WHITEPAPER

Breaking the limits of Rigid **Conveying and Sorting** Using Free Range Robotics

GreyOrange

Designing fulfillment for **speed and personal choice**

Times of rapid change reveal that companies need to rebuild their supply chains with more flexibility in order to meet and exceed consumers' expectations for personalization and next day/same day delivery.

According to a study by Deloitte, 61% of online shoppers expect orders placed by noon to qualify for same-day delivery.[i] To compete in today's era of immediacy, fulfillment centers and manufacturers must avoid being boxed in by rigid automation, fixed infrastructure, labor constraints and conventional capacity planning that can shrink margins, reduce competitive advantage - worst of all - slow speed to fulfillment. With technology reshaping the retail landscape, we are at the intersection of rapid innovation and dynamic consumer demands. E-commerce is driving demands and expectations as well as unlocking new opportunities. Even as brick and mortar stores begin to reopen, many consumers will not be comfortable shopping in stores for many months to come. Retailers will fare best by leveraging modern technology to create seamless experiences, faster deliveries, personalized products, value added services and experiential shopping online. Modernizing operations equips companies to effectively attract and keep consumers whose expectations have been forever hightened by the Amazon effect.

Instant Gratification

"61% of consumers want faster deliveries."

Source: Deloitte

The world is moving toward smaller shipments and faster fulfillment. Companies must accelarate inventory movement within the warehouse and optimize workforce utilization.

Personal Choice

"On average, 36% of consumers expressed an interest in purchasing personalized products or services."

Source: Deloitte 2019 Consumer Review

Rather than being limited to producing the same product thousands of times over, production lines now need to also be able to efficiently and flexibly produce more varied product SKUs in lower volumes.

Customers expect faster deliveries, more product choices, value added services and experiential shopping.

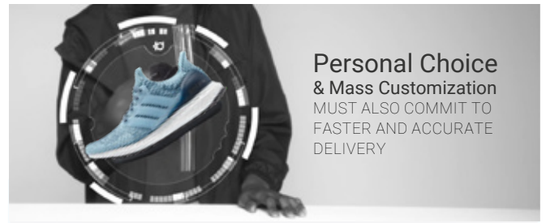
To understand the evolving needs of manufacturers and fulfillment centers, let's look at the journey of a typical e-commerce order…

Kate is preparing for an upcoming ski trip with her family and wants to order a couple of items online for her vacation. In one transaction, she has ordered a jacket for herself as well as a pair of sunglasses for her daughter that she would like gift wrapped. In the warehouse where the order is being fulfilled, the sunglasses are picked from the automated storage and retrieval area, transferred to a gift-wrapping station, and then moved to the consolidation area. At the same time, the jacket gets picked from the goods-to-person area and sent directly to the consolidation area. Elsewhere in the fulfillment center, an operator merges this order and then transfers it to a packaging station from where it's sent to the outbound sorting area and eventually to the dock.

Even this small order journey has eight touchpoints and requires precise and intelligent orchestration throughout. This kind of complexity often creates operational bottlenecks that lead to delayed or wrong shipments and negatively impact customer experience.

Next, consider a completely customizable consumer journey from product design to final purchase…

Jeremy is planning to attend a basketball game at his alma mater Indiana University and wants to design his own footwear to show his school spirit. Jeremy wants an easy step-by-step process online that enables him to choose a style he finds most comfortable, individual colors from insole to laces as well as graphics and size. The manufacturer receiving the order needs to build and source all the details in the most seamless way possible to build the shoe of Jeremy's dreams and deliver them to him in time for his road trip to Indiana University.



