Structural design of a multi-role support offshore vessel of 100m long

By

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contents

- what is offshore support vessels ?
- Why multi-role support vessel
- Design methods
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- conclusions

What is offshore support vessel ?

- Offshore support vessels are vessels that regularly carry goods, supplies, individuals, crew, and equipments in support of explorations, production of offshore minerals
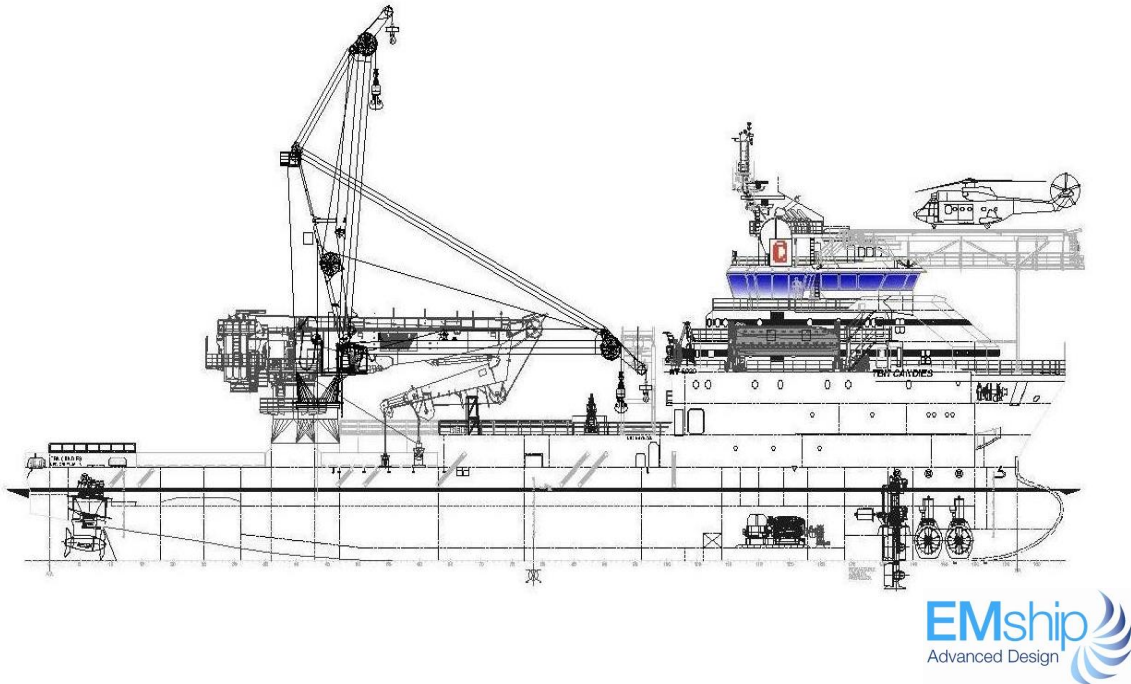
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Why multi-role

- To save operation cost

- It functions as a Diving support vessel, Emergency response, Rescue, Remote operating and maintenance support vessel,

- Combines the functions of all specialized offshore vessels

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Sectional view of the multi-role support offshore vessel

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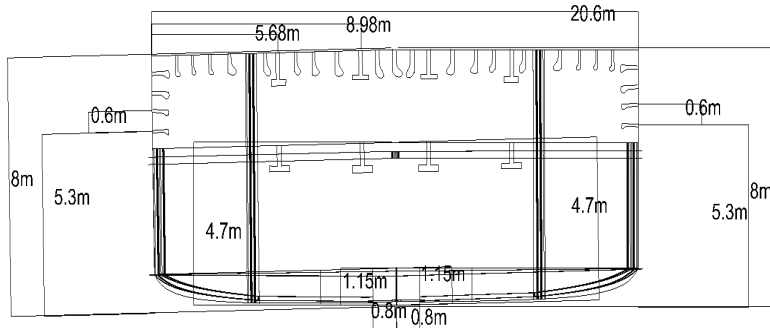
Design approach

