



Best practice example

for lightweighting in Germany

Carbon concrete composite



Bridge renovation

Sustainable rehabilitation using carbon concrete composite

Fields of application



Construction sector (building stock, retrofitting of buildings)

In this example, lightweighting allowed for the following reductions compared to a conventional model made of steel reinforced concrete:



Weight approx. -75%



Energy approx. -50%



Cost approx. -30%



Process time approx. -30%

Application

By using a carbon concrete composite layer of only 1-2 cm in thickness, the load capacity and lifetime of buildings can be significantly increased. In many cases, this can preclude the need for demolition and new construction. The positive effects of the considerable reduction in the raw materials and supplies required, and the longer lifespan in comparison to the use of reinforced concrete, lead to increased sustainability and resource efficiency in the field of construction.

Challenge

A railway bridge from 1910 was to be rehabilitated for further use. Large cracks had to be mended and to be filled with concrete reinforcement. The architectural appearance was to be retained. The most economic rehabilitation method was to be chosen.

Solution

Since a layer thickness of only 2 cm of carbon concrete composite was needed to complete the rehabilitation, as opposed to a thickness of 8-10 cm in the case of reinforced concrete, a layer of only 2 cm of the original material needed to be removed. Both the lower amount of scrap material as well as the 75% reduction in raw materials and supplies required led to higher resource efficiency and a lower price and thus resulted in a successful tender.

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Rehabilitation work



Bridge made of carbon concrete composite

Other potential applications



Construction trade (new buildings)

Aside from applications in rehabilitation, carbon concrete composite also offers substantial advantages for new construction work.

For example, pedestrian and bicycle bridges weigh only 50% of what they would if they were made of reinforced concrete, and curtain panels only 30%. Carbon concrete composite

is considered to have twice the lifespan (e.g. more than 100 years) of reinforced concrete. It is approved by the construction supervision authorities, is market-ready and offers an economical alternative to reinforced concrete.

Both concrete and carbon reinforcement as well as complete carbon concrete composite parts are available

from several German suppliers and are on the market around the world.

Compliance with all requirements relevant for the sector is being ensured. Research activities are being conducted so as to further improve maintenance, environmental protection and recycling.



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.leichtbautlas.de

The Lightweighting Initiative

Modern lightweighting is of pivotal importance for German industry and its competitiveness. The 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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