

Fuelling Wind Development on Oil Experience

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Presentation Outline

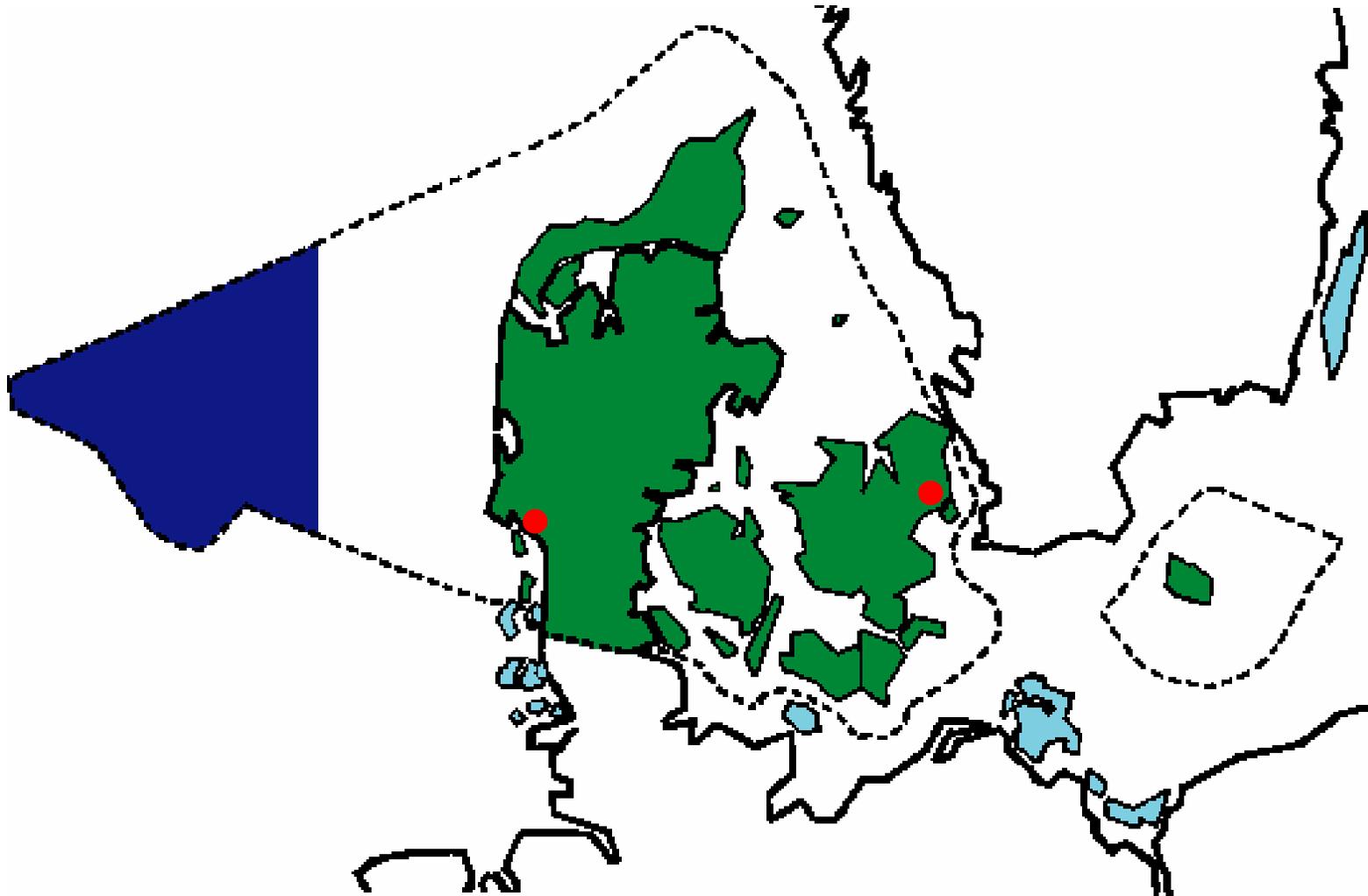
- The Past – The Oil Legacy
- The Present – History Repeating Itself?
- The Future - Synergy