- Rule –Based Design method
- DNV rule base design
- Method of design

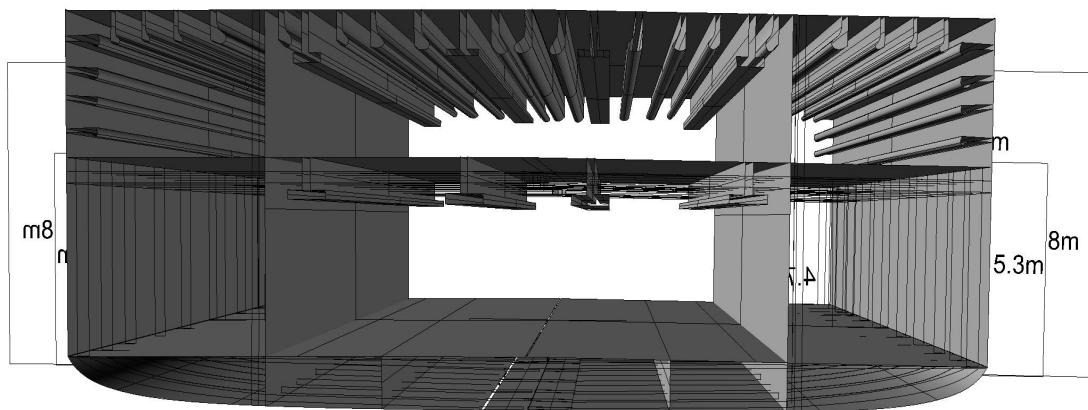Local design (simplify formulations e.g pressure on plates)

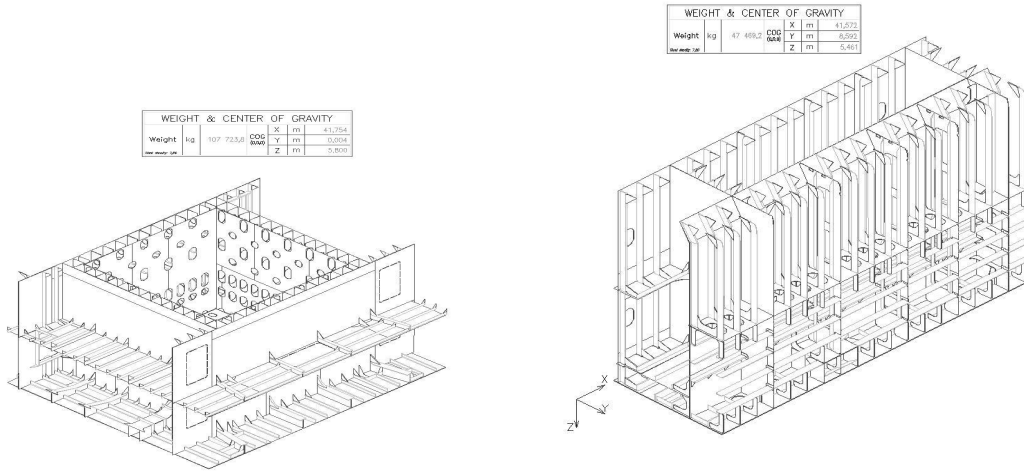Area/Hold design (direct stress analysis)

Global design (hand calculations)

