

# Application of HPHT Equipment: Next Steps for the Industry

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# What is HPHT – High Pressure / High Temperature ?

- No uniform definition

Oil Producing Area	Pressure	Temperature
UK Norway Australia	10,000 psi (69 MPa)	300 deg F (150 deg C)
US	15,000 psi (103 MPa)	350 deg F (177 deg C)

- Recent deepwater wells in US GOM:
  - > 400 deg F or > 15,000 psi
- Beyond the limits of API standards
- Beyond the regulatory limits

§ 250.804 Additional requirements for subsurface safety valves (SSSVs) and related equipment installed in high pressure high temperature (HPHT) environments.

(a) If you plan to install SSSVs and related equipment in an HPHT environment, you must submit detailed information with your Application for Permit to Drill (APD) or Application for Permit to Modify (APM), and Deepwater Operations Plan (DWOP) that demonstrates the SSSVs and related equipment are capable of performing in the applicable HPHT environment. Your detailed information must include the following:

- (1) A discussion of the SSSVs' and related equipment's design verification analyses;
- (2) A discussion of the SSSVs' and related equipment's design validation and functional testing processes and procedures used; and
- (3) An explanation of why the analyses, processes, and procedures ensure that the SSSVs and related equipment are fit-for-service in the applicable HPHT environment.

(b) For this section, HPHT environment means when one or more of the following well conditions exist:

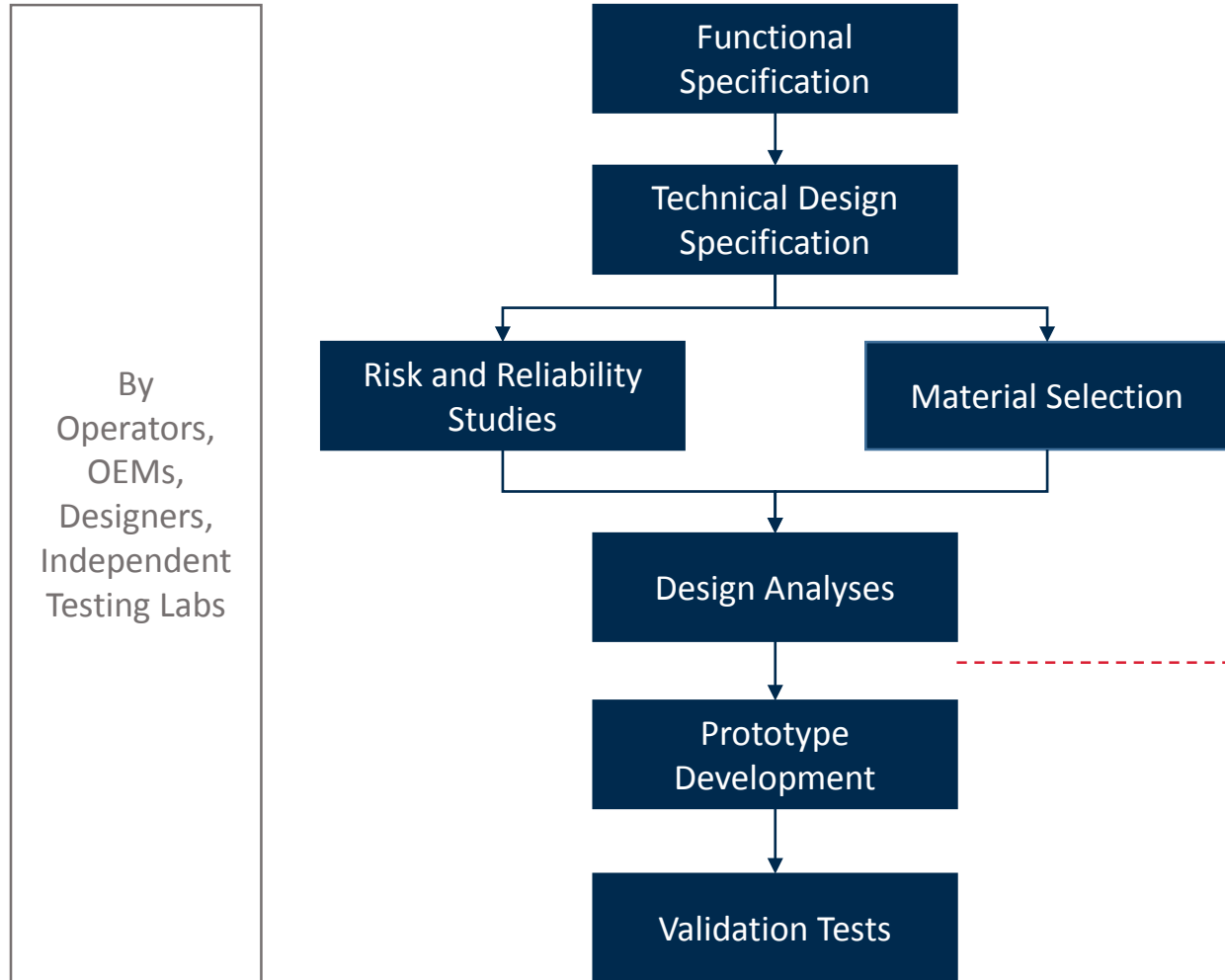
- (1) The completion of the well requires completion equipment or well control equipment assigned a pressure rating greater than 15,000 psia or a temperature rating greater than 350 degrees Fahrenheit;
- (2) The maximum anticipated surface pressure or shut-in tubing pressure is greater than 15,000 psia on the seafloor for a well with a subsea wellhead or at well with a surface

