



Fenix Staalbouwdag

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Lennart Wiltjer
09-10-25

IMd

Raadgevende
Ingenieurs

An aerial, black-and-white photograph of a city, likely Rio de Janeiro, showing a river, dense urban development, and a large stadium. The word "FENIX" is overlaid in large, bold, yellow capital letters. A thick yellow diagonal bar extends from the end of the word towards the top right corner of the image.

FENIX













Team

Opdrachtgever

Stichting Droom en Daad

Architecten

MAD Architects. EGM architecten, Polderman

Aannemer

Dura Vermeer Heyma

Staalconstructie Tornado

CSM, CIG Architecture

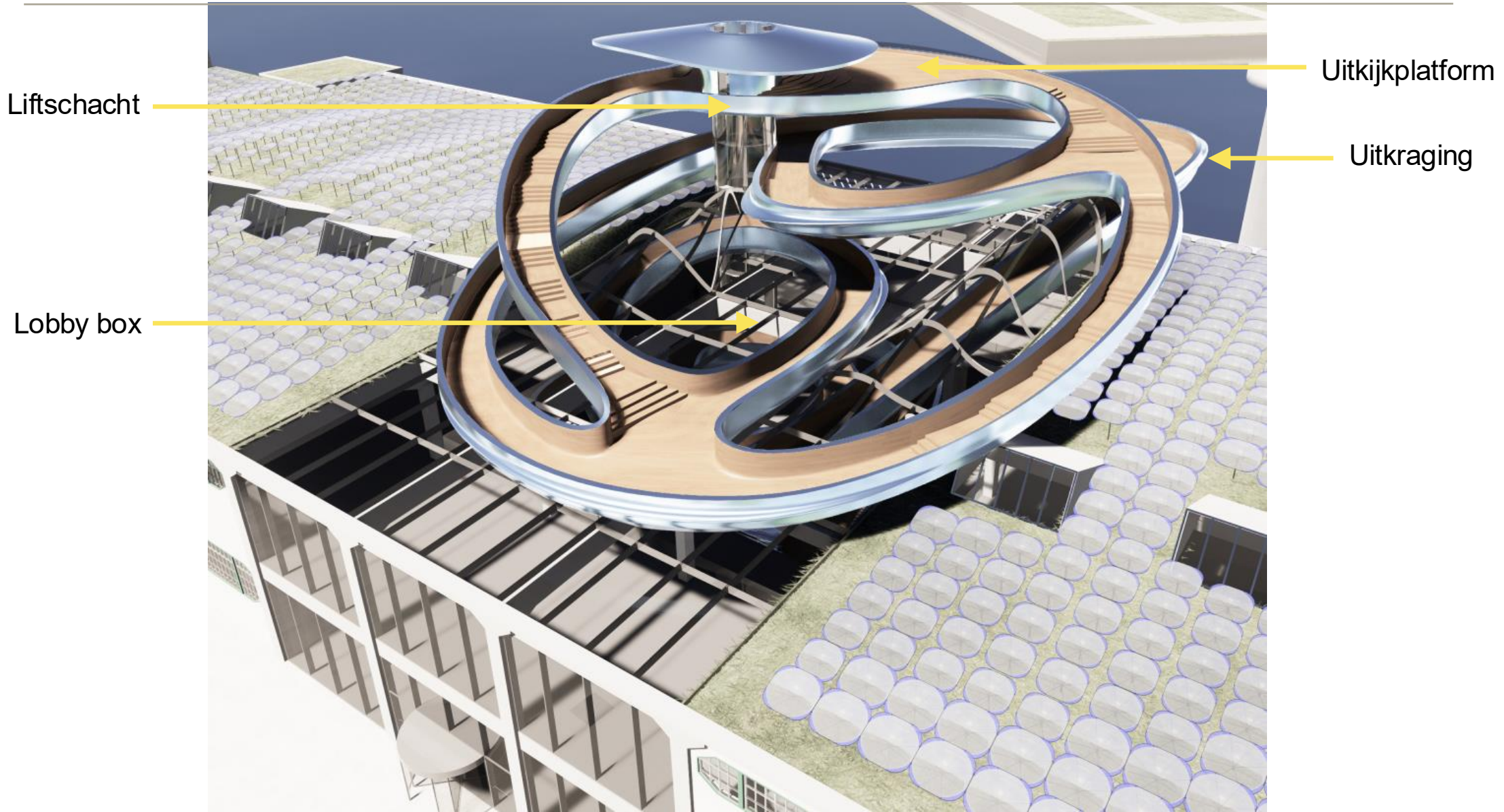




Ontwerptraject Tornado

IMd
Raadgevende
Ingenieurs

Tornado – architectonisch ontwerp



Tornado – start constructief ontwerp

Support the tornado



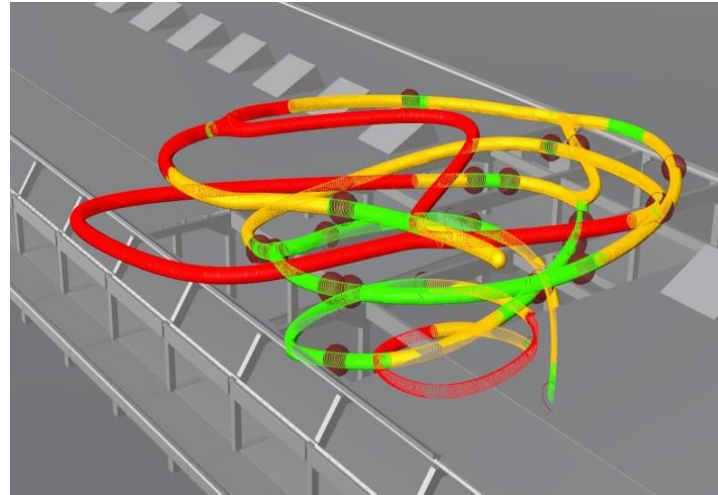
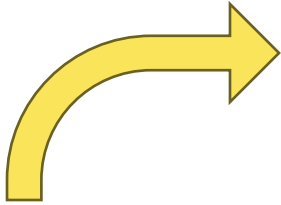
Add to the tornado



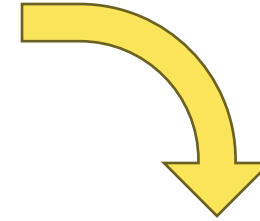
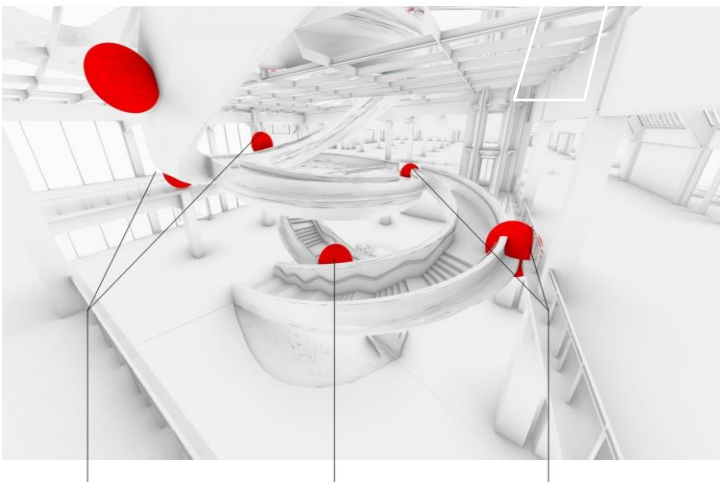
Vormoptimalisatie

2-wekenlijkse cyclus

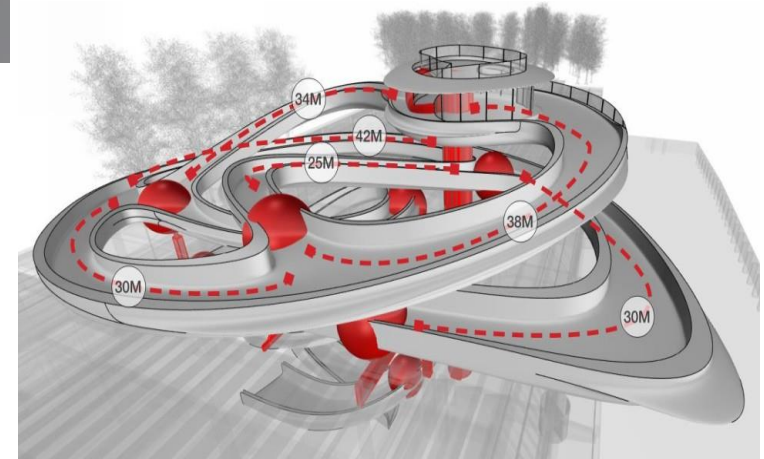
IMd check constructief gedrag,
(eigenfrequenties, vervormingen)