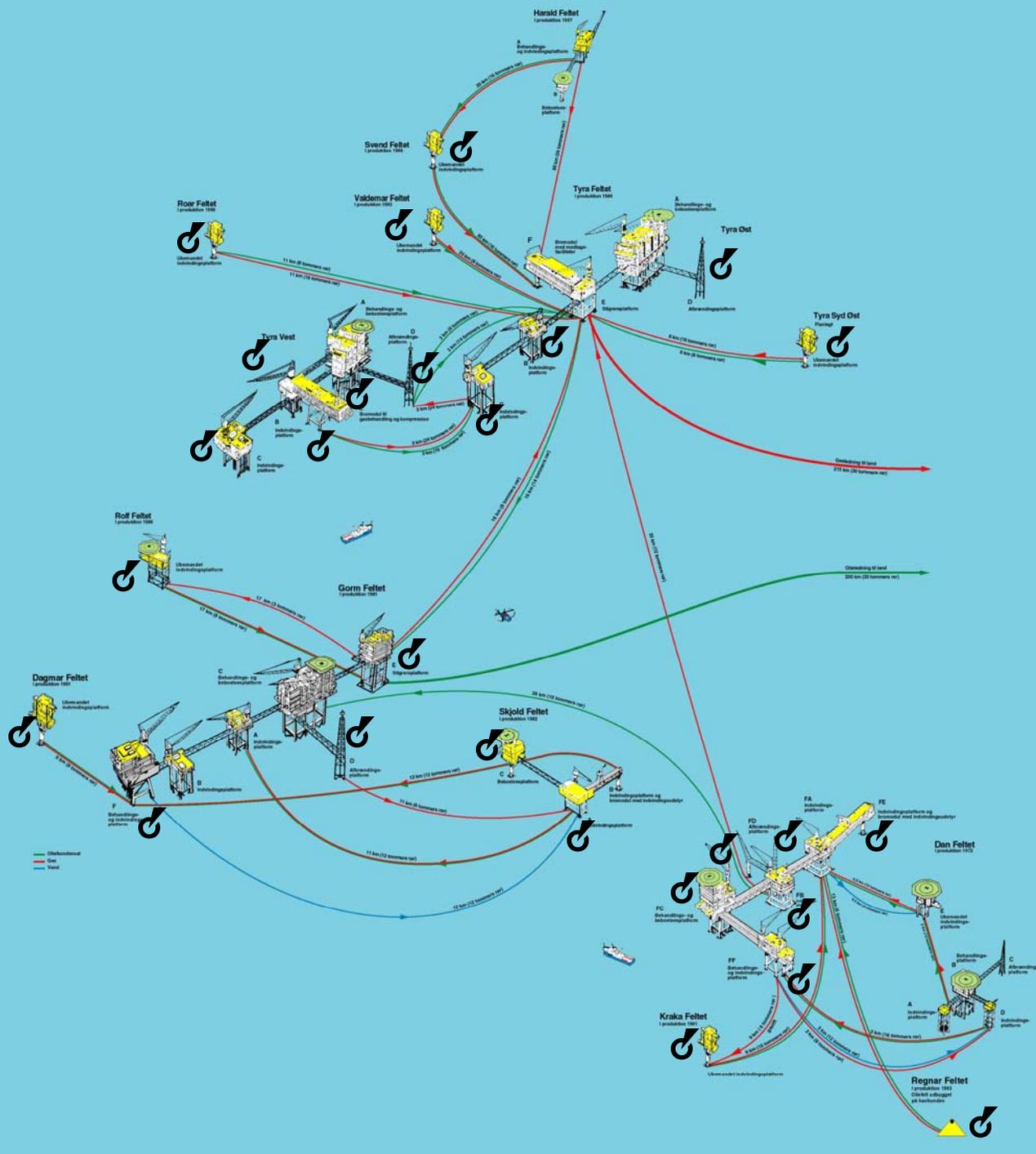
The Worlds first offshore platform (1947)

- The pioneers of offshore Oil & Gas had very limited knowledge about even the most basic design principles that we now take for granted. Fundamental offshore calculation models such as:
 - long-term wave height estimation,
 - load bearing capacity of long piles
 - wave load on cylinders
- are all examples of engineering achievements made in the pursuit of oil.



