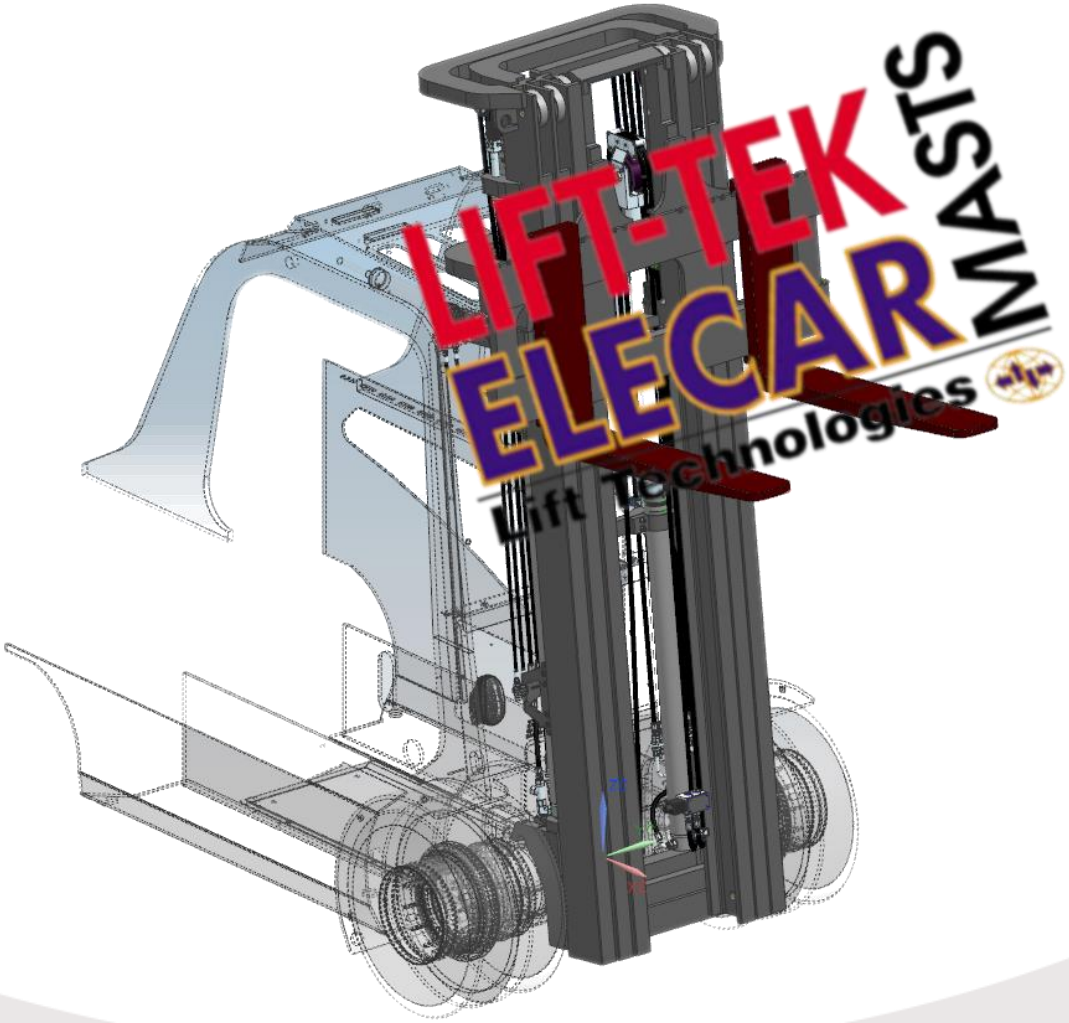


Finite Element Method structural analysis of a complete 3-stages mast with possibility of trilateral attachment from a third party in different loading conditions

Technical specifications

Mast and attachment

- 3 stages mast (TV) with attachment
- Possibility of strongly excentric load positioning
- Required lifting height H3 = 12000mm
- Load capacity ≈1000kg
- Extremely limited available operating space within the aisle at required lifting height.