MAD past ontwerp aan

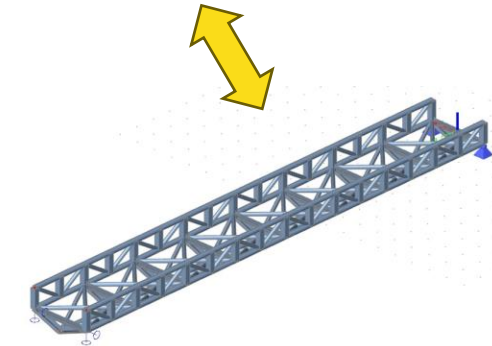
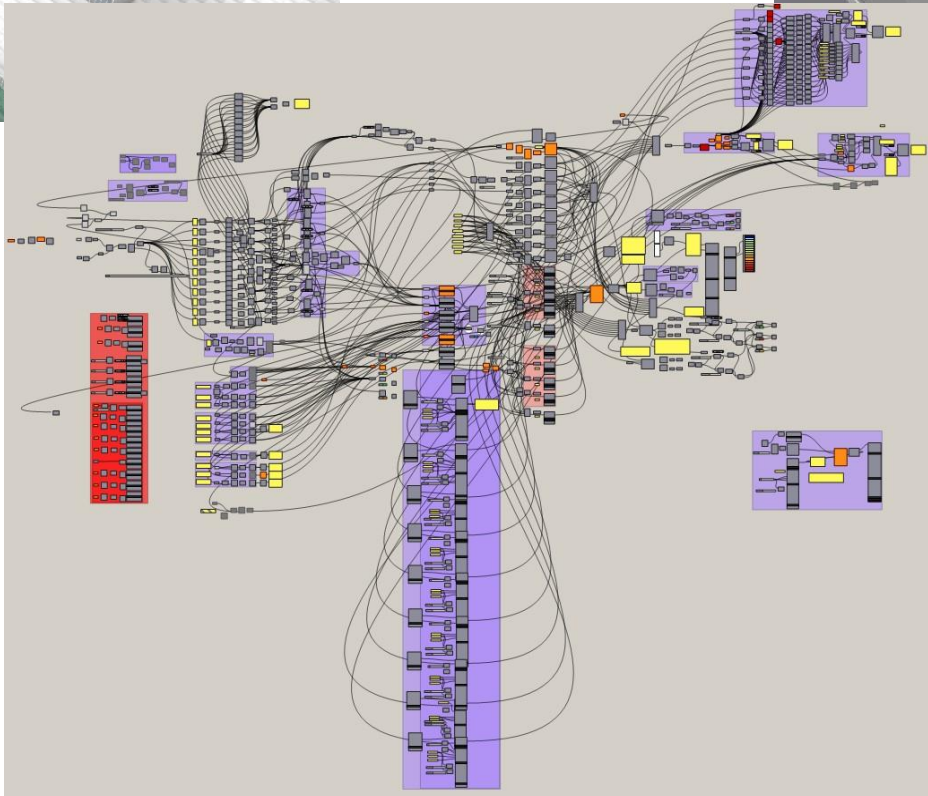
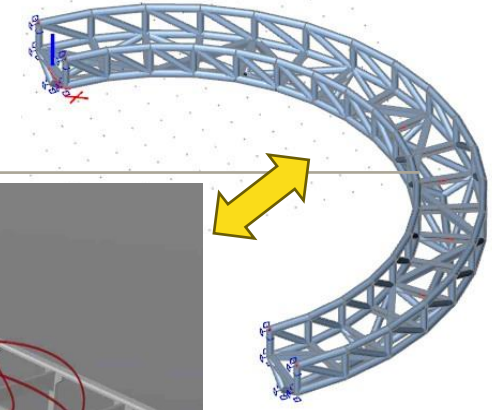
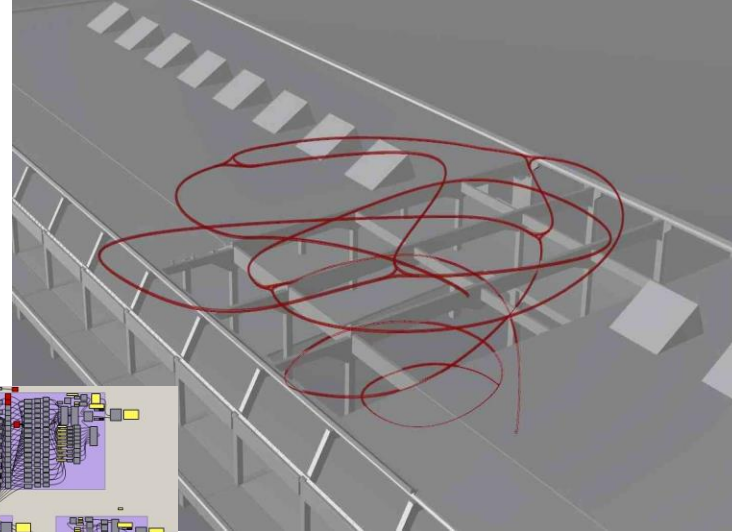
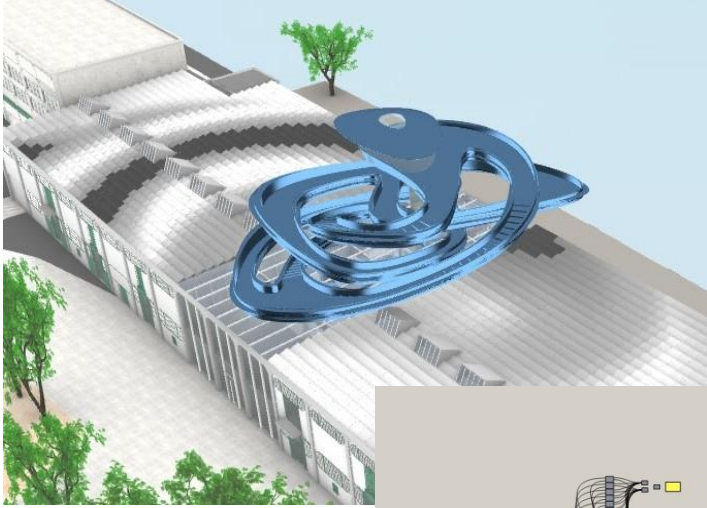


