

Specialty Contractor's Brand Is Post-Tensioning

Family-owned Schwager Davis Inc. thrives on the toughest projects and energizes the post-tensioning industry with their creative approach

by Monica Schultes

The post-tensioning (PT) industry has had a major role in the development of long-span concrete bridge construction in North America. One firm stands out in the continued growth and development of the industry: specialty contractor Schwager Davis Inc. (SDI).

SDI's reputation stems from founder Guido Schwager, who loved a challenge and pursued the most difficult jobs while also devising new techniques and materials.

With the changes in seismic requirements brought about by the 1989 and 1994 earthquakes in California, the need for PT grew there

and across the country. SDI thrived as well. Although the majority of their projects are on the West Coast, "we follow the work wherever that might be," explains Marcus Schwager, who handles business development at SDI.

Investing in Research and Development

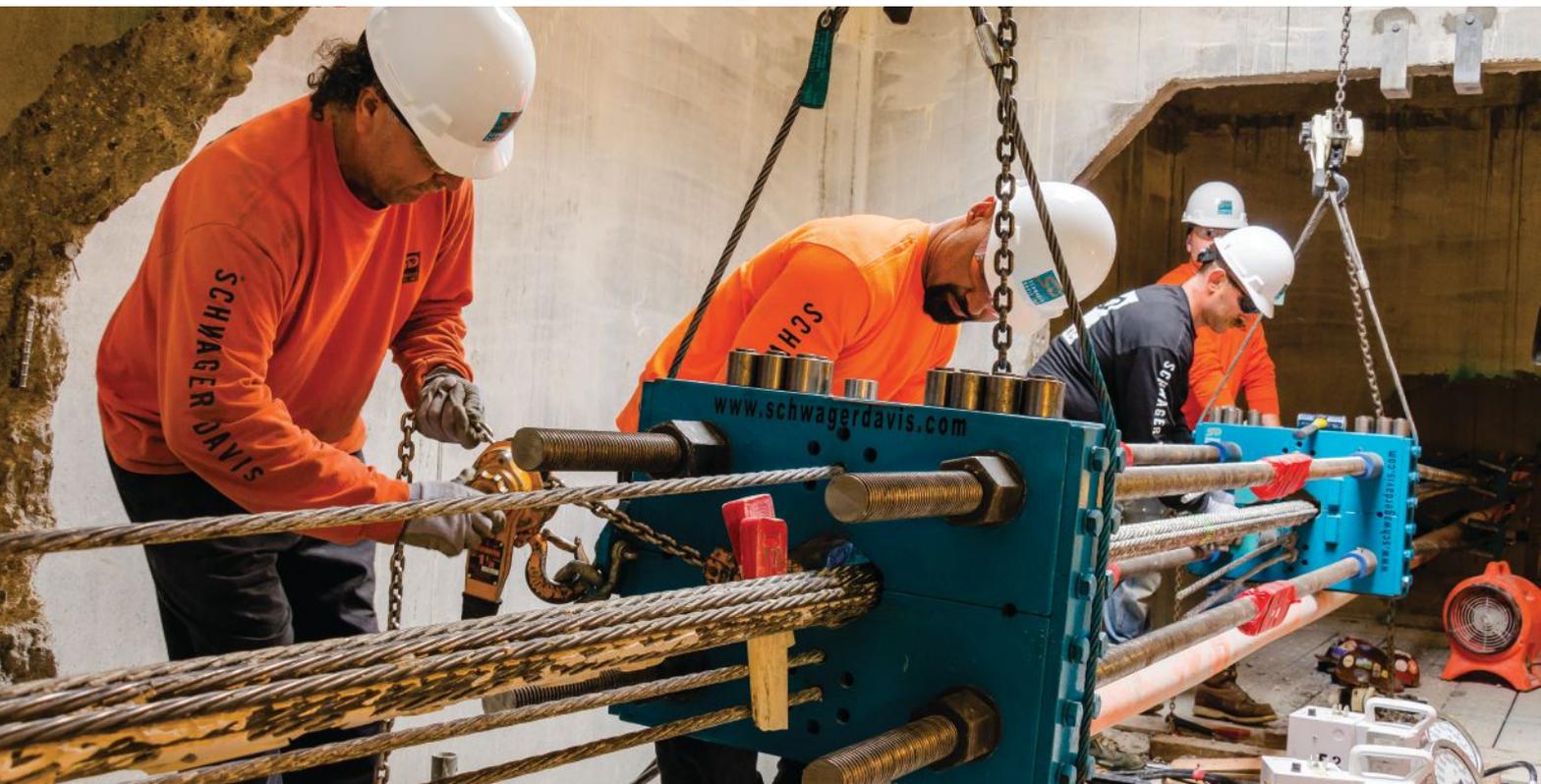
Great companies invest in innovation. SDI invests a considerable amount in research and development. "That gives us an edge over other specialty contractors," says Mike Schwager, president of SDI. "While we don't designate a specific target, we spend as much as 25% of our annual profit researching, developing, and testing new techniques and equipment."

