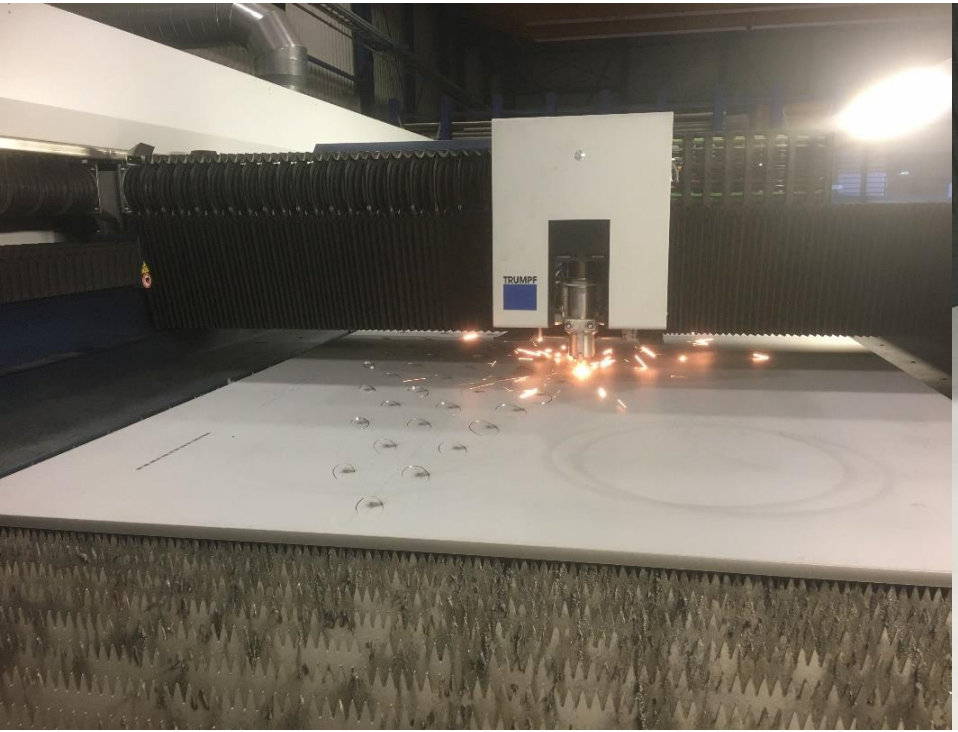
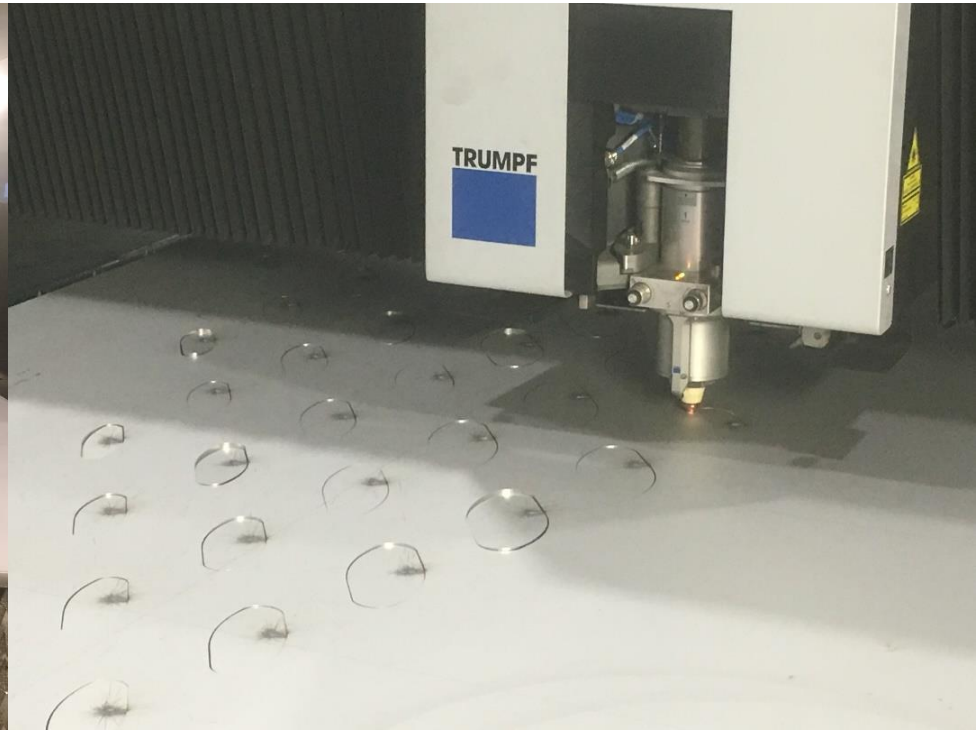
Culées et fondations