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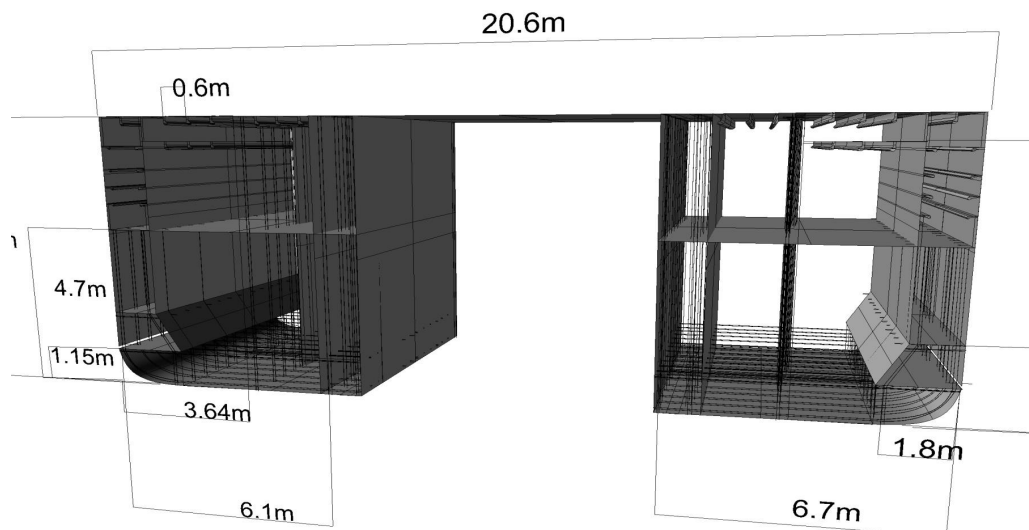# Concepts and topology frame 31

view of a section in frame 30 to 40 with stiffeners girders

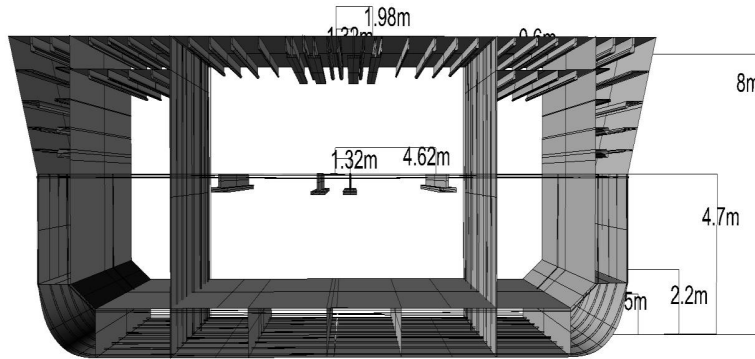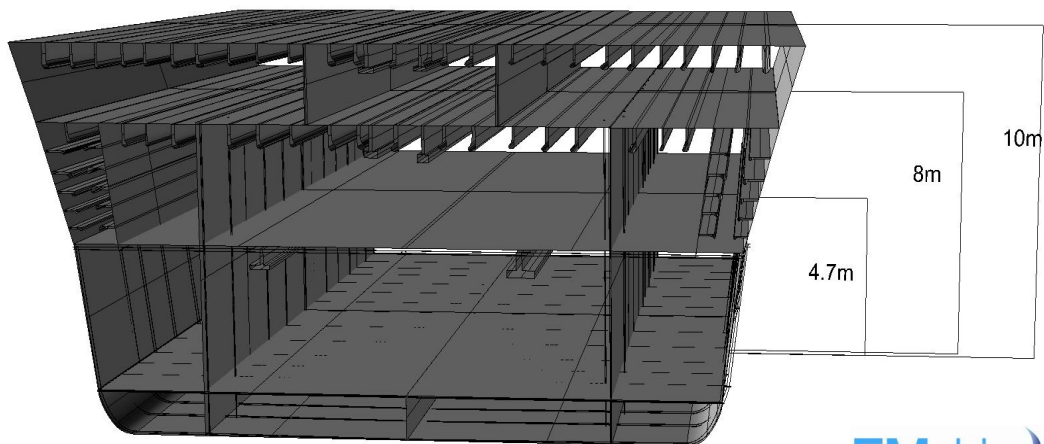# Some special fixtures
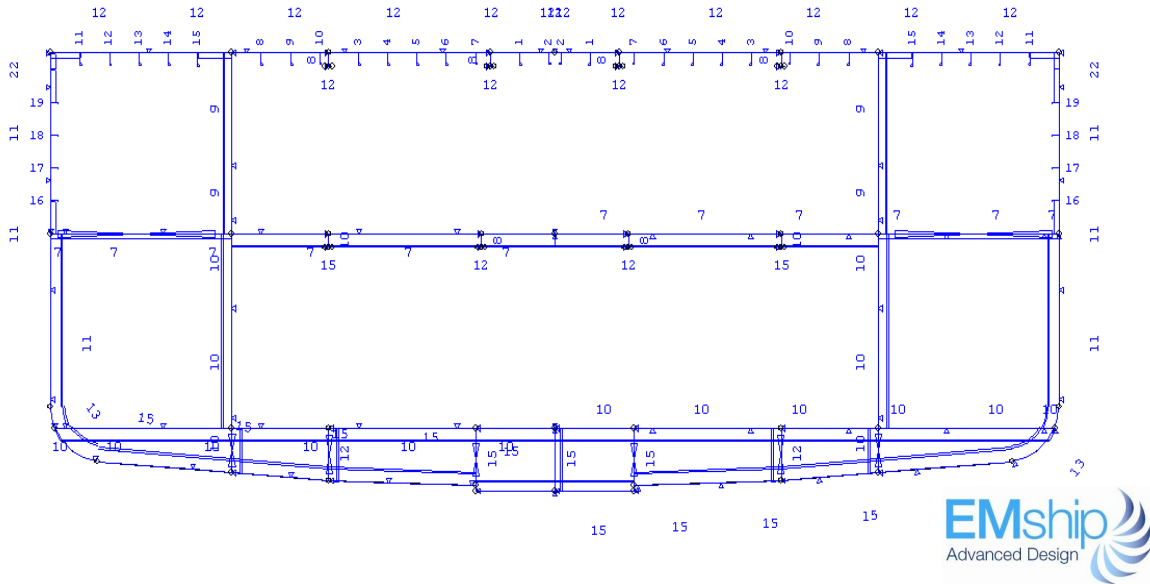

