Regulatory Requirements for NDT of Marine Composites

Ken Hickling: sherpa63 | ISO TC8/SC12/WG5

Overview

Introduction

Scope

Drivers

Requirements

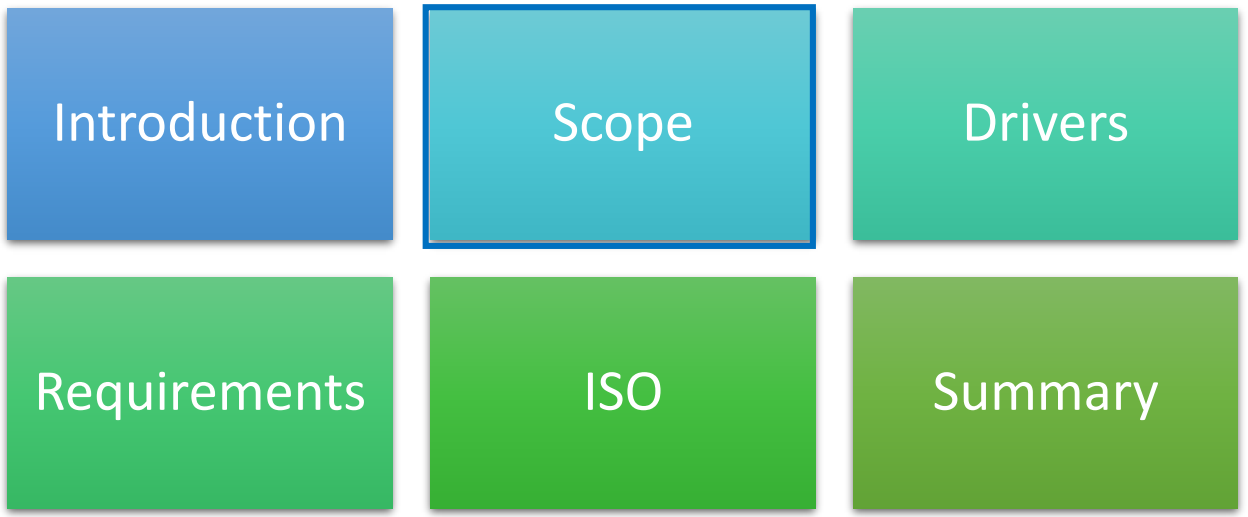
ISO

Summary

Introduction

- ISO TC8/SC12/WG5
  - Ships & Marine Technology - Large Yachts - Quality Assessment & Acceptance Criteria
- Composites are used extensively in Marine applications
- Destructive testing is useful
  - Product Development and Type Approval
- Most composite materials are ‘made’ when the product/component is made
  - Little scope for assessing the material prior to manufacture
  - Quality may vary
- NDT is valuable to let you know if you got what you expected

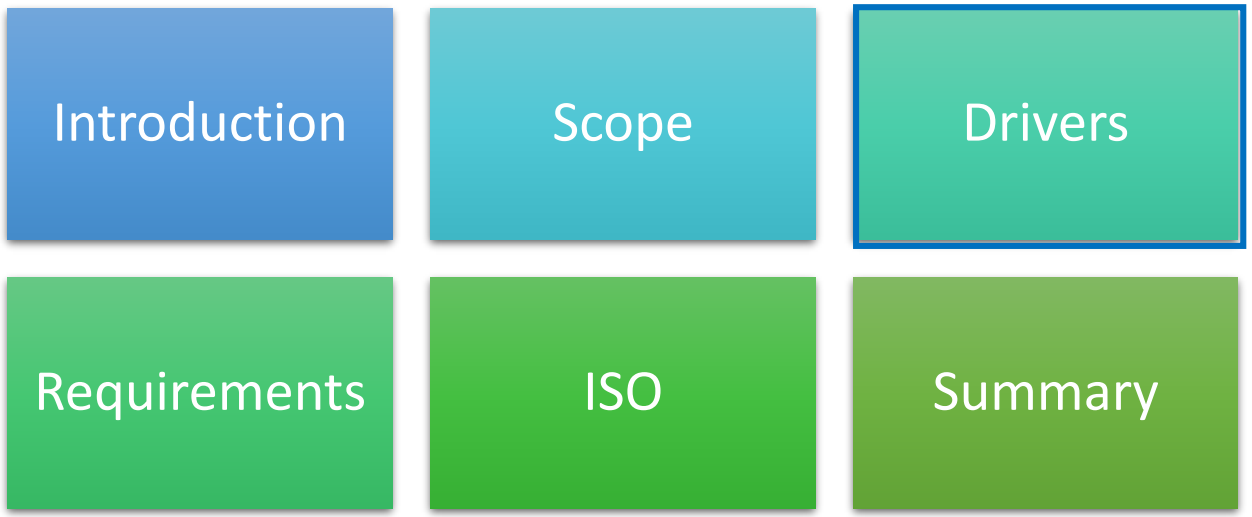
Scope



Regulatory Scope

- Design and Analysis can tell us if the component should work
  - Normal Operation
  - Performance Envelope
- NDT can confirm the condition of the component
  - Manufacturing QA
  - Correct Installation
  - Periodic Assessment In-service

