STRUCTURAL TECHNOLOGIES offers an extensive line of products to restore or enhance the load-carrying capacity of reinforced concrete, masonry, timber and steel structures. Our systems may be used stand-alone, or combined together to solve nearly any project requirement.

ENGINEERING SUPPORT
Our in-house team of product experts collaborates with engineers and owners to develop customized strengthening solutions to help solve the most complex structural challenges.

INSTALLATION SERVICES
Structural Group’s contracting companies provide specialized project management and certified field technicians – trained to provide installation of our systems with minimal downtime and impact to facility operations.

RESEARCH & DEVELOPMENT
Our in-house research and development team develops new technologies, improves existing products, tests systems for specific applications and maintains certifications to meet industry requirements for our products and systems.
STRUCTURAL TECHNOLOGIES integrates our advanced repair and strengthening products with application design support and Structural Group’s contracting services to provide the most comprehensive solutions available in the industry. Whether driven by load requirements, schedule or budget, our team provides value-added solutions to designers, engineering professionals, contractors, and owners in the commercial, public, industrial and power markets.

SOLUTIONS FOR:
- Change in Use or Code
- Seismic Upgrade
- Increased Loads
- Missing or Misplaced Reinforcement
- Deterioration
- Low Concrete Strength
- New Slab Penetrations
- Force Protection
- Pipe Rehabilitation
Wrapping concrete joist with CFRP sheet
Installation of near surface mounted CFRP bar
Column strengthening with CFRP sheet
Slab strengthened with CFRP plate
CFRP sheet installed in water pipe
Mechanical saturator to prepare materials in the field
CFRP sheet applied to shear wall

TECHNICAL DATA:

V-Wrap™ Fabric Composite System Properties

<table>
<thead>
<tr>
<th>V-Wrap™ Fabric</th>
<th>EG50</th>
<th>C100</th>
<th>C200</th>
<th>C200H</th>
<th>C400</th>
<th>C400H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fiber Type</td>
<td>E-Glass</td>
<td>Carbon</td>
<td>Carbon</td>
<td>Carbon</td>
<td>Carbon</td>
<td>Carbon</td>
</tr>
<tr>
<td>Strength per Unit Width</td>
<td>3,340 lbs/in. (585 N/mm)</td>
<td>3,450 lbs/in. (600 N/mm)</td>
<td>4,000 lbs/in. (700 N/mm)</td>
<td>6,000 lbs/in. (1,050 N/mm)</td>
<td>8,000 lbs/in. (1,400 N/mm)</td>
<td>12,000 lbs/in. (2,100 N/mm)</td>
</tr>
<tr>
<td>Ultimate Tensile Strength</td>
<td>66.72 ksi (460 MPa)</td>
<td>140 ksi (966 MPa)</td>
<td>121 ksi (834 MPa)</td>
<td>150 ksi (1,034 MPa)</td>
<td>121 ksi (834 MPa)</td>
<td>150 ksi (1,034 MPa)</td>
</tr>
<tr>
<td>Modulus of Elasticity</td>
<td>3030 ksi (20,900 MPa)</td>
<td>9600 ksi (66,190 MPa)</td>
<td>11900 ksi (82,000 MPa)</td>
<td>10700 ksi (73,770 MPa)</td>
<td>11900 ksi (82,000 MPa)</td>
<td>10700 ksi (73,770 MPa)</td>
</tr>
<tr>
<td>Elongation at Break</td>
<td>1.76%</td>
<td>1.40%</td>
<td>0.85%</td>
<td>1.40%</td>
<td>0.85%</td>
<td>1.40%</td>
</tr>
<tr>
<td>Nominal Ply Thickness</td>
<td>0.05 in. (1.3 mm)</td>
<td>0.023 in. (0.584 mm)</td>
<td>0.04 in. (1.02 mm)</td>
<td>0.04 in. (1.02 mm)</td>
<td>0.08 in. (2.03 mm)</td>
<td>0.08 in. (2.03 mm)</td>
</tr>
</tbody>
</table>

Visit www.structuraltechnologies.com for additional product technical data and updates
PRODUCTS:

**Carbon Fiber Composites**
- V-Wrap™ Carbon Fiber Sheet
- V-Wrap™ Carbon Fiber Rod
- V-Wrap™ Carbon Fiber Plate
- V-Wrap™ Carbon Fiber Anchors

