

**Van concept tot realiteit - Ontwerp en bouw van 4200
tons stalen Stinger voor *Pioneering Spirit*
Belgische Staalbouwdag, 15 november 2016**

Introductie

Otto Kooy:

- BSc Mechanical Engineering
- MSc Offshore Engineering
- Start bij Allseas in 2010
- Sr. R&D Engineer bij Innovations Department
- Lead Engineer *Pioneering Spirit* Stinger development en STF (Stinger Transition Frame)



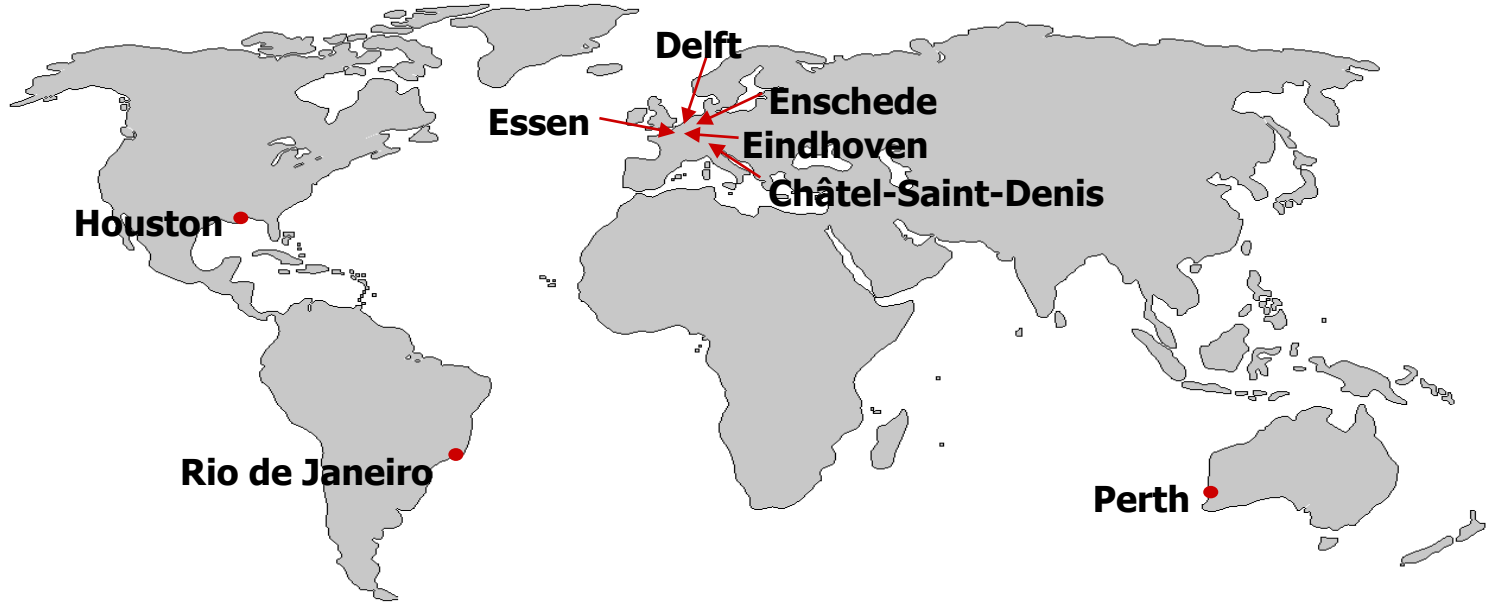
Inhoud presentatie

- Introductie Allseas
- Specificaties *Pioneering Spirit*
- Pijpinstallatie offshore S-lay
- Stinger *Pioneering Spirit*
- Van concepten naar finale concept
- Technische moeilijkheden in ontwerp en bouw
- Load out Stinger

Bedrijfsprofiel Allseas

- Zwitsers, privé eigendom, opgericht in 1985
- >3000 werknemers wereldwijd
- Offshore pijpleiding en subseaconstructies
- Installatie en weghalen van offshore platforms
- Leveren van technisch geavanceerde oplossingen
- Durf om uitdaging aan te gaan
- No-nonsense approach
- Veilige werkomgeving

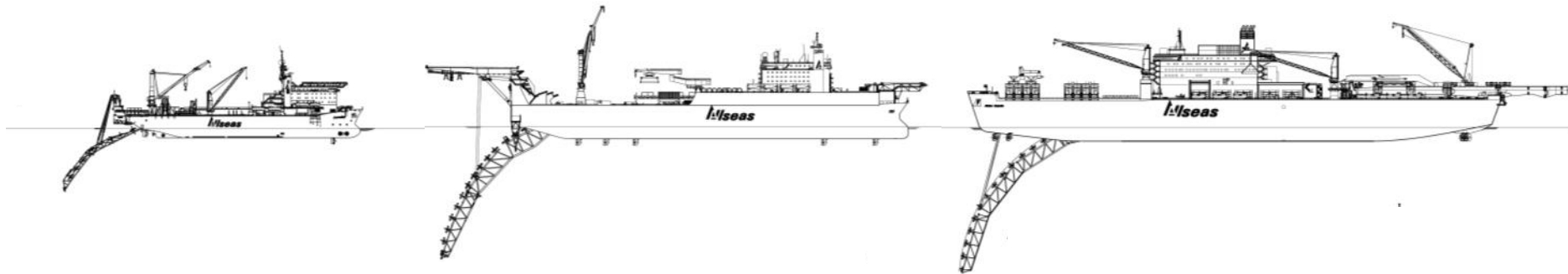
Allseas kantoren



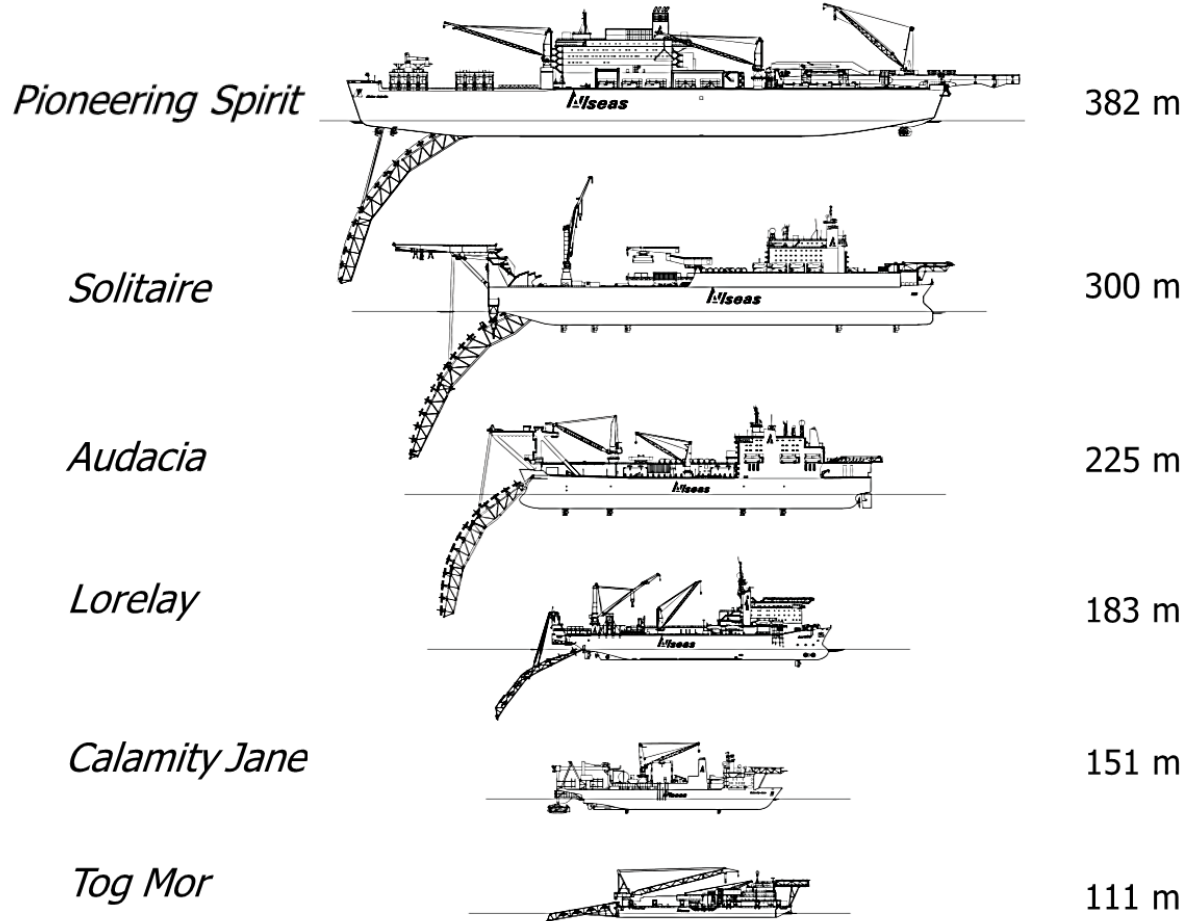
Allseas

Grote mijlpalen:

- *Lorelay*, 's werelds eerste DP S-lay schip in 1986
- *Solitaire*, 's werelds grootste DP S-lay schip sinds 1997
- *Pioneering Spirit*, sinds 2014
 - 's werelds grootste DP S-lay schip
 - 's werelds grootste 'heavy lift' schip