Objective

Very customised applications and off-centered load positioning cause very intense displacement, strain conditions and strong misalignement if compared to a standard state with central load.

The mast, in a completely opened configuration, shall not display stress, strain or deflection with level exceeding the safety limit values for this specific mast capacity, in both frontal and lateral loading condition.

Standard approach

The standard approach used for this type of analysis is to verify separately and in the following order:

- The possible attachment from a third party in the two loading configurations (frontal and lateral load) by modeling the load on the forks and the constraints with the inner stage.
- The inner stage with the constraints and loading conditions of the attachment and of the intermediate stage.
- The intermediate stage with the constraints and loading conditions of the inner and outer stages.
- The outer stage with the constraints and loading conditions of the intermediate stage and of the truck.

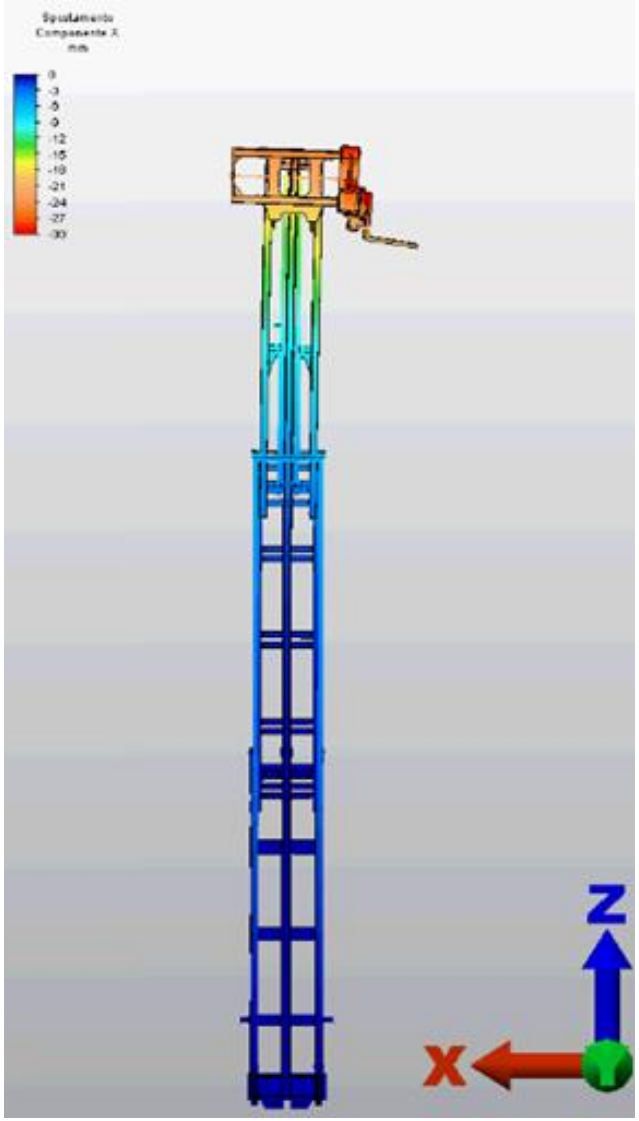
Each of these passages causes a physiological modeling error, which propagates and grows at each step

Used approach

- The model that was used for this approach is only **one**; it consists of all the 3 stages and the possible attachment.
- Two simulations have been performed for the **two different loading configurations** which represent the two most extreme situations.
- All the above-mentioned constraints and loading conditions for the standard approach are contained in one single model.
- The computational cost and the modeling complexities of a single analysis is equal to that of the three stages together plus that of the attachment.

The result of such a complex analysis allows to obtain a highly realistic model and to significantly cut the error propagation that would be present in a sequence of analysis.

