





Customized Fleet of Robots Takes Down Shopping Mall

CSDA Contractor's Arsenal of Robots Provides the Best Solution

Technology in construction has introduced methods of modifying and demolishing concrete structures with such precision and to such strict tolerances that operations in other parts of the same building are able to continue, even hundreds or thousands of feet up in the air. One of the most exciting and promising technologies has been the introduction of remote-control and robotics to construction. Both have made jobsites safer for operators and bystanders, allowed for construction and demolition to take place in confined, restricted and unsafe spaces and allowed operators access to areas they may have otherwise not been able to reach.

In late 2017, the old three-level Sears department store, part of an open-air shopping mall in Oak Brook, IL, needed to add a floor as part of a multi-use redevelopment, while still allowing for the rest of the mall to remain open. The General Contractor, Graycor, was tasked with increasing the height of the building and determined that they would need to remove two floors first, then add three to get to the desired height. The first of many challenges on this project was that the area under construction was surrounded on three sides by the active shopping mall. Traditional demolition methods could not be used, as any falling

Lighter weight demo robots were customized by Interstate Sawing Company to extend their vertical reaches to 21 feet 4 inches.

concrete would damage the remaining floor and could create dangerous vibrations through the rest of the building. Concrete cutting was another option, but due to the subzero temperatures of as low as -40 Fahrenheit, the risk of freezing water during cutting operations was determined to be too significant. Therefore, it was determined that crushing the concrete using the demolition robots was the best choice for this job.

Alpine Demolition, the demolition contractor hired by Graycor, contacted CSDA member Interstate Sawing Company of West Bend, Wisconsin. Interstate has developed a reputation for holding one of the largest fleets of demolition robots in the country and can customize these robots in-house to fit the specific needs of each job. Another challenge on this job was that there was a 21-foot distance between floors, and each floor had a 7,000 pound weight limit. There are no demo robots on the market currently that weigh less than 7,000 pounds and have a 21-foot vertical reach. So, Interstate began by customizing their fleet of Brokk and Husqvarna demo robots that weighed less than 7,000 pounds with attachments that would meet the 21-foot vertical reach requirement.

Noise restrictions, due to the surrounding shopping mall and residential development, required that instead of demolishing with impact hammers, the concrete would be silently crushed and then removed by the general contractor. This method would still cause concrete to fall on the suspended floor, so crane pads

were used to protect the existing floor that was to remain in place. Crushing the concrete also prevented the vibration that impact hammers would produce.

Interstate used a fleet of five demolition robots on this project. Four robots were manufactured by Brokk, including the 110, 160, 260 and 280 models while the fifth robot was manufactured by Husqvarna, the DXR 310. All these robots with attachments weigh less than 7,000 pounds, but their reaches before modifications range from 130 inches to 197 inches – short of the 252-inch requirement of this job. So Interstate customized two of the robots, the Brokk 260 and Brokk 280. Interstate's maintenance and fabrication division customized two additional arms for these robots, allowing them to extend their reaches by five feet, giving them maximum reaches of 21 feet 4 inches. With the additional attachments, each customized robot weighed about 8,500 pounds and the additional weight was distributed with track pads.

Interstate started with four operators on the job, but quickly realized they were crushing the concrete faster than it could be removed. So, they split the crew into two 10-hour shifts, with two operators on each shift to make the process as efficient as possible. The two customized robots were primarily used, while the other three were kept on the jobsite to tackle any specialty needs or confined space areas. They were also useful as backup in case there was an issue with any of the other robots.

