



SPECIAL SERVICES

STRUCTURAL REPAIR AND STRENGTHENING



Introduction to DYWIDAG

DYWIDAG-Systems International USA Inc. is part of DYWIDAG, which is a major global supplier operating in the Construction industries. In the Construction sector, DYWIDAG's scope of business is the development and application of Post-Tensioning and Geotechnical Systems along with Specialty Services. In the Mining and Tunneling industry, DYWIDAG is the leading manufacturer and supplier of high-quality, specialty structural support products. Founded in New York in 1969, DYWIDAG USA has grown dramatically over the last 40 years. Today, our North American Construction business is comprised of three specialty groups:

STRUCTURAL REPAIR AND SPECIALTY EQUIPMENT

As a leader in construction technologies, DYWIDAG has ventured into the development of specialty equipment to support the needs of new construction techniques and the investigation and repair of existing structures. Our systematic research in the fields of materials, structural engineering and construction methods has provided us with a constant flow of innovative solutions. Progressive development, combined with a commitment to the highest quality standards, is DYWIDAG's response to the changing needs of current and future construction markets.

POST-TENSIONING, STAY CABLE AND REINFORCING SYSTEMS

DYWIDAG systems and products have been trusted for decades in the construction of bridges, commercial and private high-rise buildings, sports facilities, paving, tanks and many other engineered structures.

GEOTECHNICAL PRODUCTS AND SYSTEMS

DYWIDAG's anchor and piling systems and related product lines are used for a wide variety of geotechnical applications such as the stabilization of slopes and excavations, substructure foundation needs and the counteraction of uplift forces for both new structures and for the rehabilitation of existing structures.



Philosophy

The DYWIDAG business philosophy is based on the establishment and cultivation of a trustworthy business relationship with our clients. No matter the circumstances, we are committed to fulfilling the tasks entrusted to us.

Safety

Working safely is a key part of our culture at DYWIDAG. The safety and well-being of DYWIDAG's employees, the employees of our clients, the general public, as well as the protection of the environment is a major commitment of the company. DYWIDAG technicians are OSHA trained and industry certified in many areas. We work with the values:

"DO IT ONCE – DO IT SAFE – DO IT RIGHT – ZERO HARM"

Dam Trunnion Rod Liftoff Testing

The picture to the right shows trunnion rod liftoff testing in progress on a USACE power producing dam in the southeast USA.



Specialty PT Grouting

Large concrete structures such as bridges incorporate the use of bonded, posttensioning systems which require special grout materials and processes to bond the tendons while providing corrosion protection. If during construction this operation is not done properly, voids can be found inside the ducts leaving critical post-tensioning tendons susceptible to corrosion. It is important that if voids are present in these structures that they are investigated and filled so the tendons can perform as designed for the service life intended. Special grouting techniques can be utilized in these situations including, vacuum grouting and vacuum assist pressure grouting.



Vacuum Void Grouting

The below pictures show external box girder tendons being inspected and then repaired with vacuum grouting techniques. DYWIDAG has developed unique equipment for volumetric measuring of the voids so that precise comparisons can be made between void size and volume of grout utilized assuring quality in the repair.



Pressure Grouting

In situations where the voids are large and continuous over an extended length, pressure grouting can be utilized. This involves the use of multiple ports with air venting and can be supplemented with a vacuum assist.



Strengthening of Structures



EXTERNAL POST TENSIONING TO RESTORE OR INCREASE CAPACITY

Structures often require strengthening due to deterioration, overloading, construction defects, or simply change of purpose. DYWIDAG provides the engineered systems and field technicians to improve both concrete or steel structures. The pictures to the right show a football stadium walkway and seating support structure being strengthened with external Double Corrosion Protection (DCP) THREADBAR® tendons. Also shown (lower right) are epoxy coated strands being utilized to strengthen a steel girder bridge.



CARBON FIBER REINFORCED POLYMER (CFRP) SOLUTIONS

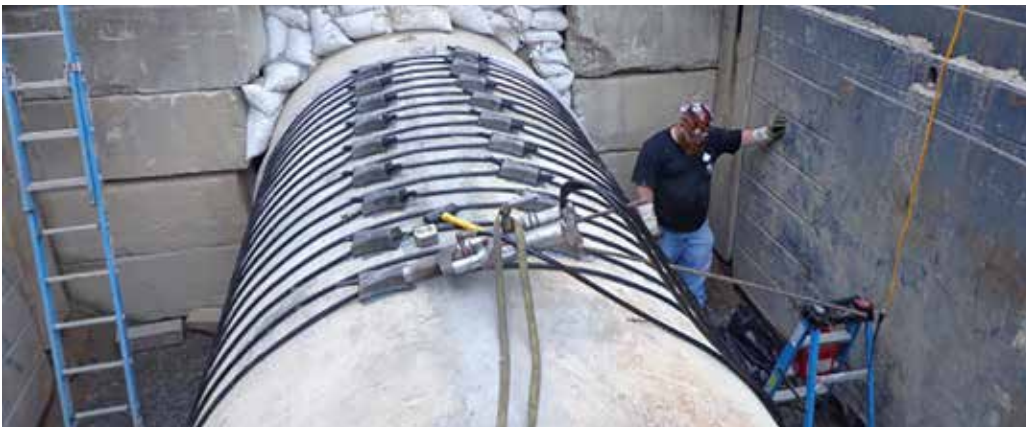


In situations where conventional strengthening systems such as external post tensioning, section enlargement or general repairs will not provide the necessary support, Carbon Fiber Reinforced Polymer (CFRP) systems can often be the solution. The above pictures show an industrial structure getting a flexural upgrade with the use of CFRP fabric.