Découpage et définition des soudures





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Lasern Outokumpu (Holland)

Edelstahl (N_2)
20 mm

Baustahl (O_2)
25 mm

Standard-
Teilequalität

Edelstahl (N_2)
20 mm

Baustahl (O_2)
25 mm

Max. Teilequalität

without BrightLine fiber :

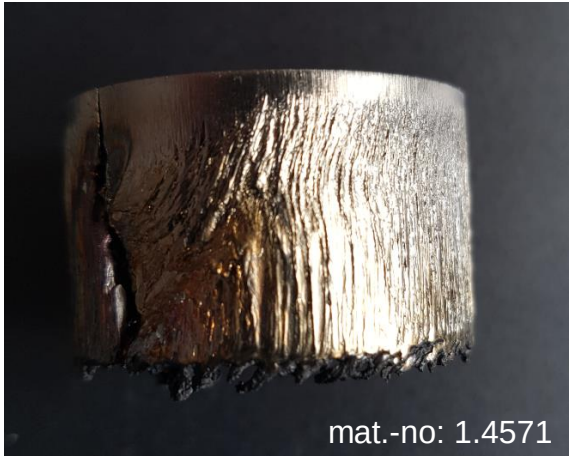
inhomogeneous cutting area and burrs

Optically low-quality impression, possibly rework necessary

with BrightLine fiber:

homogeneous cutting area and significantly reduced burrs

improved visual quality impression
roughness improved



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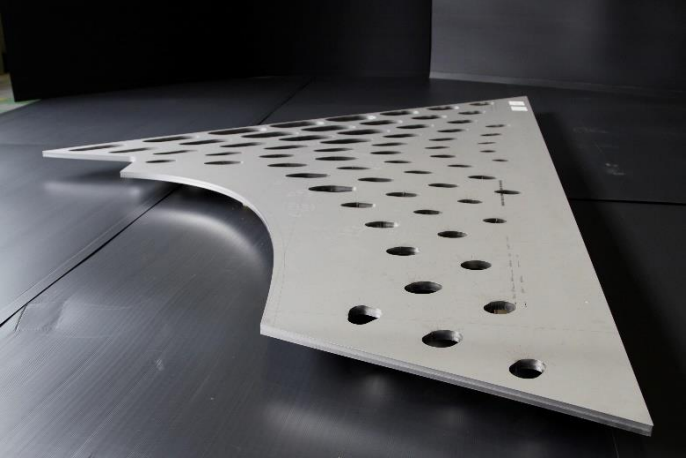
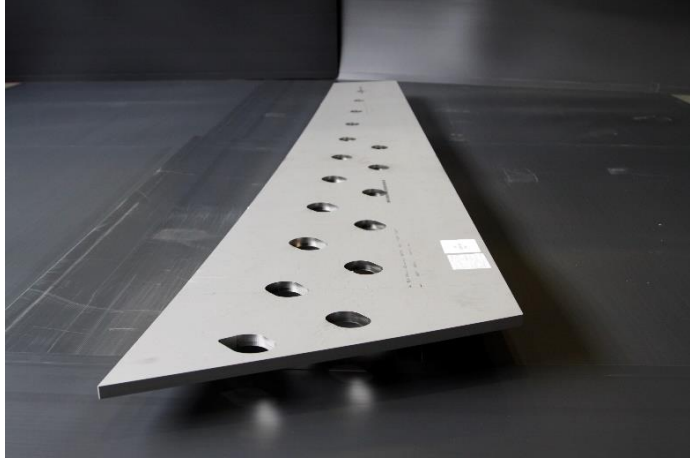
First laser tests with different stainless steel materials,
20mm plates





