

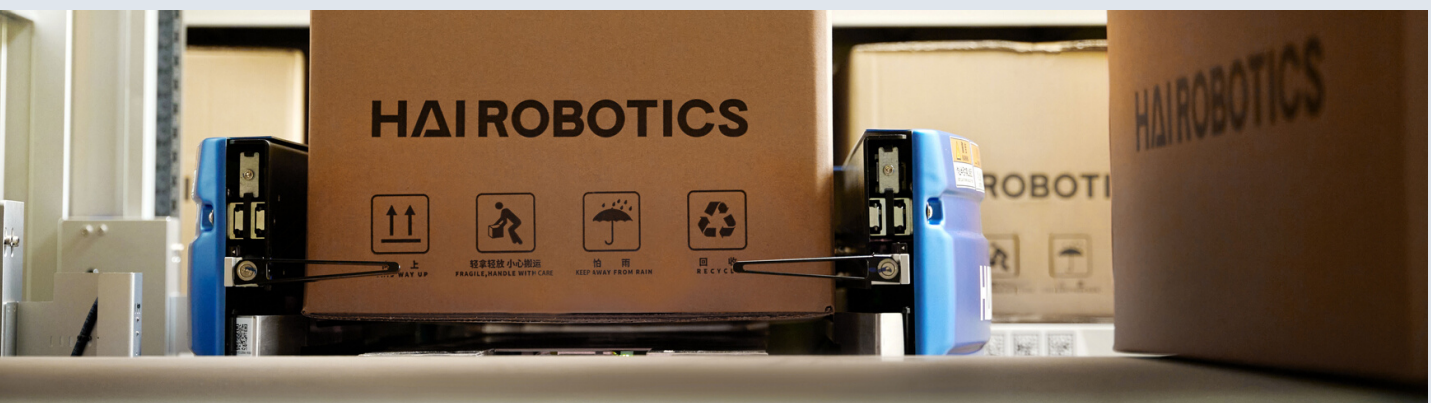
HOW TO USE BATCH FACTOR FOR RIGHT-SIZED AUTOMATION

Understanding and correctly calculating SKU batch factors will help you design the right-sized system — and [save you from overspending on robots you don't actually need.](#)

The allure of automation has cast an undeniable spell on the world of warehousing. From robotic pickers gliding through aisles to intelligent sorting systems, the promises of **increased efficiency, reduced labor costs, and enhanced productivity** have no doubt captured your attention.

Yet, as you dive into all the technologies available today, it's easy to miscalculate what your warehouse truly needs.

When you're considering and ultimately designing an automated storage and retrieval system (ASRS), one of the most important things to look at is your "batch factor." Understanding and correctly calculating batch factors will help you design the right-sized system — and save you from overspending on an army of robots you don't actually need.



WHAT IS AN SKU BATCH FACTOR?

SKU batch factor is a crucial component in warehouse automation and design that's used to optimize order picking and fulfillment. It refers to the average number of order lines that you can pick from a single inventory position — e.g., a tote, pallet, or storage location — during order fulfillment.

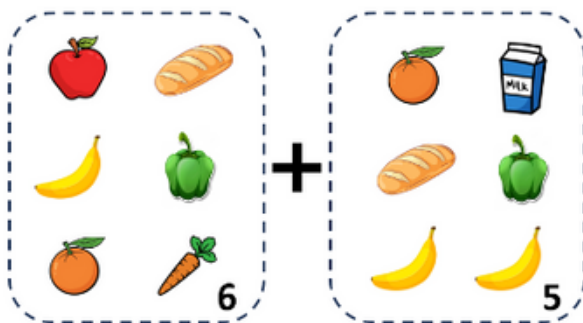
Imagine you're grocery shopping with a friend, and these are your lists:

You need:

- 1 apple
- 1 loaf of bread
- 1 banana
- 1 bell pepper
- 1 orange
- 1 carrot

They need:

- 1 orange
- 1 carton of milk
- 1 loaf of bread
- 1 bell pepper
- 1 carrot
- 2 bananas



You each have 6 items — or order lines — on your lists: 6 SKUs for you,

THE BASICS:

SKU (Stock Keeping Unit)

An individual product within a store or inventory system.

Order Line

An individual item that a customer includes in their order.

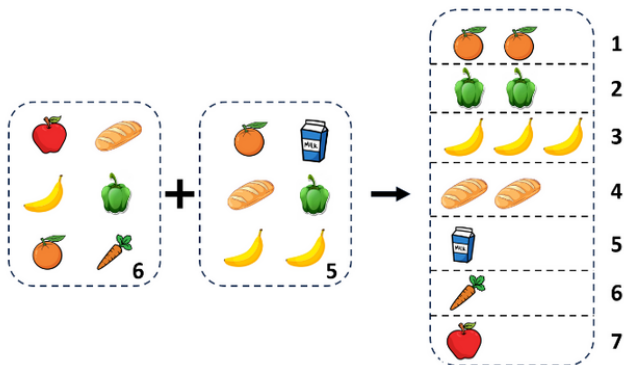
Batch Factor

The average number of order lines you can pick from a single inventory position — e.g., a tote or pallet.

and 5 SKUs for your friend (since they have 2 bananas, which are the same SKU).