Lateral loading condition



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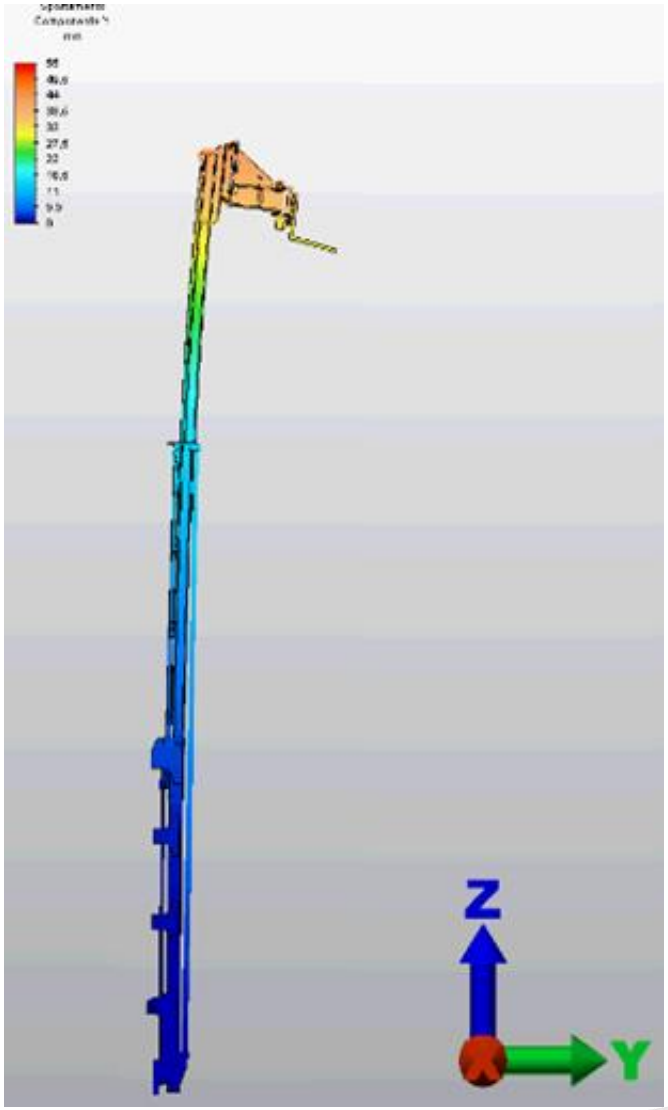
frontal loading condition