The Danish Oil and Gas Fields





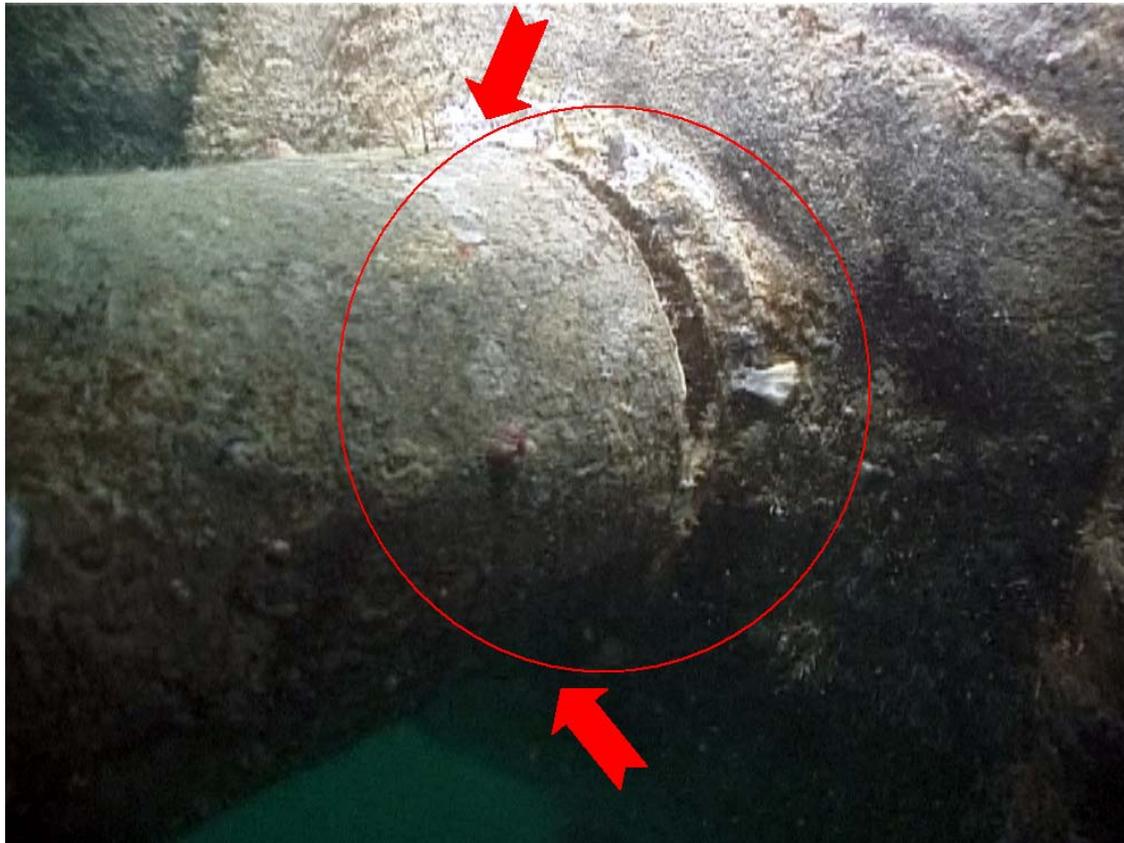
Learn from experience

Alexander Kielland 1983, 123 Casualties of Fatigue Failure

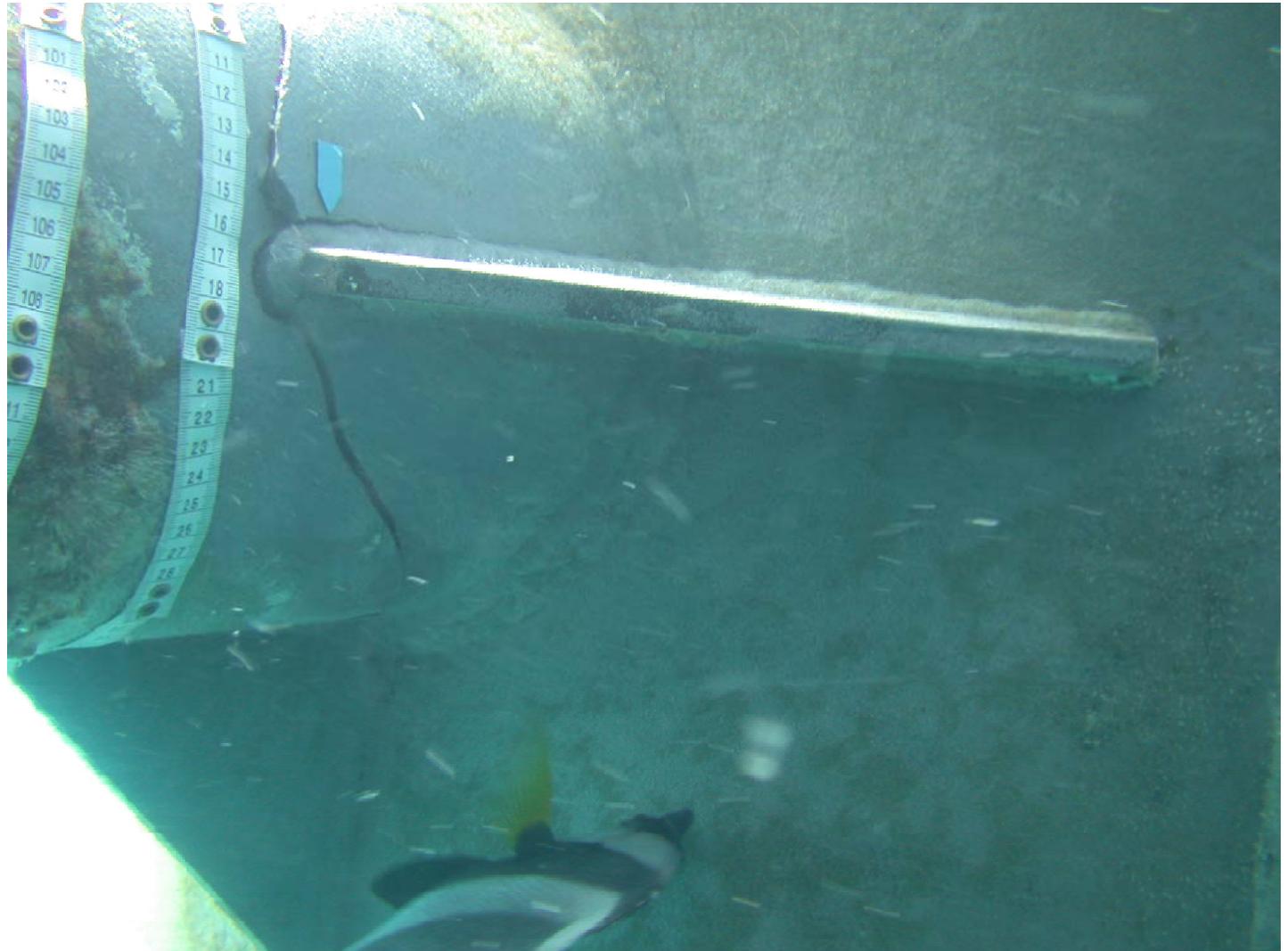


A number of measures have been adopted after the accident to improve offshore safety. Safety courses became mandatory, and all offshore workers had to be issued with survival suits - even on helicopter flights over the sea.