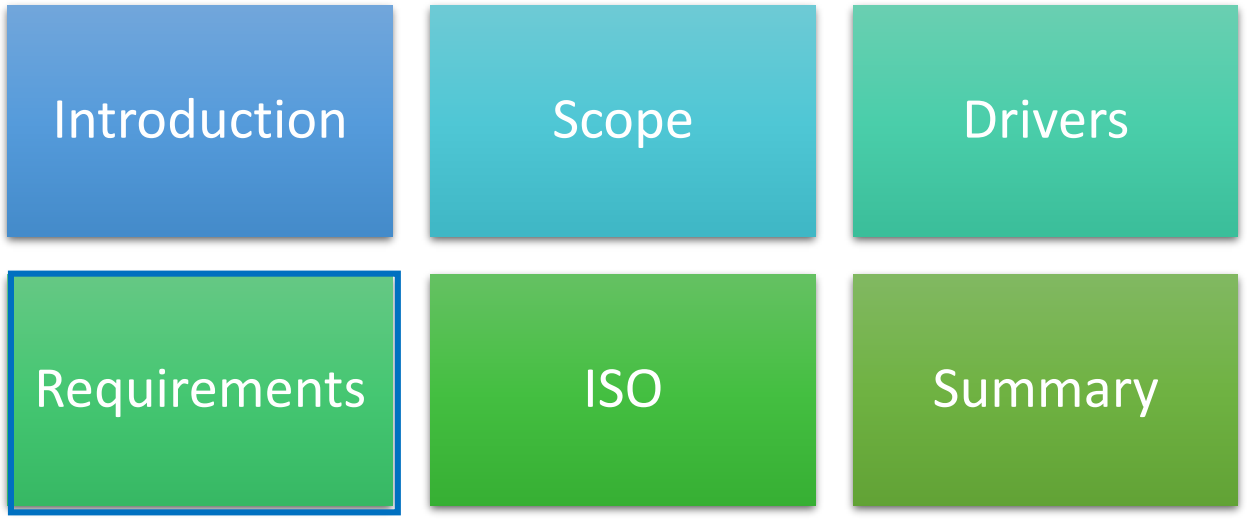
Drivers



Drivers

For use of Composites	• Performance/Economy/Carbon Footprint • Comfort/Aesthetics
To Regulate	• Safety • Standardisation
For NDT	• Direct Assessment • Increased Certainty • Time Savings

Requirements



Requirements

For the Regulations

- Pragmatic
- Affordable
- Indisputable/Clear Guidance
- Valuable

By the Regulations

- Reliable Methods
- Reproducible Results
- Innovation & Improvement
- Solution to a Problem

What's the Problem?

- Existing Regulations don't cover enough
  - Class rules cover Hull
  - Flag covers safe operation
  - MCA is strong on Procedure but guidance from 2011 states:
    - "5.1.1. There are currently no published standards which specifically cover the nondestructive inspection of carbon fibre laminates."
- Regulations are often out of date
  - Example: SOLAS FTP
- Safety usually addressed through generous safety factors
  - Inefficient
  - Quality Dependant
- Requirements for Competencies aren't Defined

ISO

TC8/SC12/WG5



Introduction | Scope | Drivers

Requirements | ISO | Summary

Composite Failures









ISO ‘Rigs’