**Glass Fiber Composites**
- V-Wrap™ Glass Fiber Sheet
- V-Wrap™ Glass Fiber Rod
- V-Wrap™ Glass Fiber Anchors

**Resins / Coatings**
- V-Wrap™ Resins
- V-Wrap™ ASTM & UL-Approved Fire Protection Systems
- V-Wrap™ Watertight Coating System
- V-Wrap™ UV Protective Coating System

**V-Wrap™ FRP Composite Systems**

STRUCTURAL TECHNOLOGIES’ state-of-the-art composite systems utilize lightweight, durable, high-strength carbon and glass fibers bonded with adhesive resins. They are used to increase or restore the load-carrying capacity, ductility and seismic resistance to a variety of structures – especially for applications with limited access and/or complex geometries.

**KEY FEATURES:**

- **Versatile.** Utilized on a variety of structural elements including columns, beams, walls and slabs to increase capacity – while also improving ductility and overall seismic performance.
- **ICC-ES Approved.** V-Wrap™ products are ICC-ES approved, meeting or exceeding industry standards for long-term durability.
- **Low Impact.** Composites have a very high strength-to-weight ratio – allowing for structural enhancement using a low profile system, minimizing aesthetic impact. Installations typically have a maximum thickness between 1/8 and 1/2 inch.
- **Environmentally Compliant.** Our systems are NSF-61 approved and meet local, state and federal environmental regulations. With no VOC’s, V-Wrap™ materials can be installed in active construction environments within commercial, institutional and industrial facilities.
TECHNICAL DATA:

1. Beam behind column after completed enlargement
2. Column footer enlargement for axial and seismic strength
3. New column capital to improve punching shear resistance
4. Concrete placement valve on pressurized form
5. Concrete placement into pressurized column form
6. Column with doweled reinforcement, prepared for formwork

Pressure sensors inside the Tstrata Pressurized Form Technology™ show high pressure is maintained after concrete placement to ensure superior bond and to minimize shrinkage.
DESIGN ELEMENTS:

Tstrata SCC Repair Material™
Our designs utilize self-consolidating concrete (SCC) materials to allow for improved consolidation in thin enlargements and congested reinforcement zones, as well as improved bond with the existing structure.

Tstrata Pressurized Form Technology™
Along with specified surface preparation procedures, our advanced form technology creates pressure to force the new concrete into the prepared surface, creating a monolithic interface between the existing substrate and the enlargement.

Steel Reinforcement
Our designs are reinforced with mild steel or post-tensioning to produce the required strength and improve serviceability performance.

STRUCTURAL TECHNOLOGIES’ Tstrata Enlargement Systems™ produce an additional reinforced concrete layer that is fully bonded to existing structural members. Our systems combine specific surface preparation, specialized materials, and pressurized formwork to produce monolithic concrete enlargements to increase or restore the load-carrying capacity, ductility and seismic resistance to a variety of concrete structures.

Tstrata Enlargement Systems™ meet both ICRI 320.IR and ACI RAP-5 requirements for placement of concrete under pressure, and are suitable for all applications, including vertical and overhead installation.

ADVANTAGES:

• Ability to add significant additional capacity to existing columns, beams, walls and slabs
• Increases axial, shear, and bending capacities of structural members
• Improves stiffness and ductility of structural components
• Incorporates steel dowels to supplement shear transfer requirements
• Can incorporate post-tensioned reinforcement to reduce service stresses and deflection
• Uniform appearance that blends well with the existing structure
• Provides high levels of fire resistance
Post-tensioning systems are connected to the structure at the anchor points. The desired uplift force is provided by deviators or deviation blocks, fastened at high or low points along the span of the member. By varying the profile of the tendons, the uplift force can be manipulated to achieve different levels of capacity/serviceability improvement.
PRODUCTS:

Post-Tensioned Reinforcement
- VStrand™ Heat Resistive Tendons
- Unbonded Monostrand
- Bonded Multistrand
- Threaded Bars

System Components
- Custom Designed Anchorages
- Custom Designed Deviators
- Duct / Grout (Multistrand Systems)
- Tstrata Concrete Repair Materials™ and Pressurized Formwork for Internal Systems

STRUCTURAL TECHNOLOGIES manufactures a variety of post-tensioning systems (high strength prestressing cables, strands and steel bars), and helps design systems to actively increase or restore load-carrying capacity to a variety of structures. Post-tensioning is ideal for situations that require significant load capacity increases or deflection and/or crack control.