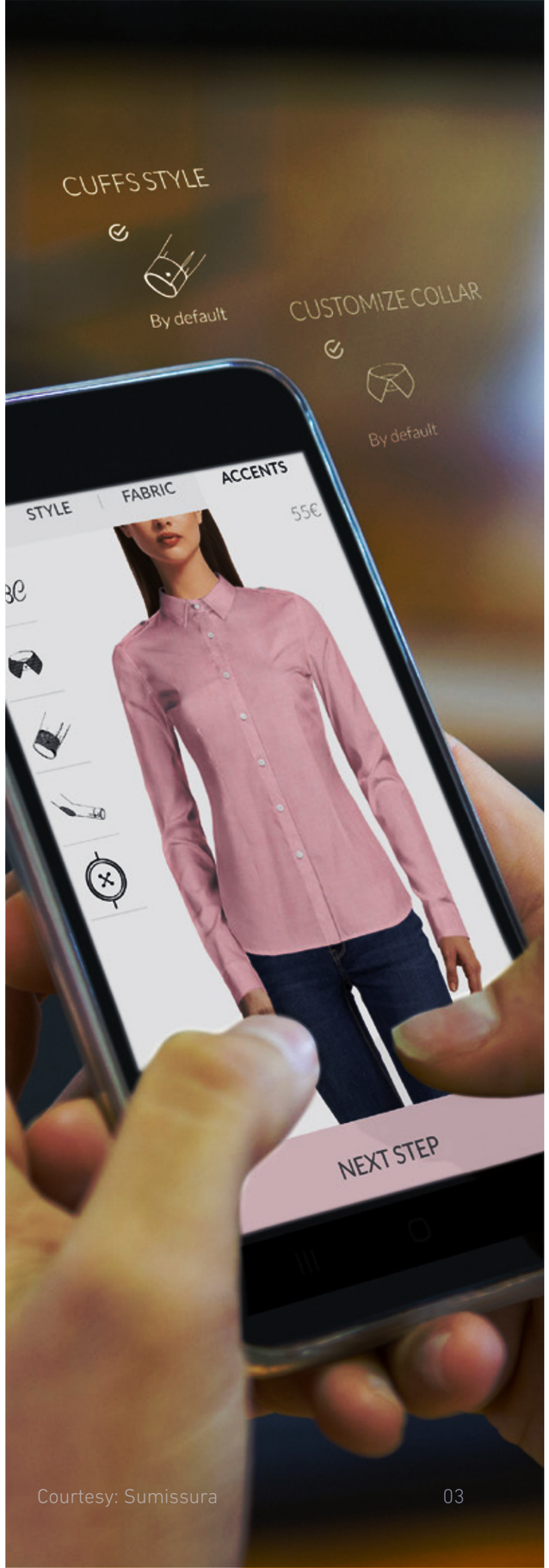
This shift in consumer buying behavior is increasing the demand for flexibility and speed at manufacturing, retail and e-commerce facilities. We are witnessing a rise in fulfillment facilities with inventory spread across multiple zones, each zone catering to some inventory or process nuance. In footwear, for instance, research by Bain & Co. determined that customers who designed their own shoes gave companies a 50% higher Net Promoter Score (NPS) than customers who bought standard products from the same manufacturer.

Designing fulfillment for
speed and personal choice

Businesses that embrace personalization and other expansions of personal choice can create a differentiated proposition that might command a premium price, improve consumer traffic and increase engagement. As a result, manufacturing and fulfillment business models are adapting to the demands of modern commerce.

• **Manufacturers** are both driving and benefiting from consumers' desires for choice and customization by adopting on-demand manufacturing, which enables consumers around the world to specify attributes of a variety of products.
• **E-commerce** retailers are developing different handling strategies and are modifying process flows to accommodate multiple touchpoints across the warehouse to enable customization. These include creating value-added services as well as merging offline and online fulfillment.

These new trends are compelling manufacturers and e-commerce fulfillment centers to modernize using software and smart robots. The technology used for inventory flow in fulfillment centers and factories is simply not set up to handle this demand for speed and convenience in a cost-effective way.