(b) For this section, HPHT environment means when one or more of the following well conditions exist:

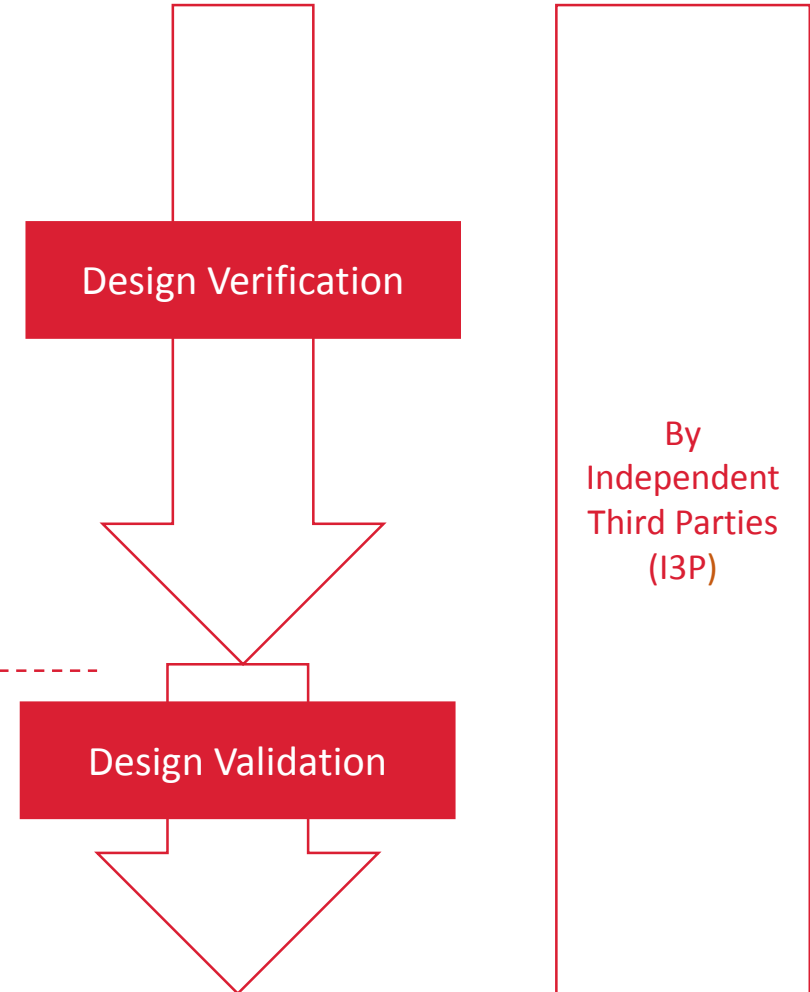
- (1) The completion of the well requires completion equipment or well control equipment assigned a pressure rating greater than 15,000 psia or a temperature rating greater than 350 degrees Fahrenheit;

temperature is equal to 350 degrees Fahrenheit for a well with a wellhead. In addition, related equipment, including threaded connections, well control equipment, and other equipment that is used in the HPHT environment.

