



Best practice example

for lightweighting in Germany

Modular ballistic safety wall



Modular safety system after shelling

Modular ballistic safety wall

Fields of application



Construction sector



Safety-critical areas and mobile safety boxes for personal protection in crisis regions

In this example, lightweighting allowed for the following reductions compared to a conventional design based on steel and concrete:



Weight approx. -60 %



Energy approx. -30 %

Application

A modular ballistic wall is to be used to protect persons and property against firearms, explosives and attempted break-ins.

Challenge

The aim was to produce a modular safety system made of sustainable materials that allows for a flexible design of ceilings and walls that can be assembled and dismantled without technical tools. The energy-intensive materials used during production were to be substituted by carbon-neutral materials.

Solution

The solution was to design a system of armoured-wood panels and profiles that could be used to provide shelters and safe ceilings in crisis regions as needed. Other features such as sound insulation and fire protection can be included. The individual elements can be reused and adapted at any time.

Best Practice Example | Modular ballistic safety wall



Safety wall with electrical socket



Back with steel plate reinforcement for through-holes, e.g. for electrical installations

Other potential applications



Commercial vehicle manufacturing



Shipbuilding



Construction of rolling stock

This solution allows for major energy savings compared to the conventional steel design. During the production of 1 kg of steel, an average of 1.46 kg of CO₂ is released. To achieve ballistic class VPAM 4 (VPAM scale – European armour standard), a 5 mm thick steel plate is required, weighing 39 kg/m². The armoured wood used is carbon neutral in its production, i.e. the CO₂

savings potential can be calculated as follows: 39 kg x 1.46 = 56.9 kg CO₂ per m².

The multi-layer structure and the reduced weight of the individual elements are devised to allow a rapid and simple assembly without any tools. The potential for energy savings amounts to 230 kWh per m² (ballistic class VPAM

4, steel vs. armoured wood). This corresponds to the amount of energy needed by a private household in a month.

Future applications include the production of box vans with a fully enclosed box body, offshore safety containers and ballistic walls for commercial and rolling stock construction, and shipbuilding.



The LIGHTWEIGHTING ATLAS

The LIGHTWEIGHTING ATLAS is an interactive web portal that pools information on those active in lightweighting and their skills across different industries and materials. The atlas is free to use and entries into the atlas are also free. You can find the LIGHTWEIGHTING ATLAS at www.leichtbauatlas.de

The Lightweighting Initiative

Modern lightweighting is of pivotal importance for German industry and its competitiveness. Federal Ministry for Economic Affairs and Climate Action has established the Lightweighting Initiative to support lightweighting in Germany. The Lightweighting Initiative Coordination Office in Berlin, which is financed as part of the initiative, pools all activities relevant to lightweighting and supports German companies, especially SMEs, as they implement lightweighting.

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