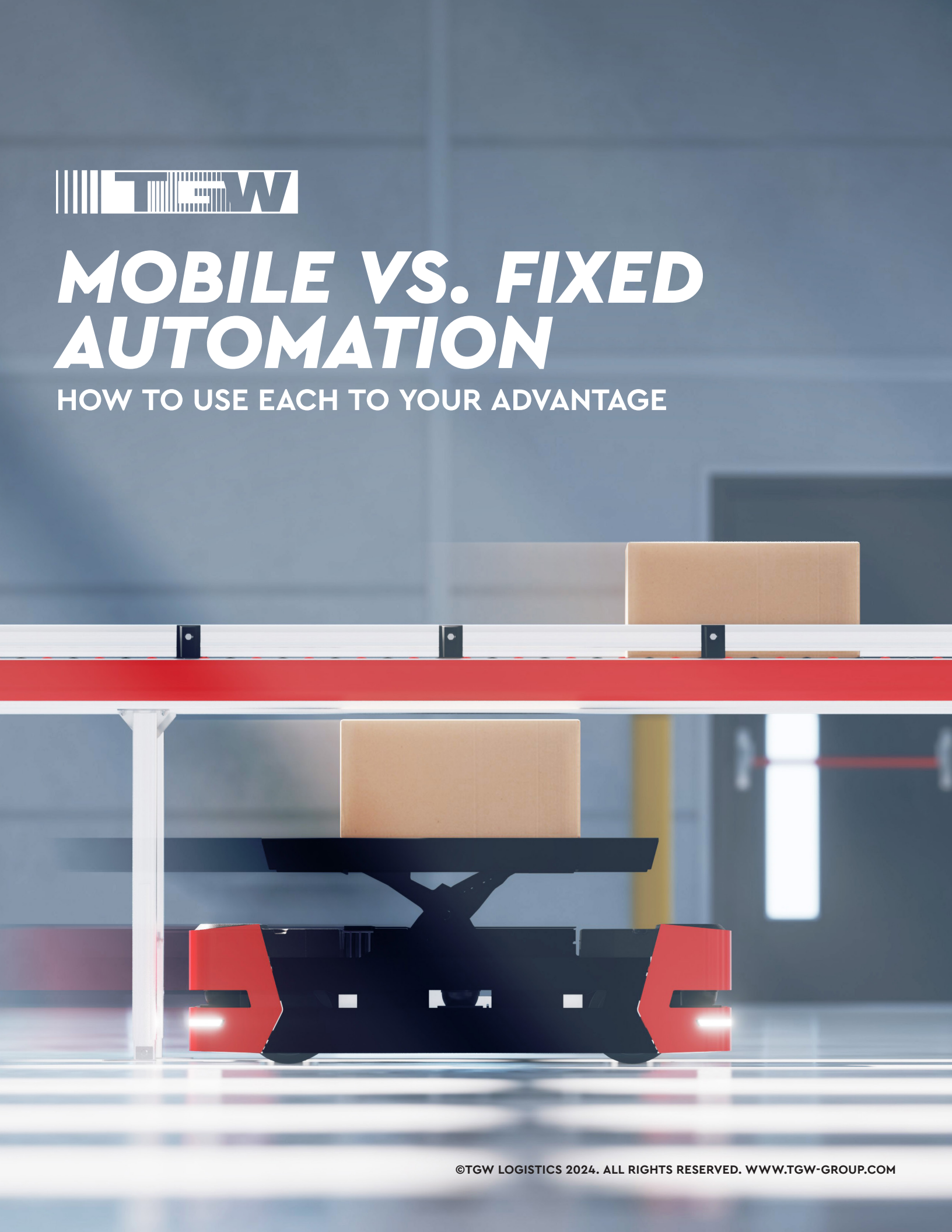
MOBILE VS. FIXED AUTOMATION

HOW TO USE EACH TO YOUR ADVANTAGE



INTRODUCTION

Now more than ever, given the competitive landscape, businesses are realizing that a well-organized and stable supply chain is essential: the flow of materials from production to distribution must be perfectly synchronized, reliable, and highly efficient to meet the demands of customers. Supply chain processes must be flexible too and able to react quickly to changes in the business or unexpected events. Many businesses are also recognizing that those who are able to make smart investments into their supply chain will reap competitive advantages. But where to invest? In many cases, automation provides answers, but what technological solutions are best suited to different applications? With the proliferation of options available now, it can be difficult to know how to properly analyze your business requirements and decide which automation is right for you. In this whitepaper, we will explain the differences between mobile and fixed automation, our recommendations on which type of automation best suits different applications, and additional considerations for selecting automation.