**Internal Post-Tensioning** systems are typically installed within a Tstrata Enlargement System™, or they may be installed into an existing member through core drilling or other methods. These systems utilize the structural element itself, or the new enlargement, to provide required durability and fire protection.

**External Post-Tensioning** systems have tendons installed outside the structural element, but may be placed in grouted ducts to improve durability and/or fire resistance.

STRUCTURAL TECHNOLOGIES provides comprehensive design support to develop system detailing, anchorage requirements and reinforcement.
Wall blast upgrade using DUCON® system
DUCON® system features high ductility and energy dissipation
Multi-layer Steel MicroMat® attached to column prior to formwork placement
Pressurized formwork for placement of DUCON® grout
Ultra-high performance grout infused into MicroMat®
Completed DUCON® column jackets

TECHNICAL DATA:

DUCON® Composite System Properties

<table>
<thead>
<tr>
<th>Property</th>
<th>DUCON® (Composite)*</th>
<th>Range (psi/ksi)</th>
<th>Range (MPa/GPa)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compressive Strength (ASTM C39)</td>
<td></td>
<td>13,000 - 18,000 psi</td>
<td>89 - 124 MPa</td>
</tr>
<tr>
<td>Elastic Modulus (ASTM C469)</td>
<td></td>
<td>3,200 - 4,600 ksi</td>
<td>22.1 - 31.7 GPa</td>
</tr>
<tr>
<td>Tensile Strength (ASTM C496)</td>
<td></td>
<td>1,300 - 2,000 psi</td>
<td>8.9 - 13.8 MPa</td>
</tr>
</tbody>
</table>

* Steel volume fraction 3-7%. Mechanical properties can be adjusted by changing steel grade and volume fraction
ADVANTAGES:

• Ability to adjust the design and physical properties to meet project requirements
• High-performance properties versus thickness ratio (i.e. thin strengthening layer)
• Can be applied in thicknesses as thin as ½ inch
• Ease of constructability allows use in a wide variety of design requirements, geometries, and orientations
• Flexibility in application methods (both in-situ and precast)
• Extremely ductile
• Abrasion resistant

DUCON® Micro Reinforced Concrete Systems are innovative, high-performance strengthening and force protection solutions designed for extreme load resistance and energy absorption. DUCON® combines an ultra high-performance grout with densely layered MicroMat® steel reinforcement.

DUCON® systems are ideal for structures that require significant load capacity, ballistic or impact resistance increases. These systems can be custom designed to meet any project-specific performance requirements.

“MOLDABLE STEEL”

Placement characteristics similar to concrete, combined with the ductility and energy absorption properties of steel, give DUCON® “moldable, steel-like” characteristics.

Like concrete in placement versatility, DUCON® can be applied to new and existing structural members, or prefabricated off-site to create a wide range of precast shapes and sizes.

Like steel with its ductility and energy dissipating qualities, the DUCON® system allows for the highest level of performance for the most challenging forces and load combinations.

DUCON® and MicroMat® trade names and patents are owned by DUCON GmbH and are distributed by STRUCTURAL TECHNOLOGIES for force protection and strengthening applications.
STRUCTURAL TECHNOLOGIES, a Structural Group Company, is firmly committed to its ongoing mission of making new and existing structures stronger and last longer. We develop and integrate products with engineering support services to provide our value-added solutions to designers, engineering professionals, contractors, and owners in the Commercial, Public, Industrial, and Power markets.

State-of-the-Art Products
For existing infrastructure, STRUCTURAL TECHNOLOGIES’ products and solutions repair deterioration or damage, and enhance structures in order to extend life or comply with change of use requirements. For new construction, our products and solutions can improve the performance, protect and extend the life of structures, as well as correct construction defects.

Solution Building & Design Assist Services
STRUCTURAL TECHNOLOGIES works closely with our clients to consider all aspects of a project. Our Solution Building teams have the experience to assist engineers in selecting the proper product, providing design assist services as well as cost and constructability consulting to ensure the best possible solution.

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Manufacturing Centers: Dallas, TX • Houston, TX • Springfield, VA • Ft. Lauderdale, FL

Products & Systems
• Strengthening
• Force Protection
• Pipe Rehabilitation
• Corrosion Control
• Concrete Repair Materials
• Moisture Control
• Equipment Foundations
• Post-Tensioning Systems

Engineered Product Support
• Budget Development
• Specification Assistance
• Application Engineering
• Design Assist