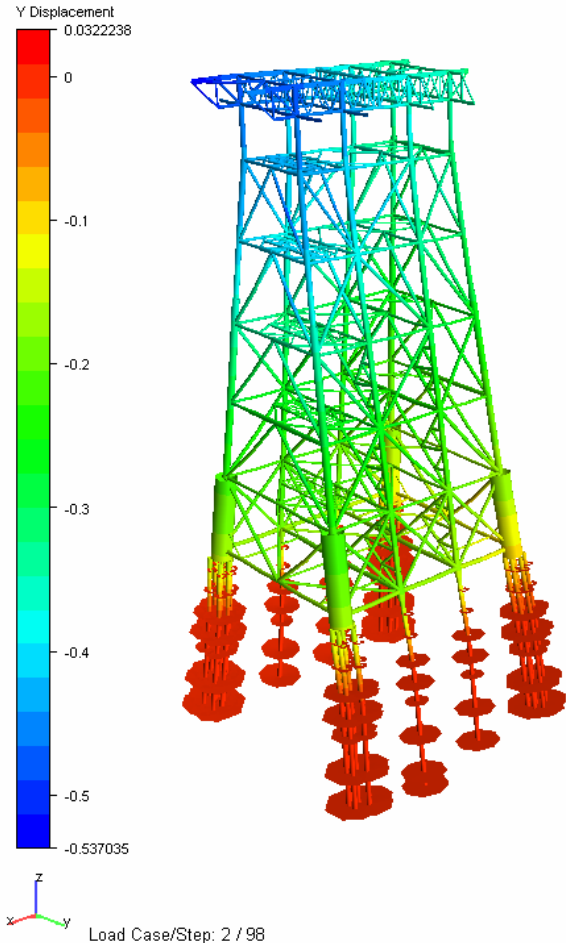


# Usfos

## Progressive collapse analysis

Efficient tool for progressive collapse analysis of space frame structures

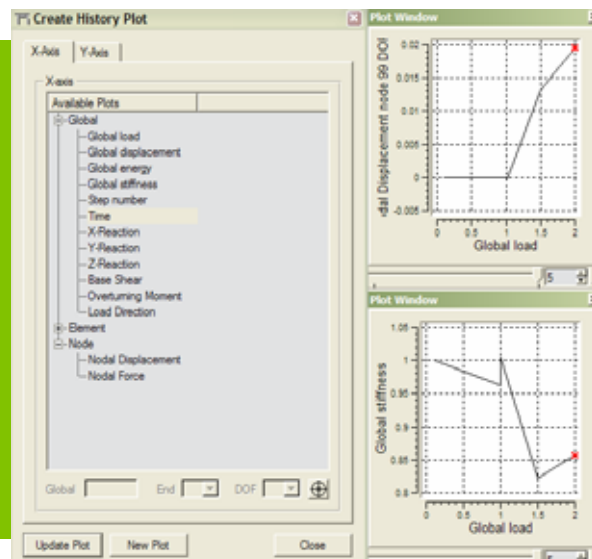
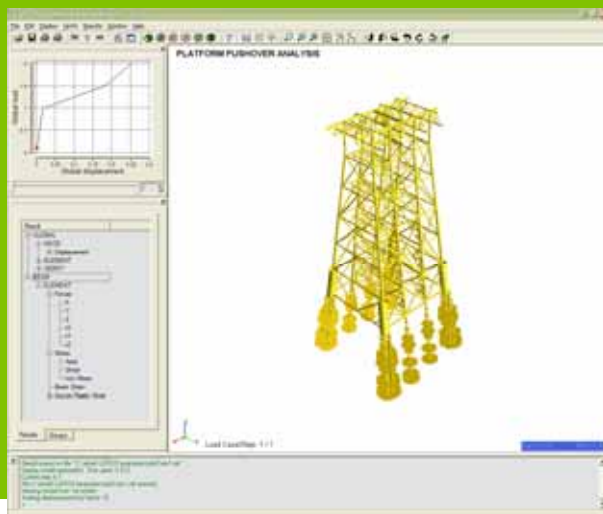
Protecting health, safety and the environment is paramount for designers and operators of offshore platforms, particularly when such structures are subject to extreme loads. Usfos is our analytical tool for predicting both the resistance of structures subject to accidental loads and the residual strength of damaged structures after such loads.



Accidental damage such as that caused by explosion, fire, dropped objects, extreme environment events, or from ship collision, poses a major threat to the safety and operation of offshore structures. Using USFOS the engineer can document the reserve strength of a structure, both before and after damage.

Usfos covers static collapse analysis, non-linear time series dynamic analysis as well as eigenvalue analysis of typically jackets, jackups, topsides and floaters.

By utilising the inherent redundancy found in most offshore structures the progressive collapse limit state can be used to design for accidental damage or extreme loads. Whereas in traditional elastic design redistribution of load is not normally considered. Collapse or plastic limit state design allows for local failure in yield or buckling and even partial collapse, provided the overall integrity of the structure is maintained. In short, plastic limit state design allows the designers to take advantage of any reserve capacity in the structure.



## Applications:

- Pushover analysis
- Accidental loads
- Ship collision
- Fire and explosion
- Reassessment
- Design

## Main features:

- Buckling and postbuckling behaviour
- Local buckling
- Joint flexibility and ultimate capacity
- Fracture
- Damaged members
- Temperature effects
- Local denting and deformation due to ship impact
- Advanced graphical results presentation
- Functional loads
- Environmental loads (wave, wind, current)
- Ship collision
- Dropped objects
- Fire loads
- Explosion loads
- Earthquake loads
- Non-linear material properties
- Linear and non-linear springs
- Simulation of internal piles

## Model and load generation

The frame model is created in the SESAM program Genie (or Patran-Pre) and the Input Interface file, T-file, is then imported in Usfos.

The wave and current loads are computed by the SESAM program Wajac and the Loads Interface file, the L-file, is subsequently imported in Usfos.

## Running Usfos and post processing results:

An Usfos analysis and subsequent results post processing are performed in a modern and intuitive Graphical User Interface (GUI). Results are presented as colour fringes (e.g. structural utilisation, temperature distribution) on images of the structure, deformed configurations, XY-plots and in tables. The structural response and collapse process may be visualised step by step and highly stressed and critical members are easily identified. This makes it easy to trace the redistribution of forces from onset of material yielding and member buckling to the final collapse of the entire structure.

## Program developments

The development of Usfos has been supported by Shell International, Phillips Petroleum Company, Elf Aquitaine, Amoco, Statoil, Saga, Norsk Hydro, Aker Engineering, Offshore Design, John Brown and ABB Impell. The program is continuously being further developed by Marintek in close co-operation with the users.

Usfos is owned, developed and maintained by Marintek.