Courtesy: Sumissura

6 Limitations of "Fixed" Automation

Fixed and rigid automation such as conveyors and sorters have been used in manufacturing and e-commerce for decades to feed production lines, to transfer semi-finished material from one zone to another, to transfer finished goods and to handle pallets. The rising complexity of fulfillment operations is compelling companies to augment traditional technology to ensure that the inventory flow through each interaction point is not hindered by the following limitations:

Inability to scale

Shifts in demand or fluctuating growth can bring inventory inefficiencies to the forefront and hamper profit margins. Traditional conveyors are designed for a set capacity with zero to little room to ramp-up without investment.

"A survey found 86% of apparel manufacturers have experienced order cancellations and 40% are struggling to pay employees due to the pandemic."

Source: Boston Consulting Group

Delays in fulfillment

The lack of flexibility in handling micro-peaks that are outside of the design capacity makes timely fulfillment unfeasible. A conveyor system may not be able to perform consistently due to single point of failure if the system is fixed and totally interconnected.

"77% of consumers say delayed order arrival would negatively influence future purchase decisions."

Source: MHL News

High cost of fulfillment

Expensive rigid automation cannot be adapted easily without large capital investment.

"Companies have found that the lower cost of capital, faster ROI and modularity of automation through robotics offer a renewed opportunity to make incremental investments that can be recouped in a reasonable amount of time."

Source: MHL News

Lack of visibility

The lack of a single view of inventory and related insight to shipment stage, volume and velocity (e.g., how much time is the stock taking to move from one touchpoint to another) can cause a build-up of inefficiencies in the overall operations.

"The same silos that don't work in the business world definitely don't work in the supply chain, where complete visibility of inventory across all channels is imperative."

Source: 5 Priorities for Omnichannel Retail Supply chain, GreyOrange

Shortage of workers

In a world requiring social distancing in work environments, automation that needs workers to closely interact with each other needs to be rethought. Workers might feel uncomfortable working in such environments.

"E-commerce fulfillment is driving a shortage of nearly 500,000 warehouse jobs in 2020."

Source: CBRE, Labor a Chief Concern for Warehouse Owners and Operators

Space crunch

Warehouse space availability has reached an all-time low. It is more critical than ever to optimize space use to avoid additional real estate cost. Rigid automation like conveyors can waste real estate that could have been used for some other value-added activity or for storage. Manufacturers are moving from large-scale production centers to multiple smaller, local production centers, driving the need for flexible systems that are movable and can operate within space limits.

"Demand exceeds supply by over 6 million square feet in the U.S."

Source: CBRE

Mobile conveying and sorting delivers modern commerce choices

Companies can create scalable, flexible fulfillment solutions using free range robotic automation. There are three key factors to consider when evaluating the right technology for inventory movement, Smart Zone Transfer and inbound-outbound sortation:

Software-First Technology Flexible, Scalable and Intelligent

The bottom line is this: You can't meet modern fulfillment demands with technology built for a previous era. Fulfilling demand in the age of immediacy requires constant dynamic optimization across every touchpoint in your flow of orders, promises and inventory. With software-first technology, autonomous fulfillment solutions fuse software and robotics powered by AI and machine learning to orchestrate high-yield decisions and scalable performance.

A software-first approach enables control to be sliced from the operational layer so changes can easily be configured. For example, the user can define flexible sortation logic, create flexible integration channels, and easily switch between multiple sort configurations.

GreyOrange's Fulfillment Operating System considers predictive and real-time data regarding orders, promises, inventory, shipping windows and resources to orchestrate how workers and robots work as a team to fulfill the right orders at the right time.

Demand-Driven Fluid Architecture

In this era of modern commerce, companies are looking for systems that have future fluid designs, are reliable, cost-effective and easy to deploy within existing infrastructure with minimal changes.