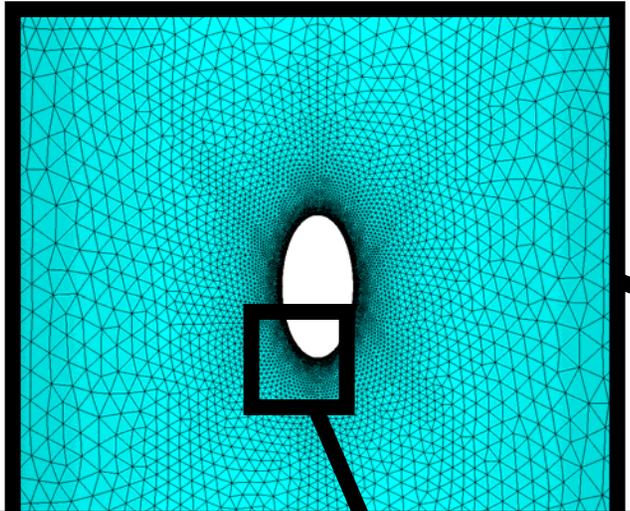
Fatigue cracks



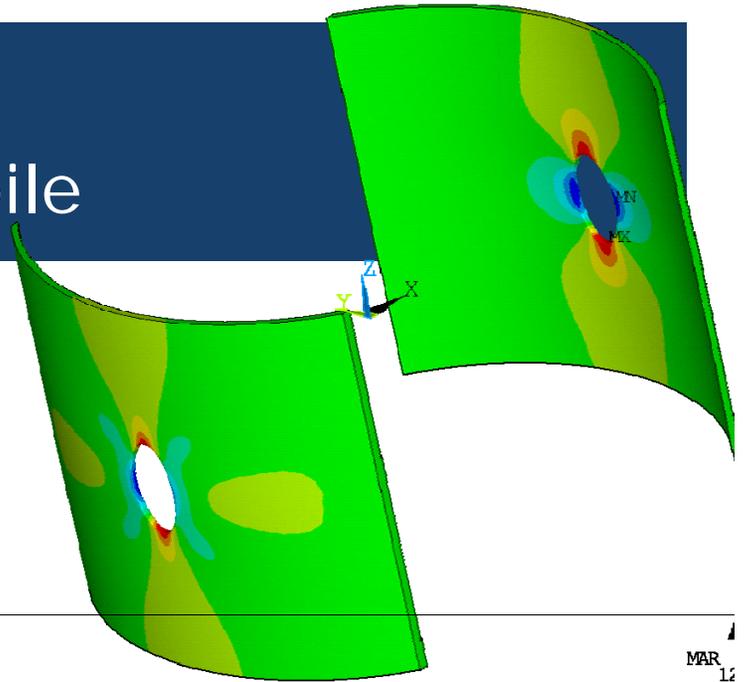
Avoid hotspots



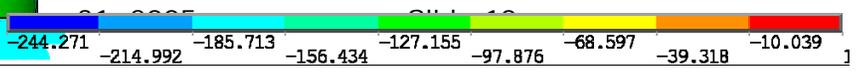
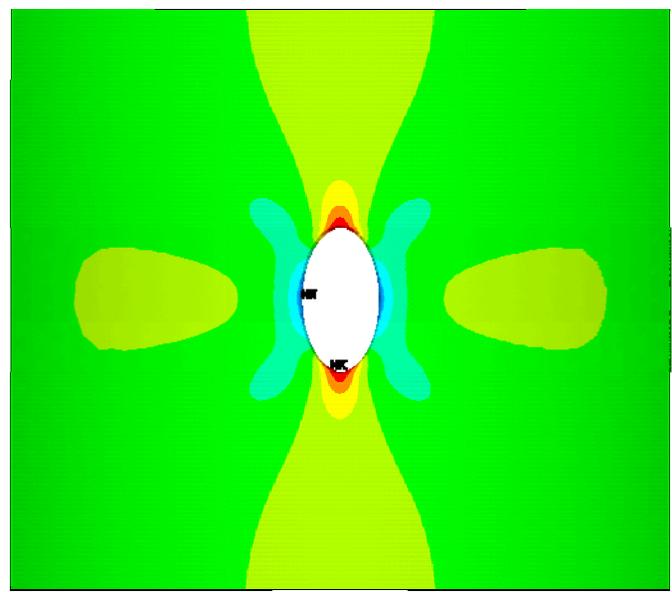
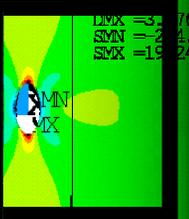
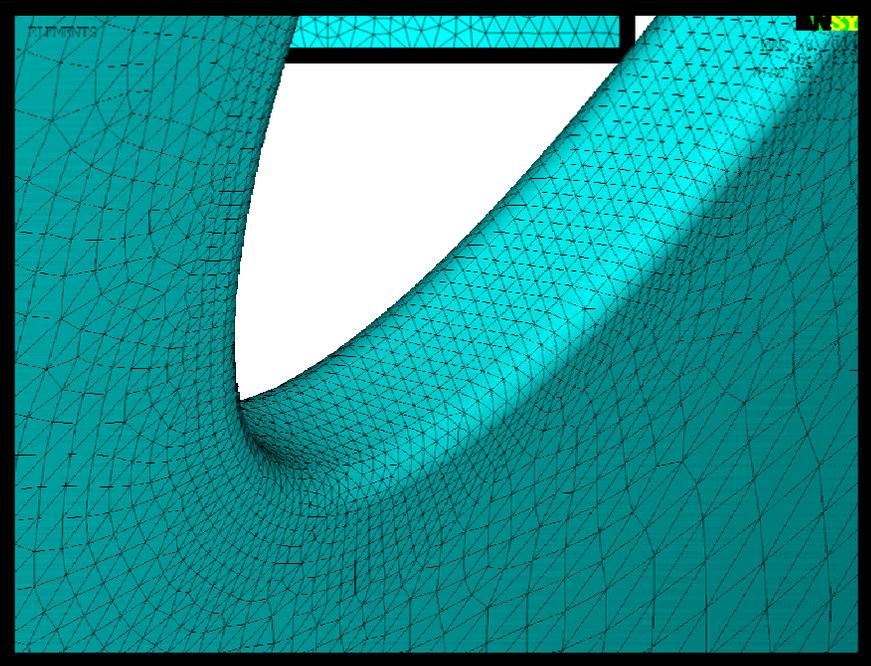
SCF's at elliptical hole in monopile