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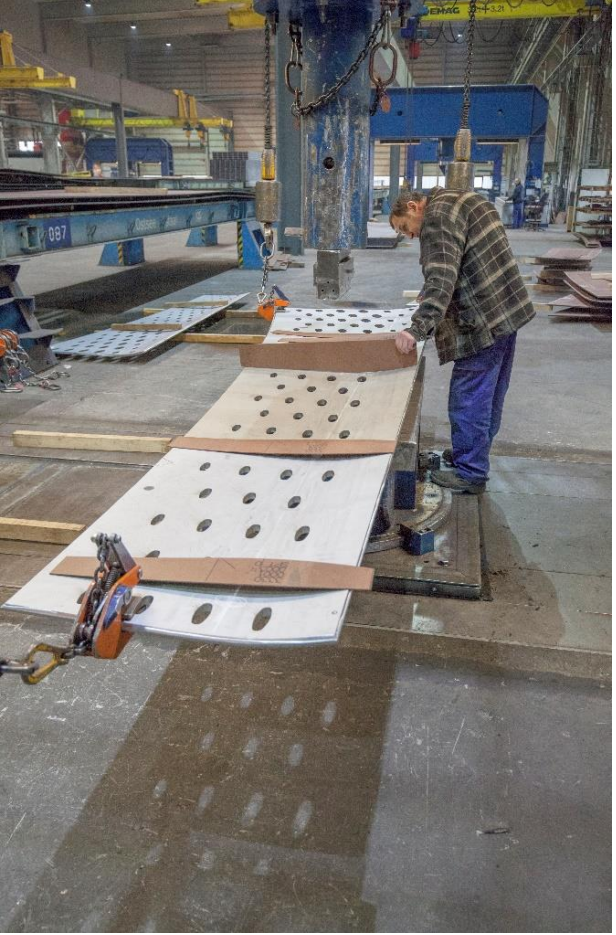
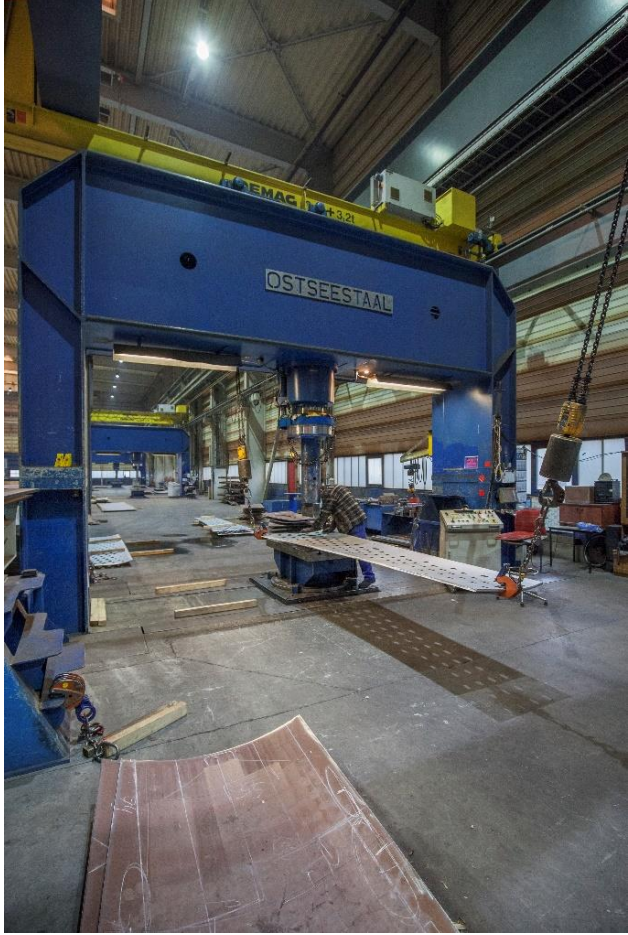
Trumpf Laser cutting Brightline quality