The GreyOrange Ranger™ MoveSmart robots operate in fleets to efficiently and fluidly move parcels from receiving through dispatch, and can flex up or down to handle market fluctuations. GreyMatter intelligence software is incorporated as a learning layer in the robots, so they can communicate with each other and with the GreyMatter central system to continuously recalculate order fulfillment priorities and inventory movement patterns. The AI-enabled mobile sortation system is easily scaled, making it an investment-friendly option for a range of applications across retail and logistics industries. Ranger™ MoveSmart can augment or even replace rigid systems to deliver scalable and portable conveying and sorting as you need it, where you need it, especially when handling peaks. Capable of operating in footprints where rigid systems won't fit, Ranger™ MoveSmart helps manufacturers and fulfillment centers optimize current facilities, plus can easily relocate to other facilities as you grow.

Adaptable Applications & Shared Resources

As we've seen during COVID-19, supply chain realities can change overnight. The pandemic has shut down retail stores, many of which can be converted into hyperlocal, micro-fulfillment DCs to serve e-commerce orders.

The AI-enabled system easily scales up or down with demand for investment-friendly performance with capacity effectively pooled and reallocated automatically based on demand, application and location. This enables using multipurpose shared hardware instead of conventional dedicated resources. This also ensures that dormant capacity in a network can be redistributed to meet unexpected demand elsewhere in the network, making sure all existing resources are used wisely.

The mobile sorters can work and transfer goods from one touchpoint to anywhere in the warehouse. This means the same solution can be reproduced across facilities with minimal design/engineering efforts. This not only simplifies planning, but also ensures affordable maintenance with a single source of spares, support and training. Seamless integration with other automation equipment such as carton erectors, packing machines and ASRS, further optimizes resources across the warehouse. Depending on the need, the software optimizes cross-utilization of robots in different sections of the same facility.

Conveying and Sorting AMR **Case Studies**

Below are two stories of brands powering warehouses/manufacturing facilities with autonomous mobile robots for faster and cost-efficient material movement across multiple touchpoints. Every manufacturer, retailer and fulfillment center is unique so GreyOrange can tailor solutions to meet distinct needs, opportunities and challenges.

01 CASE STUDY

Smart Zone Transfer and outbound sortation: Shortened lead time by 50% for an on-demand fashion manufacturer

