

AMAZON.COM, INC – CONTAINER ROUTING

Inbound Container Routing at Amazon Robotics Sortable Fulfillment Centers

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Amazon's mission statement is "to be Earth's most customer-centric company, where customers can find and discover anything they might want to buy online." To accomplish this, Amazon operates a large and complex inbound supply chain: its 25 North American Amazon Robotics Sortables (ARS) Fulfillment Centers (FC) process billions of inbound items each year from vendors, Amazon cross docks, and other FCs. Inbound units come in corrugated cases and plastic totes and vary in size, weight, and shape: from books to headphones to packs of diapers. After products are unloaded into the FC, they undergo a variable series of process steps—such as changing containers, electronic logging, palletizing—before they are distributed to one of over 100 stow stations across several floors, where associates stow them into bins.

Today, there is no procedure for deciding where in the destination FC inbound units should be sent or the order in which they should be moved and stowed. This creates variation in the inbound cycle times of units and causes units to be stowed late. While a majority of units are stowed within 10 hours of being received, a meaningful percentage of items currently takes over 20 hours to be stowed. The unreliability of inbound stow times directly impacts Amazon's customer experience: inbound is estimated to cause upwards of one million customer orders to miss promised delivery. Additionally, Amazon is unable to offer faster shipping times on items that are already inside the FC but not yet in a bin.

Combining learnings from Associate observations and leadership interviews with statistical analyses on inbound cycle times, the team identified the product attributes that cause statistically significant delays in stow time. The team designed an electronically enforced FIFO system that directs inbound associates to the longest-dwelling WIP and prevents the unit neglect that drives high inbound cycle times today. Pilot testing showed a decrease of 95th percentile (TP95) inbound cycle times by over 30% and a decrease in percentage of items stowed in 20+ hours by 5%. By increasing inbound cycle time reliability and creating visibility into inbound product movement, our project will directly contribute to increases in on-time delivery rate and shortened shipping time estimates worth over \$70M. Our project will enable FCs to make a reliable commitment to Amazon's customers, vendors, and sellers to stow units consistently on time once they enter the building.