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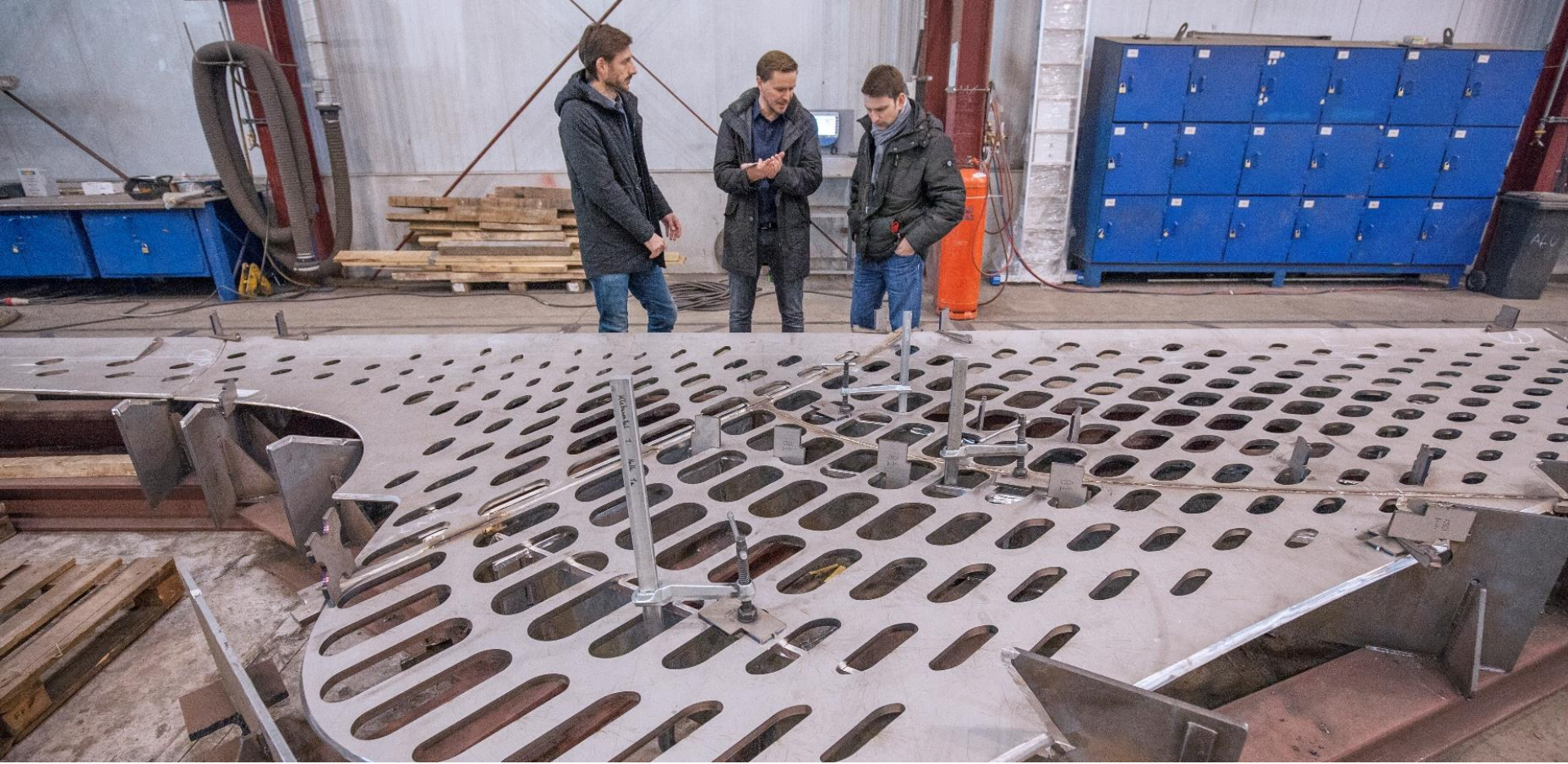
Ostseestaal Stralsund