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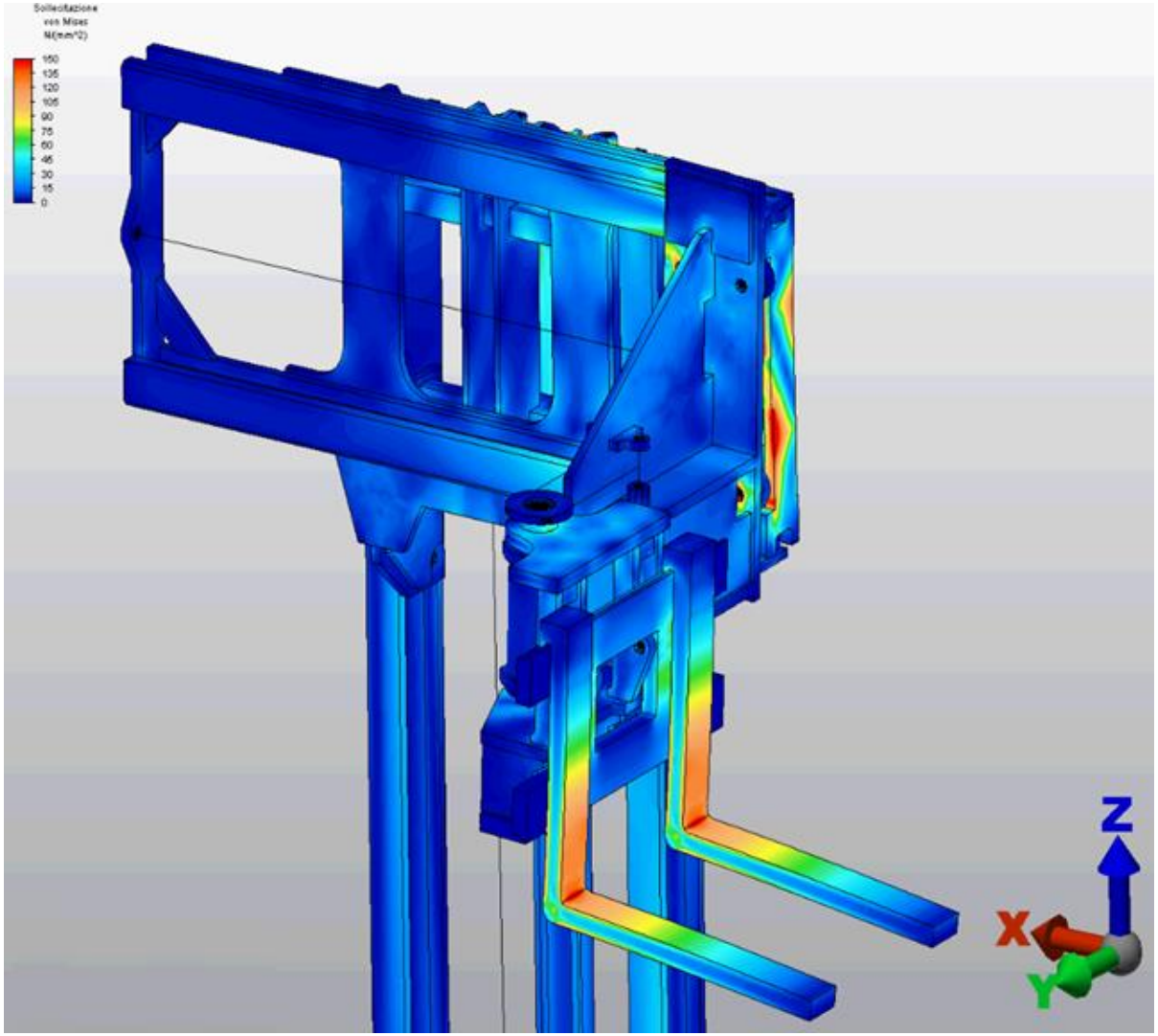
Lateral loading condition - detail



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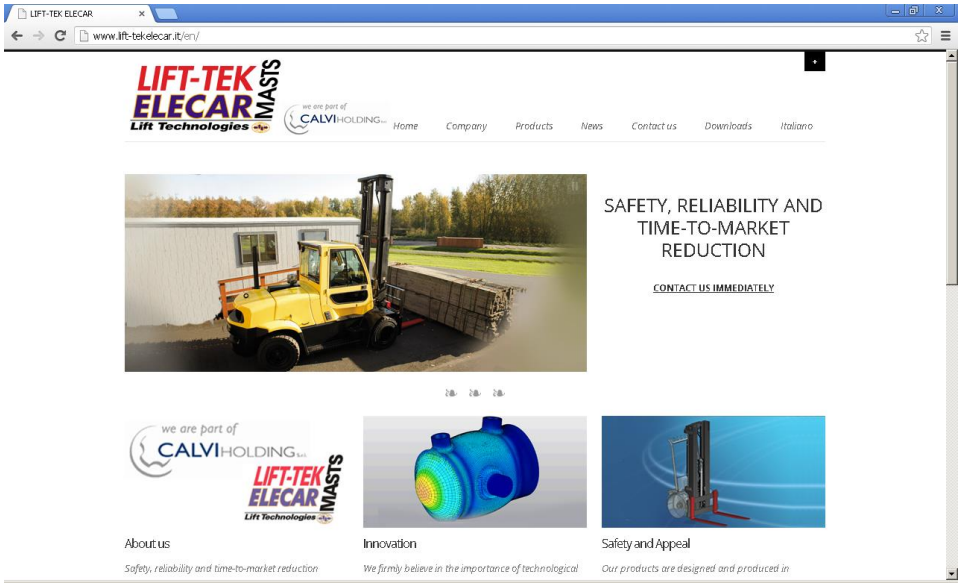

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