SDI makes substantial investments in finding solutions for challenging projects. Mike Schwager explains, "We are always trying to unravel a new knot or increase the efficiency of our current methods." Making improvements helps SDI keep the focus on the safety of their labor force and the integrity of the structure.

The SDI Difference

Active in technical associations like the Post-Tensioning Institute (PTI) and the American Segmental Bridge Institute (ASBI), SDI engineers participate in developing best practices for the entire PT industry. "It is good for our people, our firm, and helps move the industry forward," suggests Mike Schwager. Since

Because tendons could not be safely cut in the typical fashion, Schwager Davis developed a new procedure for use on the State Route 520 Evergreen Point Floating Bridge Project in Seattle, Wash. After months of troubleshooting and testing, the firm's crews carefully exposed the strands in a tendon near midspan and then detensioned one strand at a time. After detensioning, the strand was anchored at the temporary plates and retensioned. After all strands were tensioned and anchored to the temporary plates, the entire tendon could be detensioned in stages. All Photos: Schwager Davis Inc.





On the Hoover Dam Bypass Bridge, one of the largest concrete arch bridges in the world, Schwager Davis supplied the temporary stay-cable system and post-tensioning materials for this iconic bridge's twin arches that meet at midspan over the Colorado River. The firm's crews worked post-tensioning two temporary towers on both sides of the bridge. The peak of these towers served as the location for cables to be attached.

Guido Schwager established SDI nearly 25 years ago, the PT industry has seen significant improvements in techniques and materials such as better quality control; stronger corrosion protection; improved anchorages and injection ports, caps, ducts, grouts and grout caps; and installation advancements.

Looking ahead, Mario Salice, vice president of the post-tensioning division, predicts that the industry will see more electrically isolated tendons and monitoring systems (see the article on electrically isolated tendon technology in the Spring 2019 issue of *ASPIRE*[®]). The PT industry is developing standards to encourage their use. "I think these methods will help us monitor and foresee any issues. As a PT supplier, we want to preserve the simple and cost-effective system that we believe in, but there is always room for improvement."

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Many public projects are design-bid-build, which makes it difficult for SDI to modify design requirements and bring the latest technology to a project. They turn to industry association committees to update specifications to reflect the most current methodology, so that bridge engineers have the latest information.

"While we price our services competitively, there are occasions where contractors self-perform the PT work. It makes sense on small cantilever projects where construction sequencing prohibits us being on the site all the time, or where the PT work is not continuous," explains Salice.

The company culture is to be as efficient as possible. "Whether it is a stay-cable, segmental, or standard cast-in-place box-girder bridge, safety, quality, and service are the core values we insist on maintaining," Salice says.

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Duct Work

The company is constantly looking for ways to move PT technology forward. For example, they manufacture their own plastic duct. "It might not seem like a big deal, but our projects often have long runs and we needed to demonstrate effective grout pumping without voids. There were limits to what was available commercially," says Mike Schwager.

According to Salice, not all agencies on the West Coast are using plastic ducts. In his opinion, plastic ducts have brought an additional level of protection in other regions of the country, especially in harsh environments. "We tout the longevity benefits of using it and promote its use to owners," Salice explains.