The moon pool view
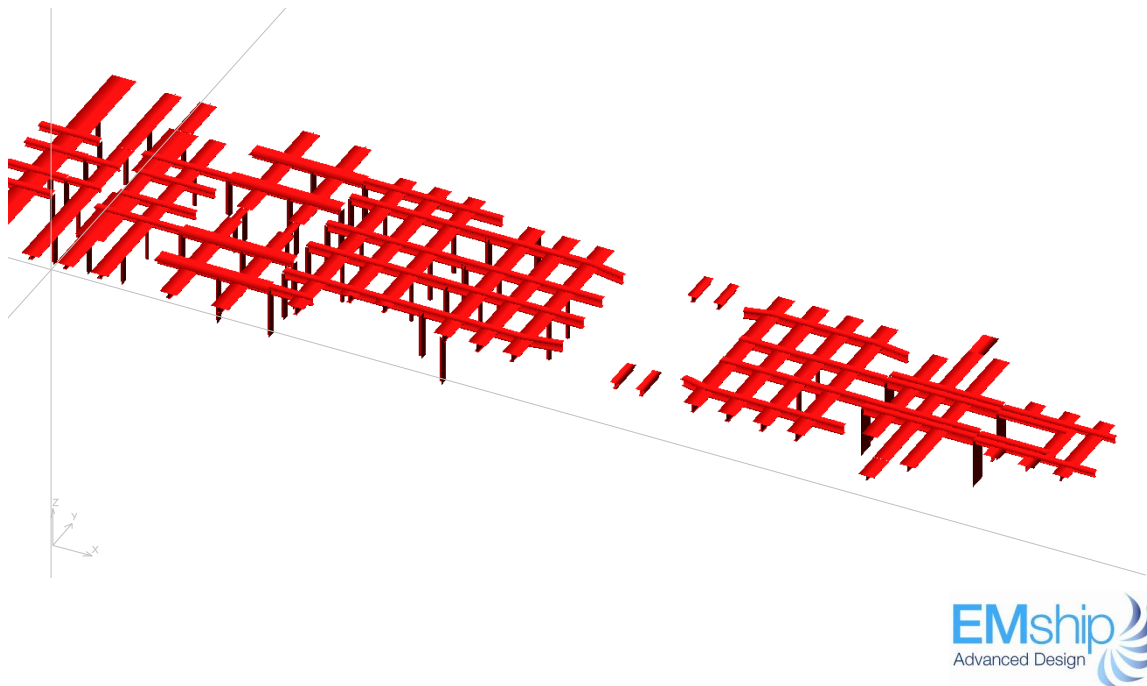
Section fore of the moon pool
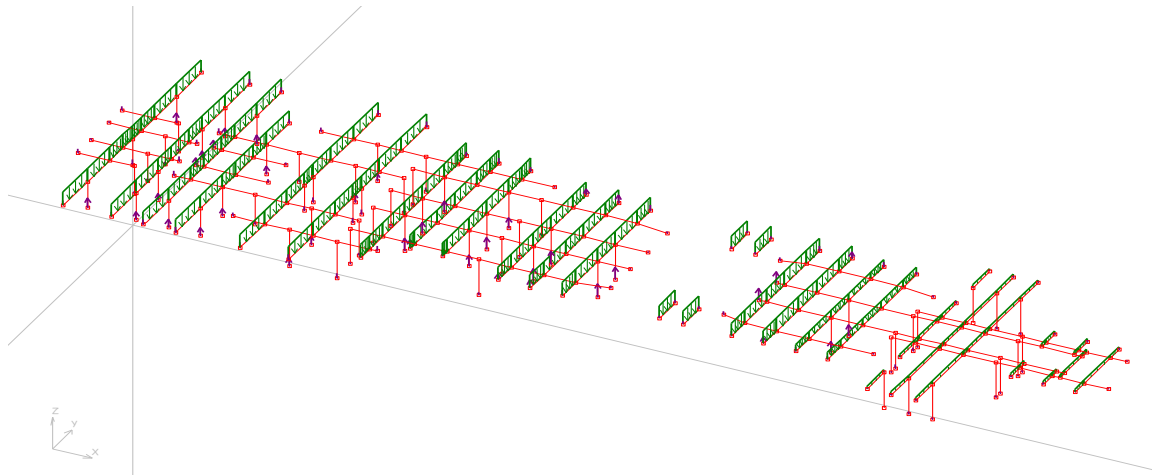