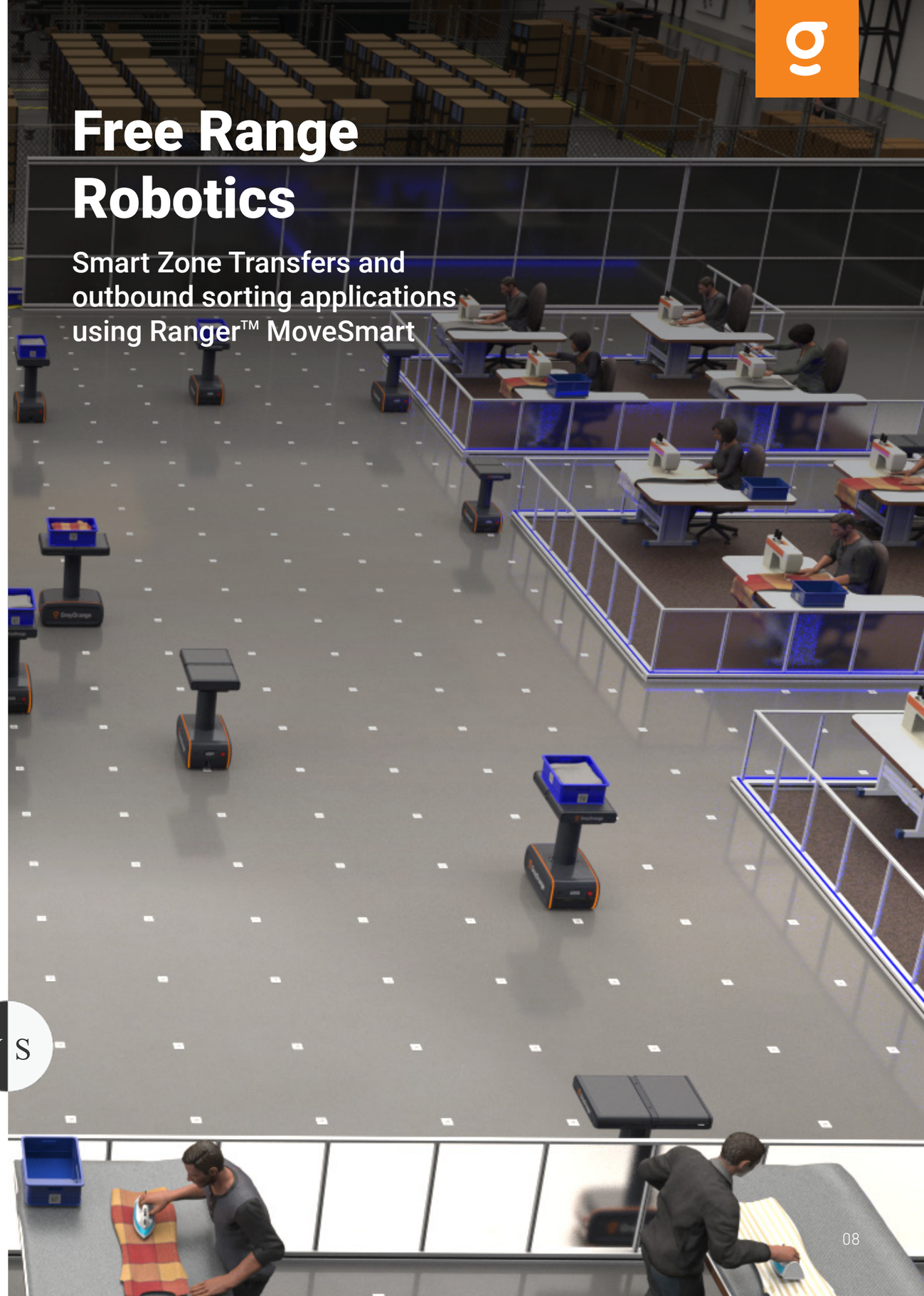
A leading manufacturer specializing in purchase-activated, on-demand mass customization of apparel wanted technically advanced yet flexible manufacturing automation for a 26,000 square-foot warehouse.

The brand aimed to build a micro-factory for just-in-time manufacturing that eliminates costly inventory handling and adjusts with demand fluctuations for more efficient production.

Installing a rigid conveyor system with 30+ worker stations for material movement seemed complex and required high upfront investment. Moreover, with such a static infrastructure a swift change in business flows and adding/removing other automation systems would be challenging. Instead, the company sought a future-proof, easily replicable robotics system to handle dynamic workflows.

GreyOrange offered a solution combining the value of Goods-to-Person and MoveSmart technologies. Its software-first approach to handle the complexity of process flows enabled the brand to deliver value to their customers more quickly and efficiently. Ranger™ MoveSmart robots move 1,200 items in an hour from one touchpoint to another, which reduced overall production lead time by 50%. The integrated solution enables the manufacturer to supply millions of unique SKUs on-demand.