MAD en IMd bespreken aanpassingen

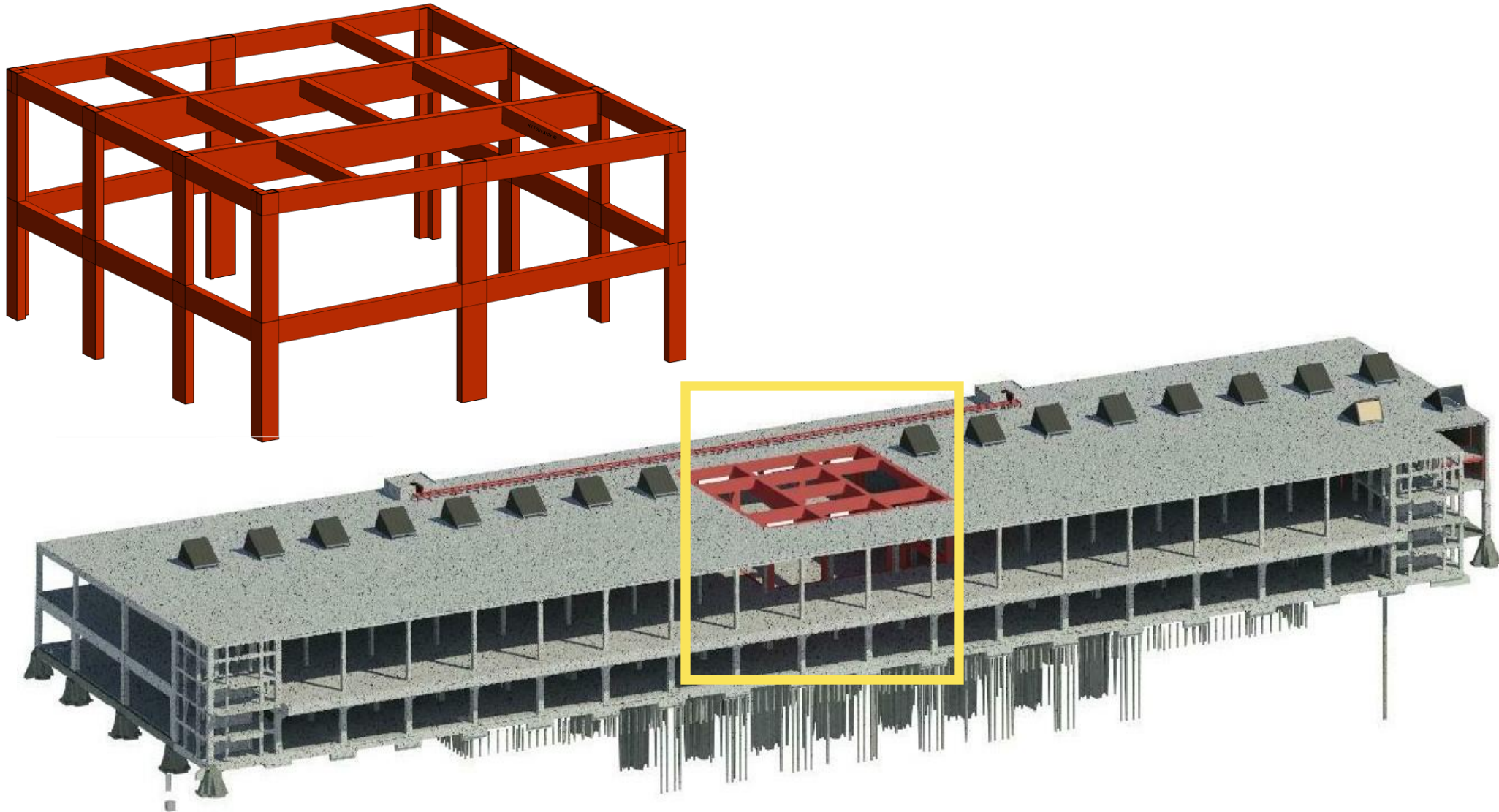


IMd

Van grof naar fijn

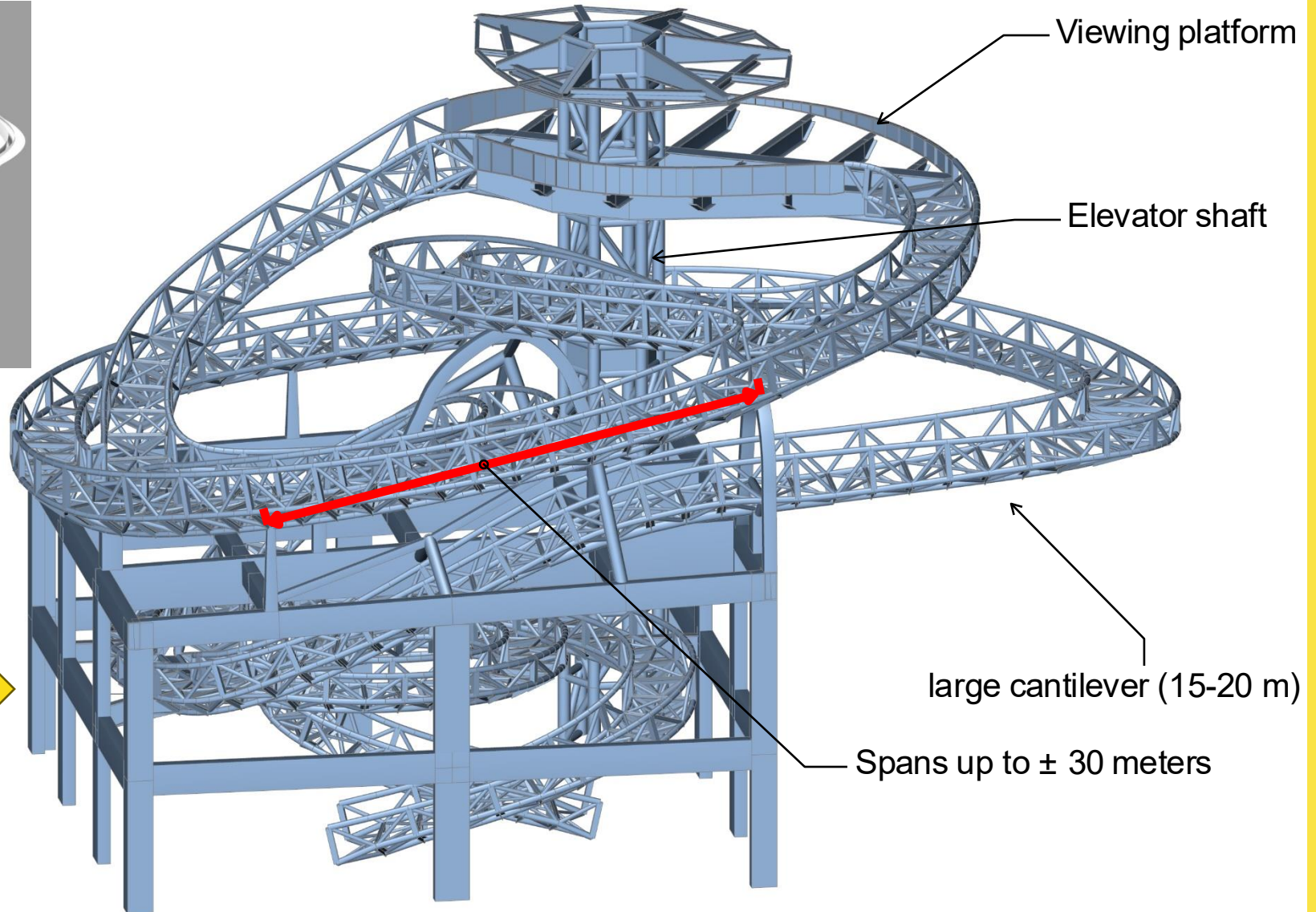
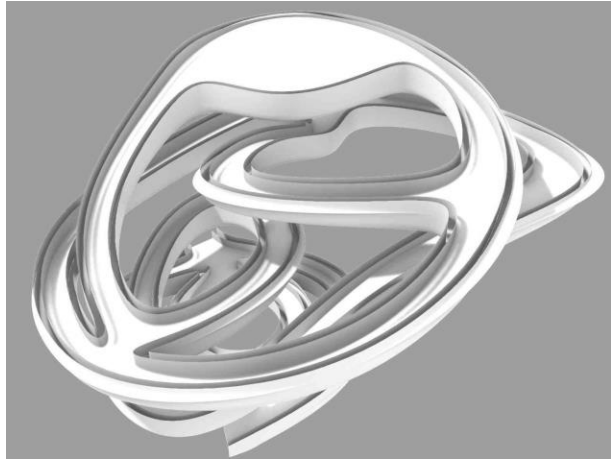


Lobby Box





Technisch Ontwerp





IMd

Vervormingen

3D verplaatsing

Waardes: U_{total}

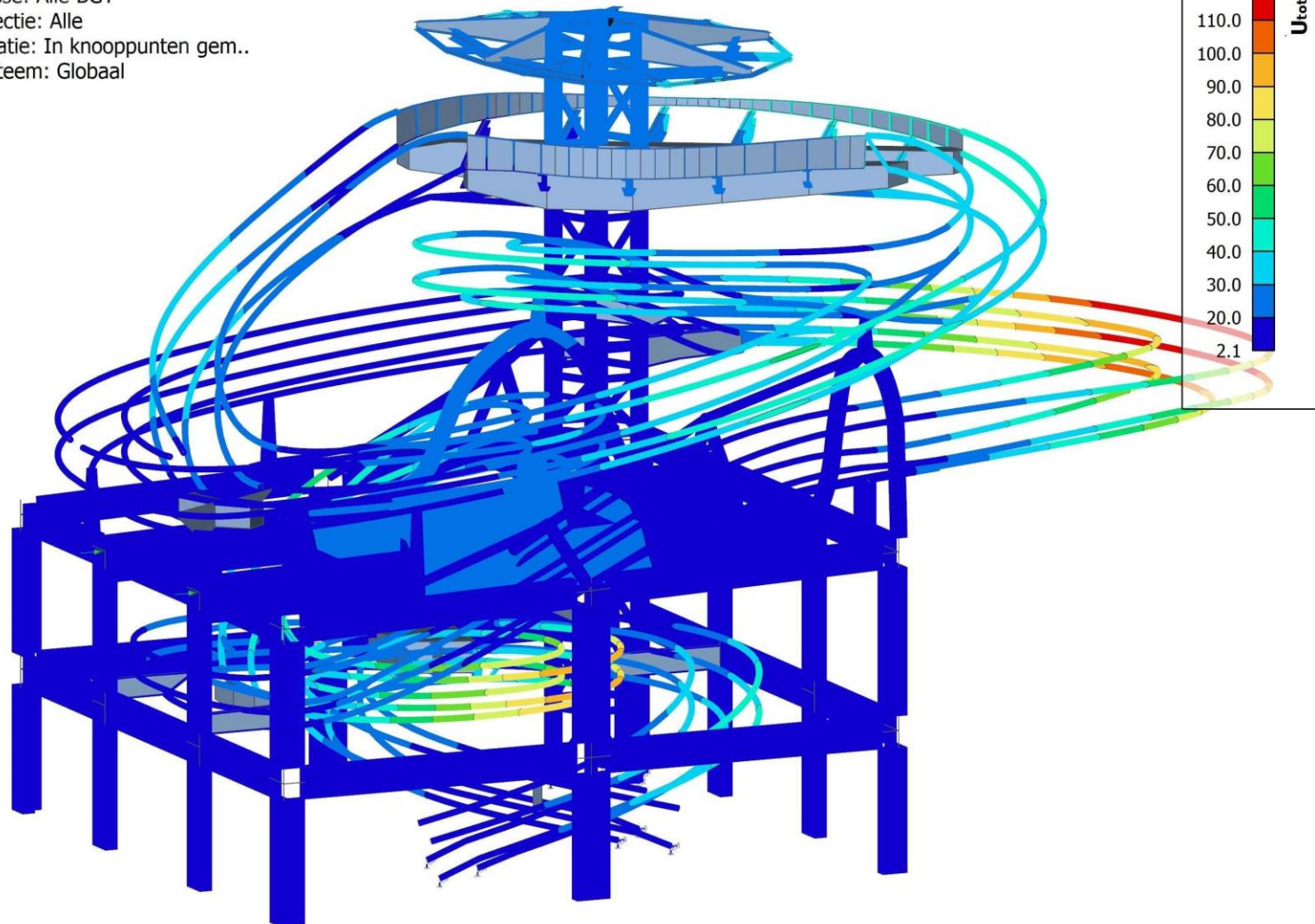
Lineaire berekening

Klasse: Alle BGT

Selectie: Alle

Locatie: In knooppunten gem..