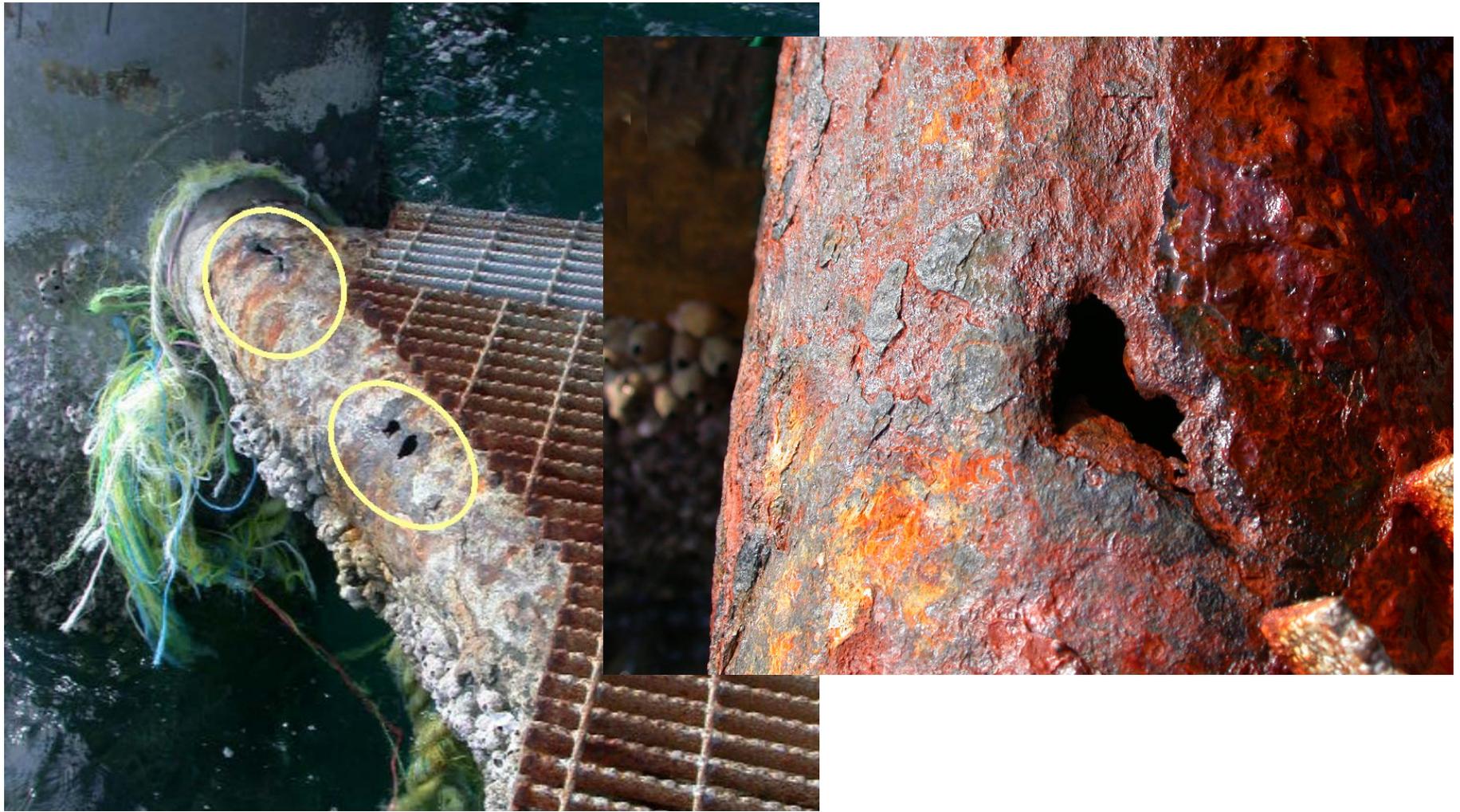
NODAL SOLUTION
STEP=1
SUB =1
TIME=1
SZ (AVG)
SMX = 244.271
SMN = -244.271
SXX = 19.24