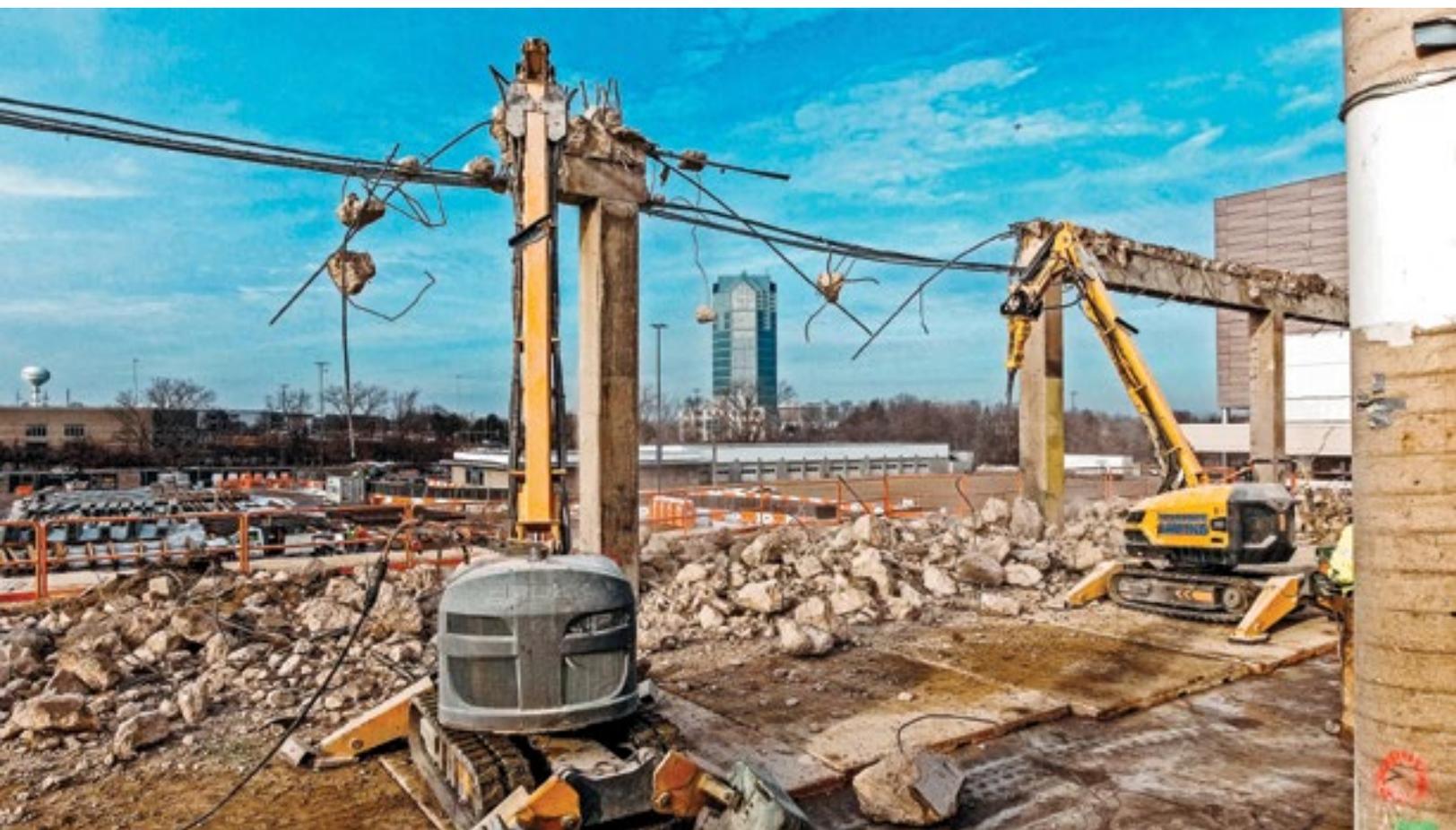
Safety and environmental concerns were a major aspect of



Two floors of an old Sears department store were demolished by crushing and removing the concrete.



Two robots were operating at the same time during each 10-hour shift. The area was surrounded on three sides by an operating shopping mall.



Crushing instead of breaking the concrete up with impact hammers reduced vibration that could damage existing structures that were to remain in place.



Interstate Sawing Company produced two videos showcasing their work on this job. The videos can be seen by searching for Interstate Sawing on YouTube: *Specialized Robotic Demolition* and *More Than Just a Concrete Cutter*

Specialized Robotic Demolition
(<https://www.youtube.com/watch?v=sccl7QJNsJU>)
More Than Just A Concrete Cutter
(<https://www.youtube.com/watch?v=X8g3OlgYaE>)



In all, over 150,000 square feet of concrete was crushed and removed.

this job. Operators were working at significant heights and at the edge of a sheer drop-off, so all on the jobsite were required to wear safety harnesses and standard PPE. This job was done during a very cold Midwest winter, so not only did operators need to dress appropriately to stay warm, water usage was limited due to concerns of water freezing during operations.

In all, over 150,000 square feet of concrete was crushed and removed to create space for the new floors to be constructed. Crushed concrete was pushed off an old stairwell with S70 Bobcats into a basement opening where it was then removed by the general contractor. The job was completed on time and within budget. Interstate owner and President Duke Long stated “We were extremely satisfied with how this job turned out. The process we developed worked beyond what we even expected it would. Our customer was ecstatic with the efficiency of this job.”

Both the general contractor and the demo contractor were also extremely happy with the outcome of the work done by Interstate. John Moore of Alpine Demolition stated “Duke and his team were an invaluable asset to the success of this project. We presented a challenge and they fabricated the answer. They came prepared with not only Plan A, but Plan B, C and D.”

Interstate was chosen for this job for their ability to not only have this fleet of robots onsite, but also for their ability to customize the robots for this specific job. Their creativity, hard work, dedication and ingenuity showcases the innovation and productivity CSDA members bring to jobsites around the world.

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COMPANY PROFILE

Interstate Sawing Company is headquartered in West Bend, Wisconsin. They have been in business since 1996 and a CSDA member since 1999. Interstate Sawing has 25 trucks and 45 employees. They are a full service concrete sawing and drilling contractor specializing in extreme limited access and confined space demolition of concrete using electronic robots.

RESOURCES

General Contractor
Graycor

Demolition Contractor
Alpine Demolition

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Methods Used
Robotic Demolition