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PROJECT LOGISTICS: GOING THE DISTANCE

When logistics professionals are tasked with a special project, no matter how enormous, no matter how infeasible, they're expected to go the extra mile.

By Tamara Chapman

Project logistics professionals are expected to dot all the appropriate vowels, cross all the right consonants, and chart a steady course from “you want what?” to signed, sealed, and delivered. Sometimes, they're even expected to build bridges — between internal units, between external partners, and across chasms.



Cranes unload a 1,376,000-lb. steam generator onto a custom-engineered load distribution system at the Port of Charleston, S.C.

The Five-Year Plan To Traverse 150 Miles

In the nuclear energy industry, there's no room — not even a nanometer — for error. That's just as true for the people delivering the equipment for facilities as for those designing, building, launching, and operating them.

Just ask Carl Rossi and Sean McDermott of Westinghouse Electric Co. Rossi is the firm's director of global nuclear transportation logistics, while McDermott serves as logistics operations manager for Westinghouse Global Logistics. Late in the past decade, the two were told that they would be responsible for moving two Westinghouse AP1000 PWR steam generators from the Port of Charleston to a nuclear generating station near Jenkinsville, S.C., about 25 miles northwest of Columbia, and roughly 150 miles from Charleston.

Ranked on a scale of one to 10, this particular challenge rocketed to the two-digit spot. Even for seasoned logistics pros like Rossi and McDermott, this job boggled the cerebral cortex.

"We have delivered an awful lot of equipment to this plant — more than 63 ocean vessels and 280 rail cars — but this was far and away the most challenging delivery of all," McDermott says.

For one thing, he explains, the generator tips the scales at a whopping 1.4 million pounds. It's 70 feet long and 21 feet wide, making it bulky and awkward. One false move and yikes — someone gets hurt or the generator gets damaged.

One Saving Grace

Perplexing as the assignment appeared, it came with one saving grace. The first steam generator wasn't expected to arrive at the Port of Charleston until spring 2015, leaving Rossi and McDermott roughly five years for planning. As it happened, they needed every one of those 1,800-plus days.

Because the steam generator, fabricated in Korea, needed to be specially configured for transport, the two began by tapping into



This through-truss bridge over South Carolina's Congaree River had to be replaced to allow clearance for the wide steam generator.

expertise inside and outside the company. Internally, Rossi says, "Sean led a cross-functional team of engineers, logistics engineers, and product engineers." Externally, McDermott also had to coordinate with roughly one dozen outside partners — from the Port of Charleston itself to a host of firms commissioned to address out-of-the-ordinary challenges, of which there were too many to count.

One of the first questions facing McDermott was whether to move the equipment over the road or by rail. When a six-month assessment revealed that the generator would overtax bridge and road capacity, they nixed the road option.

"Once we decided on rail, we conducted a rigorous mile-by-mile route survey," McDermott says. "Right away, a number of significant issues arose."

In fact, the first issue surfaced with the arrival of the generator-bearing ship in South Carolina. Much to the team's surprise, "the generator was going to be the largest and heaviest load ever discharged through the dock at the Port of Charleston," he adds.

In fact, the load was so large and heavy that Port of Charleston officials feared the dock couldn't support it. To determine what mitigation strategies might be necessary, the port's engineers assessed the dock's condition by evaluating the structural integrity of each supporting pile. In addition, McDermott explains, "we collected soil samples underneath the dock to make sure no loose soil would give way once we set the load down."

The resulting analysis showed that the dock was, indeed, at risk. And if the dock was at risk, so was the generator. "So we decided to custom engineer a load-distribution system that redistributed the weight directly onto the piles underneath the dock," McDermott says, noting that this strategy, which incorporated a series of I-beams placed directly over the piles, avoided putting weight between the piles, where the area of the dock might be weaker.

To ensure that no single set of I-beams and piles would be overloaded as the generator was lowered, the team commissioned a load-monitoring firm to design a wireless system to help with regulating weight distribution. It was critical that the generator's heft be gradually and evenly shifted onto the I-beams, McDermott says.