MAR 12
PLOT 1



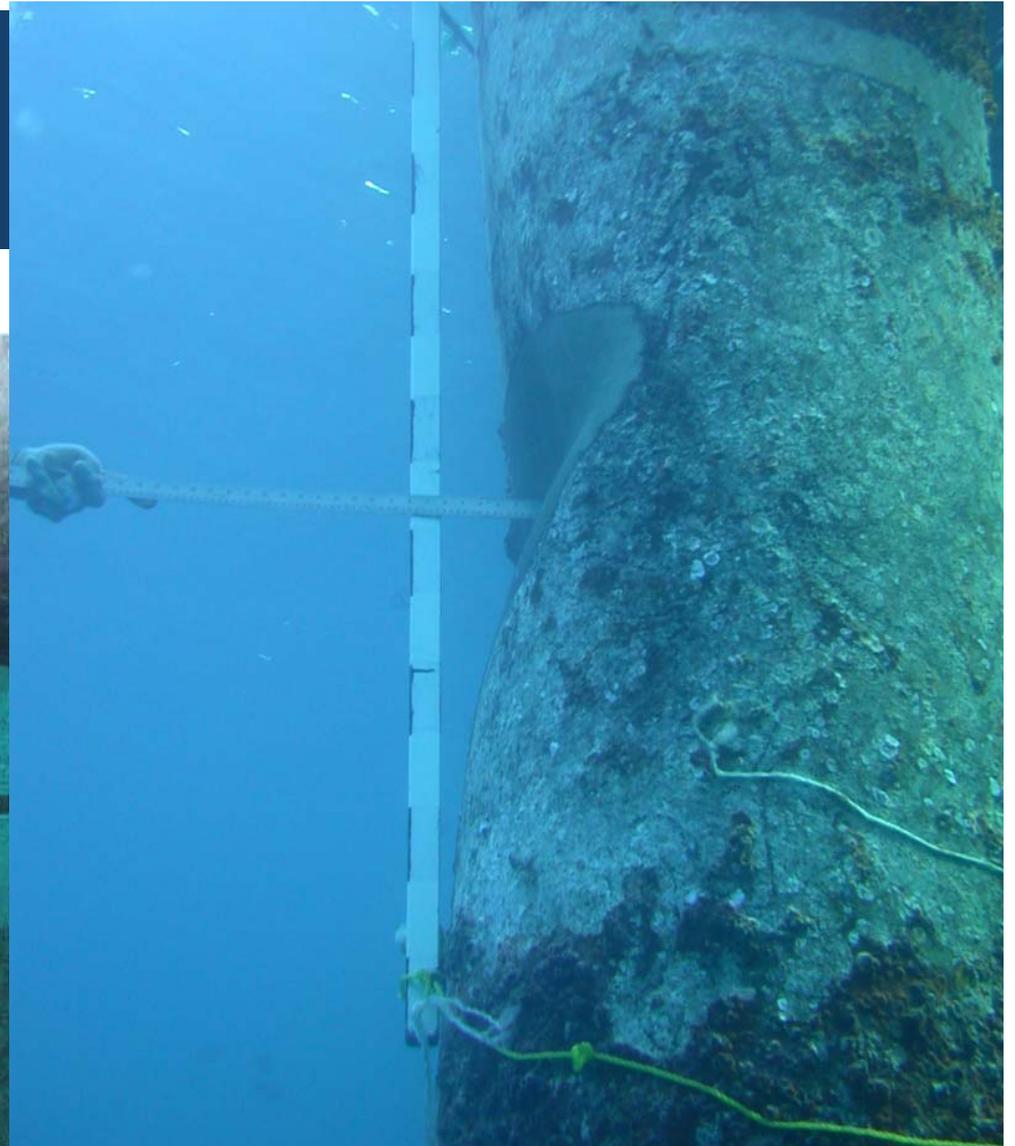
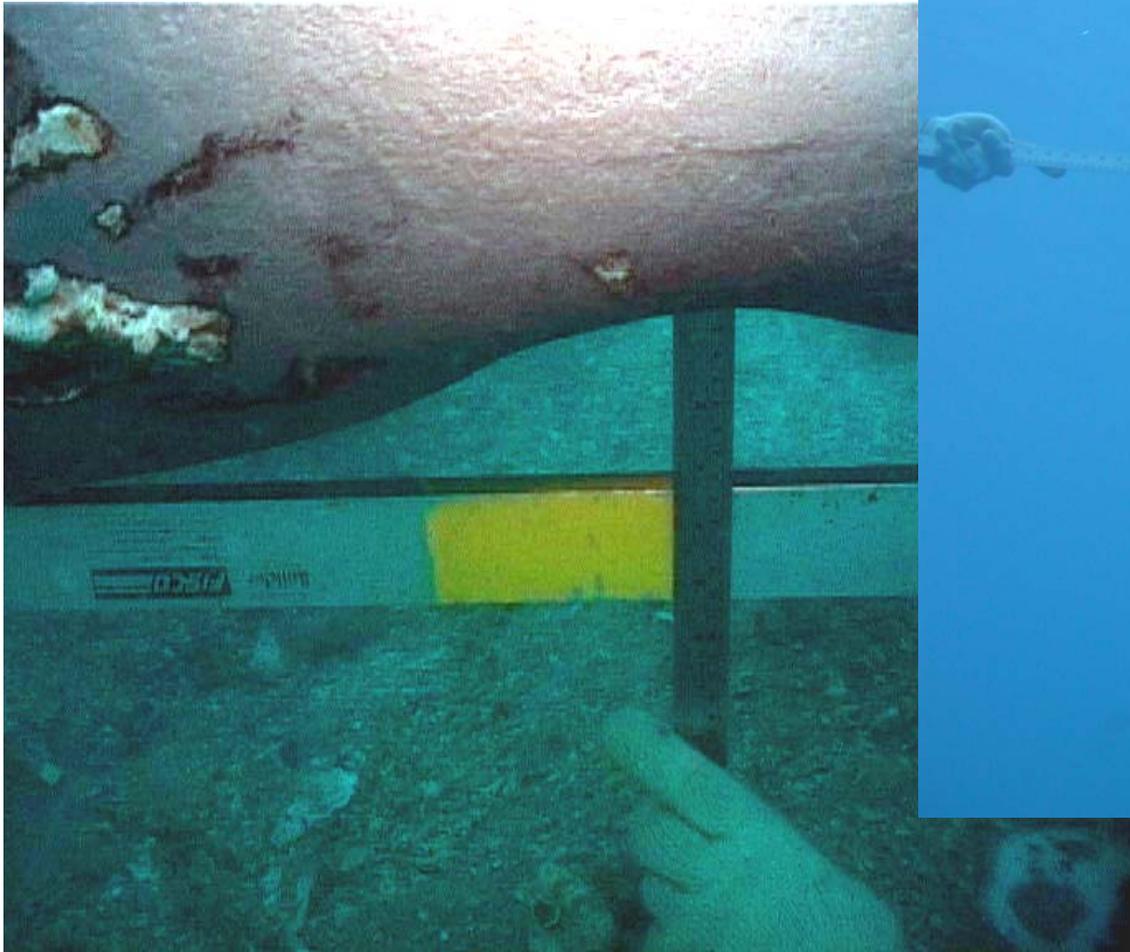
Do we need to consider corrosion!



