CORED COMPOSITE IMPACT PERFORMANCE
Drop Rig Testing Results

Gurit has embarked on a campaign of mechanical testing to evaluate the toughness of various hull configurations to compare impact resistance and to simulate encounters with floating debris, or fixed structures like wharves and markers.

One of the perceived challenges of light weight engineering of marine structures is ensuring that they are suitably robust for the harsh environment within which they will operate. This testing has followed on from previous Core Slamming Performance testing (click here for PDF) that was carried out to compare the performance of different core materials and their ability to absorb energy in a water slamming event.

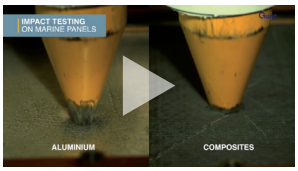
Corecell™ has been a market leader in core materials for dynamic loading applications, including a DNV type approval for slamming grade, and its toughness is recognised within international classification society rules including Lloyds, ABS, DNV and ISO 12215.

DROP RIG TESTING

The testing was completed at Gurit Asia Pacific's accredited mechanical testing lab in Auckland, using a 6m drop rig, fitted with 16kg sharp and blunt impactors with a capability of generating impact energy of 900 J.

Gurit compared a typical aluminum hull bottom design, with two different carbon and foam cored shell designs based on a 40m 30 knot high speed vessel. The success of each panel was measured by the amount of energy required to puncture the water tight boundary of the hull, when tested with the sharp impactor, and the size of indentation caused by the blunt impactor.

IMPACT TESTING VIDEO



https://vimeo.com/guritgroup/impact

	Aluminium High Speed	M130 High Speed	M200 Heavy Duty	
Outer skin	4	2.5	4	mm
Total Thickness	54	29	36	mm
Weight	17.7	9.65	14.52	kg/m^2
Energy At Rupture	217	291	823	Joules

TEST PANEL SPECIFICATIONS

The first panel, was a standard Corecell™ M130 design based on meeting the same scantling strength as the aluminum hull plating, while offering the maximum weight saving with rule recommended minimum skin weights.

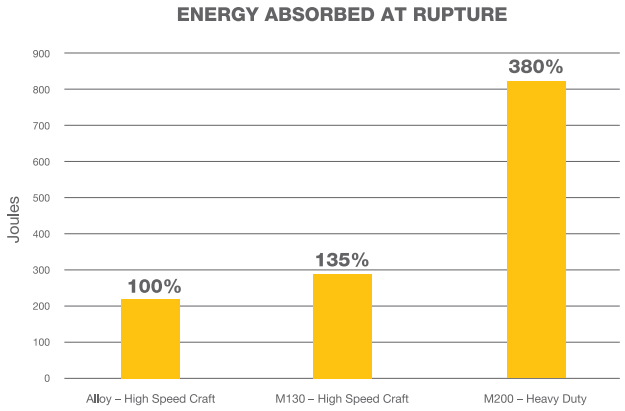
The second was a much more robust and higher density Corecell™ M200 panel, which was designed to still offer a weight saving over the aluminum but targeted specifically at increased resistance to impacts with a thicker outer skin, comparable to the alloy plate thickness. The weight saving in this configuration is given from the reduction in supporting structure and stiffeners. M200 has been approved by DNV as a slamming grade core with slamming grade properties reported on our DNV type approval certificate.

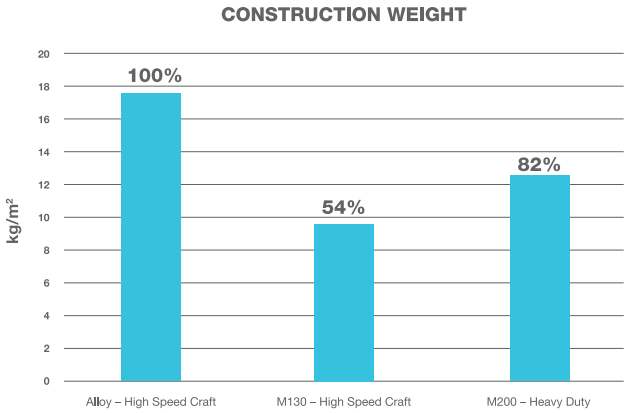
Not only did both cored structures offered significant weight savings, even the lightest panel outperformed the aluminum structure in both sharp and blunt impact resistance.

RESULTS TO HIGHLIGHT

- The Corecell™ panels impact performance was superior and always out-performed the alloy structure (defined as the hull shell remaining watertight)
- Even at 55% the weight of the alloy equivalent the M130 cored solution had improved energy absorption
- The heavy duty M200 specification provided a huge increase in safety from impact, while still offering weight saving
- M130 panel was 54% the weight with 135% the energy absorption of the aluminum panel
- M200 panel was 82% the weight with 380% the energy absorbtion of the aluminum panel

IMPACT ENERGY ABSORPTION TESTING RESULTS CORECELL M FOAM AND ALUMINIUM

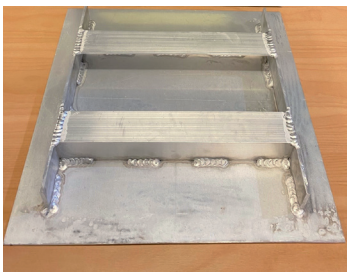




IMPACT ENERGY ABSORBTION TEST METHODS

Testing rig with impactor

Composite test panel, Corecell™ with carbon skin



Alloy test panel

IMPACT TEST RIG

- 6m drop tower
- 500 x 500 test specimen size
- 16kg sharp impactor (5mm nose radii, 30 degree cone)
- 16kg blunt impactor, 150 mm diameter 75mm radiis
- Test Energy 900 Joules
- Test Velocity 11.9m/s

For more information please visit www.gurit.com
or email: contact@gurit.com