UNDERSTANDING MOBILE VS. FIXED AUTOMATION

Before diving into different applications and considerations, it's important to take a step back and understand the two main types of automation: mobile and fixed.

THIS IS HOW TGW LOGISTICS DEFINES THE TWO:

- Mobile: Any automation that is not physically tied down to a particular location
- Fixed: Any automation that is stationary, physically tied down to a particular location

> *Fixed automation still accounts for the bulk of investments in the warehouse automation market. Whilst mobile automation is certainly growing at a rapid rate, it's not necessarily displacing fixed automation across all application. Fixed automation is still optimal in scenarios where throughput is the key parameter for success. We also see a future where mobile and fixed automation are deployed in tandem.*

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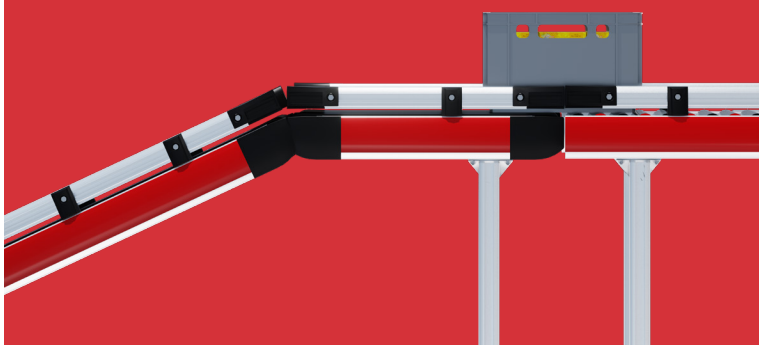

MOBILE

PROS	CONS
• High flexibility and scalability • Short lead-times • Limited blocking of floor space • Smaller monetary investment (typically), with potential for leasing models	• High space requirement • Lower throughput performance • Limitations in application

FIXED

PROS	CONS
• High throughput performance • High productivity • Good utilization of space vertically • Wide range of applications	• Longer lead-times to go-live • Higher monetary investment (typically), especially if not continuously utilized at high level • Not as flexible or easily scalable

EXAMPLES OF EACH

Mobile: AMRs, AGVs, autonomous forklifts, humanoid robots
Fixed: conveyor, ASRS systems, picking stations, picking robots

Deciding on the right automated material handling system is now easier than ever thanks to new and innovative technologies – whether combined with permanent conveyor technology or autonomous systems. Maximum productivity and a continuous supply to GTP picking is achieved through shuttle systems connected with permanent conveyor for example. The supply of production islands or VAS workstations can be solved flexibly and scalably using mobile systems (such as AMR, AGV). In the Strauss CI Factory, distribution center and shoe production under one roof, both systems are used depending on the use case. The combination of both offers high productivity while maintai

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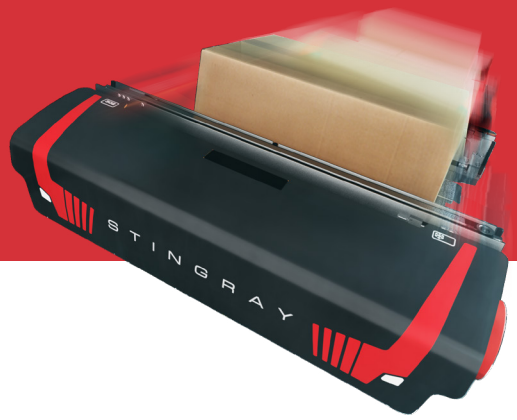


MATCHING AUTOMATION TO DIFFERENT APPLICATIONS

Supply chain processes from production to distribution can vary widely, especially if you factor in product characteristics, customer requirements, and business strategies.

For example, within production, there are drastic differences between batch production and mass production — and even within those two types, differences between facilities with continuous supply with high frequency and cyclical individual supply.
On the distribution side, processes can vary based on product characteristics (size, weight, necessary environmental conditions, etc.), inventory turnover frequency, customer requirements, SLAs, and more.

While exceptions always exist, and we will dig into some additional considerations in the next section, below are the automation types we typically recommend for our clients for supplying production islands and distribution of goods.

