A Lightweight Approach
It is well documented that reducing the superstructure weight of commercial displacement ships can result in major improvements in operational efficiency. Increased payloads, higher speeds, reduced fuel costs, better stability and a lower environmental impact are just some of the many benefits that can be gained by operators if a lightweight approach is taken.

Why Composites?
When it comes to saving weight without sacrificing structural performance, composites and in particular sandwich composites are without doubt far superior to more traditional shipbuilding materials such as steel and aluminium. Today, the vast majority of small craft (whether for leisure or commercial use) are built using composite materials. In addition composites are regularly used for the construction of mega-yachts and high speed craft such as surface effect, catamaran ferries, patrol boats and rescue vessels.

The Composite Superstructure Concept
The Composite Superstructure Concept has been developed to enable operators of passenger/freight vessels to take advantage of the many benefits offered by using lightweight composite materials for the superstructure while still complying with the SOLAS regulations.

A Joint Development
The Composite Superstructure Concept is a joint venture between the shipyard Kockums AB (a member of ThyssenKrupp Marine Systems with more than 35 years experience of design and construction of composite ships), DIAB (a world leader in composite core materials and technology) and Thermal Ceramics (a division of Morgan Crucible that is a significant force in the world.
of fire protection and insulation systems). All three companies have been heavily involved in the multi-faceted, government-sponsored LASS project, the aim of which is to improve the efficiency of marine transportation through the usage of lightweight structures. The group can guide and advise on any aspect of the structure - engineering, manufacturing methodology, fire protection or certification.

By permutating the core and skin thicknesses, a fully integrated superstructure (decks and internal/external bulkheads) can be designed and engineered that exactly meets both the global and local loading conditions. Compound curves can be readily accommodated thereby achieving a smoother surface finish.

In addition, the finished structure is virtually maintenance-free and is not subject to rust or corrosion. Similar benefits can also be achieved with other topside structures such as masts and funnels.

Savings & Benefits
In depth research shows that the Concept is a very viable alternative to existing structures built from steel or aluminium. It allows much higher cargo volumes and/or significant fuel savings as a result of the substantial reduction in deadweight (Fig. 1). Recent LCC studies show that these savings can translate to an operational amortization period of less than a year (Fig. 2). Furthermore, the specific reduction in superstructure weight improves vessel stability.

The Concept
Basically the Composite Superstructure Concept is a high strength, lightweight sandwich composite construction system that comprises a structural core to which glass or carbon fibre skins are securely bonded using an industrialized and proven resin infusion process. The final stage is the application of a FireMaster® fire insulation layer to the laminate surface to provide the required level of fire protection.

The Composite Superstructure Concept can also be readily applied to other commercial vessels such as cruise ships.

The Composite Superstructure Concept is the environmentally-friendly choice. Detailed LCA studies show a better outcome than conventional steel or aluminium structures thereby resulting in a lower environmental impact.