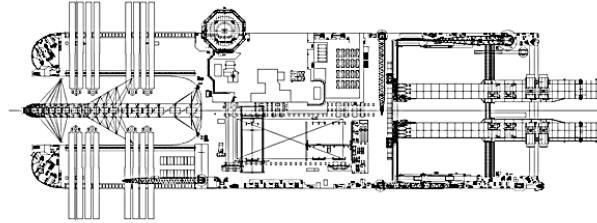


Schepen



Schepen

Pioneering Spirit



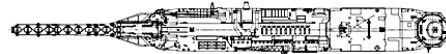
382 m

Solitaire



300 m

Audacia



225 m

Lorelay



183 m

Calamity Jane



151 m

Tog Mor



111 m





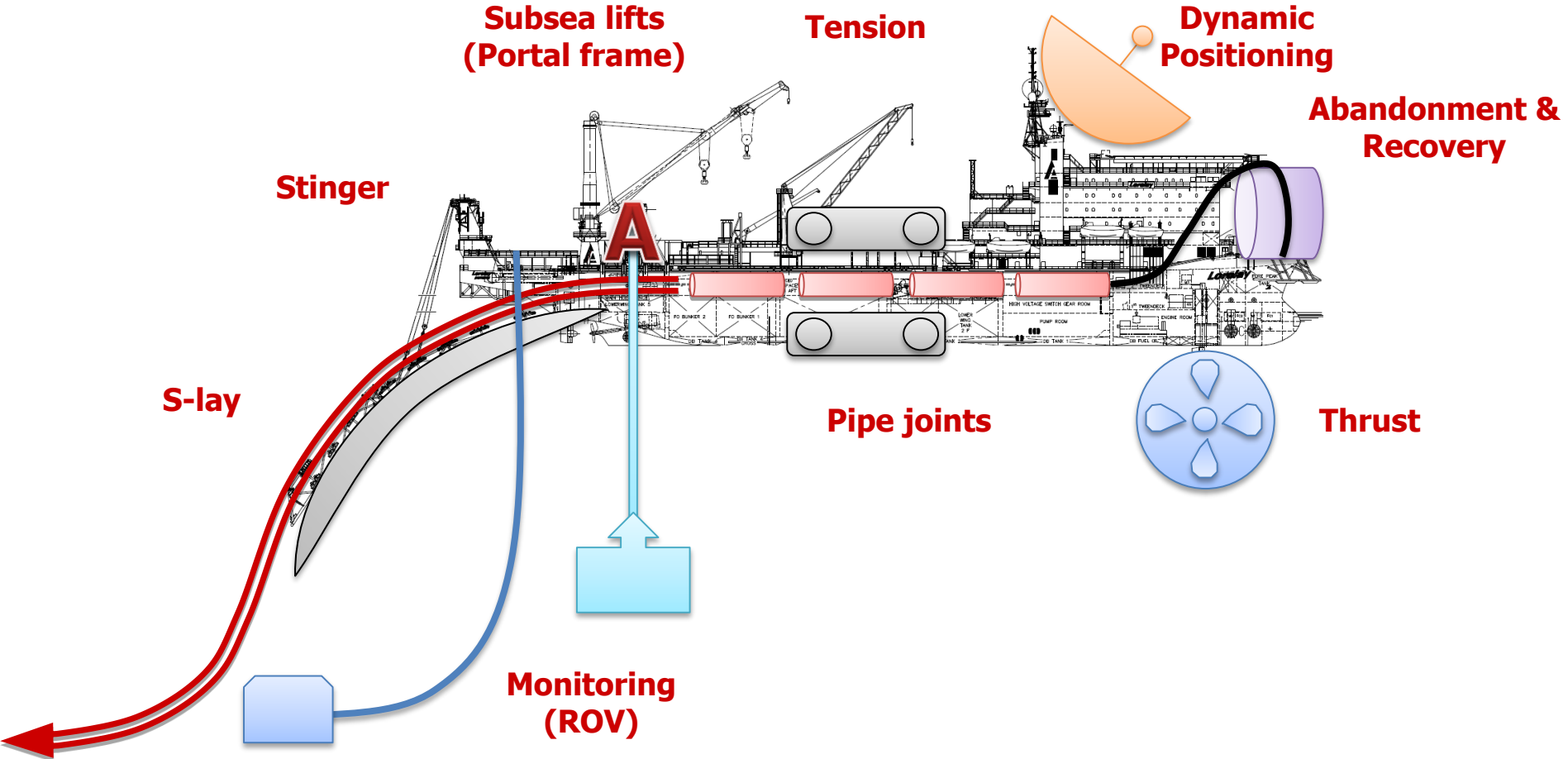
YME
9/2

The Iseas logo features a stylized white triangle with a red vertical bar on its left side, followed by the word "Iseas" in a white, italicized sans-serif font.

Iseas



S-lay DP vessel principles

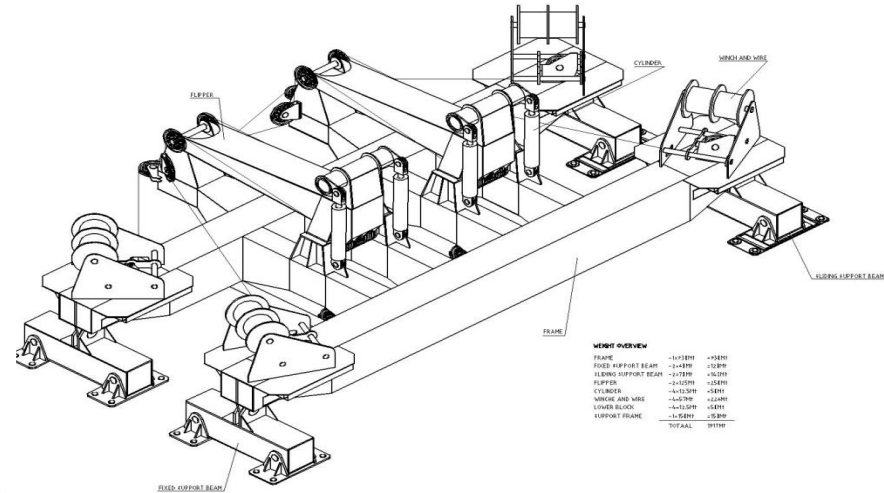
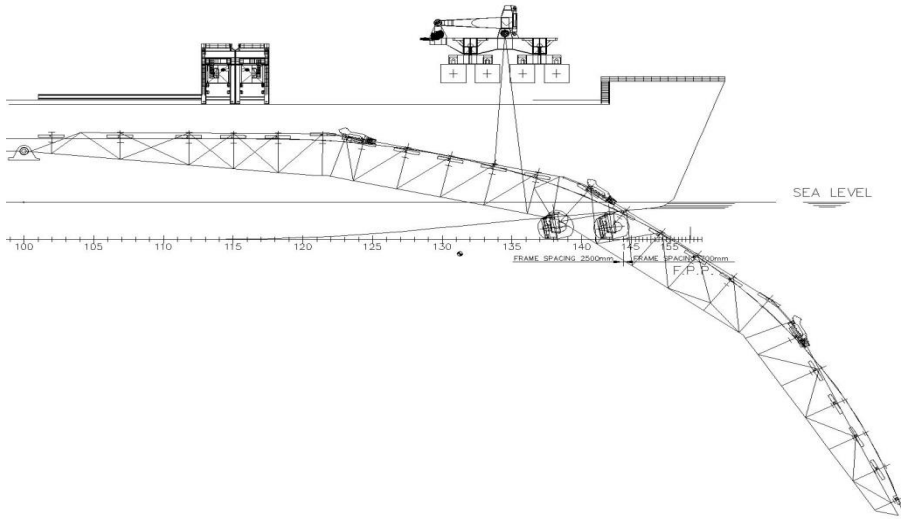




 Iseas

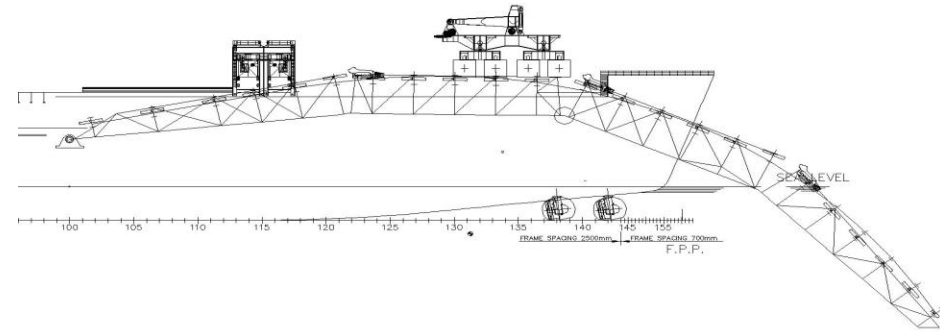
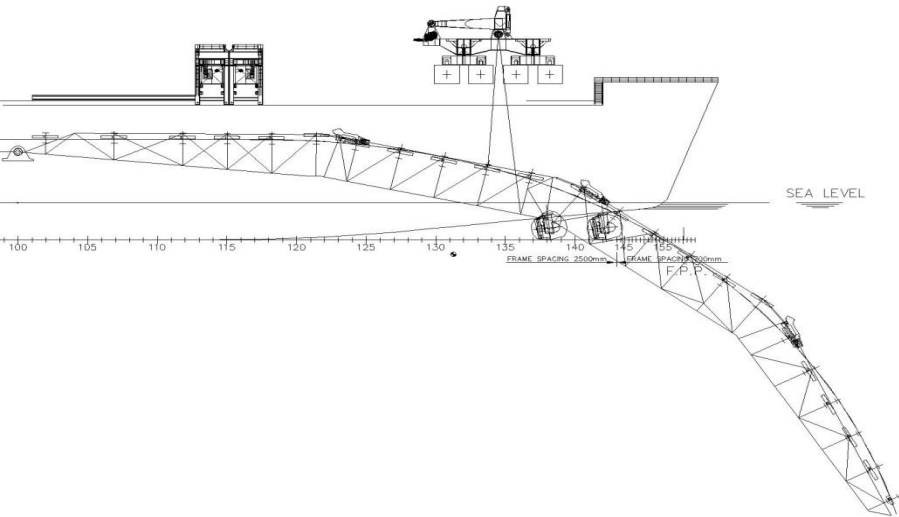


Huidige ontwerp stinger niet mogelijk



- SHF design niet geschikt voor radius adjustment
- Krachten in stinger 'hinges' en 'pup-pieces' te hoog (>6000t/per kant)
- Survival positie onmogelijk bij rotatie stinger