Anodes don't last forever



Boat impact



External J-Tubes



Keep the bolts properly tightened



Design for local wave load above splash Zone



Never underestimate the wave load



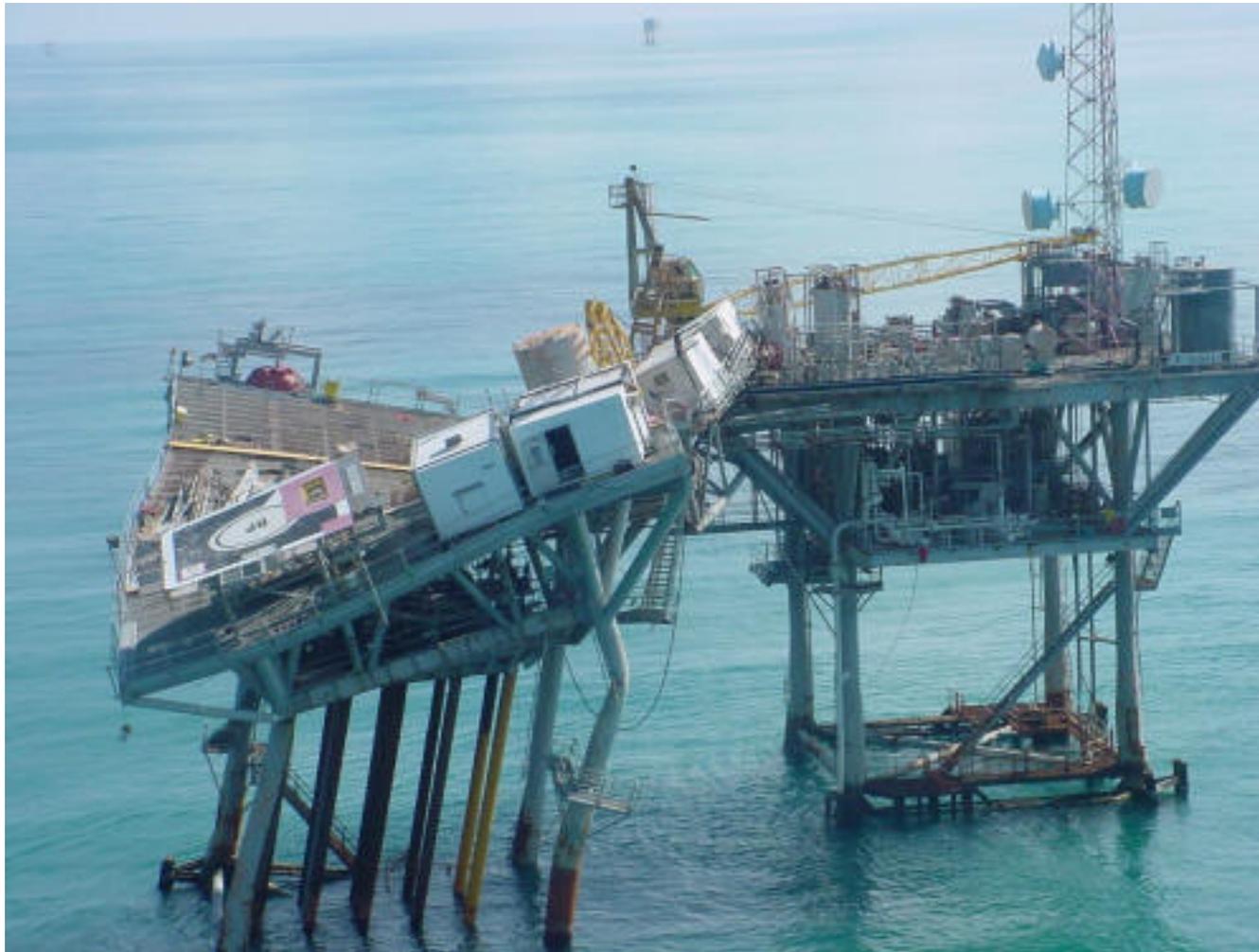
Marine growth need to be considered



Horns Rev A Transformer Platform



Hurricane Lili damage



Hurricanes Katrina and Rita

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Hurricanes Destroyed 109 Oil Platforms: US Government

"We had altogether, with both of the hurricanes, about 2,900 platforms that were in the path of the hurricanes," Interior Secretary Gale Norton said. Washington (AFP) Oct 04, 2005

Hurricanes Katrina and Rita destroyed 109 oil platforms and five drilling rigs in the Gulf of Mexico, but only a small portion of production will be lost for good, the US government said Tuesday.

Rita accounted for most of the damage in a region that ordinarily produces nearly one-third of US crude oil imports, Interior Secretary Gale Norton said in presenting a preliminary assessment report.

Rita destroyed 63 platforms and one drilling rig when it tore through the region on September 24, she said. Katrina destroyed 46 platforms and four drilling rigs when it hit the Gulf at the end of August.

Katrina also caused extensive damage to another 20 platforms and nine drilling rigs. Rita seriously damaged 30 platforms and 10 drilling rigs.

"The two hurricanes coming so close together really illustrate how much of our offshore production was affected," Norton told the CNBC network.

"We had altogether, with both of the hurricanes, about 2,900 platforms that were in the path of the hurricanes," she said.

"We have no official estimate of the dollar value of the damage and the amount that it will cost to repair those facilities, but it will clearly be in the billions of dollars."

