MARITIME

D-Class
(Data Smart Classification)

DNV GL – classification in a digital transformation

Aleks Karlsen
09 October 2018
Classification societies set technical rules, confirm that designs meet these rules, approve design documentation, survey equipment and structures during the process of construction and commissioning, and periodically survey sailing vessels to ensure that they continue to meet the rules.

Issue certificates based on compliance with the rules.
DNV GL wants to provide the industry with rules that supports use of modern and sophisticated technology in order to be able to perform incident free, cost efficient and environmental friendly operations. To reach this goal new verification tools and methods must be taken in to use by the maritime industry.

- Completely different conditions
  (this is well known...)

- But equally important...
  - Completely different toolbox
The DNV GL D-Class project

Goal:
“Create an improved and less invasive classification scheme for verification of DP systems by enabling the use of modern technology.”

- Increase **safety**
- Increase verification **efficiency**

**Technology examples:**
- Self verifying systems / automated verification tasks
- Remote verification witnessing
- Use of monitoring and data-analytics
- Other ...

**Intended future synergies:**
- **Transferable to classification of other systems**
- Methods and schemes are expected to be prerequisites for autonomous vessels
**D-Class participants**

<table>
<thead>
<tr>
<th>Operators:</th>
<th>Owners:</th>
<th>Equipment Manufacturers:</th>
<th>Others ...</th>
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<td>BP</td>
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**D-Class project Oslo workshop participants**
Present scheme

Traditional class verification methods and tools

- Witness on site by competent surveyors
- ‘Manual’ tasks
- Physical presence

...can be improved in relation to e.g.:

- Interruption of operations
- Downtime and delays
- Varying level of verification
- Low verification efficiency in modern technology and modern ways of operating vessels
- Cost
- Ensuring systems operational availability (in addition to safety)
Future schemes and methods will be gradually implemented

Future schemes and methods will enable

- Self-verifying systems
- Automated testing
- Extended simulation
- ‘Remote survey’
- Not calendar based

...which can provide

- Reduced need for physical presence
- Automated tasks
- Verification “during” operations
- Flexible schemes
- Improved level of verification (providing more robust systems and operation)
- Reduced down-time and reduced costs
- Methods fit for autonomous vessels and digital twins
- …
Example; Built in verification functionality

Built in verification functions

Body of evidence

Inspection

Testing

Traditional class methods:
• Witness on site
• ‘Manual’ tasks
• Physical presence

To obtain objective independent verification:
• That the test is applied in the right manner to the equipment/system when in the correct mode
• That the result is in accordance with acceptance criteria, in the actual test condition
• Physical condition

D-Class
Include this, and other verification methods, in to class tool box
**Example; Built in verification functionality**

**Body of evidence**

**Built in verification functions**

Office “survey”

**Traditional class methods:**
- Witness on site
- ‘Manual’ tasks
- Physical presence

To obtain objective independent verification:
- That the test is applied in the right manner to the equipment/system when in the correct mode
- That the result is in accordance with acceptance criteria, in the actual test condition
- Physical condition
- Flexibility (Verification “during” operations)
- Improved level of verification

**D-Class sets requirements to:**
- **Scope and effectiveness** of verification method
- Aggregation and delivery of **tamper free and genuine results**
- Sufficient **data management** (including quality and security)
- **SW development** and MOC processes
- ...
New automatic methods versus traditional methods

FMEA process

- Drawings
- Descriptions
- Block diagrams
- Interrelations
- Failure Modes
- Effects & conclusions
- Test Program
- Accept criteria evaluation

Acceptance

- Yes
- No

Class verification:

Set standards

- Provides competence
- Evaluate the complete FMEA documents
- Check background documentation when needed
- Checks the "logic" in the process/conclusions

- Calibrates proposed test programs
- Evaluates the final conclusions (Recategorizes all findings and adds findings when needed)
- Makes own conclusions towards acceptance criteria
- Provide comments and ensures compliance

New automated method

If this is a “black box” class cannot base its verification on it!

(This do not imply that parts of a method cannot be accepted as a “black box”)

Class verification:

Verify and validate correct functioning

- Documentation
- Witnessed demonstration of effectiveness

- Agreed information input to class
- Tamper free delivery of genuine information
- Class can make objective conclusions, provide comments and ensure compliance
D-Class scope

D-Class Scope: DP Survey Methods and Scheme

- Cyber Security
- Approval of manufacturer
- Type Approval
- Data management
- Condition Monitoring
- Connectivity and Interface standards
- Others... (e.g. competences?)

Class will set requirements to these issues. However, the detailed requirements are developed in separate projects and not in the D-Class project.
DP verification scope
Class scope, main elements

Potential shift in methods:

Present: Testing and trials.
Future: Automatic built in test functionality; Automatic reporting from real incidents.

Present: Testing and trials.
Future: Data analysis of and automatic reporting based on operational data.

Present: Inspection.
Future: Add on sensor data based analysis; video/pictures
### Verification, current and D-Class ….

#### Current verification scheme:

<table>
<thead>
<tr>
<th>At manufacturer</th>
<th>At yard</th>
<th>In Operation</th>
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<tbody>
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**Increased verification effort**

1. Less intrusive verification
2. Targeted verification scope
3. (Partly) remote verification
4. (Partly) automated verification
5. Less surveyor presence onboard
6. Not calendar based? (when needed/due date)
7. Flexible schemes?
8. Reduce duplicated verification activities.

**Improved verification efficiency**

Improved verification of Management of Change** (MoC)

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It is not (only) about “digitalizing” the traditional scope:

The **future scope** should be **better targeted**, and based on the **new available methods**.
Classification follow up – now and future (illustrations only)
Remote verification and witnessing
Remote inspection tool (mobile phone based)

FULL VIRTUAL PRESENCE SYSTEM

Onsight Connect gets your experts into the field without packing a bag, boarding a plane - or even leaving the office. Onsight gives you a collaborative real-time virtual presence experience that no other platform can deliver. Built with interactive tools that let you communicate through two-way video, audio, images, and visual notation, it is the most effective and efficient way to leverage your expertise.

Onsight delivers fully interactive mobile video collaboration between Onsight rugged smart camera, smart phones, tablets, computers, and telepresence.
Remote verification/witnessing of components
Remote verification/witnessing of systems

Systems information online in addition to audio and
Conclusions

▪ New verification methods can be used to increase verification effectiveness, and support improved safety
▪ Potential to reduce cost and improve operational availability
▪ Incorporate condition monitoring, design to be verified, and incorporated verify-on-demand capabilities
▪ Physical presence may be reduced, but not eliminated (at least not in the near/pursuable future)
▪ Verification and validation to mitigate the risks involved in changing verification methods is needed
▪ The class approach shifts, however the role is maintained
▪ Genuine and tamper free results is needed in order to perform objective class assessments
▪ Proper data management (including data quality) is essential
▪ Some conceptual challenges have also been identified:
  – Do all parties welcome transparency provided by more "online" verification schemes?
  – How to maintain the genuine 3rd party verification?
  – Uncertainties concerning new business models?
  – Less on board presence of experienced surveyors
  – Less exploratory testing as result of automated methods
  – The new methods will be another “layer” in the integration, adding complexity, which also needs to be manged and verified
  – Opposition to change
Thank you for your attention!

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www.dnvgl.com

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