SUPPLY OF PRODUCTION ISLANDS OR GROUP PRODUCTION:

Different production islands must be supplied with materials, parts, assemblies, and/or Kanban parts. The work processes typically are very diverse and require a lot of active movement by production employees.

AS A RESULT, PRIORITIES MUST BE MADE FOR:

- Not restricting employee freedom of movement
- Workstations tailored to ergonomics
- Little space allocated to part supply buffers
- Flexibility
- Option to quickly alter the space for a new small series
- Ability to provide different part quantities per production island
- Continuous flow
- Attention paid to the continuous supply of production islands as needed

OUR RECOMMENDATIONS

Mobile automation aligns well with the priorities and requirements for production supply, although stockpiling and storage needs ought to be considered in more detail.

Fixed automation fits well for the preparation of Kanban or pre-picking of small series parts, especially if high utilization and higher productivity can be achieved.

DISTRIBUTION AND ORDER PICKING

Because there are numerous factors that influence the different processes within distribution, it is difficult to pinpoint the right automation without taking a closer look at what is required for each process.

SOME KEY FACTORS

- Product characteristics (size and properties)
- Full case and / or split case distribution
- Packaging requirements
- Delivery requirements
- Building characteristics
- Desired price-performance ratio

OUR RECOMMENDATIONS

Storage is usually most advantageous as fixed automation with stationary racking technology to achieve a high storage density. In the large-volume inventory area (e.g. pallets), these are operated either manually or automatically using ASRS. In the small-volume inventory area, medium- and fast-moving items are typically stored in fixed ASRS, while slow-moving items are primarily stored in manual warehouses.

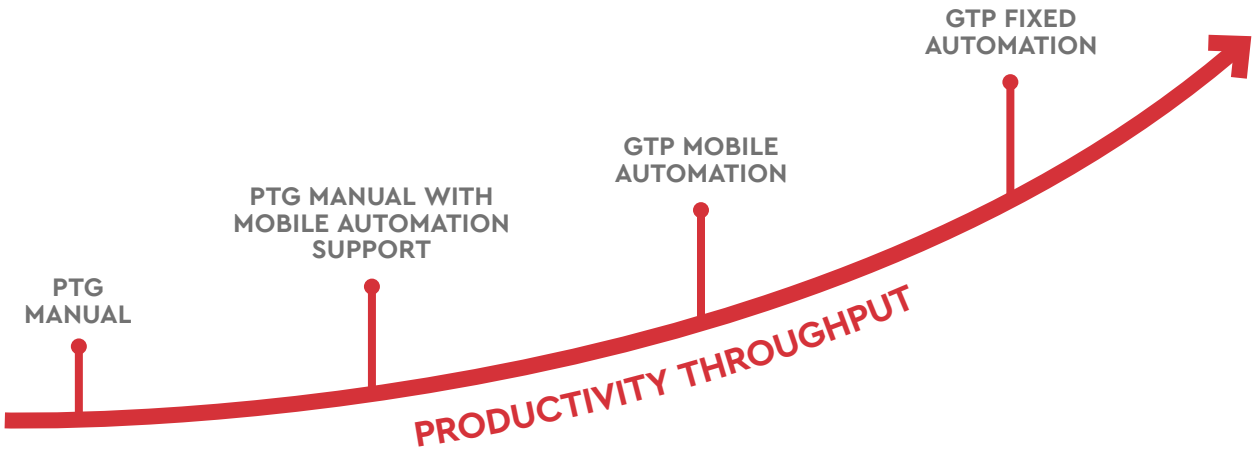
Storage on mobile shelves is mainly used for smaller numbers of items and small storage volumes.

Picking automation methods depend on both the storage solution and product characteristics.
Large-volume items that are shipped in full case quantities can ideally be transported to the loading point using mobile automation after they have been removed from the rack. The high level of flexibility enables the goods to be ideally prepared for shipping and reduces costs for personnel and forklift trucks or floor vehicles.

Mixed pallets are ideally formed by fixed automation: full case removal from an ASRS with sequencing into palletized units at semi- or fully automated workstations. Pallets can then be dispatched using fixed or mobile automation, depending on throughput requirements and space constraints.

