Welcome to the World of Trelleborg

Bend Protection of Flexible Pipe Systems
SubseaExpo – Aberdeen
Joshua Chadwick – 4th February 2016
Agenda

What’s to come....

What & Why?

How?

Technical Challenges

Market Pull

HSE and Environment
Bend Protection

The problem

What & Why?
Bend Protection

The problem

- Flexible connection points resulting in a sudden change in stiffness.
- Protection from over bending during installation, storage and operation.
- Remove the fatigue loads at the connection point through life.

What & Why?
Bend Protection

Typical considerations

Service Conditions

Storage and Handling

Design Life

Cost

What & Why?
Bend Protection

How?

Dynamic

Static

How?
Bend Protection

Bend Restrictor

How?
Bend Protection

Bending Stiffener

How?
Bend Protection

Testing and Qualification

How?
Bend Protection

Engineering analysis

- Initial design input
- Environment and conditions (temp, salinity, end fitting, etc)
- Installation conditions
- Design life - fatigue

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Technical Challenges
Bend Protection

The design

- Robust design that is fit for purpose.
- Using materials that are fit for purpose and to the customer specifications
- Protecting for the whole design life
- Incorporating into the final product
Bend Protection

The verification

- Internal Qualification
- External Qualification
- Process control
- Traceability

Technical Challenges
Bend Protection

Where do we go next?

Material Envelope  Cost  Schedule  Performance

Market Pull
Bend Protection

Is it safe?

**Must be a responsible supplier, responsible to:**

- Staff and suppliers
- Customers
- Environment

**This includes:**

- Manufacturing practises
- Material selection (Mercury content and REACH legislation)