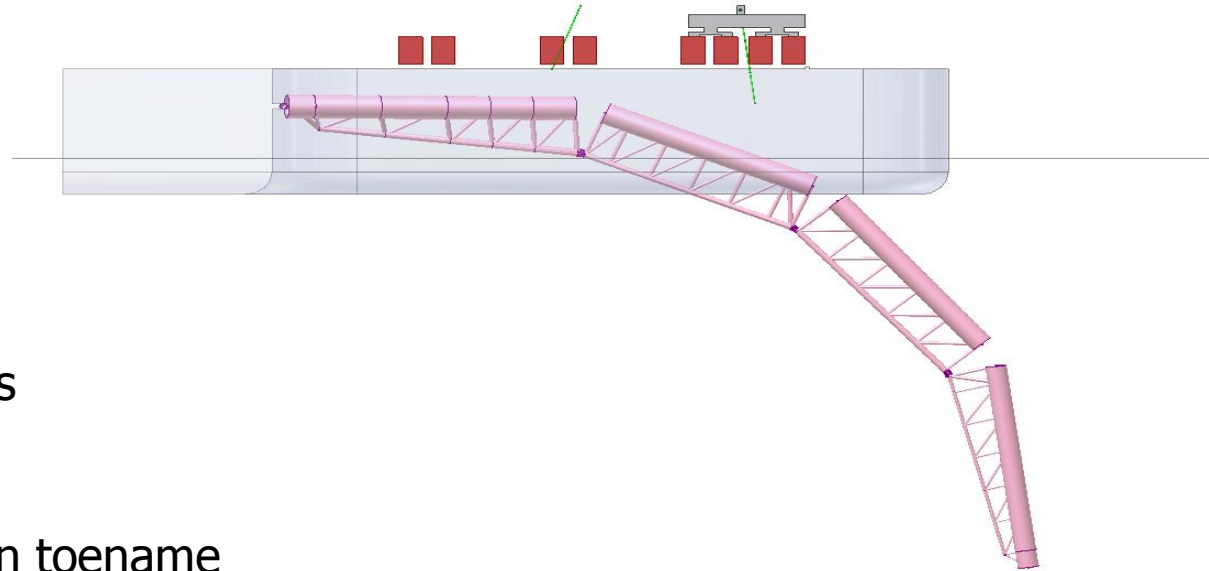
Huidige ontwerp stinger niet mogelijk



Survival positie onmogelijk bij rotatie stinger

Concept 2 – Drijvende stinger

Grote drijvende modules waarvan het drijfvermogen aan te passen is bij de gecomprimeerde luchtdruk van TLS



Pros:

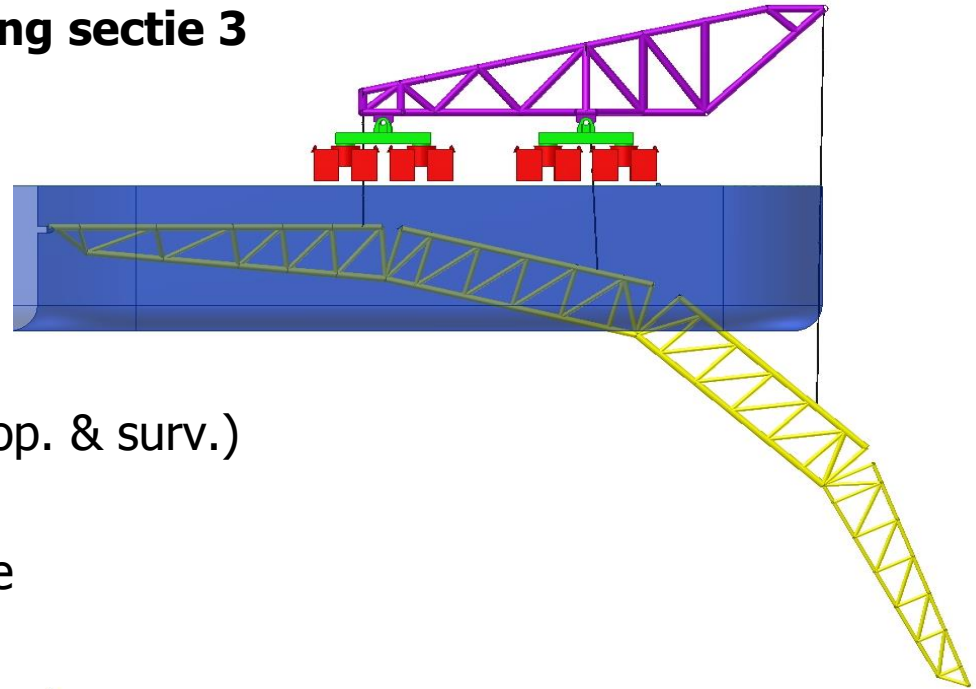
- Krachten verminder hinges

Cons:

- Hydrodynamische krachten toename
- Te ingewikkeld systeem Gecomprimeerde luchtdruk
- Oplift

Concept 3 – extended SHF

Cantilever voor verticale afhanging sectie 3



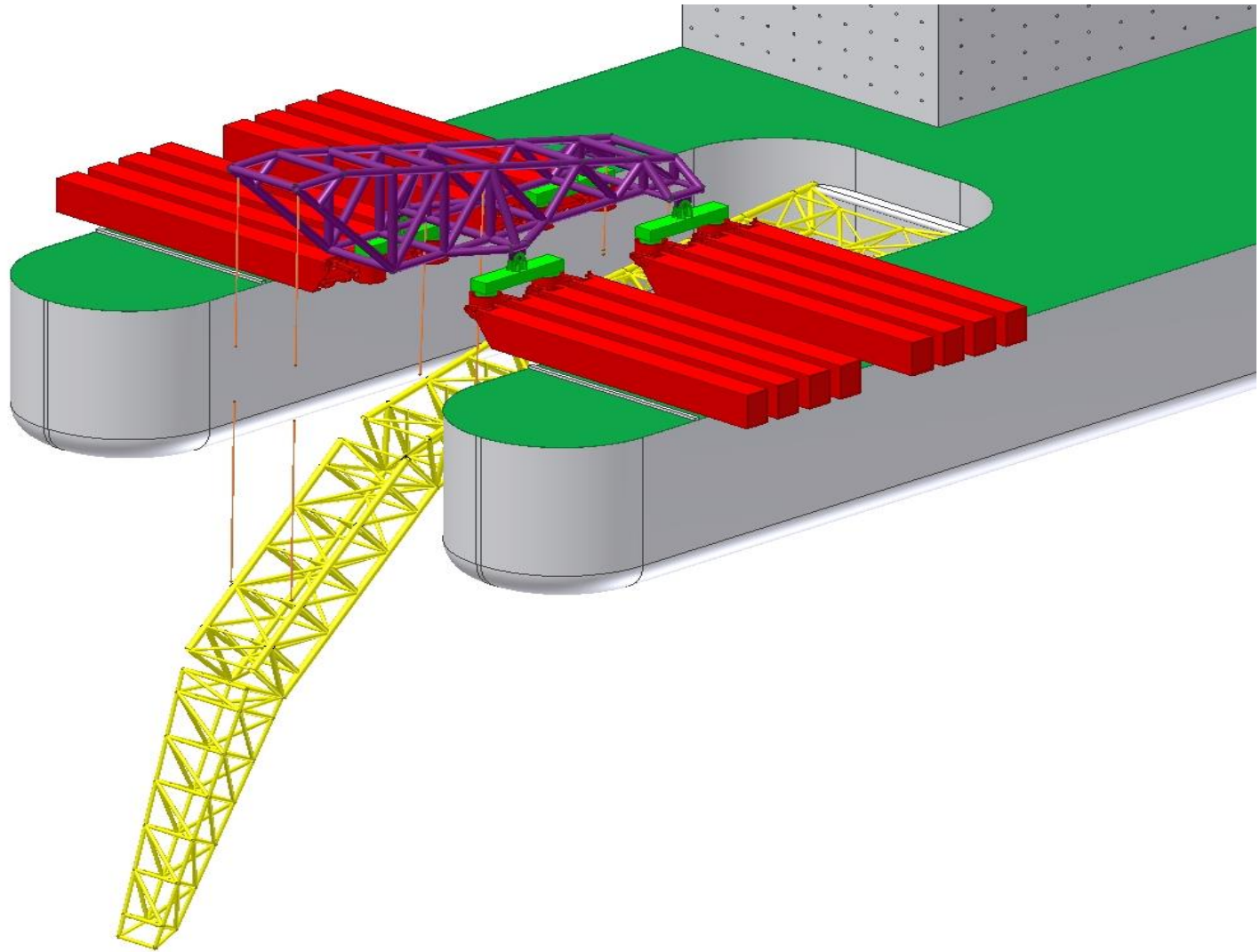
Pro:

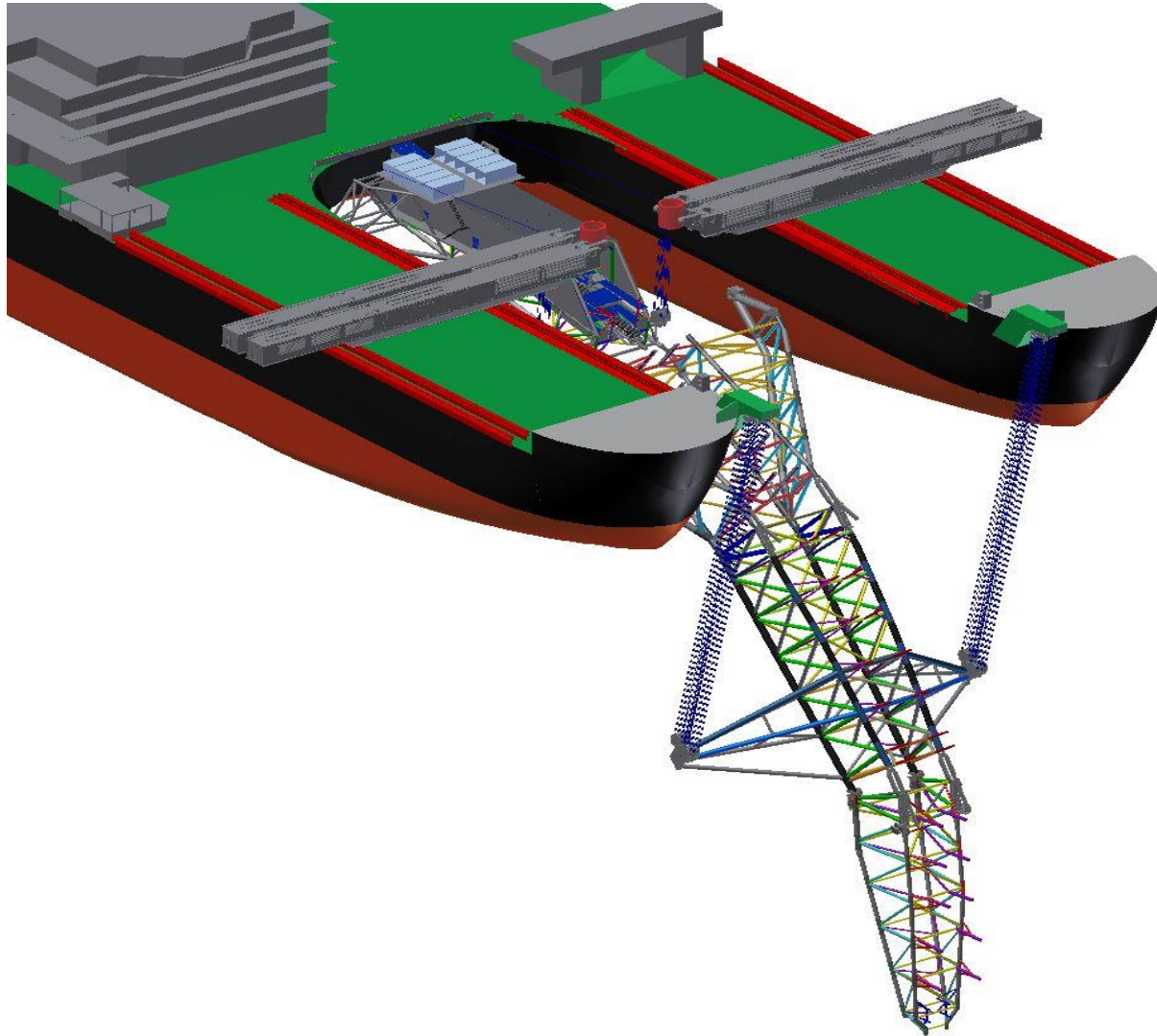
- Afname krachten in pup-pieces (op. & surv.)
- Radius adjustment mogelijk
- Mogelijkheid voor overhead crane

