Vulnerability Design Course

Survivability Consulting Ltd & Thornton Tomasetti Defence Ltd, endorsed by UK MOD's NATG

The ability of a ship to sustain battle damage and continue its operations can provide a battle-winning edge. This course will give an insight into the techniques developed by the UK over several decades to reduce naval vulnerability. It develops the attendee to practitioner level to enable informed decision making. The course provides a unique opportunity to learn from experts with decades of experience in naval vulnerability as well as a forum to network with MOD and industry staff in the field.

Who is this course for ?

- Ship & System Designers
- MOD & Industry Project Staff
- Navy Personnel
- Procurement Staff
- Engineers and Scientists
- Classification Societies

Location: SCL, Dunfermline, Scotland

Cost: £1600 plus VAT

Dates: 17-19 September 2024 (Full)

18-20 February 2025 (Places available)

Attending this course will develop an understanding of:

- Modern naval threats: anti-ship missiles, mines, torpedoes, bombs, bullets, shaped charges, shells and asymmetric attacks
- Primary weapon effects: penetration, blast, fragmentation, shock, whipping, bubble jetting
- Secondary weapon effects: flooding, fire, smoke & residual strength
- Lessons from real life battle damage incidents (e.g. HMS Sheffield)
- How to specify and measure vulnerability requirements
- Mitigation measures that can be designed-in or retro-fitted
- Vulnerability assessment through the design cycle
- The relationship between magazine safety and survivability
- How recent RN procurements have approached vulnerability
- MOD's Duty of Care during wartime & Combat Safety Summaries
- Software tools to support low vulnerability design

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For enquiries please contact Paul Horstmann 01383 257032,
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Vulnerability Design Course

Tuesday	
09:00	Welcome & Introductions
	Course Objectives
09:30	NAG Introduction
	Vulnerability & Combat Safety
10:00	**Case Study: HMS Sheffield**
	What happened & how it could be changed
10:30	Break
10:45	Threat Evolution
11:00	Above Water Threat Basket
	Missiles, bombs, shells and rockets
11:30	Above Water Primary Weapon Effects
	Kinetic Energy & Ballistic Protection
12:00	**Exercise: HMS Xanadu Propulsion**
12:30	Lunch
13:15	**Exercise: HMS Xanadu Propulsion**
13:30	Above Water Primary Weapon Effects
	Blast Theory
	Simple Analysis
	Complex Analysis
14:30	**Case Studies: USS Stark & INS Hanit**
15:00	Break
15:15	Blast Protection Measures
16:00	Susceptibility Overview
	Signature (RCS, IR, Noise, Magnetic)
	Hard kill & soft kill
16:30	**Case Study: SS Atlantic Conveyor**
17:00	Close of Day 1

Wednesday	
09:00	Underwater Threat Basket
	Mines, torpedoes & depth charges
09:45	Underwater Primary Weapon Effects
	Shock
	Whipping
10:30	Break
10:45	**Case Study: USS Tripoli / Princeton**
11:00	Underwater Shock Qualification
	Shock Analysis, Testing, Mounts
11:45	Fleet Applications (T26 & Pragmatic)
12:00	**Exercise: HMS Xanadu AAW**
12:30	Lunch
13:15	Human Vulnerability to UNDEX
13:40	Secondary Weapon Effects & Recoverability
	Fire, Smoke, Flooding, Residual Strength
	DC & FF
14:10	**Case Study: USS Samuel B Roberts**
14:30	Escape and Evacuation (inc. after damage)
15:00	Break
15:15	**Case Study: ROKS Cheonan**
15:30	RN & RFA Fleet Vulnerability Summary
	Design lessons
16:15	Reduced Vulnerability Submarines
	& Lethality against Submarines
17:00	Close of Day 2
19:00	**Evening Meal (sponsored by SCL)**

Thursday	
09:00	**Case Study: USS Cole**
09:15	Asymmetric Threat Basket
	FACs, FIACs & WBIEDs
10:00	Vulnerability Assessment Techniques
	Vulnerability Reduction Strategy
	Modelling
10:30	Break
10:45	Magazines
	Jutland, Hood and Antelope
	Risk & Consequences
11:30	Procurement Lessons
	Requirements
12:00	Lloyd's Rules Military Notations
12:15	Lunch
13:00	Combat Safety Summaries
	Meeting the Duty of Care during wartime
13:30	**Case Study: HSV Swift**
13:45	Lethality
	Threat platforms, Weapon Design
14:30	Break
14:45	System Design (from concept to build)
	Primary components, power, cooling & data
15:15	**Case Study: HMS Glamorgan**
15:45	**HMS Xanadu Results**
16:15	Course Summary
16:30	End of Course

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