To McDermott's relief, "the weight came on nice and even," he says. "We could actually chart and graph the weight as it was being transferred." That painstaking process took six hours to complete, and it took a full four hours just to transfer half of the generator's weight onto the dock.

Once the generator was off the ship, it needed to be transferred to a waiting rail car. But not just any rail car. Given the generator's heft and bulk, McDermott secured a Schnabel car for the job. Designed so that oversized loads can be suspended between the car's ends, this specialized freight vehicle uses lifting arms to distribute weight over a large number of wheels.

It Don't Mean a Thing If It Got That Swing

Because suspended freight swings when the Schnabel car negotiates curves, getting the freight car out of the port presented yet another challenge. At the end of the dock, the railroad track rounds a 20-degree bend to avoid a warehouse. Engineers estimated that the generator would swing about 26 feet, which meant it would have crashed through the warehouse walls—a prospect that spelled calamity for both the structure and the generator.

"So we took the corner I beam out of the warehouse," McDermott says. "And we installed a temporary jacking system to keep the roof up and take the sides of the building off so we could bring the Schnabel car through it. Then we put the sides back up and put the beam back in."

Matter-of-fact as that experience now sounds, it proved nerve-racking for everyone involved. "We ended up clearing the warehouse by only less than two inches," McDermott says.

The dock and precariously situated warehouse were just the first challenges revealed by the route study. Along the 150-mile journey, a host of obstacles popped up that tested the team's troubleshooting skills. For example, the team discovered that an existing bridge over the Congaree River was too narrow and old to accommodate the load. It had to be rebuilt—a \$10-million endeavor that

involved 18 months of strategizing with Norfolk Southern Railroad, conducting a full complement of environmental studies, and, of course, managing design, permitting, and construction.

At another point on the route, it was evident that the generator wouldn't clear an overhead bridge. Instead of reconstructing that bridge, contractors lowered the railroad bed, allowing the Schnabel car to slip underneath with both the structure and the generator unscathed.

Overall, it took three days just to transport the generator to its final destination. Since then, Rossi and McDermott have overseen what Rossi calls the "flawless execution" of the second delivery. With each of the deliveries, "nobody has gotten hurt or injured along the way, and we've delivered everything on time," Rossi says.

A Bridge to the Rescue

In June 2013, floods devastated the Kedarnath Valley, nestled in India's Himalayan Mountains. In the remote village of Sonprayag, surging waters washed away a much-used road bridge. It was rebuilt as quickly as feasible, but just two years later, the new bridge succumbed to yet another deluge.

For the dispirited citizens of the valley, replacing the bridge was an urgent need. The World Bank agreed and allocated funds to



Logistics Plus India helped coordinate the replacement of a crucial bridge in the Himalayan mountains by moving parts to the installation site over some of the world's most challenging terrain.

install sturdier infrastructure from New Jersey-based Acrow Bridge.

Getting that new bridge from one continent to another was a routine job. For the first legs of the journey, the bridge parts moved conventionally—by container ship to Bombay, by rail to New Delhi, and by trucks to a temporary base camp in Rishikesh in the Himalayan foothills. But moving them from there required the talents of an intrepid logistics expert.

Enter Sundreysh Sarup, managing director of Logistics Plus India, a division of Pa.-based Logistics Plus Inc., which specializes in transportation and logistics solutions. It fell to Sarup to determine how to move the bridge parts over extremely



Logistics Plus India spent significant time planning and coordinating to ensure all bridge equipment and parts arrived at the job site on time and intact.

challenging terrain to the installation site more than 155 miles from Rishikesh.

“My first thought was, there will be issues—that’s logistics—but we can do it,” Sarup says, adding that he recognized immediately that this particular job would require him to “deliver the extraordinary.”

Detailed planning began in earnest once Sarup received the final packing list from New Jersey. That’s when he could start calculating the “number of trucks needed, the weight per truck, the types of trucks, cranes and forklifts, and the manual labor.” It was his job to not only load and dispatch the trucks at Rishikesh, but also to ensure that the appropriate equipment for unloading the vehicles was delivered to the construction site.