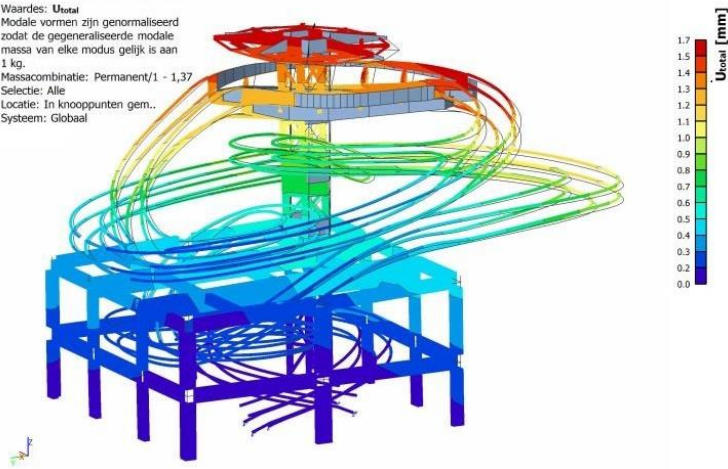
Systeem: Globaal



Eigenfrequenties

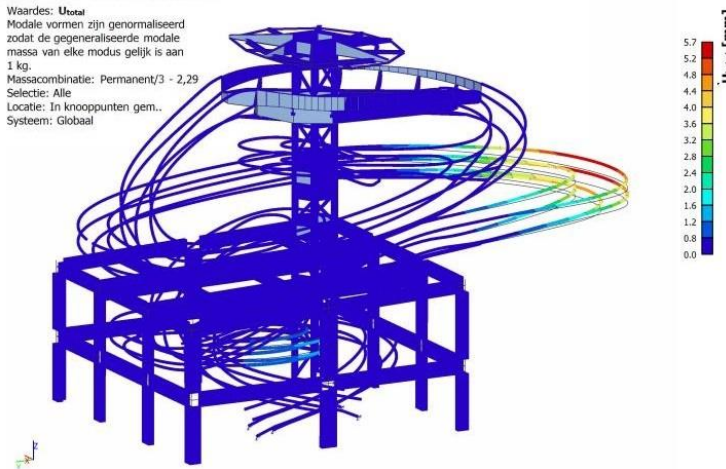
1.2.1. 3D verplaatsing; U_{total}

Waardes: U_{total}
Modale vormen zijn genormaliseerd
zodat de gegeneraliseerde modale
massa van elke modus gelijk is aan
1 kg.
Massacombinatie: Permanent/1 - 1,37
Selectie: Alle
Locatie: In knooppunten gem..
Systeem: Globaal



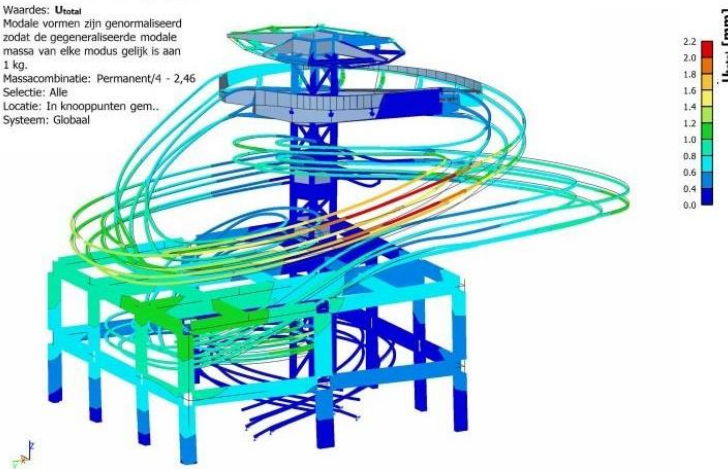
1.4.1. 3D verplaatsing; U_{total}

Waardes: U_{total}
Modale vormen zijn genormaliseerd
zodat de gegeneraliseerde modale
massa van elke modus gelijk is aan
1 kg.
Massacombinatie: Permanent/3 - 2,29
Selectie: Alle
Locatie: In knooppunten gem..
Systeem: Globaal



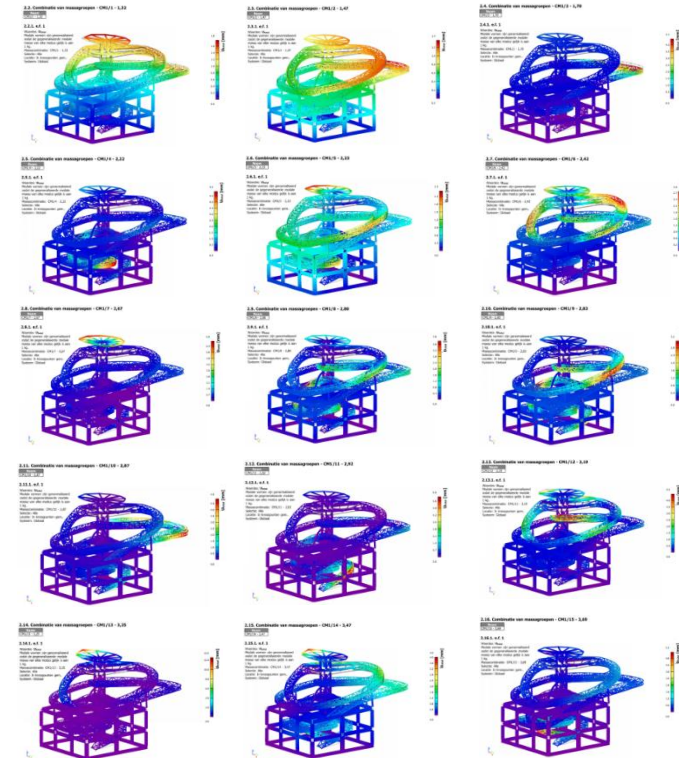
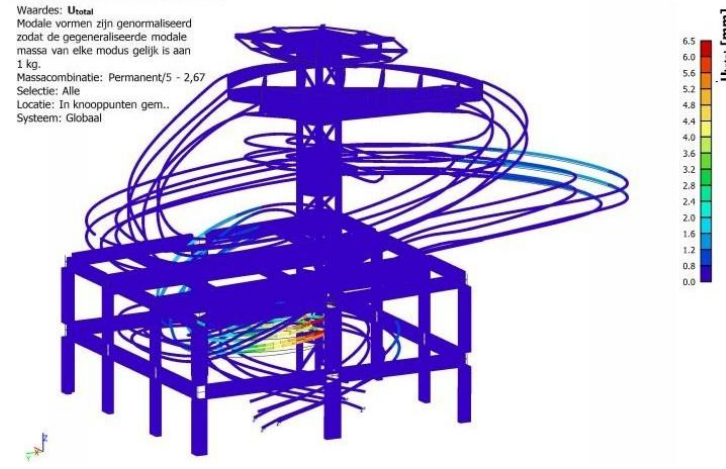
1.5.1. 3D verplaatsing; U_{total}

Waardes: U_{total}
Modale vormen zijn genormaliseerd
zodat de gegeneraliseerde modale
massa van elke modus gelijk is aan
1 kg.
Massacombinatie: Permanent/4 - 2,46
Selectie: Alle
Locatie: In knooppunten gem..
Systeem: Globaal



1.6.1. 3D verplaatsing; U_{total}

Waardes: U_{total}
Modale vormen zijn genormaliseerd
zodat de gegeneraliseerde modale
massa van elke modus gelijk is aan
1 kg.
Massacombinatie: Permanent/5 - 2,67
Selectie: Alle
Locatie: In knooppunten gem..
Systeem: Globaal