A fore section with shelter deck

Scantling for operation requirement with Nauticus Hull,
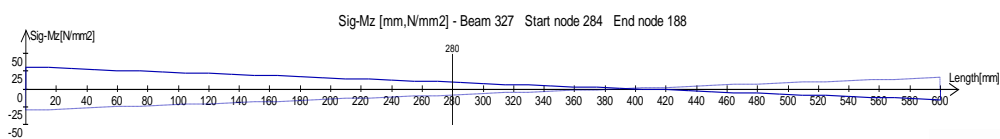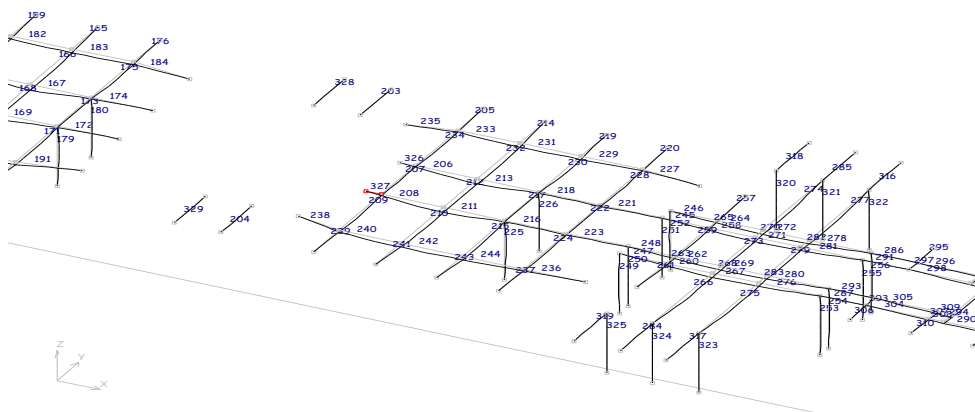# Additional forces needed to be imposed on offshore vessel design

