

## Accepted Manuscript

### Review

A review of impact testing on marine composite materials: Part I – Marine impacts on marine composites

L.S. Sutherland

PII: S0263-8223(17)33871-0

DOI: <https://doi.org/10.1016/j.compstruct.2017.12.073>

Reference: COST 9230

To appear in: *Composite Structures*

Received Date: 20 November 2017

Accepted Date: 28 December 2017

Please cite this article as: Sutherland, L.S., A review of impact testing on marine composite materials: Part I – Marine impacts on marine composites, *Composite Structures* (2017), doi: <https://doi.org/10.1016/j.compstruct.2017.12.073>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



# A review of impact testing on marine composite materials: Part I – Marine impacts on marine composites

L. S. Sutherland\*

*Centre for Marine Technology and Ocean Engineering (CENTEC), Instituto Superior Técnico,  
Universidade de Lisboa, Lisbon, Portugal*

**Abstract:** Composite materials are now used throughout the marine industry but their susceptibility to impact events is still an unresolved problem. There is a huge body of work in the area, succinctly summarised here, but the great majority concerns impact events and composite materials more relevant to the aeronautical industry. A discussion of the complexity of the problem in terms of damage and dependence on the many material and impact event parameters shows why there is a need for a review of work specifically considering ‘impact on marine composites’ due to the distinctive impact events and materials of marine applications. Marine impact scenarios are discussed and comparisons between composite and other construction methods made. Together with parts II and III, this paper gives a comprehensive review of ‘marine impact on marine composites’, providing a valuable resource for the marine industry and research fields.

**Keywords:** Impact; Marine; Testing; Damage; In-service events

## 1. Introduction

Laminated fibre-reinforced composite materials are now used throughout the marine industry; composites are ubiquitous in pleasure boat and racing yacht construction, are widely used in the construction of fast ferries, naval and coastguard patrol craft, fishing and work boats, and also in the offshore oil and gas industry [1]. This is because composite materials promise many advantages over the use of steel, aluminium or wood, such as resistance to corrosion and rot, ease of forming complex seamless shapes, and high specific material properties.

However, these materials are known to be very susceptible to impact damage especially that due to out of plane impact events. An impact on a composite material is a complex, structural event involving multiple and interacting failure modes. This is further complicated by the fact that there are many parameters defining both impact event and composite material, and the effects on impact behaviour of almost all of these parameters are large *and* interdependent. There are also various facets of impact behaviour to consider; Impact response (force, deflection and energy absorption), impact resistance (to damage) and impact tolerance (residual properties). Finally, the definition of ‘good’ impact behaviour will depend on the application and its impact requirements, and different aspects of this may well be in conflict (e.g. energy absorption and damage resistance and/or tolerance) [2,3].

---

\* [l.sutherland@tecnico.ulisboa.pt](mailto:l.sutherland@tecnico.ulisboa.pt) L.S. Sutherland

Download English Version:

<https://daneshyari.com/en/article/6704048>

Download Persian Version:

<https://daneshyari.com/article/6704048>

[Daneshyari.com](https://daneshyari.com)