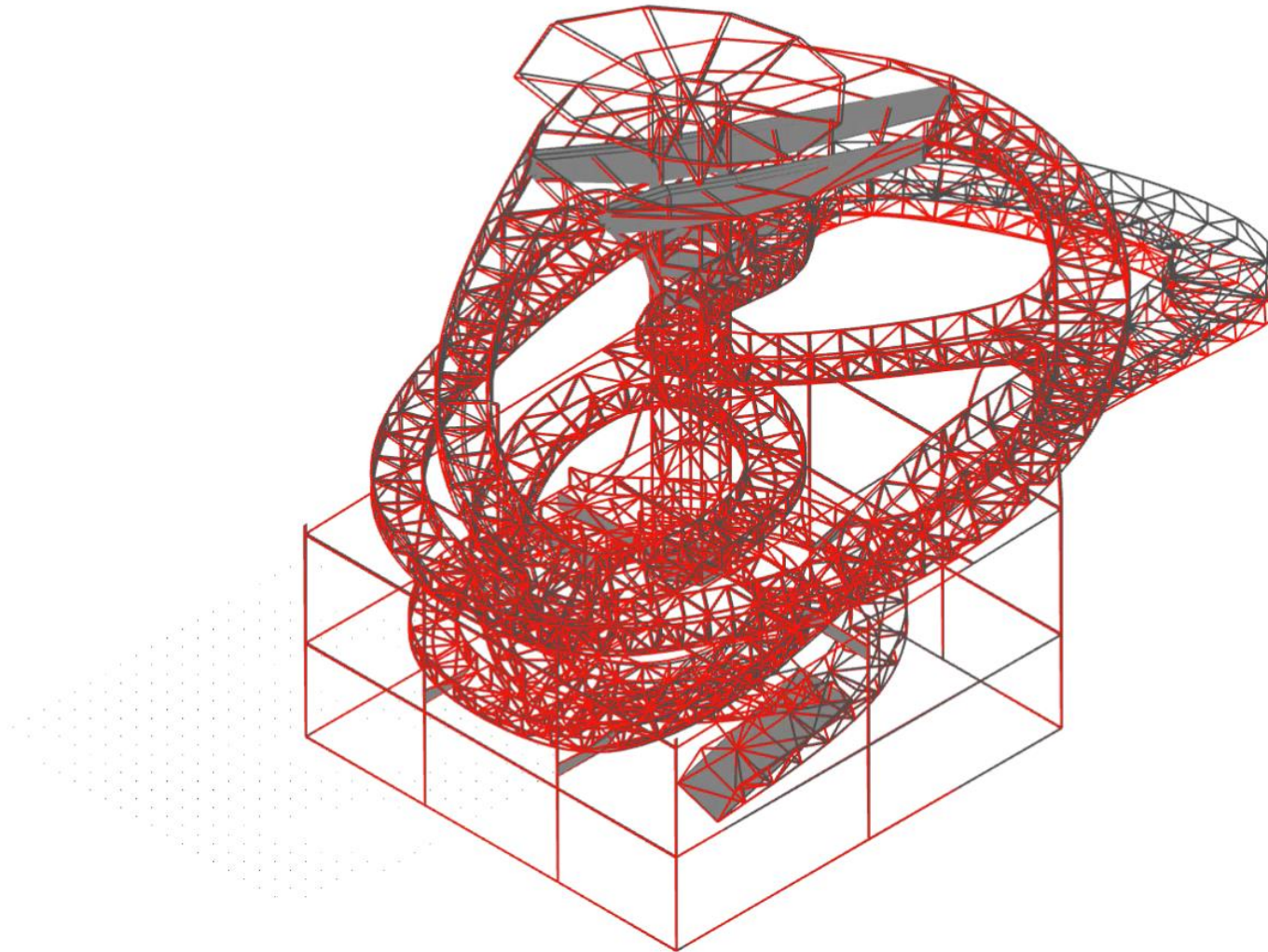


Dynamische belasting



Voorbeeld: lower cantilever

Start animatie

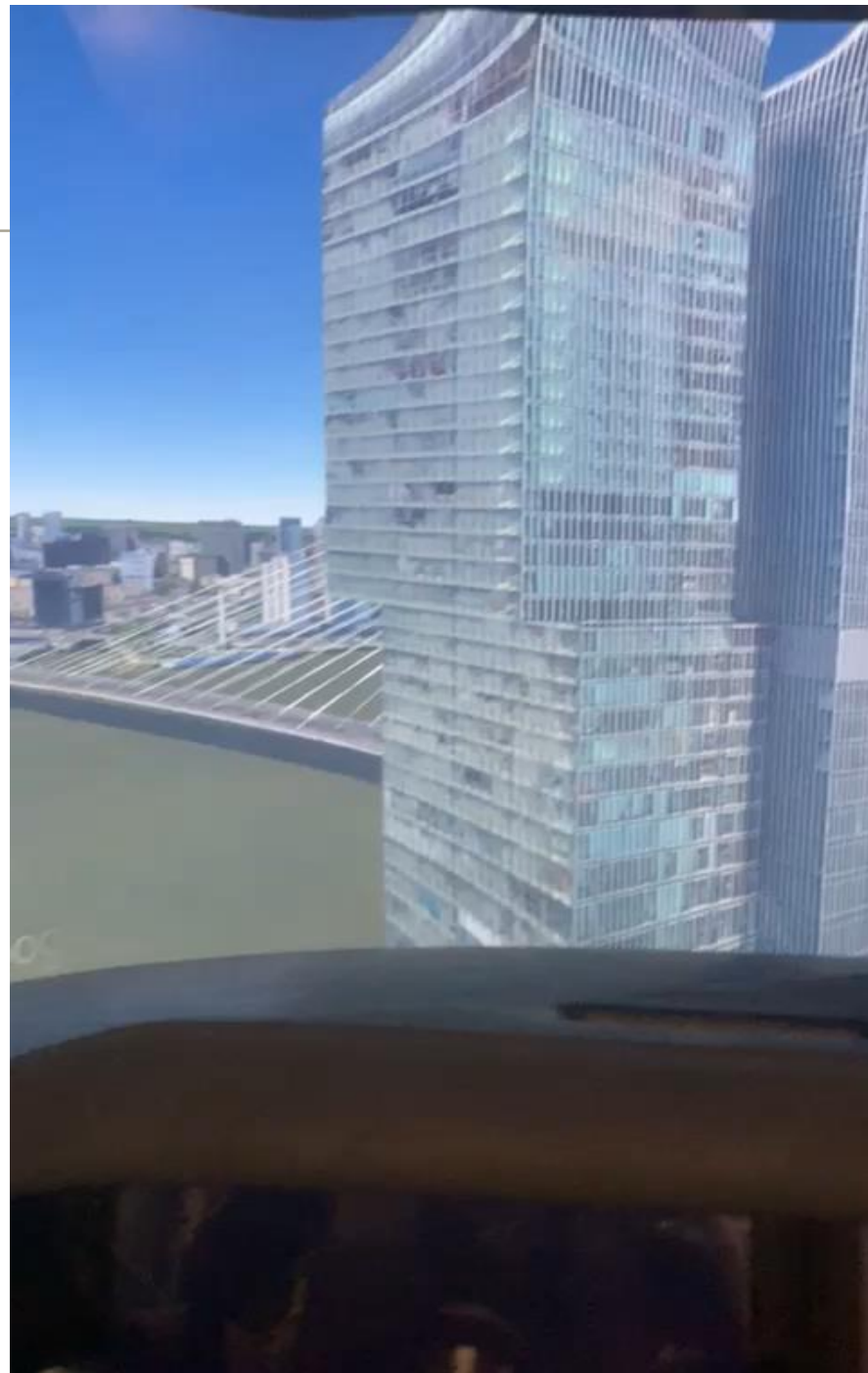


IMd

Simulator



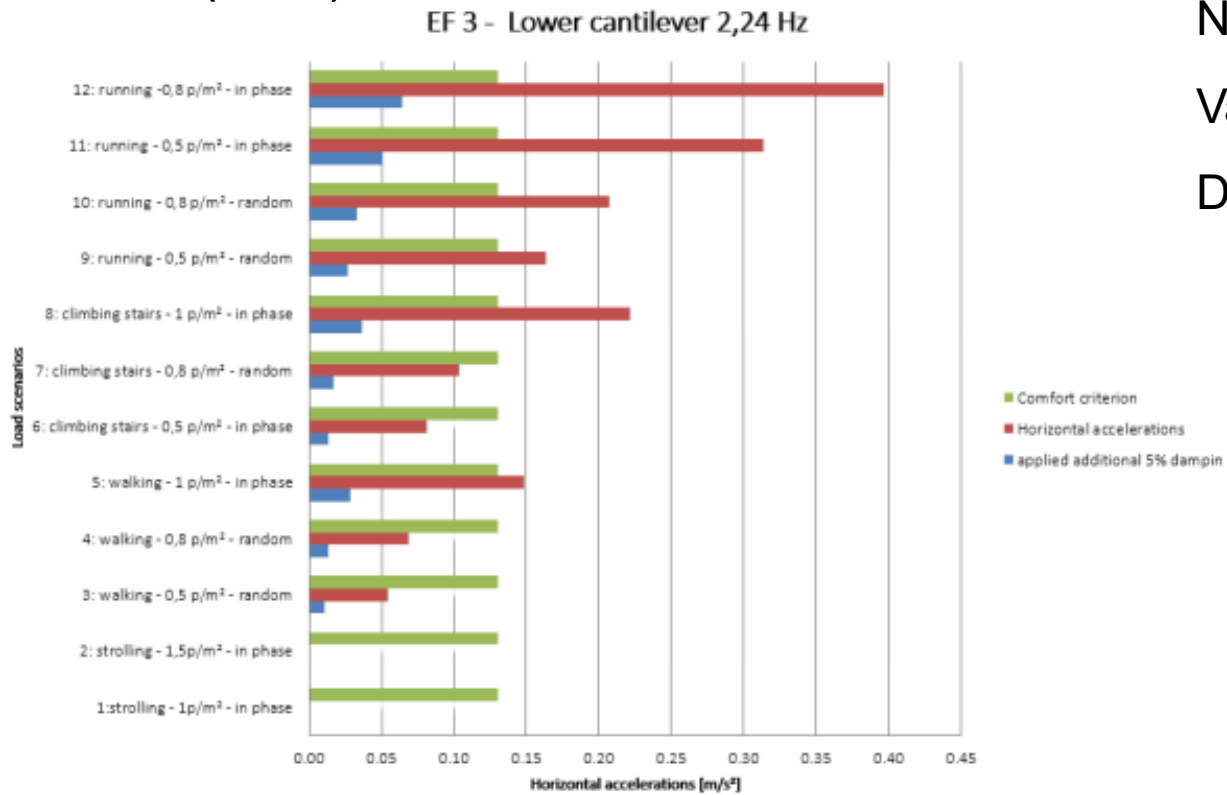
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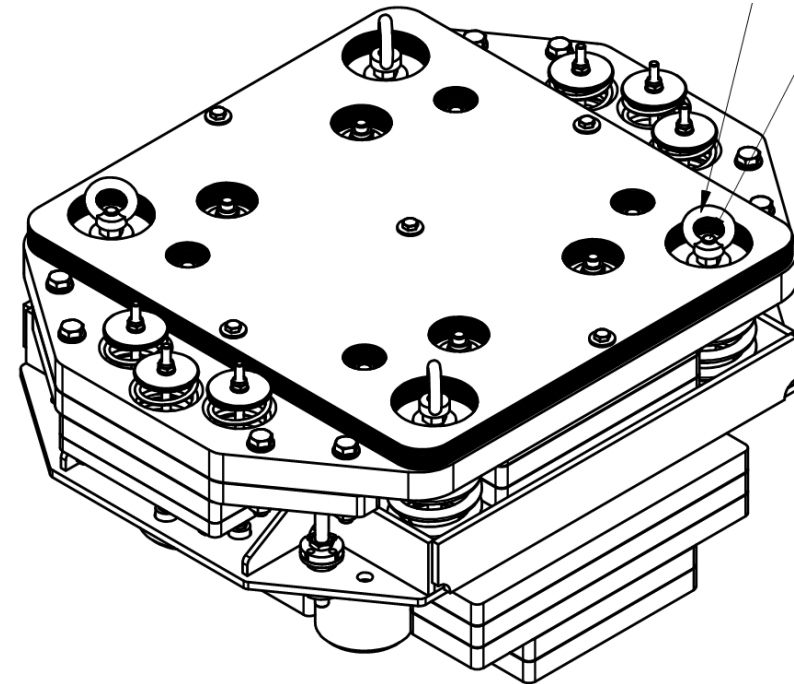
IMd

