HITEXBAU GmbH

Innovative Carbon Grid Reinforcement

Industrial Floor Renovation with Carbon Concrete,

Alligard,Czech Republic

Executive Summary:

This industrial floor renovation project in the Czech Republic exemplifies a first-principles rethink of traditional refurbishment: stripping away inefficient steel-reinforced methods to embrace lightweight, high-performance carbon concrete for rapid, sustainable upgrades. Covering 3,300 m² across three production halls, the initiative addressed severe degradation—cracks, breakouts, and unstable substrates—stemming from heavy machinery loads and years of wear. Led by **Hitexbau** GmbH in collaboration with Koch GmbH, the project deployed carbon fiber reinforcement grids (**HTC** series) embedded in specialized flow mortars, slashing costs by 20-30%, project duration to 2-3 weeks, and CO_2 emissions by up to 87.5% compared to full steel concrete replacement. Executed in phased segments to minimize operational downtime, the work restored full load-bearing capacity for forklifts and equipment while optimizing resource use—reducing energy consumption by 87.3% and diesel by over 1,400 liters. Completed in 2022, this effort pushes the envelope of industrial maintenance, proving that innovative composites can deliver durable, eco-efficient solutions without compromise. By getting it done efficiently—faster cures, thinner layers, zero corrosion—it sets a scalable model for global manufacturing facilities, driving progress toward net-zero renovations while keeping production humming.

Project Background

Location and Context

Project Name: Industrial Hall Floor renovation with Carbonbeton.
Location: Alligard s.r.o. facility, Libavské Údolí 44, 357 51 Libavské Údolí, Czech Republic—a rural industrial site in the Sokolov District, Karlovy Vary Region.
Region: Northwest Bohemia, known for manufacturing heritage (textiles since the 19th century). The area's post-industrial economy demands cost-effective upgrades amid EU green transitions.
Purpose of the Floors: Supported Alligard's core operations—knitting, digital printing, and processing industrial textiles like carbon grids—under heavy loads from machinery, forklifts, and storage.
Need for Renovation: Halls suffered from weakened old concrete (1-4 cm milling depth revealed issues), partial breakouts, rifts, and non-bearing coatings due to dynamic stresses and moisture. Traditional steel rebuilds risked prolonged shutdowns; carbon concrete enabled swift, green fixes, aligning with Czech incentives for innovative materials (e.g., via CzechInvest for low-emission projects).

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Scope and Objectives

Scope: Revamp 3,300 m² of degraded flooring in three halls, emphasizing minimal disruption via layered composites over full demolition.

Objectives: Reinstate load-bearing prowess for industrial ops while spanning cracks and fortifying weak bases.

Drive sustainability: Aim for 20% cost cuts, 87.5% CO_2 drop, 87.3% energy savings through material efficiency.

Expedite execution: Wrap in 2 weeks vs. steel's 10-12, preserving production flow.

Boost endurance: Leverage non-corrosive grids for 100+ year lifespans, halving maintenance.

Innovate boldly: Showcase TRC's potential, optimizing from ground up—less volume (thinner slabs), smarter logistics (94% less transport)—to propel industry-wide adoption.

This pushes boundaries: Why settle for bulky steel when carbon delivers twice the life at half the footprint?

Methods and Materials

1. Site Preparation

Milling (Abfräsen): Strip 1-4 cm of damaged topcoat for fresh substrate.
Shot Blasting (Kugelstrahlen): Blast for adhesion, eradicating loose particles.

2. Reinforcement and Layering

Carbon Fiber Grids: HTC variants (e.g., HTC 15/15-40, 21/21-40, 34/34-40, 50/50-40 or -80, as listed), carbon-based (1.78 g/cm³ density), coated for 40-80°C use. 5,000 m² applied in 1 layers as rolls/mats; tensile: 75-202 kN/m, elongation: 1.34-1.71%.

Equalization Layer (Egalisierungsschicht): Cement-bound flow screed (Saint-Gobain Weber), machine-pumped (1-4 cm), embedding grids in one day—walkable in 1-2 hours, loadable in 24.

This composite system minimizes thickness, accelerating cures and slashing inputs—real progress in action.

Execution

Timeline: 2 weeks in 2022 (prep/application phased).
Phases: Hall-by-hall: Prep (1 week), grid/layering (1 week), cure—full resistance in 7 days.

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Team and Partners:

Lead/Supplier: Hitexbau GmbH (grids, concept).
Executor: Koch GmbH (on-site works).
Materials: Saint-Gobain Weber (screeds).

Scale: 3,300 m²; efficient crew, low machinery for quick turnaround.

Challenges and Solutions

Substrate Instability: Cracks/breakouts—bridged with flexible HTC grids.
Operational Continuity: Active factory—segmented phases kept halls partially usable.
Load Extremes: Heavy traffic—selected higher-strength HTC (e.g., 34/34-40) for 180+ kN/m.
Eco-Optimization: Steel's high emissions—carbon slashed CO_2 87.5%, energy 87.3%, debris 90-94%, proving feasible green shifts.

Outcomes

Revitalized Facility: Seamless, load-ready floors boosting Alligard's textile output.
Benefits: 20% cheaper than steel rebuild; environmental wins (87.5% less CO_2, 1,406 liters diesel saved); no reported issues by 2026.
Innovation Impact: Validates TRC for factories, with Alligard's in-house use showcasing product efficacy.
Metrics: Project time 20-30% of alternatives; resource savings as imaged—sand/water down, logistics streamlined.

Conclusion

Alligard's Libavské Údolí renovation gets the job done from first principles: diagnose wear, deploy carbon for lean strength, and surge ahead with quantifiable eco-gains. It's optimistic realism—pushing TRC's envelope to halve timelines/emissions while doubling durability.