

# CARBOCOMP

Highway Structures | Rail & Transportation  
Residential High Rise | New Construction  
Airports | Mine Process Areas  
Seismically Active Regions



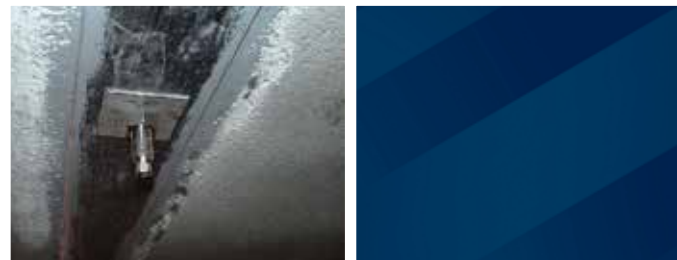
STRUCTURAL STRENGTHENING

# STRUCTURAL STRENGTHENING WITH CARBON FIBRE

The use of carbon fibre has become ever more prevalent as economies of scale mean manufacturing costs have declined, thus allowing the technology to become more accessible. This has led to a cost effective and reliable technique for the strengthening of Concrete, Steel and Timber elements within buildings and structures. Carbon Fibre Strengthening is now a widely accepted technique for seismic upgrading, locally trimming apertures and restoration of damage/load carrying capacity, including fire damage without adding significant load.

Carbon fibre is many times stronger than steel and extremely durable, and can therefore, be used in some of the most arduous situations without fear of failure. Ease of application is also synonymous with this technology, where its inherent light weight means large and/or long plates can be installed with minimal manpower, simple scaffolding and no lifting equipment.

The most common technique for mass production of carbon fibre plates is pultrusion, where the carbon fibre strand is “pulled” through a bath of epoxy adhesive and then squeezed through a die. This type of production leaves the plates very smooth and coated with a grease or wax bond breaker to prevent them sticking to the die during manufacture. Plates made in this way often require mechanical abrasion and de-greasing with solvents prior to their use. This technique also results in plates that have strands aligned in a single direction, which precludes the user from drilling into the plates due to damaging the carbon strands and thus rendering large portions of the plate ineffective.



# BENEFITS OF STRUCTURAL STRENGTHENING

Stonhard's partners have developed a patented vacuum manufacturing technique which eliminates all of these drawbacks when producing pre-formed plates. The vacuum process leaves the surfaces pre-roughened and ready to receive adhesive, which is protected with a peel ply layer at time of manufacture. It is free from any form of bond breaking compound and also has the advantage of allowing the introduction of additional strands at a  $\pm 45^\circ$  angle within the matrix of the plate. These additional fibres allow for holes to be drilled into the plates without damage to the load carrying capacity of the system. This technique allows plates to be manufactured in 50mm, 60mm, 80mm, 100mm and 120mm widths with a minimum fibre content of 65%.

When used in conjunction with wrapping fabrics, the Stonhard CarboComp System can be used to upgrade all aspects of a building or structure including increased shear strength of beams and resistance to bursting loads by increasing compressive strength in columns.

The ability to bolt plates into the structural element to be strengthened gives many advantages including:

- Efficient transfer of end peel stress
- Shorter anchorage lengths
- More efficient design
- Prevents premature de-bonding phenomena for higher security of the structure
- Achieves higher strengthening factors
- Application to poor quality concrete possible (tensile strength < 1.5 MPa)
- Increased ductility of the reinforced element
- Increased resistance to vibration and impact

## GLOBAL ADVANTAGES

- High tensile strength and stiffness
- Lightweight
- Very low creep
- Great lengths can be installed without joints
- Excellent corrosion, acid and alkali resistance
- Flexible in use
- High durability
- Little thermal expansion
- Requires little or no maintenance
- Finishing with paint or plaster demands no special treatment



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