Circular Structures

Silos and PCCP pipes are commonly in need of strengthening and adding compression into a circular structure is often the solution. The installation of DYWIDAG encapsulated hoop tendons provide a durable solution especially when the structure needs to stay in some level of service during the repair.



Structural Repair



Backed by many years of experience in complex construction projects, DYWIDAG has developed extensive capabilities in the field of inspection and turn-key repair and strengthening of structures. DYWIDAG provides support in every project phase from planning and engineering to the execution of repair and strengthening work, including quality management and long-or short-term monitoring services.

CONCRETE REPAIR

Whether a precast beam, double tee, hollow core panel, or cast in place concrete, deterioration of these structures can be found in a variety of forms. DYWIDAG employs the latest concrete repair standards for durability.



UNBONDED PT REPAIR/ REPLACEMENT

Tendon repair involves many unknowns and requires highly experienced crews to perform this work safely. DYWIDAG technicians are well trained and experienced with this type of specialty repair.

EPOXY INJECTION

The epoxy injection of cracks in structural concrete members is a repair method used to restore the integrity of the element returning it to original design loading criteria.



PRESTRESSED TENDON REPAIR

Prestressed tendons found in pre-cast concrete oftentimes require repair due to corrosion, impact damage or overloading. These repairs can be challenging due to working with short development lengths. DYWIDAG provides the engineering, special hardware and know how to implement these repairs. Above shows pre-cast/pre-stressed girder tendon repairs.

Heavy Lifting and Specialty Equipment



DYWIDAG provides resources and specialty equipment that is unmatched in the industry. We have an extensive inventory of hydraulic jacks, pumps, lifting systems and accessories all designed for safety and ease of use. All of our equipment is professionally maintained in house by trained DYWIDAG hydraulic specialists.

Strand Jacking for Lifting of Heavy Structural Elements

Whether lifting a chimney liner or a bridge segment from a barge, DYWIDAG strand jacks are a perfect choice for heavy lifting. Individual Strand Jacks are available with up to 2,000 ton capacity and in multiple or series up to 1,700 ton capacity each.



CHIMNEY LINER LIFT

DYWIDAG has experience providing heavy lifting equipment and services to lift a chimney liner into position piece by piece until fully constructed. The system designed and utilized for this long term lift had built-in redundancy for added safety.



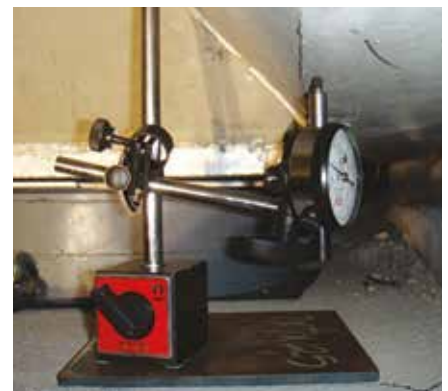
CULVERT JACKING

The below pictures show cast in place vehicular culverts being horizontally jacked through the soil embankment under active railroad tracks performed with a uniquely designed DYWIDAG strand jacking system. This is an example of the adaptability of DYWIDAG jacking systems and how they can be utilized to solve extreme site challenges.



BRIDGE JACKING FOR BEARING REPLACEMENT

Bearing replacements call for thin specialized jacks that can handle heavy loads. DYWIDAG supplies the jacks and the experience to make your bridge jacking and bearing replacement projects possible.



Inspection Services



Following quality construction methods, the single most important factor in the lifespan of a post-tensioned structure is proper inspection at prescribed intervals. In depth inspections can be critical in determining potential issues that may require enhanced inspection intervals, maintenance, or even repair work.



POST-TENSIONING AND CABLE STAY SYSTEMS

The below picture shows how an external bonded tendon can be opened for grout sampling and visual inspection of the PT strand.



GROUND PENETRATING RADAR (GPR)

DYWIDAG Technicians use Ground Penetrating Radar for identification of PT tendons, reinforcing systems, and other concrete embedded metal items.



PT SURVEILLANCE IN NUCLEAR FACILITIES

DYWIDAG has performed Inspection and surveillance of post-tensioning systems in nuclear containment structures.



FORCE VERIFICATION

Knowledge is important for owners when it comes to managing the health of their structures. The ability to read force in post-tensioning systems that are in-service is an important part of inspection and evaluation programs. DYWIDAG is routinely called upon for our expert services and equipment to perform liftoff testing.



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