

# Construction Chemicals for Repair, Strengthening and Rehabilitation of Structures

## Overview

Deterioration in concrete is something inevitable. As a structure grows old, it is only natural that it loses its strength, develops cracks and other signs of stress. Thermax, therefore offers a plethora of solutions for structural strengthening. Maxtreat® range of Cement & Resin base materials reinstate, strengthen and retrofit defective & distressed concrete.

One such repair project was undertaken for Forbes Marshall Plant in Pune. The structure was 15 years old reinforced concrete frame G+2 structure. The use of heavy mechanical machinery led to stability issues at various levels. Thermax put together a rehabilitation plan using six products to tackle the issues. The structure stands tall now as the issues have been resolved.



## Challenge

As a part of initial investigation non-destructive tests were conducted on the structural elements to assess the quality of concrete and load bearing capacity and the results are as mentioned below-

- Inadequate Thickness
- Deficient Steel
- Punching Shear Failure of Drop Panels

By Finite Element Method, it was also found that the slab had deflected in the middle one third portion of the span.

## Solution

With a vision of an economical repair, columns, slabs and drop panels were treated with a combination of six products.

- Jacketing of column along with provision of additional steel using MAXGROUT PAF was done. BS 66 MuCiS corrosion resistant micro concrete along with a coat of TM BOND AR adhesive, a layer of MAXTREAT LAMINATE with a coat of MAXTREAT PRIMER and MAXTREAT GLUE was used to strengthen the column.
- Drop panel was provided additional depth with the help of extra steel and use of BS 66 MuCiS corrosion resistant micro concrete with TM BOND AR adhesive along with a layer of MAXTREAT LAMINATE with a coat of MAXTREAT PRIMER and MAXTREAT GLUE was used to strengthen it.
- Slab at mid span was strengthened by cutting grooves in the soffit of slab and applying a coat of MAXTREAT PRIMER and providing MAXTREAT LAMINATE strips on each groove cut with MAXTREAT GLUE.

## Results

Mid span section strengthened by providing carbon fibre laminates at soffits.

- Drop panels strengthened for flexure & shear by enhancing the depth of the panels and providing additional for additional flexure by providing carbon fibre laminates.
- Columns strengthened with Microconcrete and additional steel.
- Additional strengthening with carbon fibre wraps.
- Beams strengthened with carbon fiber laminates and carbon fibres.

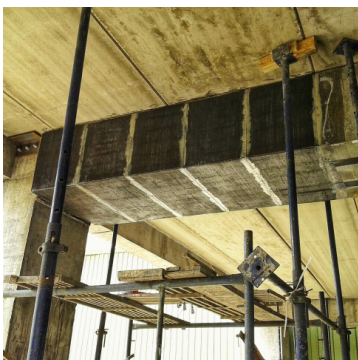
## Innovation and Technology

With the help of pre-examination of structures using FEM software's like SAFE, and Maxtreat range of cement and resin products; Thermax ensures a highly effective overall solution to all the repair problems to structures, including underwater repairs. Thermax also provides in-house design consultation for repair and rehabilitation of structures.

## References



Repair and Strengthening - Raw Mill Silo -Saurashtra Cement, Ranavav



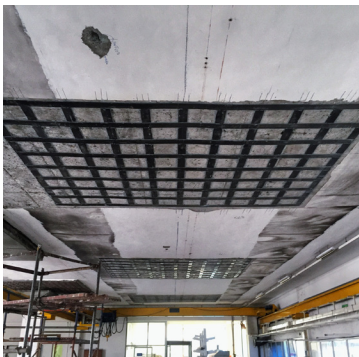
Carbon Fibre Beam Strengthening at Mahindra Heavy Engines, Chakan



Micro Concrete Strenthening for Alien Developers, Hyderabad



Repair and Strengthening at Udiapur Palace, Rajasthan



Maxtreat Laminate Slab Solution for Krohne Marshall, Pune



Structural Elements Repair at Town Hall, Kolkata

### Some more references:

FORTIS Hospital	Ultratech	Lupin	Lafarge Cements
Adani Port	IIFCO	Grasim	Pride Purple Properties
Birla Cements	Saurashtra Chemicals	Thermax Eco House	Modern College