Transport des éléments préfabriqués

Arrivée des éléments préfabriqués sur site



Arrivée des éléments préfabriqués sur site

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Soudage

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Soudage

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Meulage des soudures

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Atelier sur site

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Atelier sur site

Démontage de l‘atelier temporaire

Préparation pour le grutage

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Méthode pour le grutage

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Grutage

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Grutage

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bergermann partner

Grutage

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Grutage

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Détail des appuis

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Détail des appuis

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Détail des appuis

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Finalisation de la pose

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Mise en place du garde-corps

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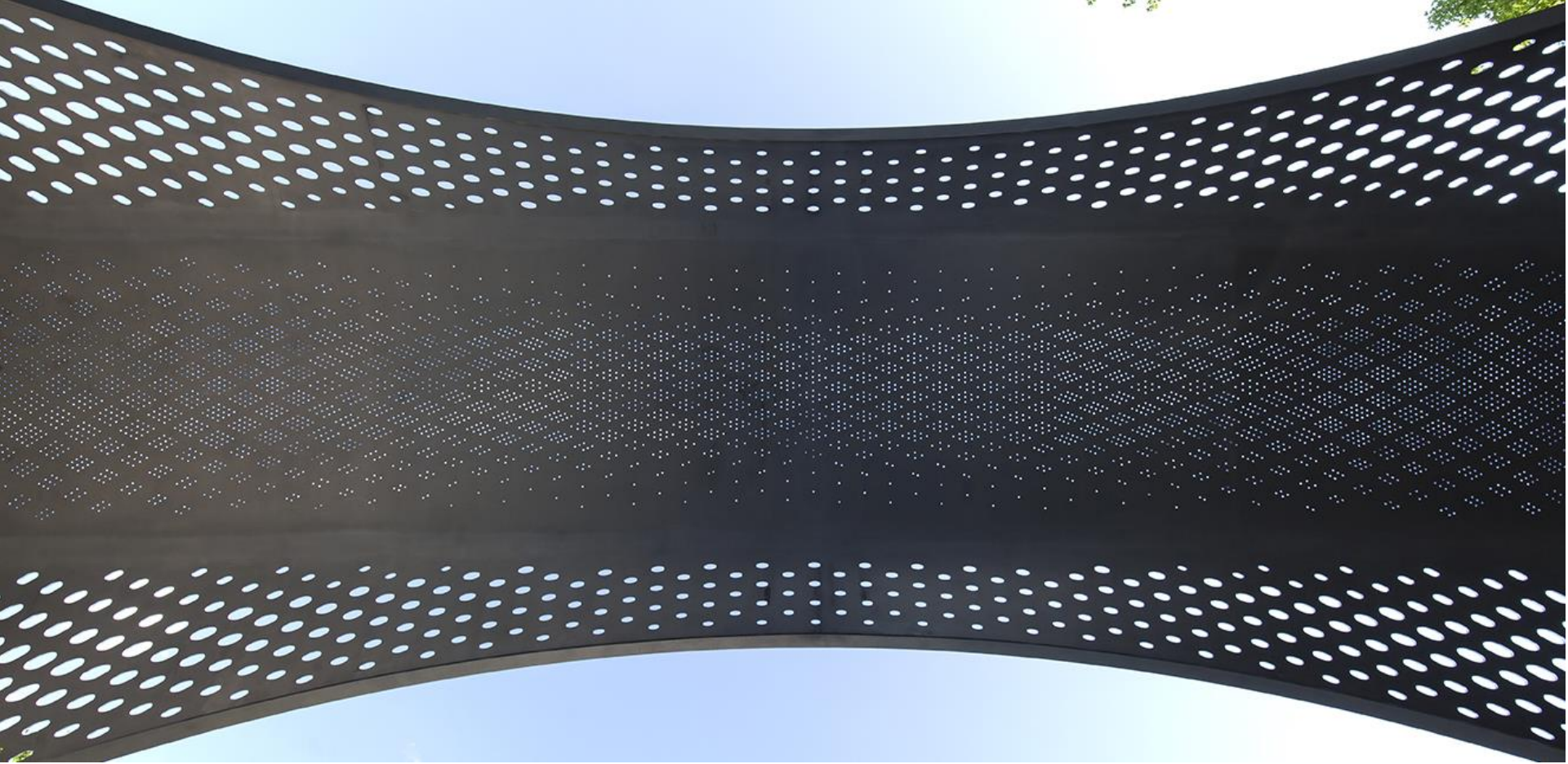
Mise en lumière