SDI's signature fusion duct hardware details were incorporated into the longitudinal PT tendons for the Honolulu Rail Transit Project in Hawaii, with over 7000 connections installed. (Segments 1 and 2 of this project were featured in a Project article in the Summer 2015 issue of *ASPIRE*.) The elevated guideway carries the Honolulu commuter rail system from Kualakai to the east end of the island (20 total miles of dual-track structures and 21 stations).

SDI also fabricates their own PT couplers, which is critical for projects with long duct runs. "Our assembly is easy for the ironworkers to assemble. It makes installation simpler and virtually foolproof," describes Mike Schwager. That is an improvement over other versions that require multiple steps, any of which could cause failure or grout leakage.

Precast concrete box-girder segments on the new Marc Basnight Bridge in North Carolina's Outer Banks incorporated SDI's anchorage systems and required

nearly 6000 of their segmental duct couplers. The North Carolina Department of Transportation specified the use of stainless steel post-tensioning materials up to 12 ft above the water and stainless steel reinforcement in all cast-in-place concrete for this project. SDI supplied PT materials and equipment as well as technical assistance for the precast concrete segmental section of the project (see the Project article in the Fall 2019 issue of *ASPIRE*).

Talent Scout

Headquartered in San Jose, Calif., SDI employs up to 150 people, including engineers, project managers, ironworkers, and support teams. That number can fluctuate depending on the local repair projects they take on, as well as project backlog. SDI is committed to “work safely, deliver quality, and provide excellent service. That is of paramount importance to us,” says Marcus Schwager.

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The Bay Area’s high cost of living due to its booming technology industry puts a strain on finding talent in the engineering and construction industry. According to Mike Schwager, “The number one challenge that we have here is finding and keeping young talent. The draw of start-ups and tech companies is very strong and skims the pool of employees, making it difficult to compete with their entry-level compensation.”

While labor shortages are felt across the country, PT is very technical, making those highly skilled workers even more difficult to find. However, the company’s reputation for seeking the most complicated and stimulating projects helps SDI attract and retain those who are passionate about their industry.

Evergreen Point Floating Bridge

“We have done 34 segmental bridge projects and over 1000 PT structures, which is our bread and butter,” says Mike Schwager. “Almost every project features a challenging or difficult aspect, but the Evergreen SR 520 project was our most memorable.”

The Evergreen Point Floating Bridge in Seattle, Wash., was built in 1963 at a

staggering 7580 ft long and underwent a PT seismic retrofit in 1997 that added both grouted and external tendons that were each 3600 ft long. (The low-rise portion of this bridge was the subject of a Project article in the Spring 2016 issue of *ASPIRE*.)

When the Washington State Department of Transportation decided to build a new structure to withstand a 100-year storm, engineers were faced with the challenge of how to safely detension the retrofitted tendons while protecting the old pontoons for use as floating docks. Guido Schwager describes the Evergreen Point Floating Bridge as the “most complicated PT challenge of my career.” Even after decades of experience on countless PT projects, this project presented a conundrum.

“Some of the early ideas for detensioning were not safe or feasible,” recalls Guido Schwager. Traditional methods could release forces that might injure workers or possibly sink the bridge pontoons. Guido Schwager and his team at SDI considered and designed alternative solutions despite no assurances that they would be awarded the project. After months of troubleshooting and testing, SDI resolved to reanchor and retension the strands transferring loads until they could safely be detensioned hydraulically one stroke at a time, releasing 24 ft of elongation in each 15-strand tendon. Ultimately, SDI was awarded the contract and began work in 2016.

“That problem-solving exercise is a great example of how much we love a challenge. In this industry, you can’t repeat the same approach. That helps keep our crews sharp and engaged from job to job and year to year,” describes Guido Schwager.