VS



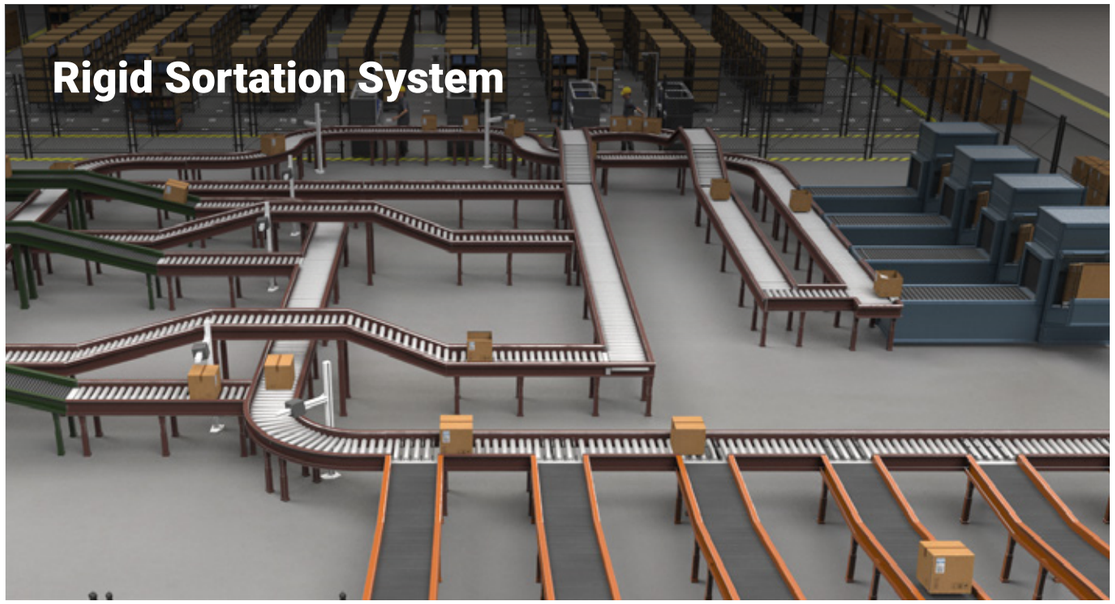
02 CASE STUDY

Post Picking Outbound Sortation: ~40% savings in e-fulfillment

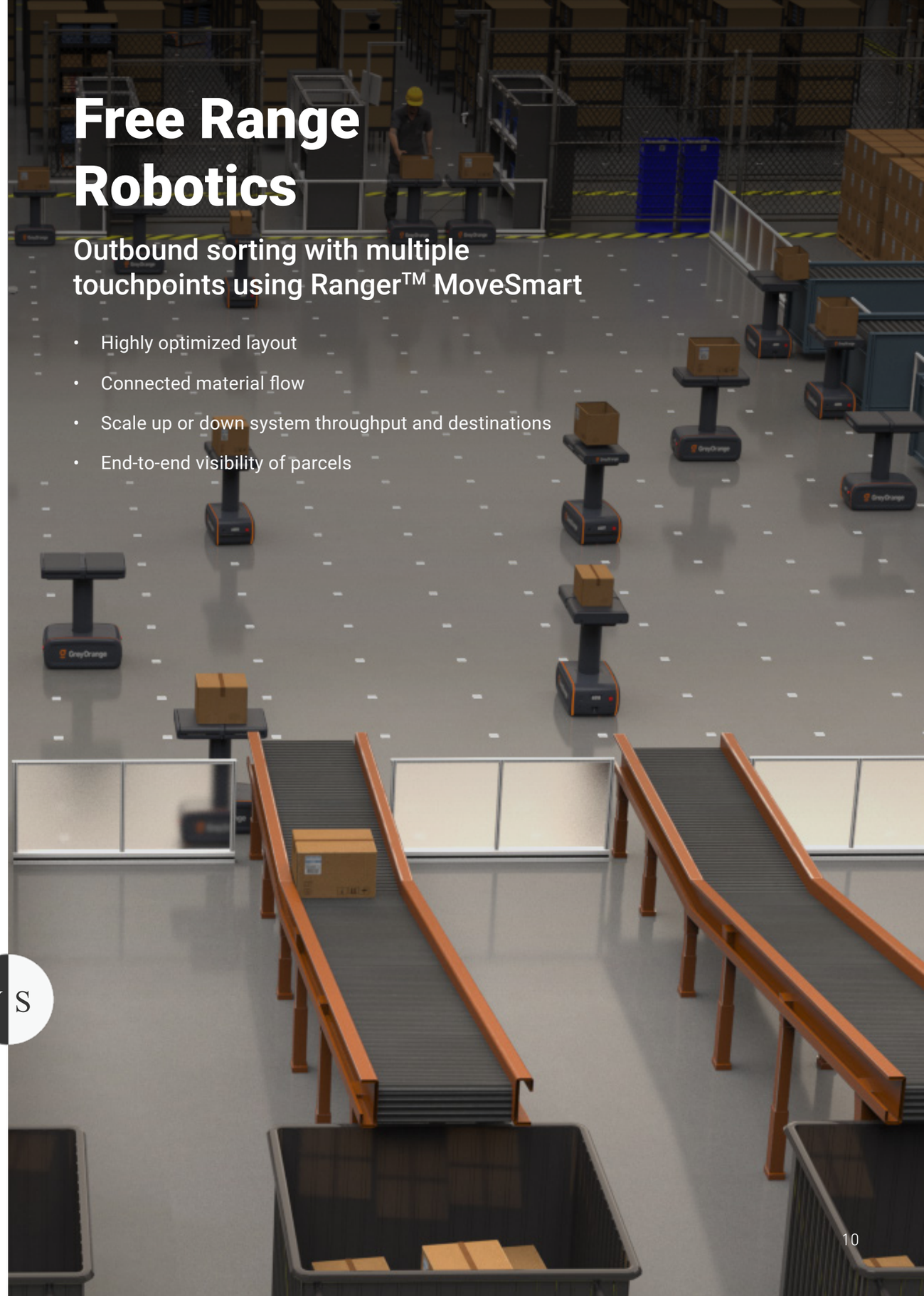
One of the largest fulfillment centers in Europe specializing in cross-border fulfillment for e-commerce brands wanted to update their technology with a new system that could integrate multiple inventory touchpoints within their warehouses. High growth volumes compelled them to ensure they could scale to meet increasing customer desires.