Con:

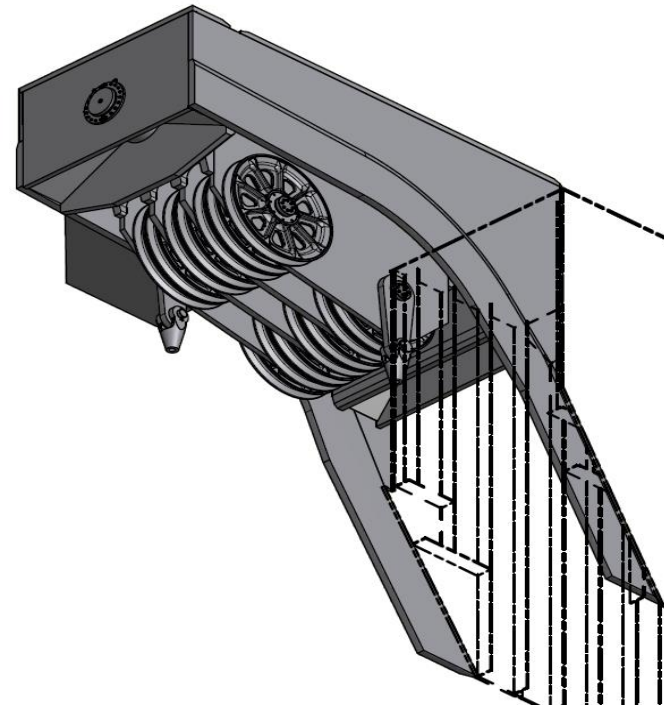
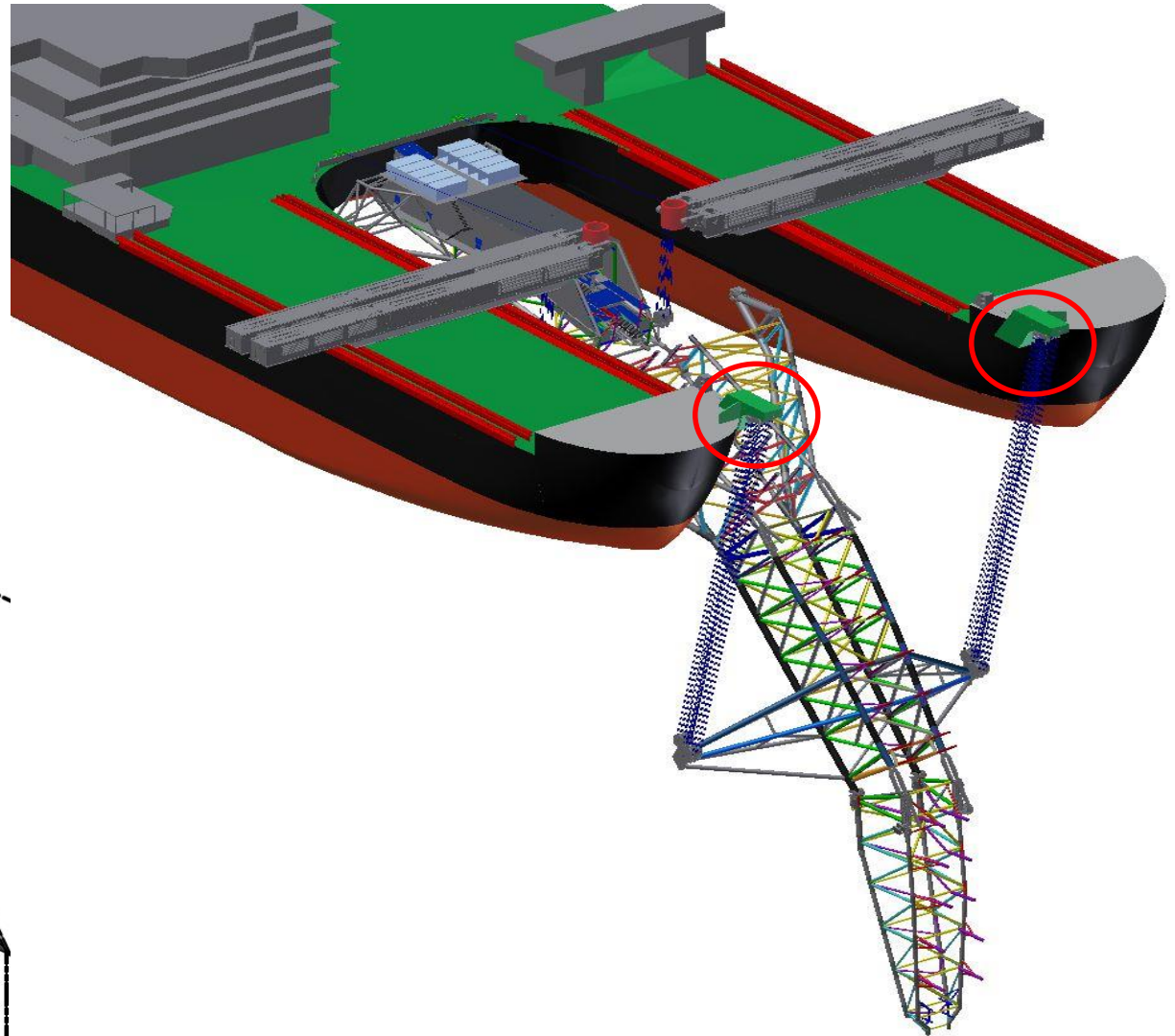
- Te groot en te zwaar frame

