The Marine Industry Today and Goal Based Rules

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Introduction

- Scene setting
- Fundamentals of Goal Based design
- Lloyd’s Register’s current & future rule development
Scene Setting – Goal Based Standards / Rules

The goals of *Classification Rules*

- What are the objectives and limitations of prescriptive rules?
Scene Setting - Classification Rule Evolution

- 255 years old!
- Relatively ‘simple’ designs ~ 1750
- Masters competence
- Increasing complexity

- Rules driven by
  - Need for prescription
  - Engineering judgement ‘cautious’ > understanding > modelling capability
  - Experience

- Historically considerable safety margin ‘fat’ in Classification Society Rules
“What is the difference between a prescriptive and a goal based standard?”
Example Prescriptive Standard

‘All motor vehicle exhausts are to be fitted with a filtration unit of 120 mesh size or less’

- This specifies the technical measure to be used
- Compliance is easily checked
- It may not be task or cost effective
- No ownership of the objective by the car manufacturer
Example Goal Based Standard

‘The level of particulates emitted from a motor vehicle engine should not exceed 1 ppm’

- The goal to be achieved is clear
- The manufacturer may use any solution in achieving the goal
- The manufacturer has to own / understand the goal
- Compliance with the goal is easily achieved by air sampling
Not one or the other approach – they are complementary!

- Risk / Goal / Performance regime
- Prescriptive and compliant regime
Scene Setting – The Challenges of Today

- $\text{NO}_x$
- $\text{SO}_x$
- $\text{CO}_2$
- EEDI
- Operational Cost
- Reduced Weight & Resistance
- Materials
- Scantlings
- Hull Form
Classification Rules and Standards

BS EN 13445-6:2002
Unfired pressure vessels. Requirements for the design and fabrication of pressure vessels and pressure parts constructed from spheroidal graphite cast iron

BS EN 13445-6 specifies requirements for the design, materials, manufacturing and testing of pressure vessels with a maximum allowable pressure exceeding 60 bar, this standard is intended for use in conjunction with BS EN 13445-1. It covers the design, manufacture, testing and inspection of unfired pressure vessels and pressure parts constructed from spheroidal graphite cast iron.

BS ISO 4126-9:2008
Safety devices for protection against excessive pressure. Application and installation of safety devices excluding stand-alone bursting disc safety devices

Standards and rules typically manage hazards & immediate consequences
Classification Rules and Standards

Standards and rules *typically* manage hazards & immediate consequences
Today’s Situation is then one of...

- Increased performance
- Regulation
- Complexity
- Novel Design
- Peeling away excess safety margin
- Goals are met
- A culture of active ownership
- Costs
- Automation
- Hazard management
Alternative Design & Arrangements

- SOLAS Chp II-1 & III (effective 1/7/2010) joined Chp II-2
- Demonstrating equivalence
- Equivalence with what objective .......
  - Performance based
  - Hazard, Consequence or Risk based
  - Etc
Lloyd’s Register has 2 Technical Committees (TC)

Main TC
- 79 external members, yards, operators, owners, institutions
- Meets yearly in November
- Various national / regional TC’s which feed into the main TC (14 members).
- Purpose is to provide independent oversight / approval of proposed rule changes

Naval TC is similar, meeting May

In 2011 both TC’s were asked their view on how to incorporate increasing complexity and whether prescriptive rules were the answer.
• Historically Lloyd’s Register has always addressed novelty on a case by case basis
• Volume, complexity and removal of the ‘fat’ means the rigor now required is quite different to that of 20 + years ago.
• What gives **confidence** to enable LR to independently classify a vessel is that the objective of the rules are met. So:-
  - The goals of Classification Rules need to be specified
  - Rule structure needs to develop - currently only the detail of the rule is specified.
Implications of Goal based *Classification Rules*

- If pursuing a prescriptive route:
  - Greater understanding of why the rule exists

- If pursuing a goal based approach:
  - It requires a very different culture, of all organisations involved, to realise the benefits
  - Initial cost & effort (design / build) is significant
  - Significant through life benefits
Conclusions

- Goal based Classification Rules are required to cope with today’s new / novel designs
  - System complexity
  - Removal of traditional excess safety margin
  - Allow innovation
- In realising the benefits of using goal based design
  - Change in approach - passive compliance to active ownership
- Lloyd’s Register future rules will be:
  - Goal based, and will also
  - Allow a purely prescriptive route to be followed
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