# Technology Development



# Technology Qualification

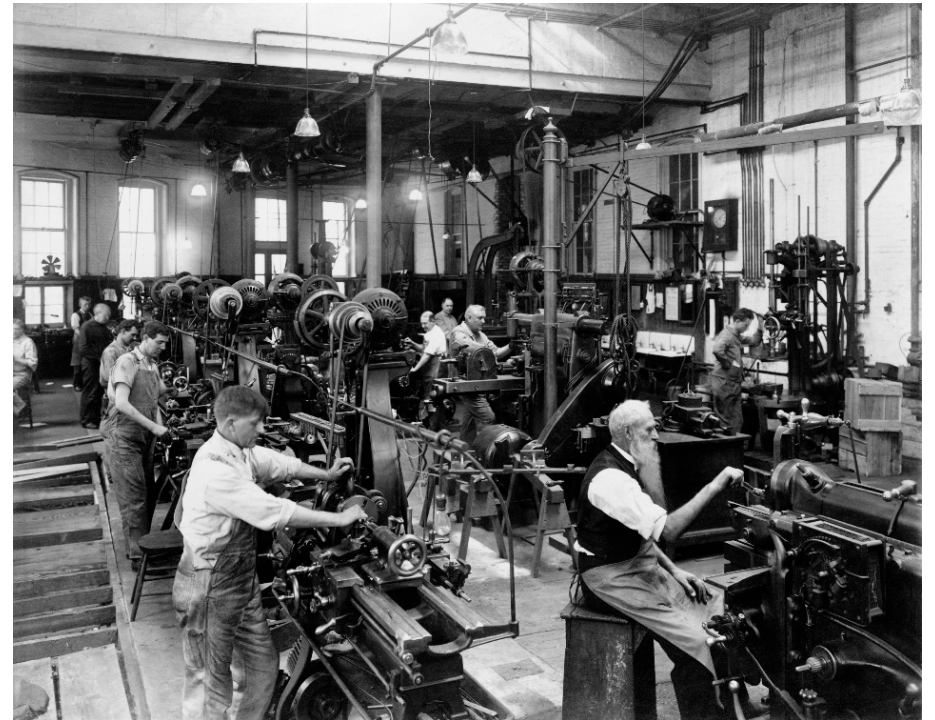


# Now that the Technology is Qualified....

Next step:

**Project Realization** – building the equipment that goes into operation

- No standards
- No specific regulations
- Manufacturing based on:
  - TQ design
  - Manufacturing processes reviewed by I3P
- Testing:
  - Reviewed testing procedures
- **How to certify compliance and suitability?**



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# Certification Process – The Challenges

## Challenge 1

### Certification Procedure

- Certification without:
  - Standards
  - Regulatory requirements
- Repeatability
- Consistency

## Challenge 2

### Product Realization Control

- Interchangeability
- Information availability
- Geographical coverage

# Certification Process – Customization to Suit Application

## Certification by Independent Third Party

- Competency
- Understanding design features
  - Design changes are inevitable – design re-evaluation may be required
  - Material substitution to be assessed
- Experience with manufacturing processes
  - Production equipment process may differ from prototype manufacturing
  - Material traceability to be closely monitored
- Working knowledge of failure modes
- Familiarity with testing regimes

# Certification Process – Customization to Suit Application

## Independent Product Realization Management

- Product Management System
  - Documentation
  - Continuous tracking
- Information Management
  - Availability
  - Reliability
  - Transparency
- Global Reach
  - Accessibility to stakeholders



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# Summary and Conclusions

- Without certification, **safety** may be compromised
- **Certification** is challenging:
  - Lack of standards
  - Regulatory requirements
- Technology qualification used as basis
- Modifications are inevitable and must be dealt with

- Customized certification process by an **Independent Third Party**
- **Classification Societies** are prepared to respond to the challenge:
  - Independent
  - Competent
  - Global footprint
  - Similar processes already in place
- Robust product realization management process



Thank you!



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**ABS**