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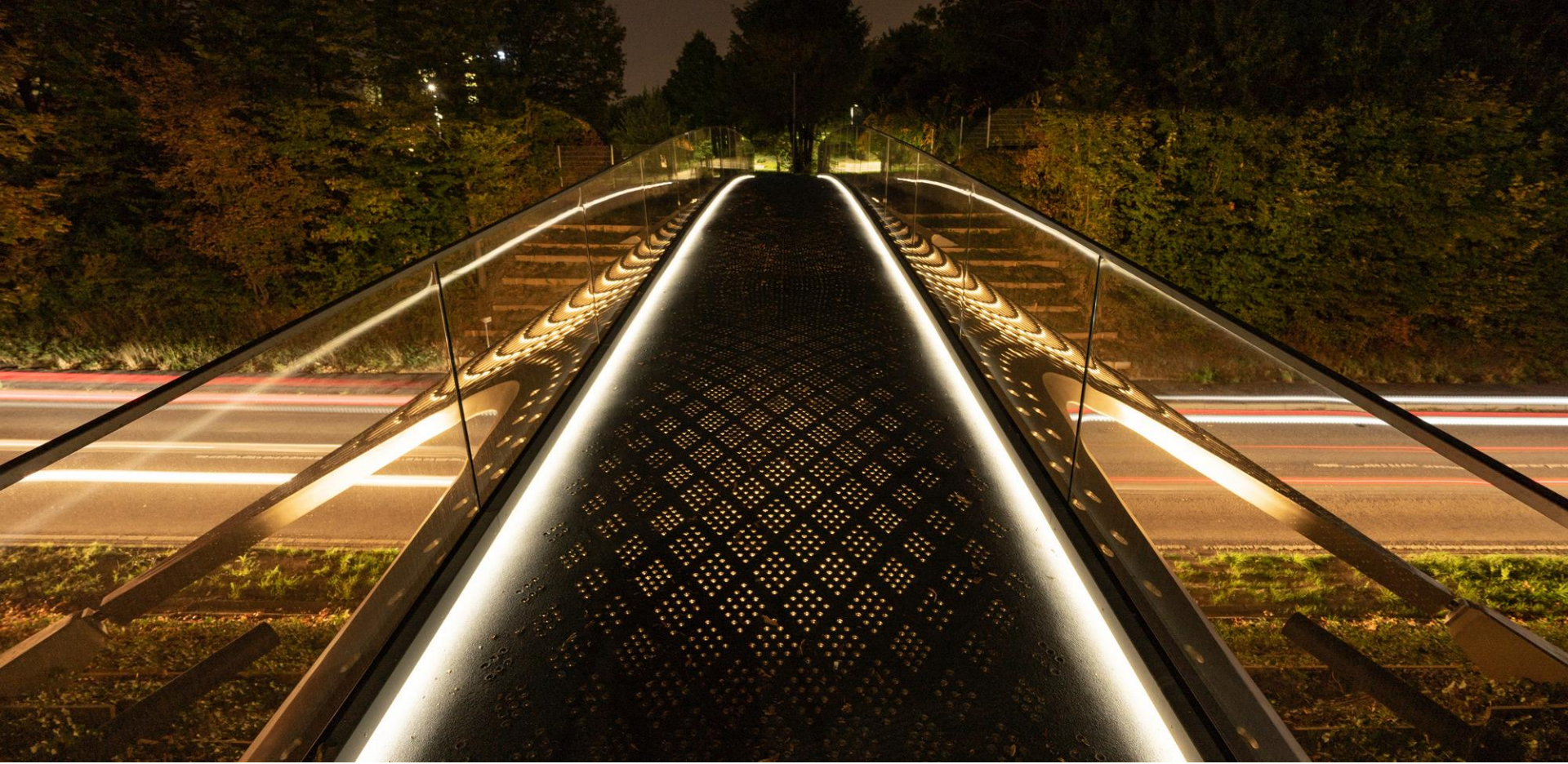