For his base camp, Sarup chose a dry riverbed site where he and his team would have “movement space to hold trailers with containers, and space for our cranes and forklifts to function,” he says. “At this base camp, all the equipment was opened from its original containers, and then loaded onto smaller trucks.”

The smaller trucks were essential, because only they could negotiate the narrow, steep, and winding roads through the peaks. “Trucks traveling on Himalayan roads have limitations on weight, dimensions, and time when they can move,” Sarup notes. “Moreover, in some smaller towns, markets form on part of the main road, leaving even narrower spaces to move.”

Without proper planning, Sarup adds, the trucks would not have been allowed on the roads. He spent several months securing the required approvals and documentation. Because of the bridge’s importance, state officials were happy to make that process as

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— **Sundreysh Sarup**, Managing Director, Logistics Plus India

painless as possible. “I must admit, the support extended by the state of Uttarakhand was amazing,” Sarup adds. “Without it, we could not have completed such a difficult task with ease.”

That said, there was nothing truly easy about the job. “We expected—and planned for—traffic jams, tougher turning radiuses, and truck breakdowns,” he says. But fate delivered a few unexpected opportunities for on-the-fly troubleshooting.

“The biggest problem we encountered was when one of our cranes, stationed at Sonprayag, malfunctioned and didn’t work for one full day. We called a special engineer from Rishikesh, and at the same time arranged for an alternate crane to avoid hindering the delivery schedules.”

Thanks to Sarup’s quick thinking, the project was not appreciably delayed. “Our workers did earn a much needed one-day break after the project was completed,” he says. In fact, it was constructed in a record 30 days, just in time for pilgrims making their way to a shrine in Kedarnath.

“It’s the first bridge of its kind ever built, delivered, and executed in India,” Sarup says. And, as the logistics wizards behind that feat, Sarup and his team took pleasure in the results of their precision efforts. “It was certainly a moment of pride,” he says.

Thinking Outside the Boxcar

When T.J. Mahoney of Atlanta-based Railserve dispatches one of the company’s energy-efficient, low-emission locomotives to an eager customer, he typically routes it along the track of least resistance: He sends his in-demand LEAF locomotives by rail.

But when the customer is located in sub-Saharan Africa, Mahoney has to get creative.

That’s what happened when the state railway of Gabon, the Société d’Exploitation du Transgabonais (SETRAG), contacted Railserve about purchasing LEAF locomotives. Eager to modernize the country’s freight rail operations, SETRAG representatives were in North America to investigate green options. SETRAG ultimately ordered six LEAFs, along with a container of spare parts. Once the order was placed, delivery was scheduled for late 2015.

For Mahoney, the task ahead was completely devoid of crossing guides and signals. He had to start from scratch.

His first task was to master the shipping details. “That was a steep learning curve for me because I had not exported large, heavy items before,” he says. And the LEAF qualifies as both large and heavy. At 100 metric tons each, the locomotives needed to be transported in a vessel whose cranes could handle the load.

For help, Mahoney turned to Breakbulk Transportation Inc., which specializes in moving large and heavy cargo, and which offered Mahoney a crash course on shipping products overseas. Mahoney knew how to get the locomotives from the manufacturing operation in Longview, Texas, to the nearest port in Houston, but his expertise ended at the railroad tracks. And because the SETRAG/Railserve contract assigned responsibility for safe delivery to the manufacturer, he wanted to leave nothing to chance.

“We were responsible for the freight, and we were responsible

for the locomotives to get delivered to the tracks in Gabon,” he says. “So the risk of loss was ours during that transition, which was new for us. Typically, when we sell a locomotive, the client owns that transportation risk. So it was all new to me and new to our company.”

One thing Mahoney learned right away was the importance of selecting the right partners. He tasked Breakbulk with handling the logistics once the locomotives arrived, two at a time, in Houston. Breakbulk took responsibility for cleaning, packing, and prepping the vehicles for their 6,000-mile journey.