In advance of the hurricanes, crude oil production ground to a halt as Gulf sites were evacuated.

A total of 342 platforms remain evacuated, roughly 40 percent of the manned sites in the Gulf, Norton said.

As a result, 90 percent of crude production and 72 percent of natural gas output is paralysed, she said.

But Norton also stressed that only one of the damaged platforms was built after federal construction standards were tightened in 1988. The ones that were destroyed were nearing the end of their lives.

"As a result, only a very small percentage of production is expected to be permanently lost," she said in a statement.

"Despite such intense winds and powerful waves offshore, we experienced no loss of life or significant spills from any offshore well on the outer continental shelf," Norton added.

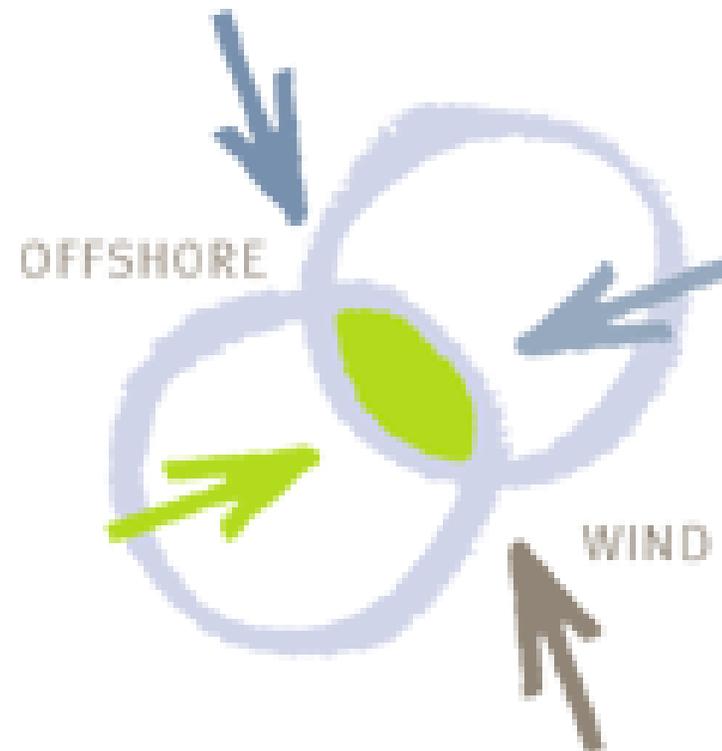


Offshore Wind - Offshore Standards

- international standard EN/ISO 19900 series
 - in preparation for more than 10 years. The development of this standard has involved people from most of the world's oil producing countries, and therefore contains over 60 years of experience from more than 20 countries and thousands of offshore structures.
- IEC 61400-3 "Safety requirements for offshore wind turbines"
 - With these new standards it is believed that a consistent level of reliability in the design and fabrication can be achieved, thus strengthening the confidence in the offshore wind industry.

Synergy

- [from Greek sunergia, meaning "cooperation," and also sunergos, meaning "working together"]
- Traditional Oil companies as developers of offshore wind farms will undoubtedly use their experience from Oil & Gas.
- Technical Synergies will come when consultants and researchers are involved in both industries
- Contractors will utilise their production facilities, know-how and experience.



Power Production