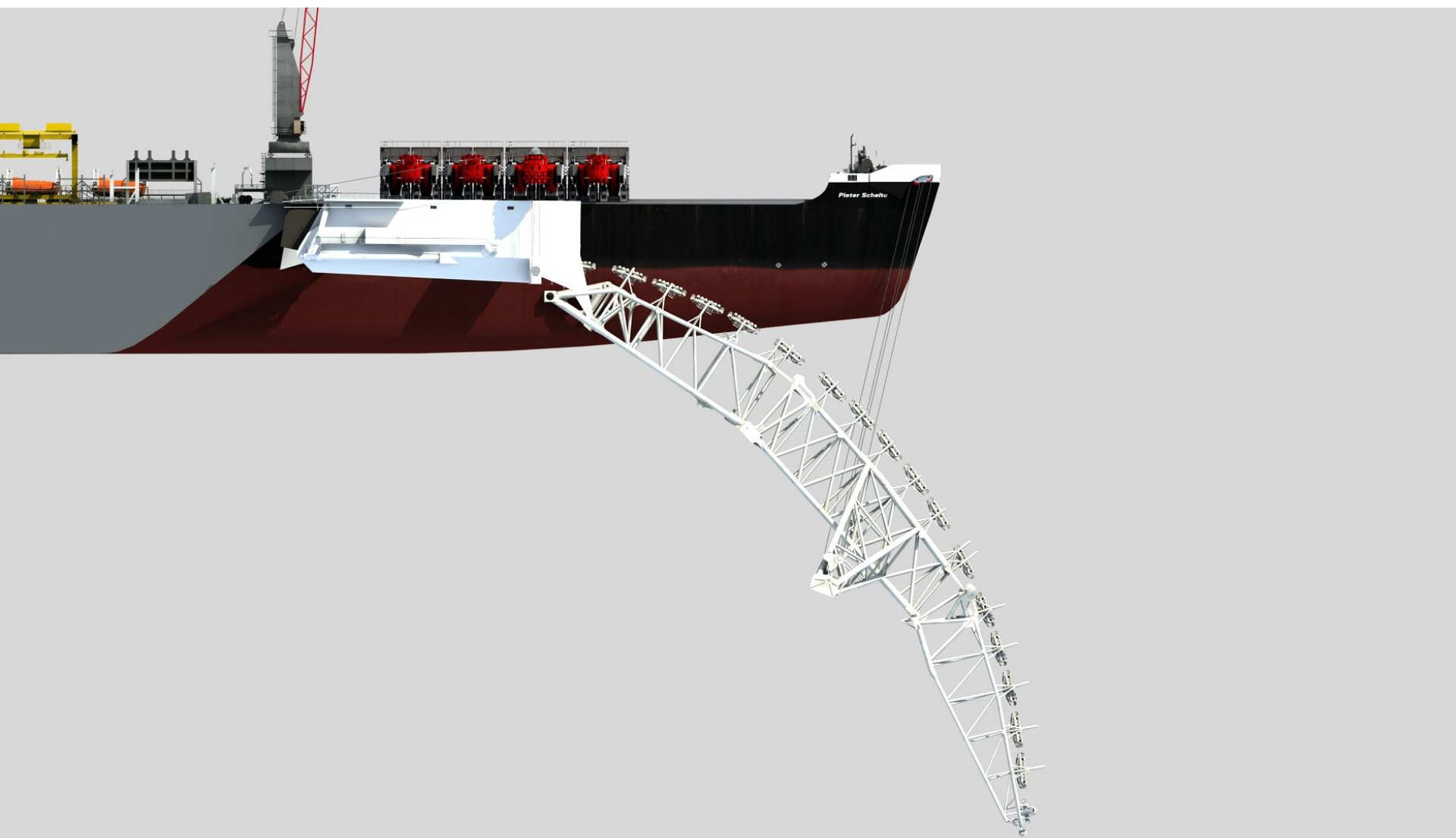


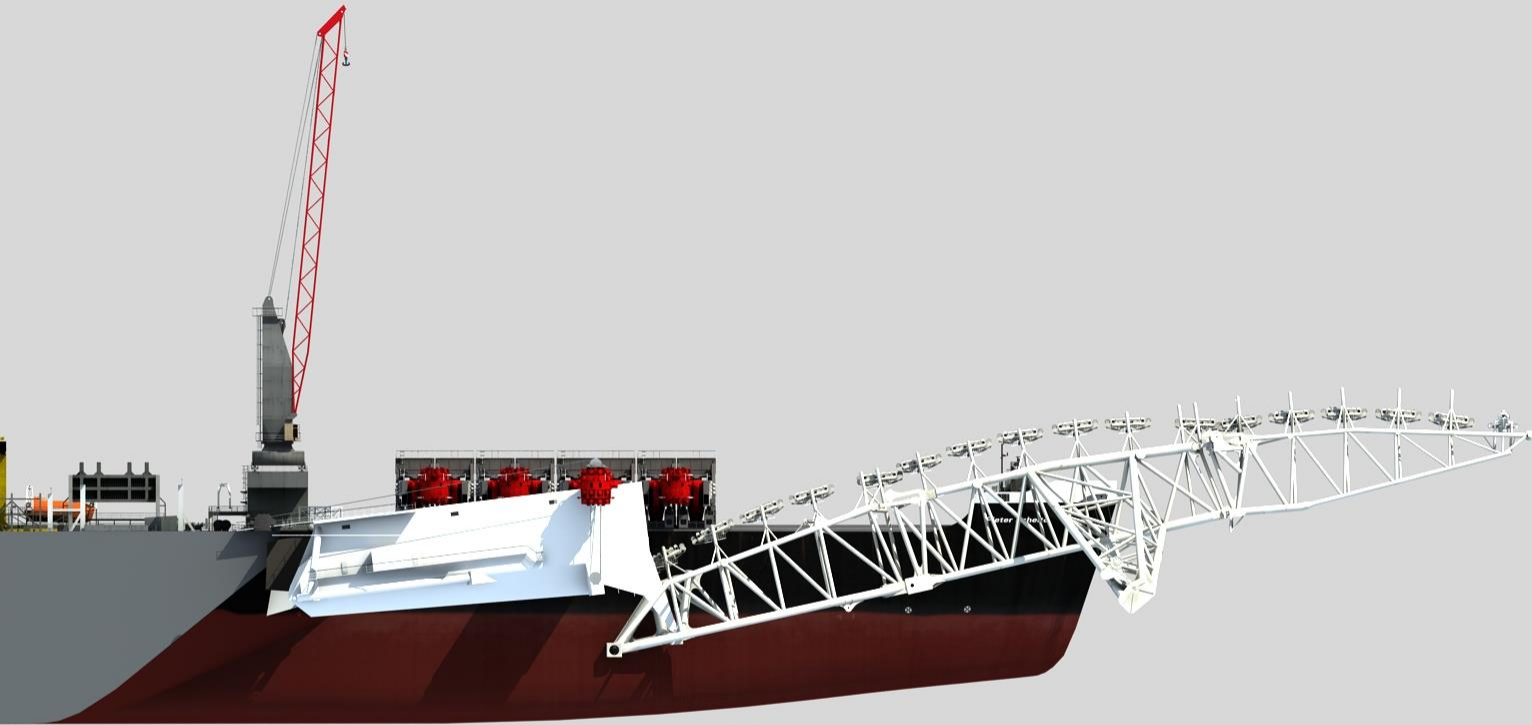


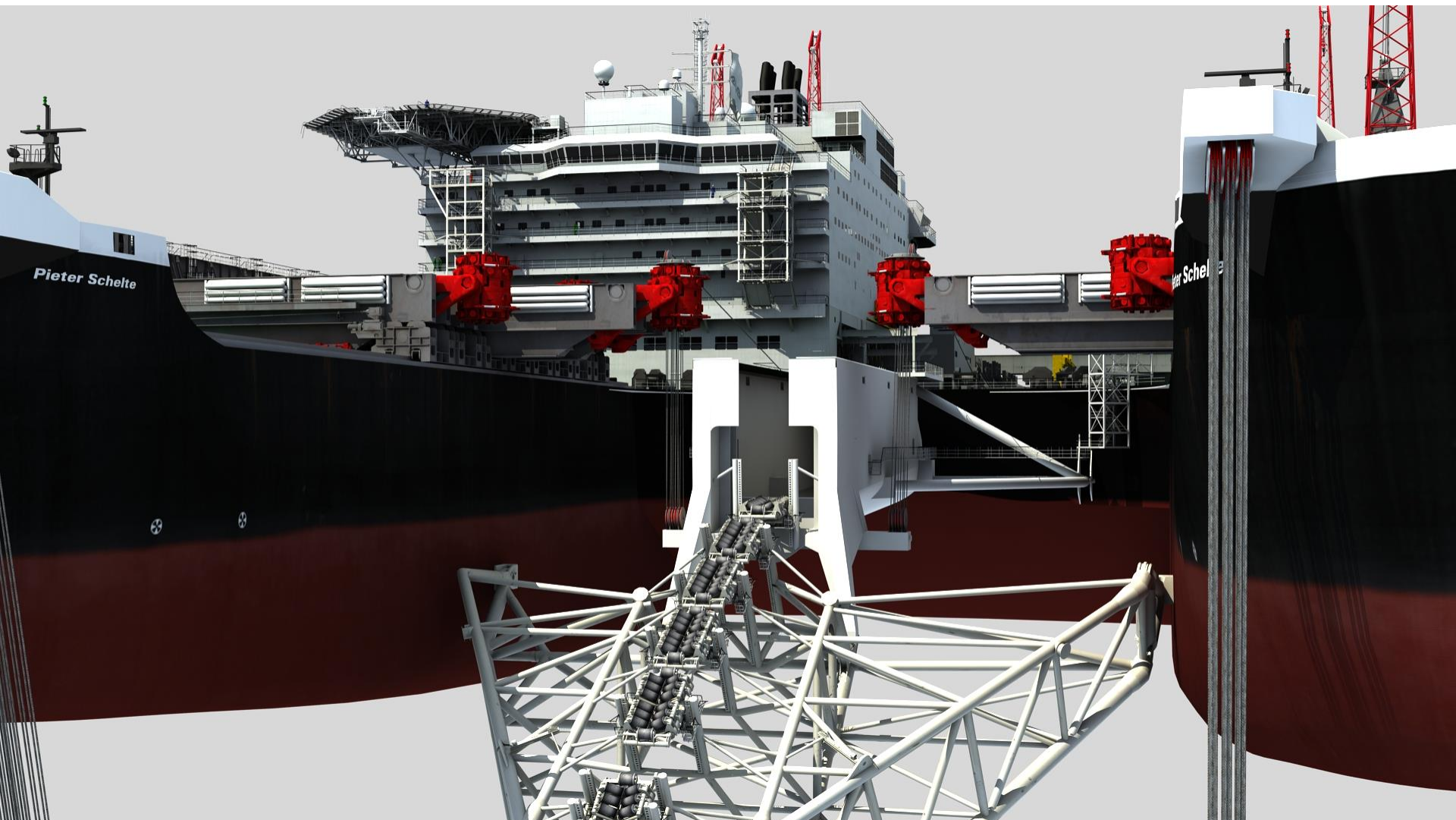


Finale ontwerp

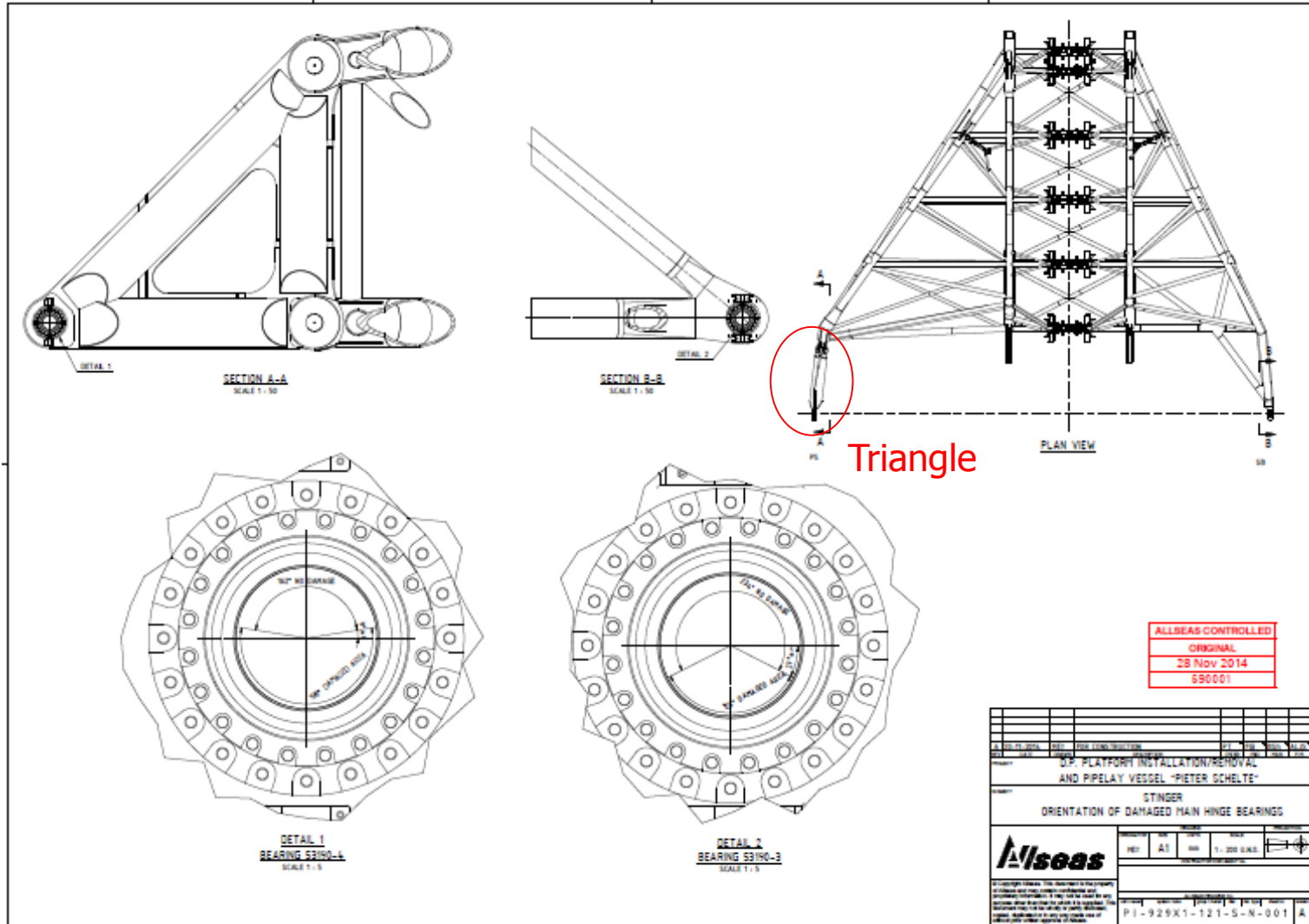




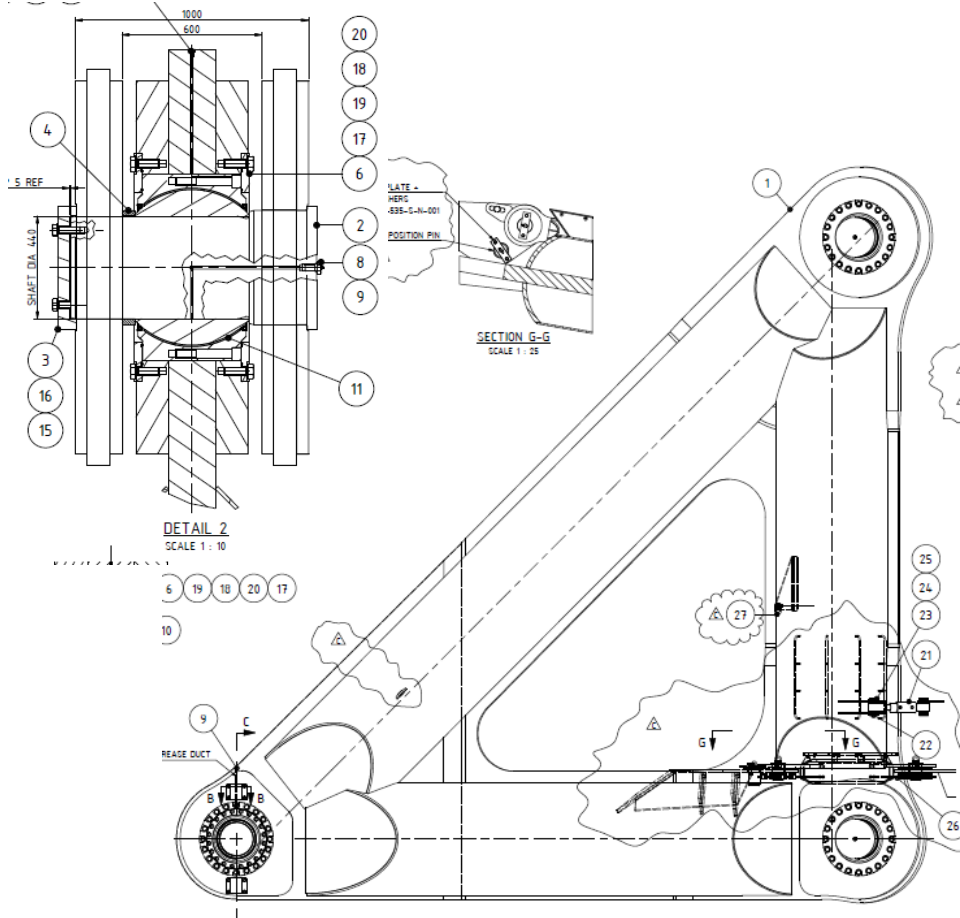