Conclusies

Comfort (SLS)



	Without damping	With damping
Normal use	✗	✓
Vandalism	✗	✓
Dancing	✗	✗





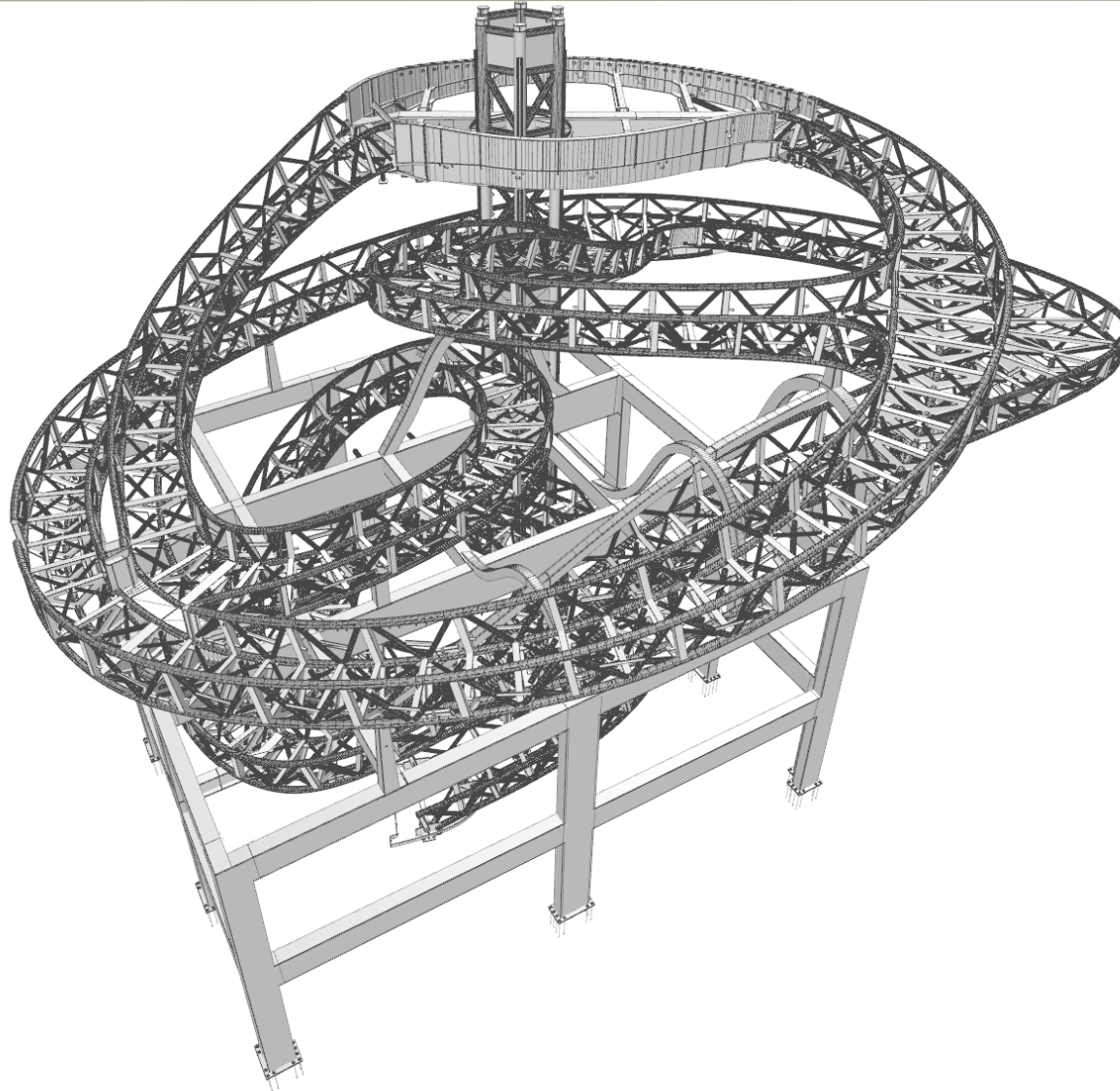
Robuustheid

IMd

Raadgevende
Ingenieurs

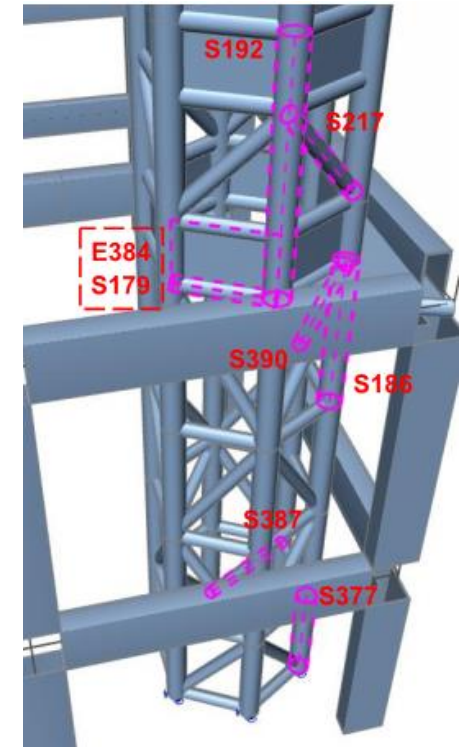
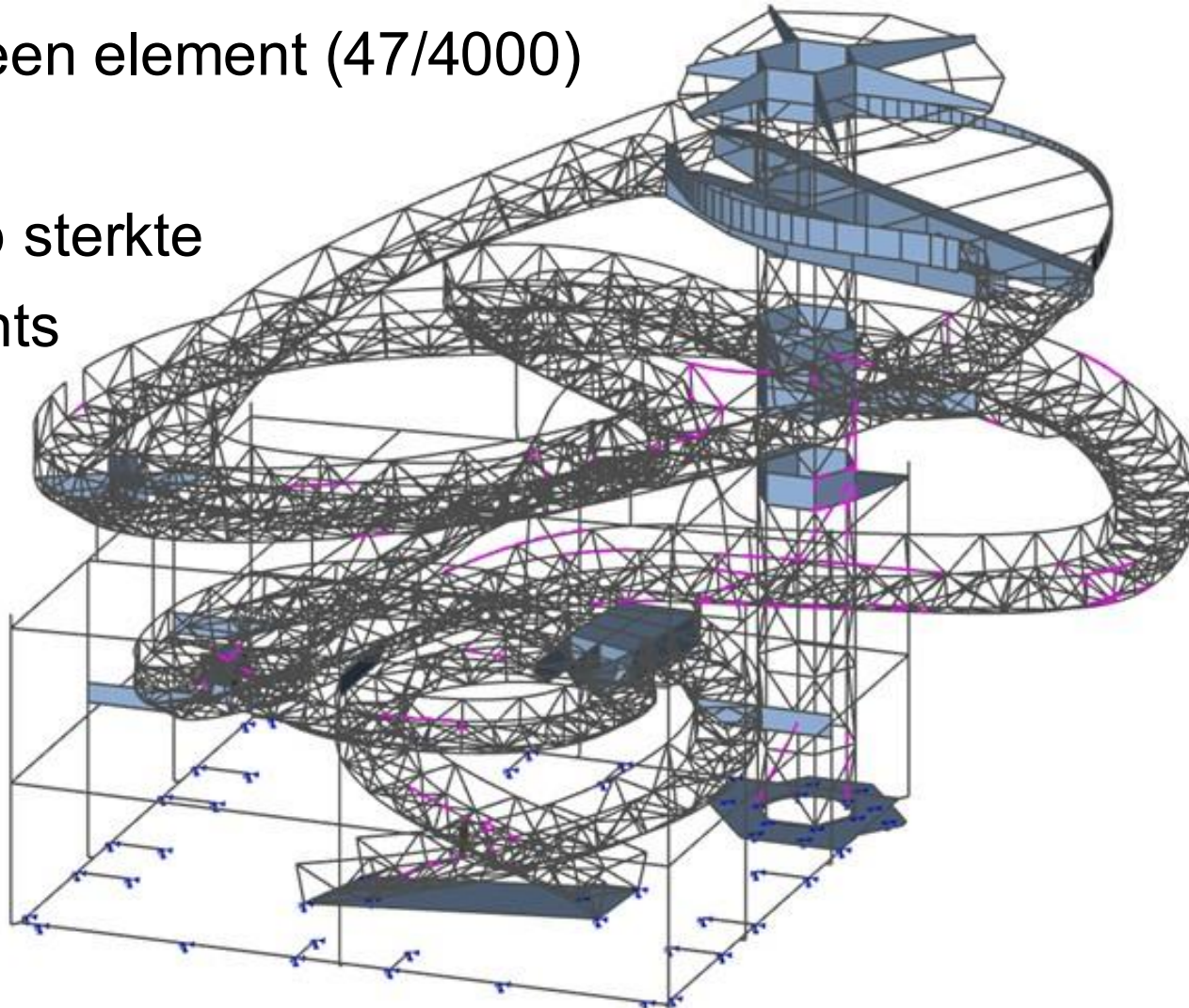
Kritieke onderdelen