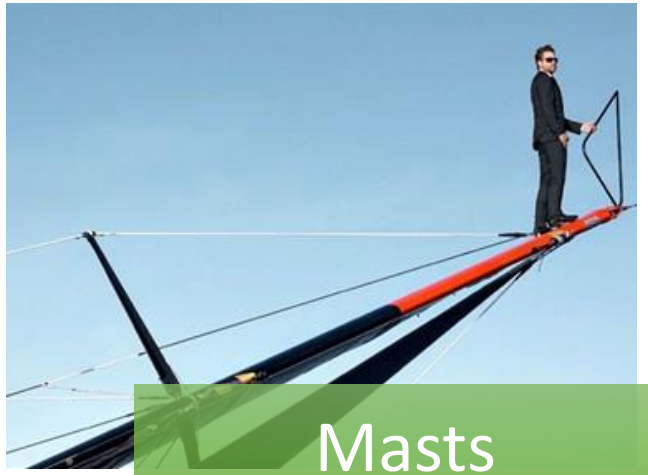
Masts



Standing Rigging



Chainplates etc



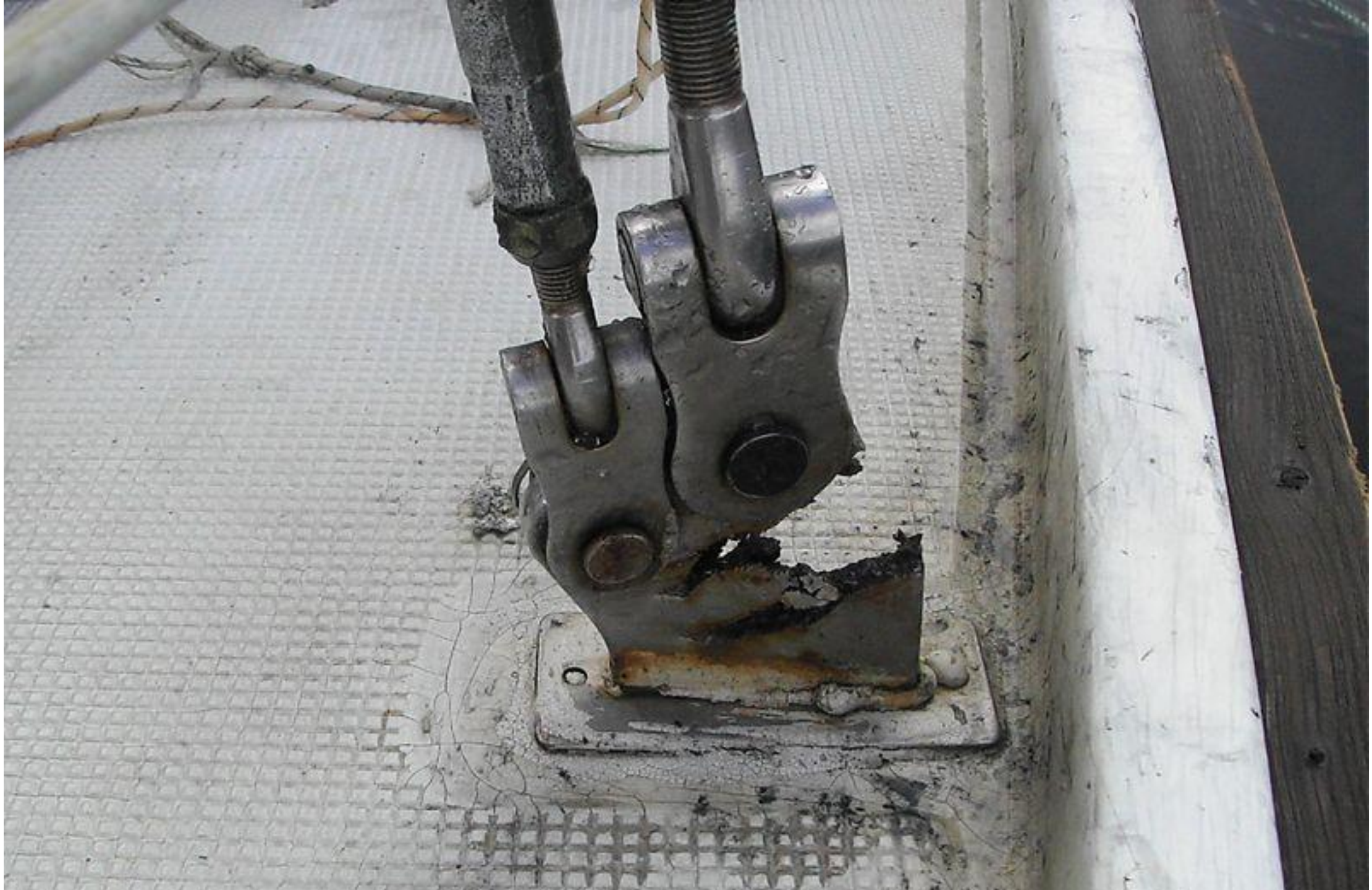
Masts



Standing Rigging



Chainplates etc



Project Scope/Opportunities for NDT

Production Quality

- Fibres & Distribution
- Resin Matrix
- Fibre/Matrix Bond
- Core
- Contamination

Installation

- Damage
- Setup

In-Service Checks

- Degradation
  - Fatigue
  - Impact
  - Overload
- Post Lightning Strike

Summary



Summary

- Advanced Composites in Marine applications are still becoming established
- Production quality can easily be compromised
- Customers have good reasons to want the benefits of composites
- Risk is often unknown or poorly managed
- Responsibility for risk management is routinely pushed onto the client
- Regulation can provide meaningful guidelines and help manage risk
- NDT will pay a vital role and needs to contribute to regulatory development

Summary



- Uncertainty
- Inconsistency
- Variability

- Transparency
- Definitions
- Competencies

- Confident
- Safe
- Reliable

Thank-you