Stinger triangle hinge assemble



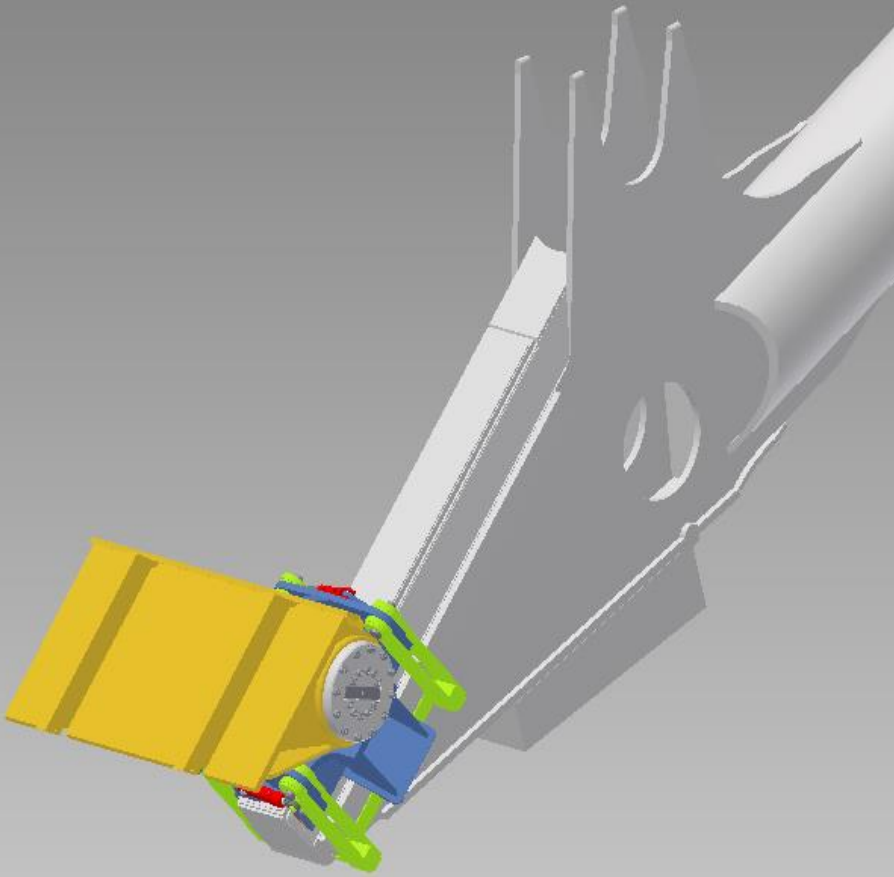
Stinger triangle hinge assemble



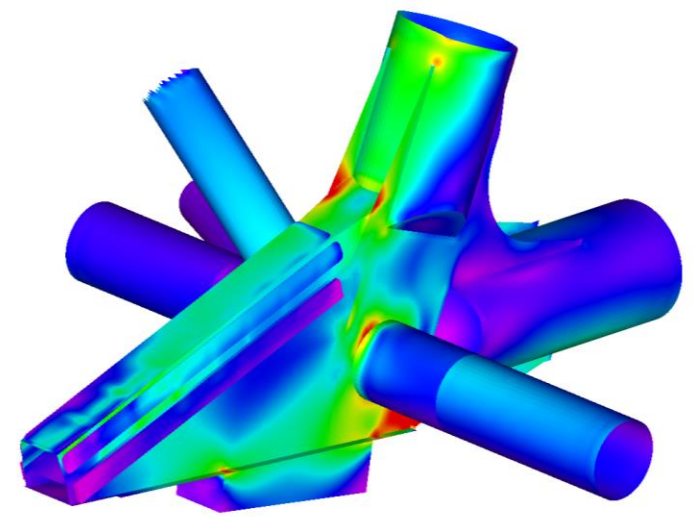




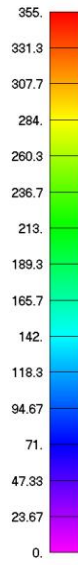
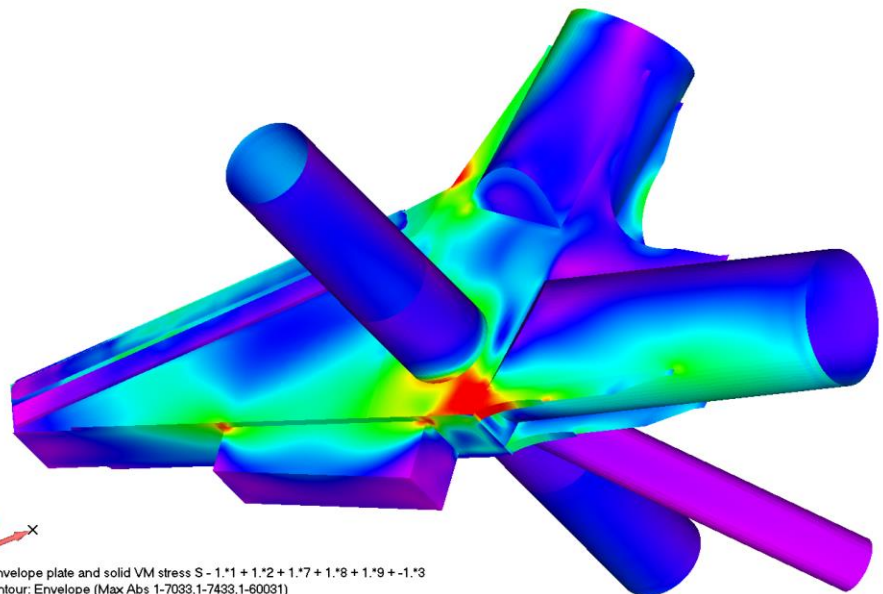
Stinger sliding punten STF

