

KIT Innovation HUB – Prevention in Construction

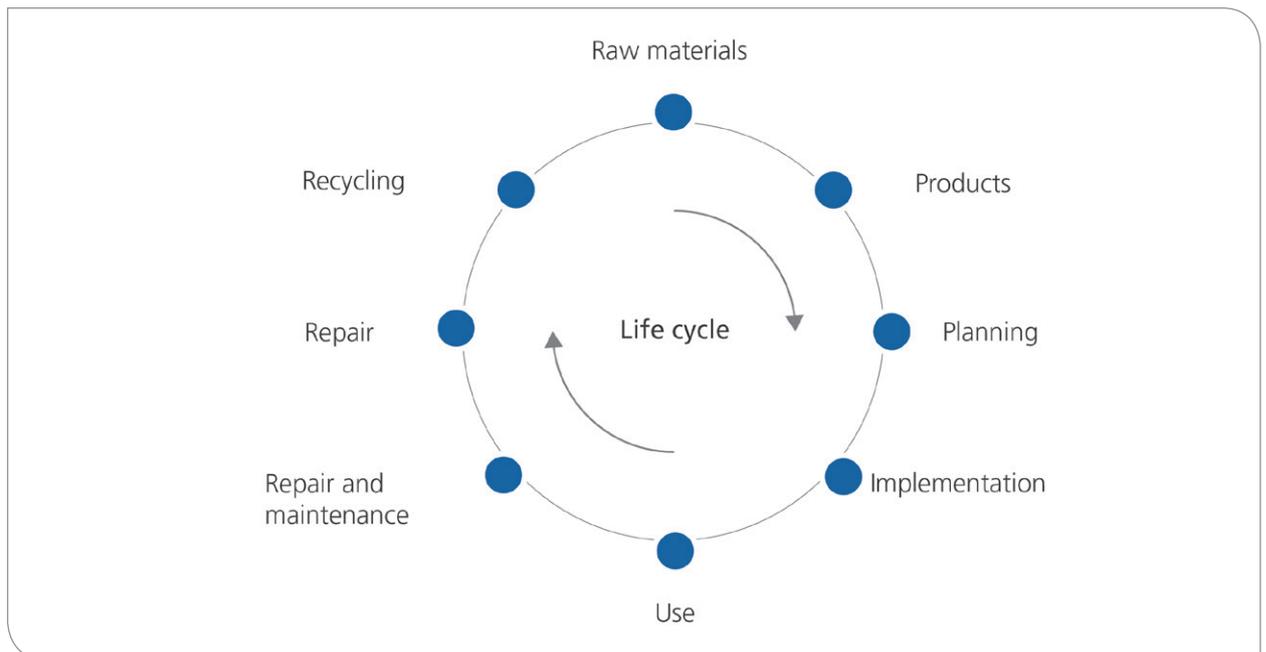
Roads, bridges, water and energy supply – our diverse technical infrastructure facilities are of crucial importance to industry and the society. Preservation, however, is associated with big challenges that are further aggravated by impacts of climate change, resource scarcity, and globalization. The result: More and more frequently, infrastructure facilities fail far before the expiry of the planned service life and repairs are required. These are not only associated with a high technical expenditure, but with high ecological and economic burdens. It is our vision to prevent this and to more sustainably design the infrastructure facility to cope with future challenges.

The KIT Innovation HUB pursues a first approach of this kind worldwide by integrating all stakeholders of the chain of values added in the construction sector, i.e. from the raw material manufacturers to the builder, and develops preventive measures in the form of innovative products, technologies, and services. KIT wants to bring together

small and medium-sized companies, link competencies, and develop sustainable solutions for the preservation of modern and historical buildings.

From the Small Molecule to the Bridge Peers

Using the KIT-developed nano-to-macro approach, we develop detailed knowledge on the behavior of construction chemicals on the molecular level. Based on these results, we then design marketable products, technologies, and services in cooperation with partners from industry and science. To ensure quick commercialization, the development process is accompanied by transfer projects that are carried out together with the operators of infrastructure facilities. This development strategy “from the molecule to the building” was implemented successfully on the aviation areas of Leipzig Airport, among others.



Chain of values added in the construction sector.

A Story of Success – Laufenmühle Viaduct

The Waldbahn railway line near Welzheim is one of the most beautiful railway lines in South Germany and is listed as a monument. When checking the structural integrity of the more than 100-year-old construction, however, major damage of the reinforced concrete was found to be in need of repair.

The challenge: Restoration of the viaduct with state-of-the-art methods would have been associated with a high expenditure and high costs. Moreover, the viaduct would be modified irreversibly, as a result of which the monument character would be endangered.

The solution: A new approach to object-related state analysis, data evaluation, and repair planning of the historic monument. Together with partners from industry and research, the KIT Innovation HUB developed a prevention strategy to adapt repair to the viaduct without damaging its basic structure. Modern approaches used in the areas of science and engineering were combined with classical engineering methods to define a structure-oriented, cost-optimized repair concept for the railway line. "The original appearance of the viaduct is preserved and the costs to be paid by the city of Welzheim are reduced considerably," says Professor Andreas Gerdes, Scientific Director of the KIT Innovation HUB. Instead of 3.5 million, only 2.2 million euros have to be afforded for restoration. Gerdes and his team consider this a contribution to increasing sustainability. The city of Welzheim can further operate the railway line as a tourist attraction.



Detailed radar and ultrasonic measurements were made from a mobile platform underneath the viaduct.

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