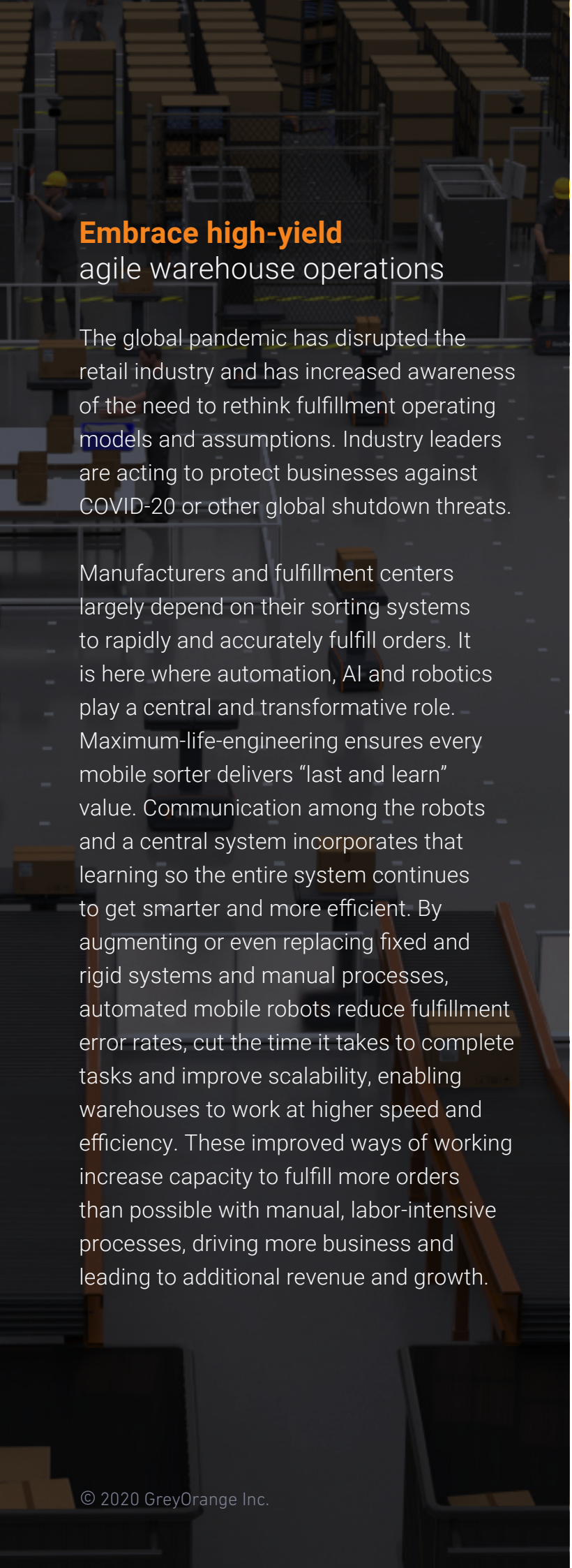
The brand was doing 30,000 shipments daily from its 40,000-square foot warehouse and wanted to implement technology that would increase their efficiency and help them stay ahead of their competitors. Their operational infrastructure was highly complex due to constantly shifting business requirements, including volume changes during peak periods and pressure to cut operational costs. They were looking for a solution that could handle unpredictable parcel volume growth, establish a connected material flow, integrate with existing automation and handle varied future business cases.