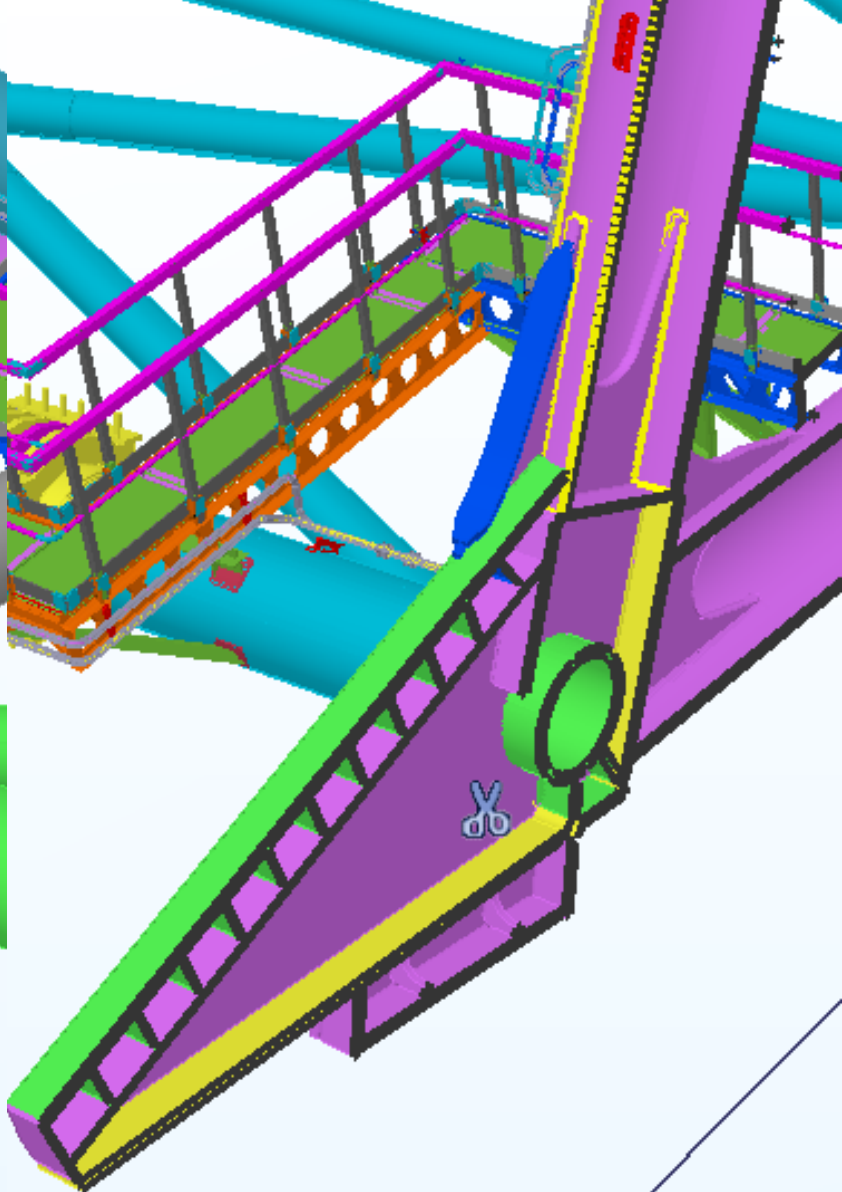
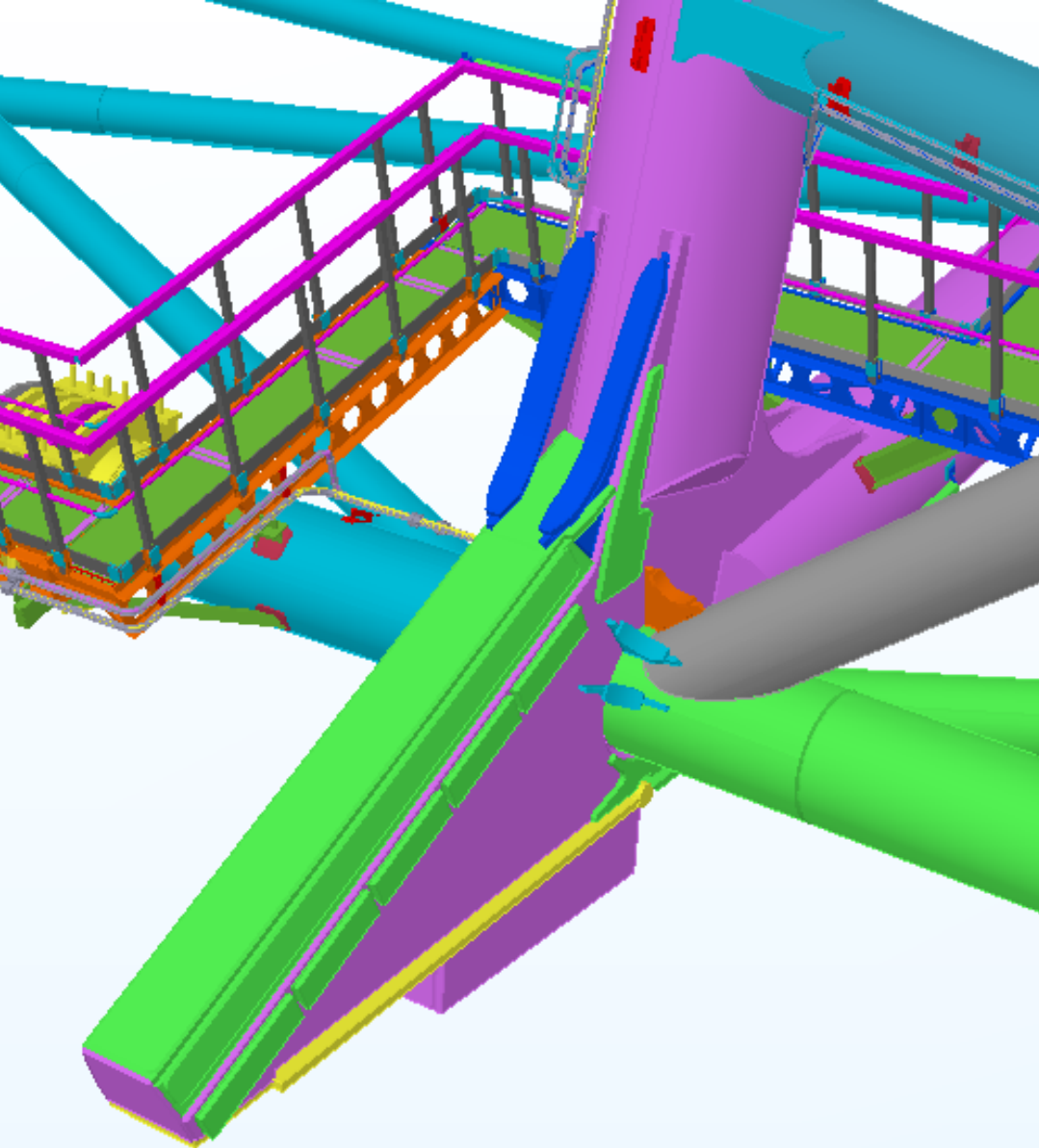


Envelope plate and solid VM stress S - 1.*1 + 1.*2 + 1.*7 + 1.*8 + 1.*9 + -1.*3
Contour: Envelope (Max Abs 1-7033,1-7433,1-60031)



Envelope plate and solid VM stress S - 1.*1 + 1.*2 + 1.*7 + 1.*8 + 1.*9 + -1.*3
Contour: Envelope (Max Abs 1-7033,1-7433,1-60031)









*Section 1 sliding point, March 2014
Iemants, Arendonk, Belgium*





250
Technical Queries

La Chouffe Borrel

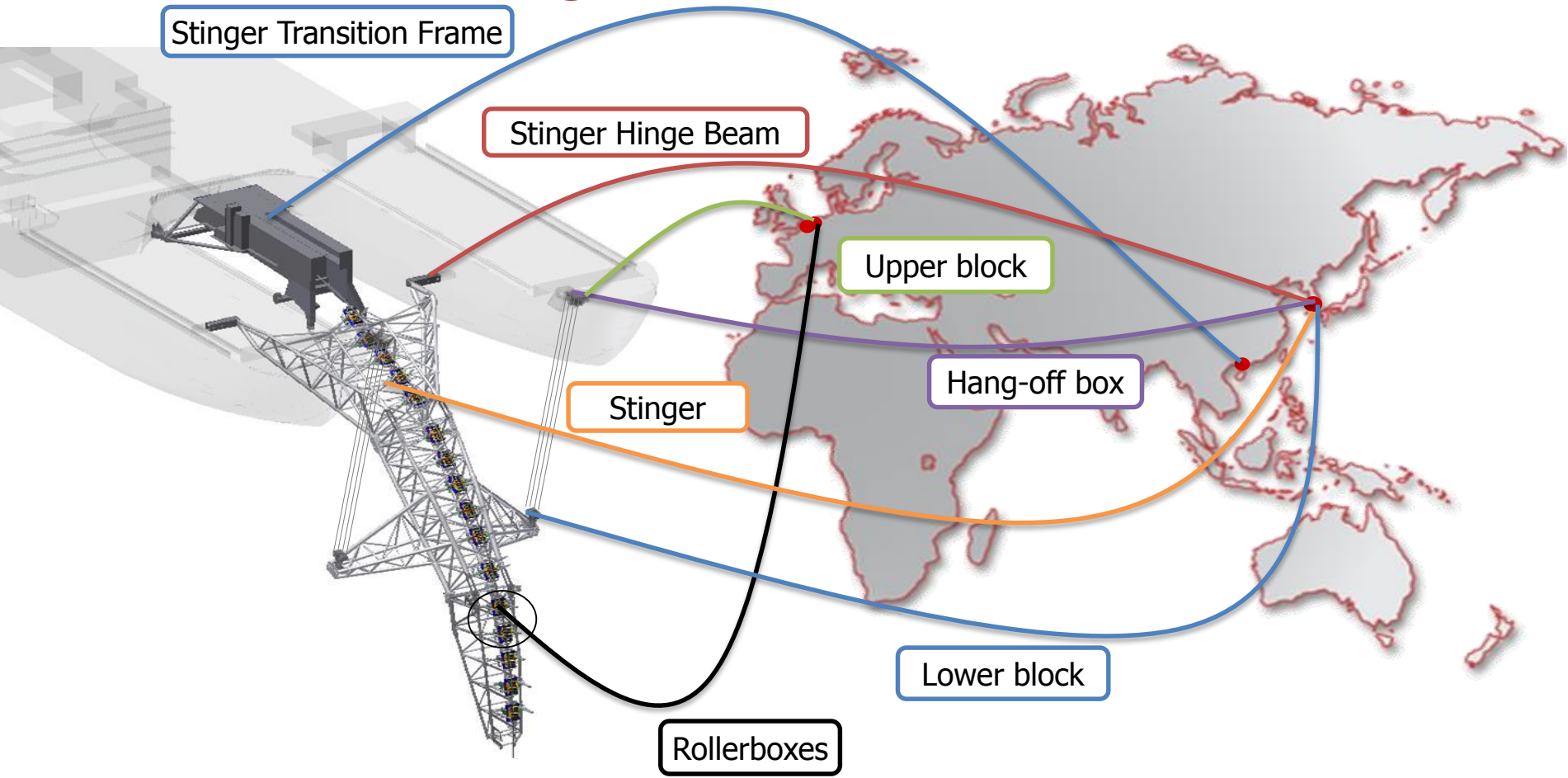
Celebration of 250 Technical Queries on the *Pioneering Spirit Stinger* fabrication project, offered by Iemants NV

