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

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- ISO
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Drivers

For use of Composites
- Performance/Economy/Carbon Footprint
- Comfort/Aesthetics

To Regulate
- Safety
- Standardisation

For NDT
- Direct Assessment
- Increased Certainty
- Time Savings
Requirements

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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• Regulations are often out of date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
Composite Failures
ISO ‘Rigs’

Masts

Standing Rigging

Chainplates etc

Masts

Standing Rigging

Chainplates etc
Also…
## 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
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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

Where we are Now
- Uncertainty
- Inconsistency
- Variability

What will get us there
- Transparency
- Definitions
- Competencies

Where we want to be
- Confident
- Safe
- Reliable
Thank-you