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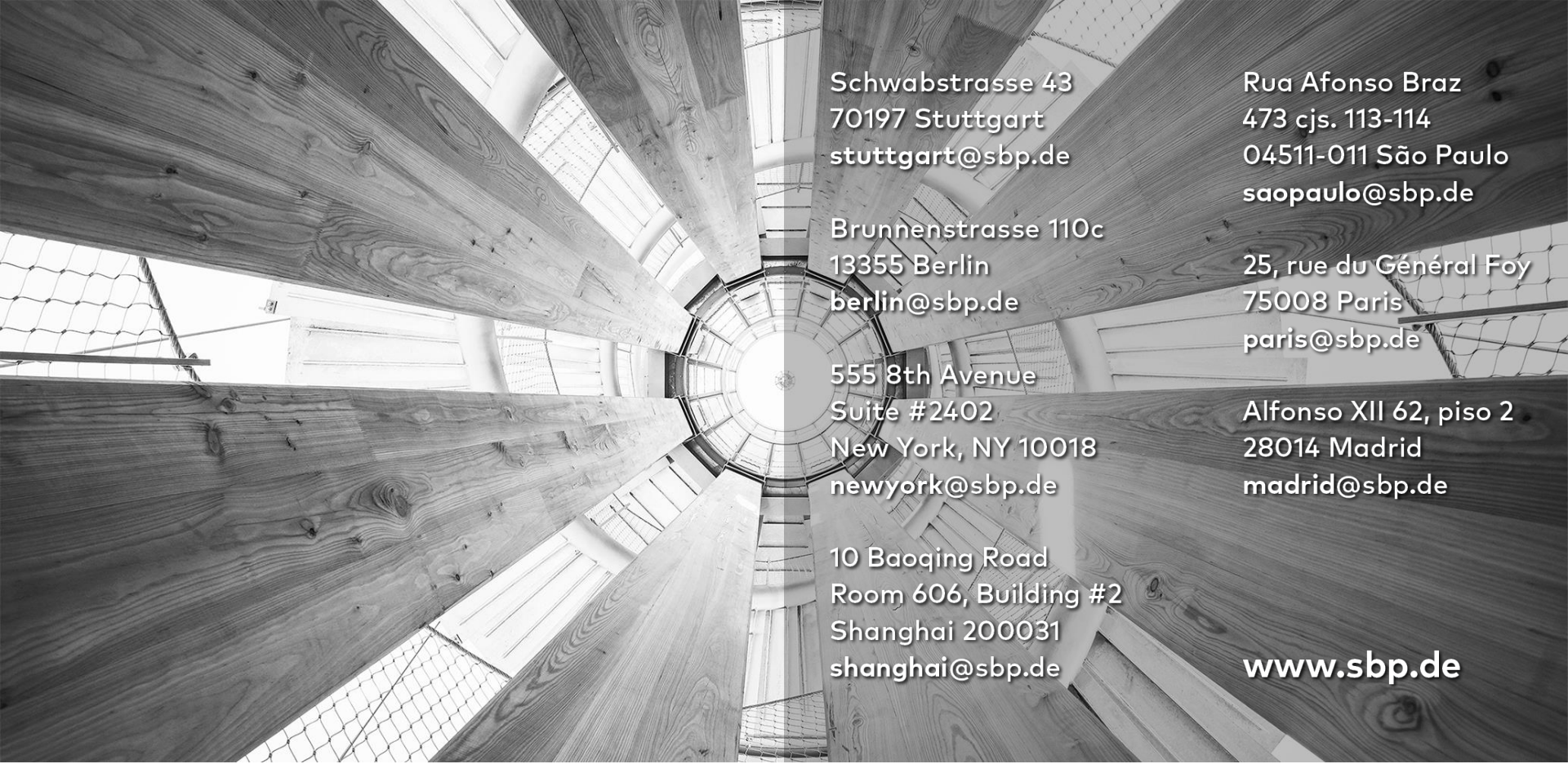
Merci pour votre attention!



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