

Sortation Center – DEN 5

244 million people log on to Amazon.com, one of the world's largest digital retailers, to buy anything from books, to electronics, to diapers. On peak days, Amazon sells 306 items per second and ships an average of 608 million packages per year. They have over 100 warehouse facilities in the United States alone. The newest one just opening in Aurora, Colorado with the help of MTech Mechanical.

The Amazon Sortation Center DEN5 is a 452,400 square-foot sortation center. Packages arrive already sealed and are then sorted by zip code. Delivery companies, individual rideshares, or Amazon Flex drivers then into the facility, pick up packages, and deliver them directly to customers. The facility is expected to handle 22,000 packages per hour and Amazon will save 5-cents per package by sorting packages in-house.

When it comes to sorting, time is money, and from the beginning it was very clear that the faster Amazon can get a facility up and running, the better. This facility build-out goal was 45 days to get their Temporary Certificate of Occupancy, the shortest time frame goal for any of the Amazon facilities built up to this point in time.

Amazon selected Commerce Construction to be their general contractor. Commerce quickly turned to MTech Mechanical. Not only did MTech complete the design-build scope for the core/shell structure, but MTech possessed two (2) qualities required to be successful at this project: the necessary labor resources and the strong ability to develop creative solutions to accommodate an accelerated schedule. MTech was given only 5 days to understand and price the project, which includes 25 packaged rooftop units (RTUs), exhaust fans, high volume low speed (HVLS) fans, direct fired make up air units, eye wash stations, hydrogen gas detection, CO/NO2 gas detection, and plumbing facilities.

Commerce Construction awarded the project to MTech on a Monday evening and craftsmen were on the jobsite the following morning. In order to meet the aggressive construction schedule, there would be no time to waste. It was obvious that the other construction trades agreed; as the inside of the facility quickly looked like I-25 on a Friday afternoon. There were scissor lifts everywhere!

There were so many scissor lifts on site that Denver area rental companies had to procure scissor lifts from nearby states to accommodate the high demand.

While there was not much time to evaluate the system and offer much in terms of value engineering to this plan-spec project, MTech was challenged with ways to meet the very demanding completion schedule. They identified the natural gas piping installation as the first big opportunity. The original design specified that the natural gas piping be installed inside the building, within the joist space, and penetrating up through the roof to the HVAC equipment. Instead, MTech was able to get a plan approved to install the gas piping on the roof. This reduced labor and scissor lift traffic inside the building.

After determining the piping could go on the roof, it was taken one step further. MTech got a plan approved to utilize Viega MegaPress where applicable. MegaPress is a newer technology that allows for press joining pipe connections instead of time consuming threading or welding. The manufacturer (Viega) boasts a 60% reduction in installation labor when using MegaPress, and based upon our experience with this installation, MTech would agree. It also appears that this may be one of the first instances of MegaPress being utilized in Aurora; as approval process has to be completed with the city.

Next we utilized double random lengths of steel gas piping. Instead of the more typical 21' lengths of steel gas pipe, double random(s) are approximately 42' long. They may be slightly shorter or slightly longer, but when an individual run of gas piping exceeds 800', the randomness of the gas piping length is not a concern. However, the savings in number of joints, thus welds, is a huge time saver.

The combination of eliminating the need to work in a congested area with other scissor lifts, eliminating the slower pace from working overhead with heavy pipe, the reduced welds by utilizing double randoms, and the implementation of MegaPress allowed MTech to complete the installation of gas piping well ahead of schedule.

Although the relocation of the gas piping to the roof provided improvements to schedule and a reduction in labor, it also presented a need evaluate how the broader climate variations on the roof would affect expansion and contraction of the gas piping. The temperatures outside can vary from

-10° F to 100°+ F; resulting in significant piping length changes. Without proper design, the changes in pipe length could result in forces and stress on pipe joints that could lead to gas leaks. MTech's in-house engineering team performed the evaluation, designed and then detailed an expansion loop including guides and anchors. The incorporated expansion loop allows the gas pipe to expand and contract safely without causing any failures in the gas piping (that could result in gas leaks).

MTech's next opportunity to improve the construction schedule focused on quickly procuring long lead time equipment. The mechanical design for Amazon includes twenty-five (25) custom RTUs. These RTUs had excessive lead times that would have had a very negative impact on the construction schedule. We worked with Trane to develop a plan which would pull individual standard RTUs from stock. Trane offered to ship RTUs in from different parts of the country in order to complete the entire order. Once on site the standard RTUs would then be outfitted in the field with the appropriate custom accessories. This process allowed us to cut several weeks off of the delivery schedule.

Another time savings measure had us reconsidering a "traditional" equipment hoist that involves a hydraulic crane. Given the placement of the HVAC equipment across the roof of this very large building, MTech was originally going to rent a 400-ton hydraulic crane that would need to be erected, torn down, and re-assembled in multiple locations around the building. This process was scheduled to take 5 days. With improving the installation schedule being a high priority, MTech knew there had to be a better way.

With a little research and a few phone calls, a better way was found. On the day of the hoist, a Bell UH-1 Iroquois helicopter appeared over the horizon arriving at the Amazon DEN5 facility. This was a first for MTech. The crew of 11+ craftsmen participated in safety training with the pilot and then got to work setting sixteen (16) 25-ton RTUs and four (4) large exhaust fans. The weight of the RTUs was approaching the helicopters lifting capacity; therefore, the helicopter could only carry a fraction of its fuel load. With such little fuel, the helicopter would set 2 units and then land for about 1 minute to re-fuel. Even with the constant re-fueling, what was originally planned to take 5 days with a traditional crane was completed in 90 minutes with a helicopter! The pilot was

very complimentary of our crew's organization and efficiency. MTech was grateful for the cost savings and schedule improvement.

MTech was able to use creative problem solving to in order to improve on most time constraints throughout the project, but there were four (4) outside air units whose shipping times could not be improved. These units were needed as part of a ventilation system for the 90,551 square feet delivery side of the building. The ventilation system utilizes CO/NO2 gas detectors to control operation of exhaust and make up outside air for proper ventilation where vehicles are operating. A temporary certificate of occupancy would require proper ventilation. But without the outside air units arriving for another month, how could this be accomplished in time?

MTech, Amazon, Commerce Construction, and the City of Aurora agreed on a temporary solution. The exhaust fans would be manually set to their highest exhaust rate and a sufficient number of overhead doors would be locked in their fully open positing using "lock out tag out" procedures for the electric door operators. The high exhaust rate would meet ventilation code and the locked open doors would provide sufficient make up air for the space until the outside air units arrived.

This project required crews of about 30 craftsmen, with many MTech employees putting in 60+ hour weeks. Proudly, we can say the MTech's focus and dedication to safety resulted in zero incidences on over 8,300 man-hours.

Millions of online consumers have come to depend on Amazon and their quick 2-day shipping. MTech Mechanical was the perfect fit for this project, and was able to deliver a quality product with a record turnover time of 45 days for a building of this size and contract value. Amazon gave the MTech team their highest rating for contractors that they work with: Excellence in Service. MTech believes that it was the ability to greatly improve the delivery schedule, while providing a quality product, that resulted in Amazon recognitions as a contractor of choice for future projects.











