Verifisering, testing og kvalifisering av ny teknologi

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DNV GL - global reach – local competence

150+ years
350 offices
100+ countries
13,500 employees
Putting our expertise to the test: 14 laboratories across 3 continents

- Environmental laboratory services
- Flow testing and calibration
- Materials qualification and testing
- Full scale testing
- Verification and testing of control systems software
- High-power/High-voltage testing
- Failure investigation
- Battery and energy storage testing
Only by connecting the details can we impact the bigger picture

- We classify, certify, verify and test against regulatory requirements, standards and recommended practices
- We develop new rules, standards and recommended practices
- We assist in developing national regulations
- We qualify new technologies and operational concepts
- We give expert advice on technology, efficiency, performance, risk management and new opportunities offered by digitalization and data management
DNV-GL’s laboratory facilities in Bergen

Materials & Corrosion Technology centre
- Failure investigation and root cause analysis
- Materials testing and characterisation
- Corrosion testing (i.a. sour service, SSRT, electrochem.)
- Coating and CP testing

Technology centre for Offshore mooring and lifting
- Structural large scale testing (i.a. chains, steel wire ropes, fibre ropes, cables, umbilical's, hoses, risers)
- Component testing
Why do new technologies take so long to scale?
Technology Readiness levels

- **TRL 9**: Actual system “flight proven” through successful mission operations
- **TRL 8**: Actual system completed and “flight qualified” through test and demonstration (ground or space)
- **TRL 7**: System prototype demonstration in a space environment
- **TRL 6**: System/subsystem model or prototype demonstration in a relevant environment (ground or space)
- **TRL 5**: Component and/or breadboard validation in relevant environment
- **TRL 4**: Component and/or breadboard validation in laboratory environment
- **TRL 3**: Analytical and experimental critical function and/or characteristic proof-of-concept
- **TRL 2**: Technology concept and/or application formulated
- **TRL 1**: Basic principles observed and reported

Source: www.nasa.gov
Technology Qualification

Yes, we can!

Look at all the great work we have done!

Convince me, prove it

Wow, but is it relevant and complete?

What is the residual risk?

Developer

End-user
Published best practice for anyone to use

DNVGL-RP-A203
DNV-RP-A203 Technology Qualification: A 3-step decision-making process

Qualification Work Process

Qualification Basis
(Set the requirements)

Technology Assessment
(Novelty and prohibitive obstacles)

 Threat Assessment
(Failure modes and risks)

Qualification Plan
(Select qualification methods)

Execution of the Plan
(Collect evidence)

Performance Assessment
(Verify compliance with requirements)

DNV GL deliverables

Technology Assessment Report

Statement of Feasibility
“No show stoppers”

Technology Qualification Plan

Endorsement of Qualification Plan
“Technically executable”

Technology Qualification Report

Statement of qualified Technology
“Technology qualified”

DNV GL deliverables

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Additive manufacturing will provide efficiency gains for the subsea and ocean industry.

AM piloting of different application for the ocean domain ongoing, use DNV GL as a trusted partner to explore your opportunities.

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Naturlige “bekymringer”

• Tåler AM produsert komponent det miljøet den skal stå i og den bruken det skal benyttes til?
  • Materialvalg
  • Nøyaktighet og toleranser
  • Styrke
  • Trykk, temperatur
  • Vibrasjon
  • Fuktighet og korrosjon
  • Ytelse og degradering i levetiden
  • +++
Seawater to DNV GL laboratories at Marineholmen, Bergen

- Seawater used for both long term, coating, anode testing and corrosion testing
- Customized testing in realistic environments (mud, hydro-carbons, H2S, deep-sea / pressure, elevated/ lowered temperature)
- Capable of simulating actual offshore conditions (seawater, corrosive gases as H2S and CO2)
OUR VISION

GLOBAL IMPACT FOR A SAFE AND SUSTAINABLE FUTURE

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