That process was made more complicated when SETRAG requested some last-minute modifications to the locomotives, including installation of different ditch lights. With two of the locomotives already in Houston, awaiting their date for loading, a crew arrived from Longview to remove the old lights, and weld and wire the replacements.

Protecting the Assets

Once the locomotives were cleaned and prepped, each was carefully shrink-wrapped. “We wanted to protect the exterior of the locomotive from undue damage,” Mahoney says. “In addition to the shrink-wrapping, we installed wooden protection on the windows, and we built wooden boxes around all the lights and the horns. Then, the shrink-wrap went around all that wooden covering, just to be sure we didn’t break something off inadvertently.”

When it came time to select a shipping company, a little homework pointed Mahoney in the direction of Houston-based Intermarine, which controls an international fleet of more than 50 vessels with lifting capacity up to 900 metric tons. What’s more, Intermarine provides regular sailings out of Houston to ports in West Africa.

The locomotives were assigned space aboard the nearly new *Ocean Grand*, equipped with all the latest conveniences. “The vessel was built in 2015, with two large 450-ton cranes that were more than capable of handling our locomotives,” Mahoney says. “Each crane could have handled twice as much weight as our locomotives.”

Once onboard the *Ocean Grand*, the locomotives shared space with several tons of food aid destined for various African ports. Oddly, it was the rice and flour that caused the greatest consternation for Mahoney, who had plans to fly to Gabon to oversee the locomotives’ safe delivery to SETRAG.



The Intermarine *Ocean Grand* departed from Houston with six 220,000-lb. Railserve LEAF Gen-Set locomotives—each individually shrink-wrapped—on board.

“I planned to meet the vessel on arrival, because we still owned the locomotives and needed a representative there. I was familiar with the contract and had some language skills,” he recalls. “But the arrival date kept moving because of delays at the ports, where the vessel stopped to offload the food aid.”

Offloading the food wasn’t particularly complicated, but inclement weather halted the process at several ports of call. The perishables simply couldn’t be exposed to drenching rains, and so the food sat in the hold—and the ship sat in the harbor—until the fronts passed and the sun emerged.

Meanwhile, back in the United States, Mahoney struggled to coordinate his travel arrangements. Finally, on the Friday after Thanksgiving, he set off for Gabon’s Port Owendo, arriving the following Sunday, just ahead of the *Ocean Grand*.

“On Monday we organized the reception for the locomotives at the harbor,” he says. “The vessel was supposed to come in on Thursday, but it wound up coming in on Tuesday, and was out of there by Tuesday night. I almost missed it.”

And had he missed it, he would have missed out. Watching the locomotives come off the ship was a reward for all those months of research, planning, and improvisation.

“It was an interesting operation to see,” Mahoney says. “Lifting the first locomotive out of the hold was a little tricky, because they were stacked six across, with only about 18 inches between the first locomotive and the vessel wall. But once they got the first one out, the others moved quickly.”

After the locomotives cleared customs and were delivered to SETRAG, Mahoney finally relaxed. With a Railserve team on hand to start the locomotives and train SETRAG personnel on operating and maintaining them, his job was largely done, except the unwrapping.

“I went to the SETRAG shop the next day, and we unwrapped the first locomotive. The shrink-wrap was fastened on the bottom by a large, 2,000-pound weight-bearing strap,” Mahoney says. “It was probably overkill.”

Overkill or not, the locomotives emerged from their protective covering in mint condition, ready to help Gabon achieve its sustainability goals.

And speaking of sustainability, the workers at the shop were



Railserve individually shrink-wrapped its locomotives to protect their exteriors from undue damage during transportation.

careful not to damage the shrink-wrap. “I’m sure,” Mahoney says, that like the locomotives themselves, “the shrink-wrap is being put to good use.”

Every project move is unique, and these project logistics moves demonstrate the resourcefulness and creativity required to get oversized loads where they need to go — on time and unharmed. ■