In the small-volume area, picking is heavily influenced by the existing order structure. Since there are a wide variety of methods, several parameters must be considered. Precise analysis leads to advantageous results:

- Fast-moving items are often picked from pallets or flow channels; replenishment can be useful here as fixed or mobile automation.
- Medium- and slow-moving items are picked as goods-to-person (GTP) or person-to-goods (PTG) in discrete or batch mode. Since this area is usually the most labor-intensive, special attention should be paid to productivity and throughput requirements. Productivity and throughput increases when picking from PTG manual to PTG manual with mobile automation support to GTP mobile automation to GTP fixed automation.
- Order picking with subsequent packaging (also called "pick & pack") can work well with either fixed or mobile automation. This decision requires a closer look at the required processes with the most efficient solution arising from a holistic view of order fulfillment.



Shipping area automation depends on delivery requirements: the type of shipping unit, necessary preparation of shipping units, necessary environmental conditions for delivery (e.g. temperature control), delivery vehicles, and SLAs. For example, different automation should be applied for pallets vs. roll containers vs. cardboard boxes vs. soft packaging. Provisioning, sorting, and loading are all tasks that can be automated in the shipping area, and the right solution depends mostly on what flexibility and space requirements are most effective.

ADDITIONAL CONSIDERATIONS FOR AUTOMATION

As noted earlier, selecting the right automation for your supply chain processes is not always as simple as an if-this-then-that situation. When analyzing your business, considerations should also be made for sizing, software, and budget.

SIZING

The size and throughput of a warehouse or distribution center has a significant impact on the system design and options for automation. High throughputs enable a higher degree of automation because labor costs and labor scarcity challenges increase enormously with increases in throughput. This can have significant effects when it comes to mobile and fixed automation. Fixed automation becomes more cost-effective, and ultimately more economical than mobile automation, when it is running at maximum capacity. Additionally, when high productivity is achieved through fixed automation, there is a greater reduction in the number of employees required. On the other hand, there are individual areas of warehouses and distribution centers that may be smaller and/or do not require high throughputs. In this case, mobile automation is a more natural fit to make secondary processes more flexible and cheaper.

SOFTWARE

Because software plays a central role in all automated tasks, the quality of software your business runs on is particularly important. Software can positively or negatively impact the stability and performance of your automation. Ensure that whatever software you have already, or purchase with your automation, empowers the respective strengths of your fixed and/or mobile automation: the software ought to ensure smooth, high performance and precision for fixed automation and provide flexibility and scalability for mobile automation. The software must also successfully orchestrate the interactions between people and automation.

BUDGET

Investment budget is sometimes the most powerful consideration for automation, often overruling other factors. Ultimately automation solutions must fit within a budget, and focus must be put on achieving the highest possible efficiency and productivity for the spend.

The demographic development and resulting worker shortage force us to relieve the burden of manual activities on employees as best as possible and, for example, to largely reduce manual transport. Especially in large-scale warehouses, we use driverless transport systems (mobile automation) to reduce up to 200 miles of otherwise manual forklift driving every hour.
The targeted use of fixed automated storage technology enables optimal use of the expensive or limited available land space through compact storage that factors building height, as well as highly dynamic provision of the goods for further processing. Ultimately, automation not only reduces errors and damage caused by manual manipulation, but also significantly improves throughput and lead times in our central and shipping warehouses.

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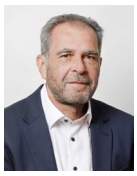
CONCLUSION

In the end, the question is not whether or not you should invest in automation — as noted, supply chain management is quickly becoming a competitive advantage — but rather what level of automation and which intelligent combination of mobile and fixed automation.

Our Clients Have Realized Significant Advantages From Working With Our Team And Implementing Our Automation

- Achieving the ideal balance between high system performance, productivity, and reliability, while still being flexible and scalable
- Improving sustainability metrics and lowering energy consumption
- Optimizing space utilization, while taking into account building characteristics and people movements
- Reducing staffing, and in some cases, creating flexibility in personnel deployment through workforce management software
- Expanding labor pools through improved ergonomics for manual tasks
- Developing every-day processes that can be easily adapted and scaled up for peak-season spikes.
- Satisfying ROI and IRR needs by right-sizing automation solutions for budget and throughput requirements.

TGW Logistics is here to leverage this potential for your business too. With over 50 years of experience, we are able to analyze your various processes and requirements to determine how to get the most value out of your investment. We support the entire lifecycle of your automation: from planning, designing, and implementing to maintaining.



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