The banner features the IEMANTS logo, a photo of a ship's hull, and a cartoon gnome. The word 'I:seas' is also visible.

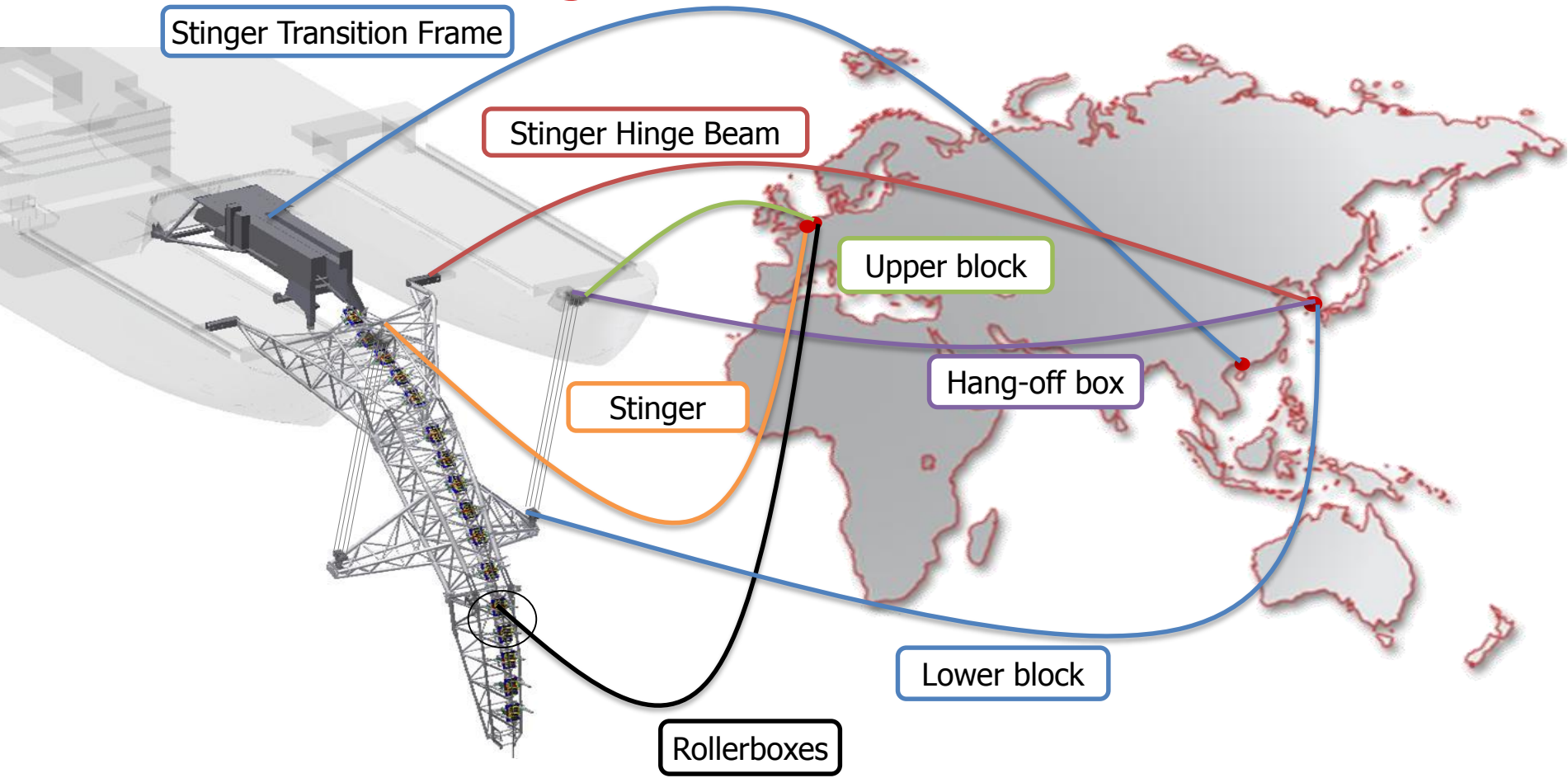




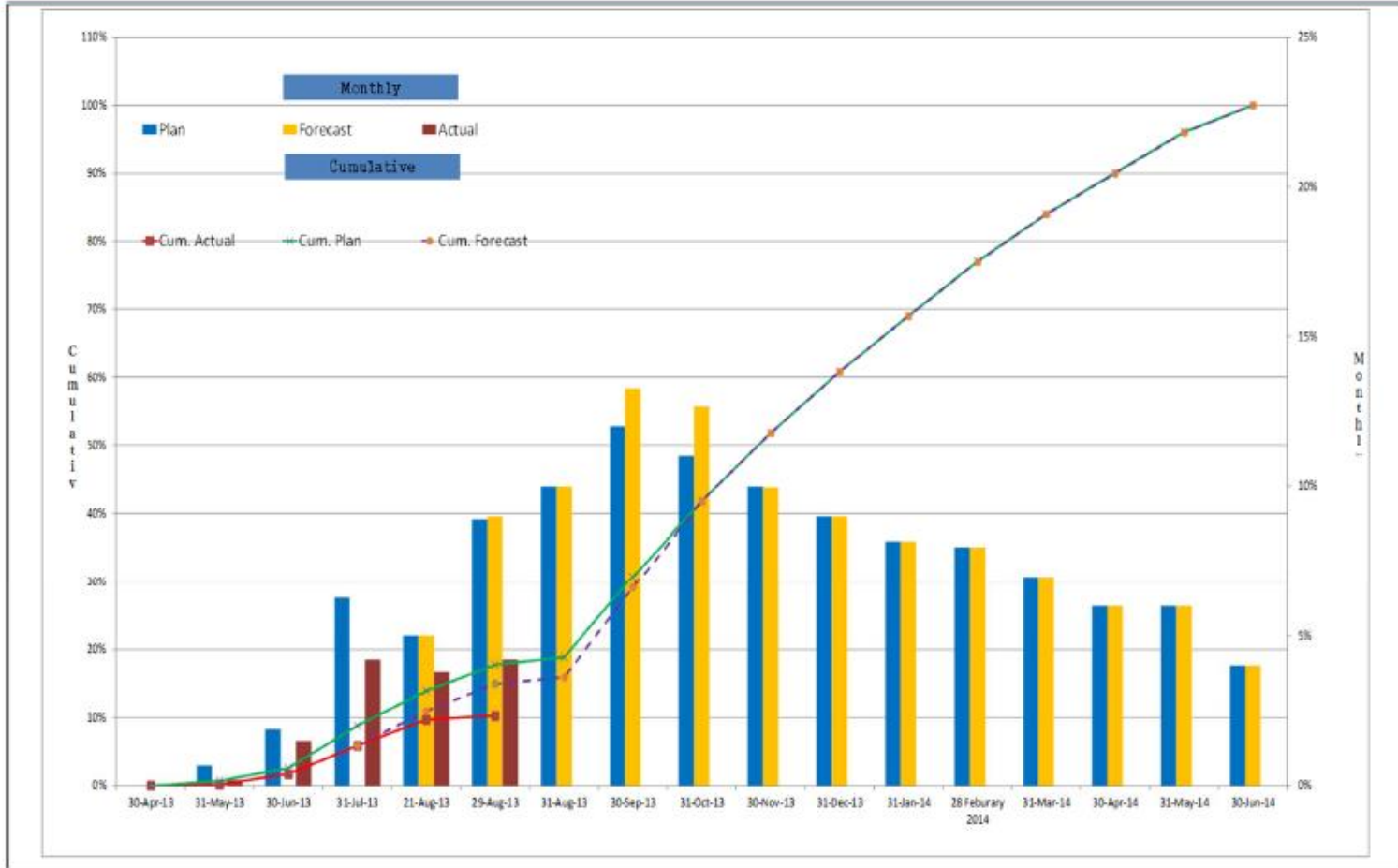
Stinger fabricatie locaties



Stinger fabricatie locaties



S-Curve



• Above S-Curve is based on the Improvement Status & Further Plan submitted to Allseas on Aug 8th.



*Loading of stinger materials onto Eernsgracht, November 2013
Doosan, Busan, South Korea*

**Woord aan Patrick Maes – Iemants Staalconstructies NV -
Technisch Directeur**

Afsluitend filmpje load out Stinger

(Beeld vorming / back up slides)

Dag 1 – Rijden van Stinger Barges



Dag 2 Draaien en uit 'elkaar' Rijden



Dag 3 – tussen varen van de Bumblebee



Dag 4 – Landen op van de Stinger op Bumblebee door ballasten