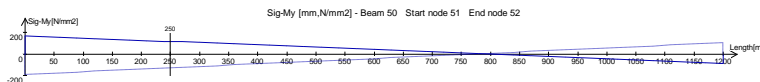# STRENGTH OF THE GRILLAGE STRUCTURE OF THE MAIN DECK

Loading on the maindeck on 3D beam

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Deck section with stress above the recommended value

Sig-Mz [mm,N/mm2] - Beam 327   Start node 284   End node 188

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A deck beam with stress above the recommended rule values in red
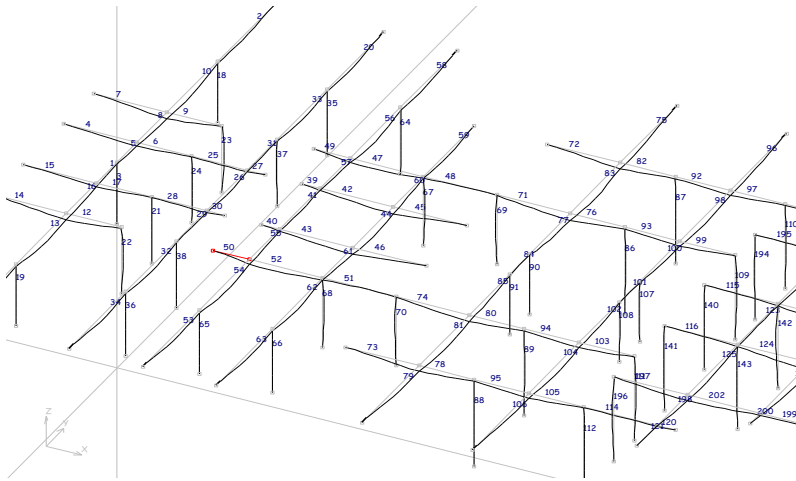

End connections
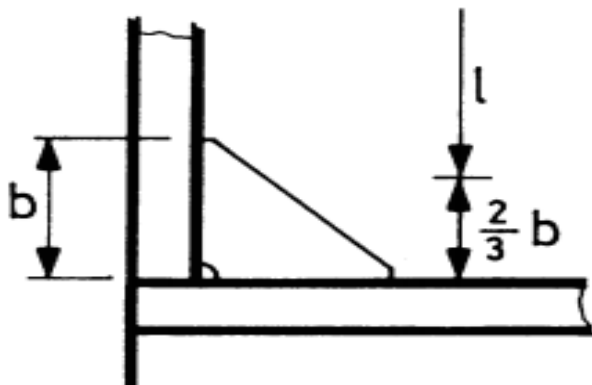
- $a = c\sqrt{(Z/w_k)/(t_b - t_k)}$ (mm)
- Arm length of brackets

conclusions

- The weight of the vessel around the moon pool region is 173.95 tones and the neutral axis is 4.137m from the base line,

- At the frame 30 to 40 is 95.06 tones, with neutral axis height from the base line as 3.229m,

- At frame 105 to frame 110 is 49.23 tones with a neutral axis distance of 3.768m to the base line

- And frame 115 to 125 is 102.34 tones with neutral axis at a position at 4.92m from the base line