The company decided to implement Ranger™ MoveSmart to manage the complexity of the inventory they distribute and to scale their sorting capacity to 20,000 parcels in each of 3 shifts for a total of 60,000 shipments per day, double the starting volume over the next few years. With this solution, the company has built the capacity to process more than 10 million orders each year for its customers.



VS





Embrace high-yield agile warehouse operations

The global pandemic has disrupted the retail industry and has increased awareness of the need to rethink fulfillment operating models and assumptions. Industry leaders are acting to protect businesses against COVID-20 or other global shutdown threats.

Manufacturers and fulfillment centers largely depend on their sorting systems to rapidly and accurately fulfill orders. It is here where automation, AI and robotics play a central and transformative role. Maximum-life-engineering ensures every mobile sorter delivers "last and learn" value. Communication among the robots and a central system incorporates that learning so the entire system continues to get smarter and more efficient. By augmenting or even replacing fixed and rigid systems and manual processes, automated mobile robots reduce fulfillment error rates, cut the time it takes to complete tasks and improve scalability, enabling warehouses to work at higher speed and efficiency. These improved ways of working increase capacity to fulfill more orders than possible with manual, labor-intensive processes, driving more business and leading to additional revenue and growth.

About GreyOrange

GreyOrange is a global company that modernizes order fulfillment through Artificial Intelligence-driven software and mobile robots built together so they cooperate in deciding on and executing warehouse activities that maximize payoffs and minimize tradeoffs to create the highest yield. The company's Always-Solving™ Fulfillment Operating System, GreyMatter™, considers predictive and real-time data regarding orders, promises, inventory, shipping windows and resources to orchestrate how workers and robots work together to fulfill the right orders at the right time. GreyMatter™ orchestrates the operation of a range of mobile robots which includes Ranger™ GTP, a goods-to-person system, Ranger™ MoveSmart, a fleet of robots for conveying and sorting packages and Ranger™ IL, an intelligent Interzone material transport solution. GreyOrange experts help organizations master fulfillment in the age of immediacy so they keep promises, capture more revenue, and improve the work experience for warehouse employees. GreyOrange has core operations in the United States, Singapore, Germany, Japan and India. www.GreyOrange.com

Sources:

i. https://www2.deloitte.com/content/dam/Deloitte/us/Documents/process-and-operations/us-urban-fulfillment-centers.pdf

ii. https://www.bain.com/insights/making-it-personal-rules-for-success-in-product-customization/

iii. https://www.supplychainresearch.info/2019/download/Supply_Chain_Research_2019_Focus_on_CX_Adelante_CSCMP_BluJay.pdf

iv. https://www.marketingevolution.com/knowledge-center/retail-marketing-trends-2020