1. Platform
2. Lobby box
3. Kern
4. Tornado



Kritieke onderdelen

- Uitval van een element (47/4000)
- Scripten
- Controle op sterkte
- Key elements

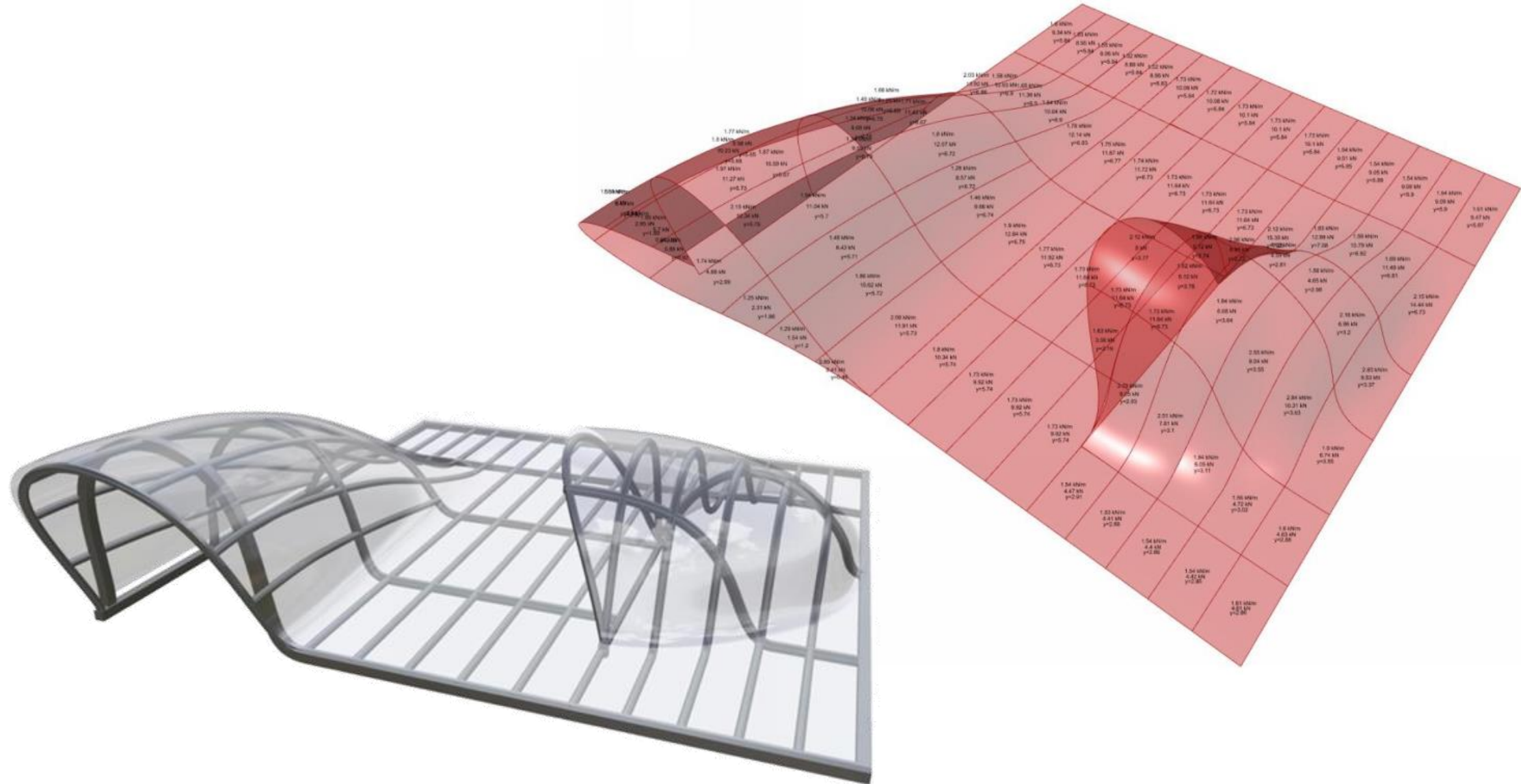




Glasdak

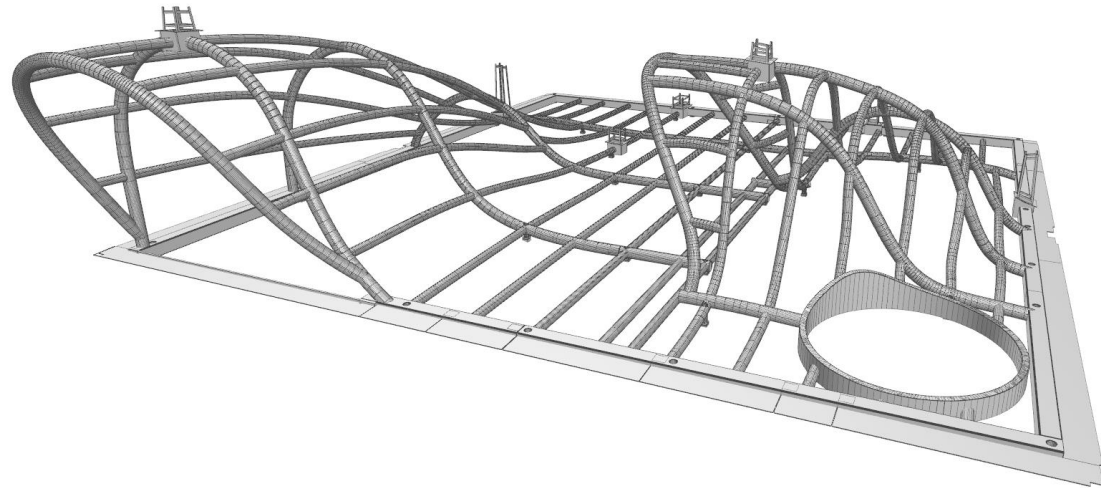
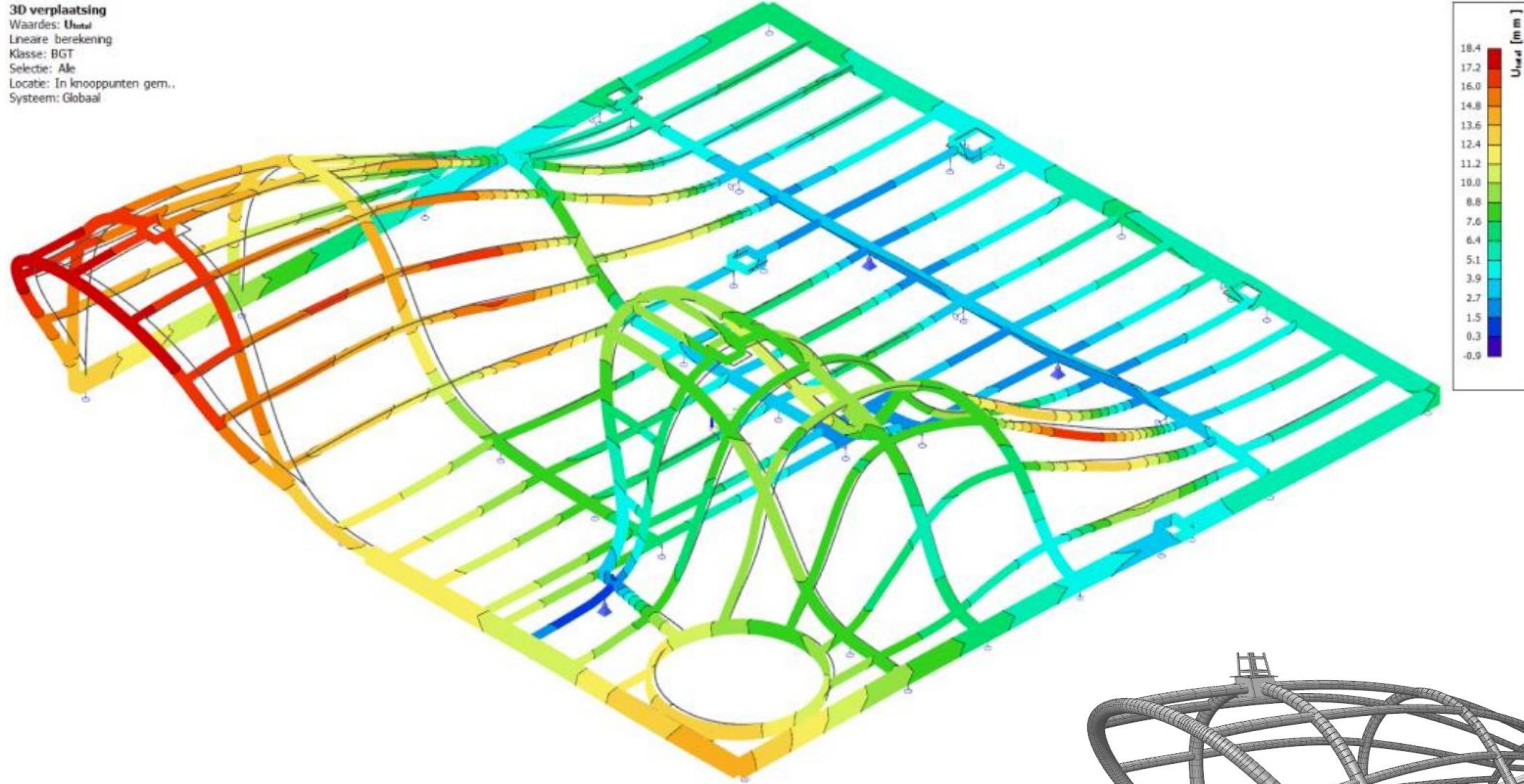
IMd
Raadgevende
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Glazen panelen