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conclusions

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Length =2400 mm, Spacing =600 mm
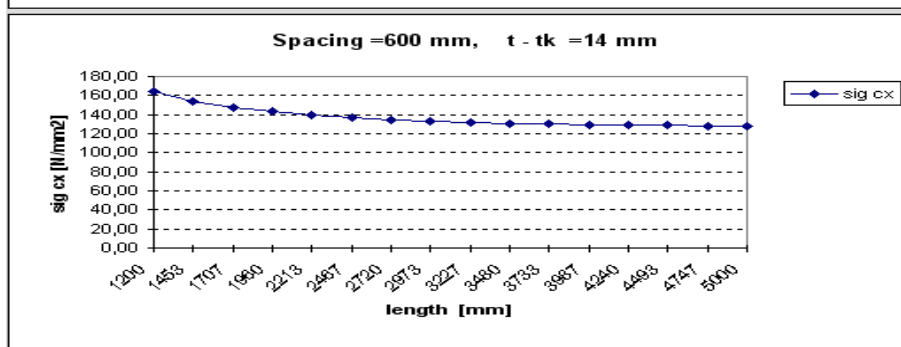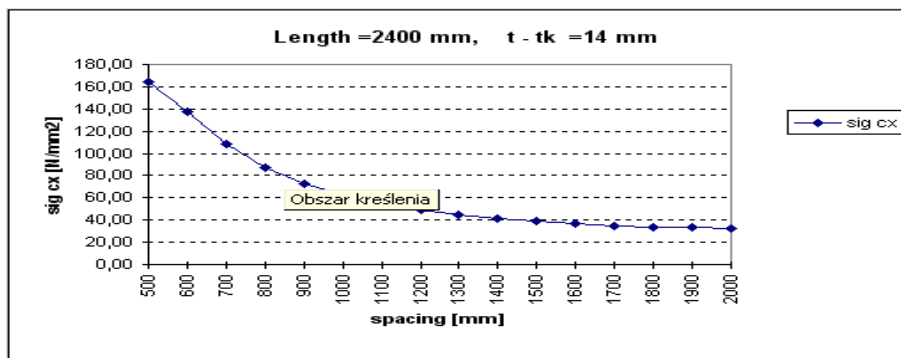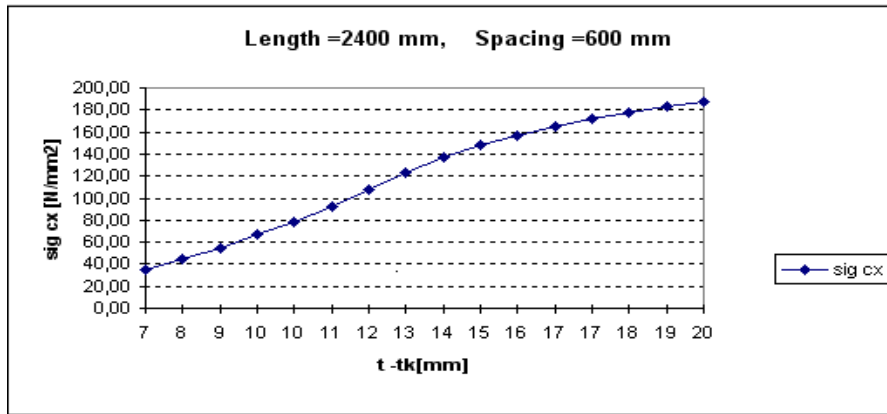
- The design tools used are appropriate, and Nauticus 3D beam software proved to be excellent tool for the finite element analysis since the meshing time is not required after defining the profile type.

comparison between operation requirements and optimized in terms of mass

sections	Percentage difference of the optimized design structure to operation requirement structure (%)
Frame 30-40	-7.99
Frame 63-77	-17.28
Frame 105-110	-6.63
Frame 115-125	-1.01

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- Thank you for your attention