Homer M. Hadley Floating Bridge Retrofit

Accustomed to technical challenges and with their previous experience in floating bridges, SDI was consulted for the retrofit of the Homer M. Hadley Memorial Bridge on Interstate 90 (I-90) in Washington state, which is one of the longest floating bridges in the world. Westbound traffic from Mercer Island to downtown Seattle travels on the northern lanes of the

As a supplier and installer on the Honolulu Rail Transit Project in Oahu, Hawaii, Schwager Davis provided fusion duct hardware details that were incorporated into the first phase of the project. The superstructure consists of precast and cast-in-place trapezoidal concrete box-girder segments that are 30 ft wide. Both the precast concrete and the cast-in-place concrete spans were longitudinally post-tensioned using internal tendons.





Schwager Davis crews worked high above the Pacific Ocean on the Pitkins Curve Bridge on the Pacific Coast Highway (State Highway 1) in Monterey County, Calif. Schwager Davis served as form traveler and post-tensioning supplier on the project.

bridge, while the southern lanes have been designated to carry the Sound Transit East Link light rail extension. A companion span carries eastbound vehicular traffic.

Sound Transit agreed to add longitudinal post-tensioning to the pontoons to increase the load-carrying capacity of the bridge by minimizing movement during adverse weather. At approximately 3600 ft long, the tendons are some of the longest PT tendons in the world.

To add to the construction challenges, the work included fabricating, delivering, and installing 1800 pieces of anchor frame steel collectively weighing 41,000 lb into the confined spaces of the pontoons and hand transporting them to each end for the erection of 20 anchor frames. The pontoons were cored and 20 tendons containing a total of over 1 million ft of strand were installed through the pontoons to each anchor frame. "In my opinion this project solidified our reputation as excelling at these challenging projects," recalls Salice.

Technical Support

From one high-profile and challenging project to the next, SDI has changed the landscape of the country. Employees point to projects like the Pitkins Curve Bridge in Monterey County, Calif. SDI takes pride in playing their part to keep the Big Sur coastal highway accessible. Their crews were frequently seen on the job high

above the Pacific Ocean, as SDI served as form traveler and PT supplier and installer.

As an example of their teamwork, SDI frequently consults with engineers and contractors to plan erection sequencing. Such was the case at the Hoover Dam Bypass Bridge, the longest concrete arch span in North America (see the Project article in the Spring 2010 issue of *ASPIRE*). Involved from the early planning stages, SDI supplied the temporary stay-cable system as well as all PT materials and technical support.

Future Generations

Guido Schwager is deeply invested in the family business that he created, and he passes on that reputation and philosophy. While it would be difficult to match his level of passion about work, SDI has excelled at finding like-minded colleagues. Like many family-owned companies, the passion of one spreads to many. "Our challenge is to continue to grow and diversify but stay true to our core values," says Salice.

Mike Schwager took the reins as president of SDI in 2018. "Guido's humble, passionate, and insightful leadership built this company and prepared me and our team to forge on to the next chapter of our company's life. I am thankful to still be working with him, I am proud to further what he so brilliantly began, and I am honored to lead the excellent engineering and construction team that SDI is today." 

History and Growth of SDI

Guido Schwager, founder and chairman of Schwager Davis Inc. (SDI), grew up in Switzerland and studied engineering. After immigrating to the United States, he joined VSL, where he quickly rose to CEO of the company's USA West Division. He joined Baker Davis in 1993 and quickly transformed the tiny construction operation into one of the nation's leading specialty contractors. The small, local firm ultimately became Schwager Davis Inc. (SDI). It was clear that Guido wanted to grow the business and enter more challenging markets. He found ways to improve a design, implement an unexpected solution, and even keep a historic building from demolition. He played a key role saving buildings and shoring up local infrastructure after the 1989 Loma Prieta earthquake in California.

Guido Schwager's career of masterful engineering and business integrity provided the reputation for SDI to take on projects of dramatically increased scale and scope in a relatively short time frame. Whether the project involved post-tensioning installation or repair, bridge girders, stay cables, people movers, form travelers, parking structures, nuclear energy, or natural energy projects, he made a place for SDI at the table of regional and national infrastructure.

Guido Schwager was recently recognized by the Post-Tensioning Institute as a "Legend of Post-Tensioning": an individual who has made a significant, long-term contribution to the development of the post-tensioning industry in North America.