Dakconstructie

3D verplaatsing
Waarden: U_{max}
Lineaire berekening
Klasse: BGT
Selectie: Alle
Locatie: In knooppunten gem.
Systeem: Globaal





Uitvoering

IMd

Raadgevende
Ingenieurs

Tubex palen

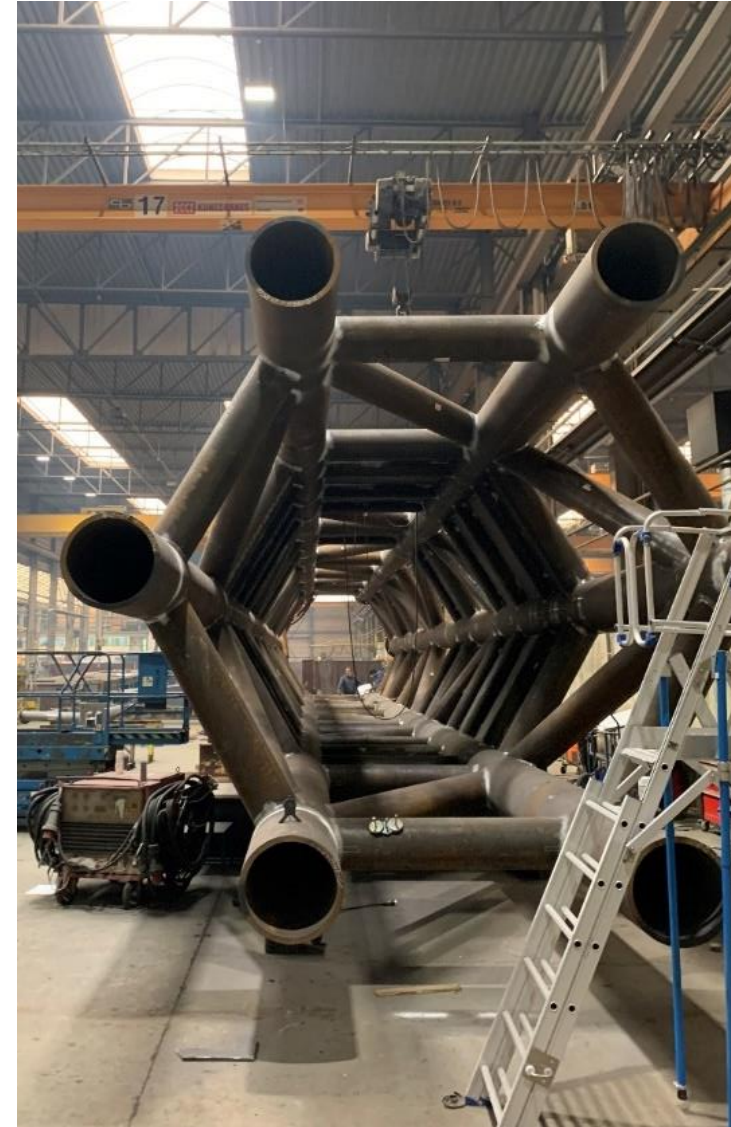


Fundering



IMd

Fabriek CSM



IMd

Inhijzen liftschacht



Lobby box





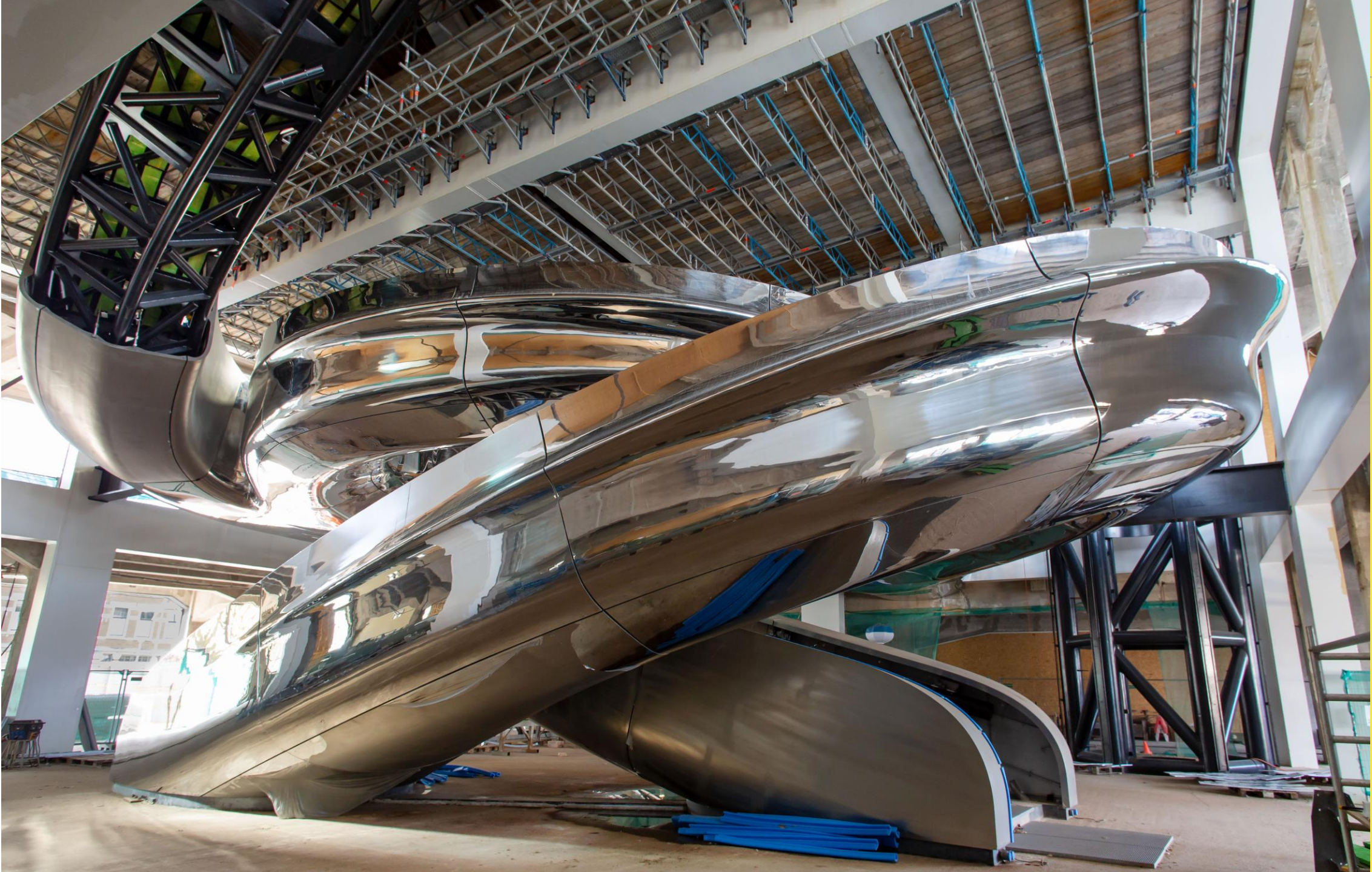
IMd

Weghalen stempels



Fabriek CIG





IMd



IMd





IMd



IMd



IMd



FENIX