GCE Subsea Breakfast seminar Hyperbaric testing 2018-10-19

1. Introduction to hyperbaric testing
2. Requirements for hyperbaric testing
3. Testing facilities overview
4. Potential consequences
5. Establishing local hyperbaric test centre (discussions)
6. Industry demands (discussions)

Introduction to hyperbaric testing

Introduction to hyperbaric testing

- Hyperbaric pressure testing is a well used and proven method to validate subsea equipment;
  - Functionality (work as intendant)
  - Integrity (water ingress, strength,) +++
  - … under realistic and as in-operation conditions

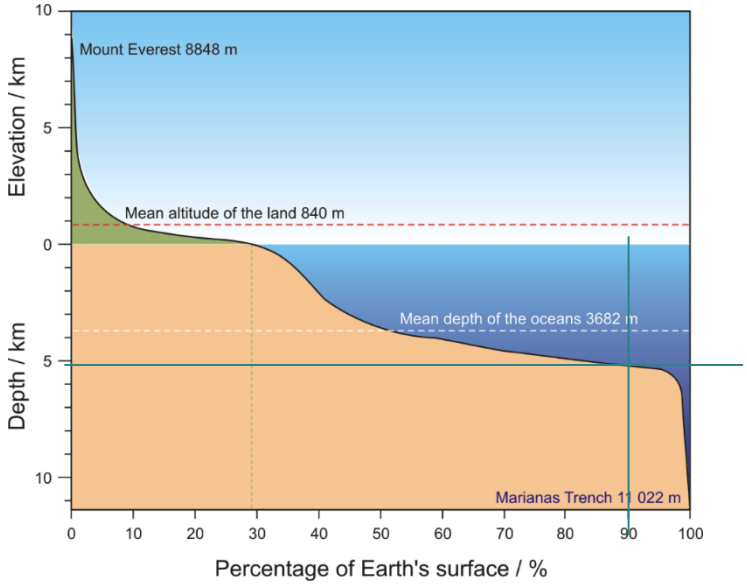
- Avoids conducting sea test→ Significant cost reducing factor

Relevant industries

- Oil & Gas
- Subsea mining
- Renewable energy
- Military and Defence
- Offshore Fish Farming
- Marine research

The oceans of the world – by depth

- Oil and Gas
  - 100 to 3000 msw
  - HPHT wells → 1000 bar+
- Subsea mining
  - 800 to 6000 msw
- 90% Coverage → 5100 msw
  - 1.3SF → 6633 msw
- Research?
- Is the 6000 the new 3000 msw?



Reference to standards/recommendations

Some examples:

- DNV-RP-A203 – Qualifications of new technologies
- DNVGL-ST-F301
- API 6A, 6D, 17D, 17H
- **ISO 13628-4**
- Client specific requirements

Testing facilities - overview

Hyperbaric testing facilities in Norway

- Limited independent hyperbaric testing facilities in Norway
- A few subsea supplying companies have invested in their own hyperbaric testing chambers (is this due to lack in available options?)
- Limited quantity of large ultra deep chambers

Hyperbaric testing facilities abroad

- Significant sized independent/ semi-independent test centres has been established over the last couple of years
- Large quantity of large ultra deep chambers
- A few sized “ultra-ultra” deep chambers are also identified, 1000bar +

Hyperbaric testing facilities - GAP

- There is a significant gap between (in particular) UK and Norway
  - Large and deep test chambers is available in UK, while non existing (almost) in Norway
  - The “business case” in UK seems to differs from Norway
    - “Independent” test centres has been established in UK over the last couple of years.
    - In Norway, some suppliers companies have invested in their own test facilities (to cover their needs)

Hyperbaric testing facilities - GAP

- “The Norwegian model”;
  - Limits availability of testing facilities (competitive companies and due to internal priorities)
  - Hyperbaric test chambers will be/is limited in size and pressure rating, as it covers the specific companies req.

  - Is there something we have missed (Why is the investments abroad so large)? – Are equipment being sent abroad for hyperbaric testing?

Potential Consequences

Potential Consequences

Lack of suitable, independent, test facilities in Norway might lead to:

- Test and verification must be performed in other countries

That might lead to:

- Companies moves activity abroad
- Competence moves aboard
- Development activities moves aboard
- Production moves aboard
- Service activities moves aboard

Establishing a local & independent - hyperbaric testing facility

Establishing a local testing facility

- A new local, independent, testing facility will;
  - Strengthen local companies
  - Strengthen local technology development for established and new companies
  - Strengthen local competence
  - Reduce cost
  - **Increase competitiveness**

NUI Business models

- Stand alone company investment
  - Higher risk, requires a significant potential (or client) in qty. of tests
- Group/cluster/partners investment
  - Establish a test centre in Bergen with investment from local companies/clusters
  - Significantly limiting investment cost for partners
  - Control of cost elements

NUI Business models

- However!
  - We do not know what **you** need

SIZE Length Depth

nui

Local/national industry needs & requirements

What do the industry (you) need in the future.

- How Big & how Deep?
- What kind of verification testing is required by the industries?
- Does other industries meet the same requirements as the Oil and Gas industry?
- Is the local/national demand for such facility large enough?

- Discussions