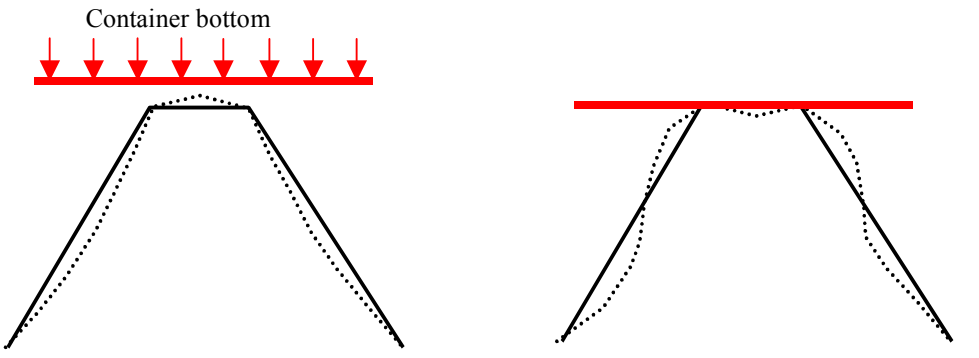
Offshore

Low speed - high energy impact

Client Norsk Hydro Produksjon AS

Non-linear analysis of several existing Protection Covers in GRP around Heimdal Riser Platform has been performed. Damage scenarios based on an accidental container drop were investigated. They were evaluated based on geometric properties and material properties of each cover, providing a sound engineering basis for conservative analysis of impact behaviour of each protection cover.

- Initial energy absorption is governed by the structural stiffness of the protection cover (analysed by non-linear static force – deformation pattern of the protection cover) causing in the end a local damage.
- Crushing of sidewall is the next and final step absorbing the residual impact energy remaining from the initial phase.
- This method of analysis is considered the most correct approach, although generally conservative.
- All deformation is calculated at the protection structure. Container and bottom is rigid (infinite stiffness), which is conservative.
- Ignoring fluid – structure interaction, also ensures a conservative approach.

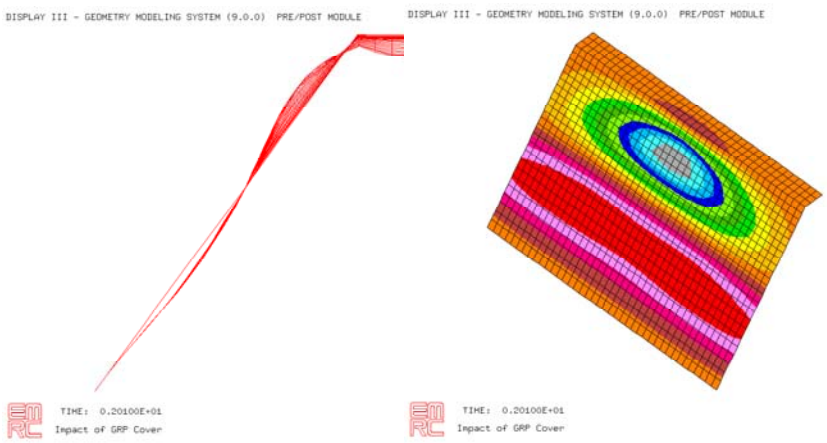


Initial deformation pattern is a function of loading and geometry, before impact occur

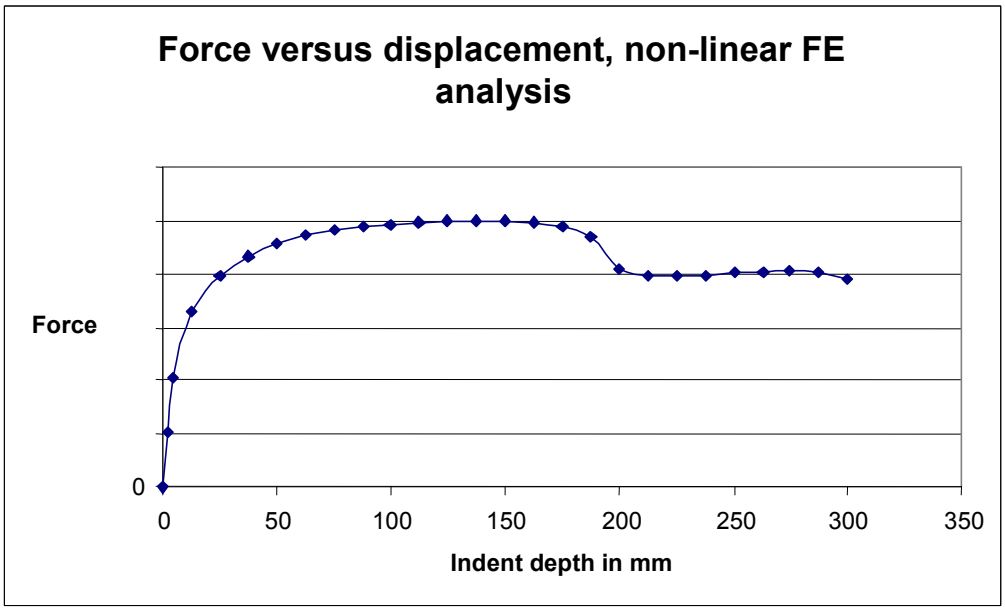
Deformation pattern changes caused by Vertical impact of stiff container structure

Basis for evaluation of impact behaviour

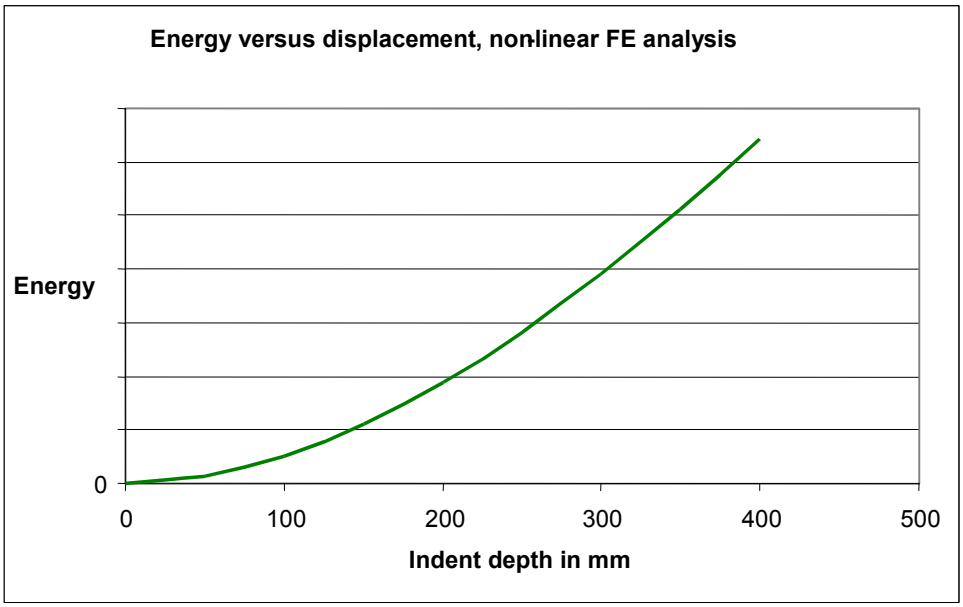
Offshore



Analysis results from non-linear analysis



Non-linear force displacement curve



Energy absorption versus indent depth from FE analysis