Instead of making 6 and 5 trips, respectively, to get all those different items, you could batch your lists. So maybe you get the apple, oranges and bananas, while your friend gets the carrot, peppers, milk and bread.

In this example, you've just turned 11 trips around the store into 7 trips – saving time and resources for you and your friend.



In a warehouse setting, automated storage and retrieval systems (ASRS) replace the laborious searching and walking that bemoans shoppers.

Inventory is housed within a storage grid, and robots collect bins containing the items on your lists. The bots drive each bin to workstations where an operator may select, for example, one banana – processing an order line of your grocery list.

The robotic act of retrieving a bin, presenting it to a workstation and returning residual inventory to the storage grid is known as a “double cycle.” If both grocery lists are processed separately, the ASRS will perform 11 double cycles – 6 SKUs in your list + 5 SKUs in your friend’s list.

But – if your grocery lists are combined – the demand on the ASRS is reduced to 7 double cycles, as shown in the figure above.

In this instance, you achieve an SKU batch factor of 1.57.

11 ORDER LINES

= 1.57 BATCH FACTOR

7 SKUS

Grouping orders with like-SKUs empowered the ASRS to process more orders with 1.57x less effort. When sizing automation for your solution design, this translates to fewer robots – reducing costs and improving your ROI.

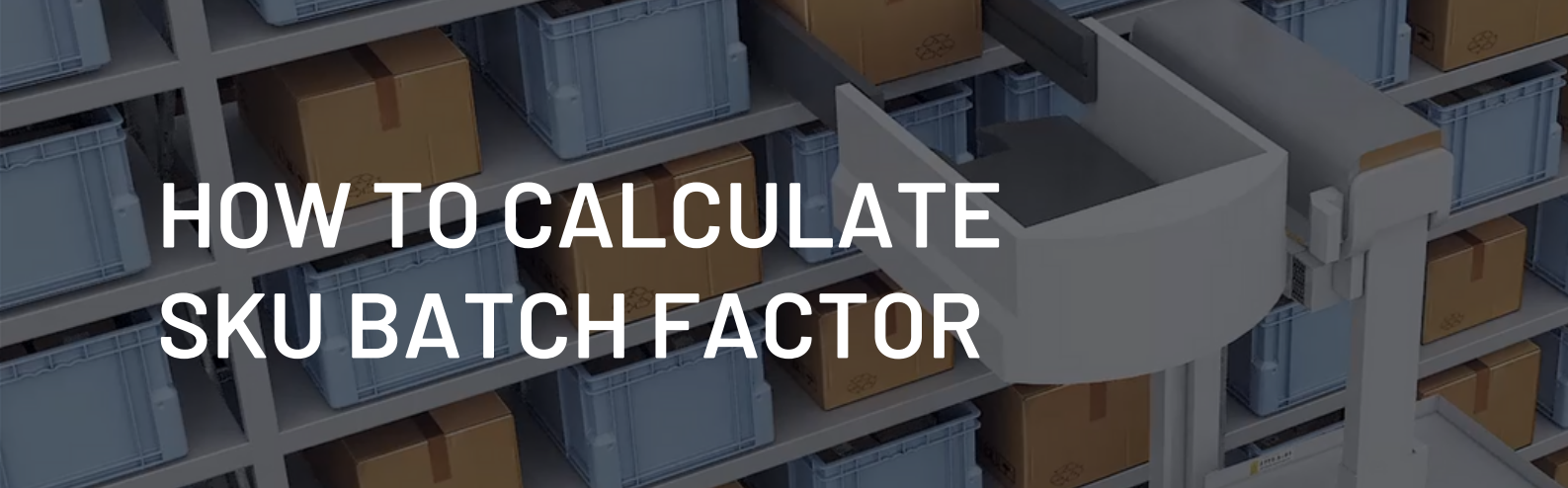


WHY DOES BATCH FACTOR MATTER?

If you don't know the SKU batch factor, or it's miscalculated, you run the risk of buying an oversized or undersized system. Batch factor is a critical design element because it's a direct multiplier on the amount of automation and equipment needed.

Assuming a batch factor of 1 when it's really 3 will result in a system that's three-times too big – and perhaps triple the cost. Assuming a batch factor of 3 when it should be 1 will result in a system that's three-times too . Both of these scenarios can have extreme consequences on an operation, facility, and company.





HOW TO CALCULATE SKU BATCH FACTOR

Accurate calculation of an SKU batch factor requires trained engineers, consultants, or analysts utilizing accurate SKU and order data. Most automation providers and integrators will be happy to help you better understand your SKU set and associated batch factor for your system design.

There are two key elements you should discuss with your solutions provider when calculating SKU batch factor:

Order Profile

Orders are composed of order lines (often unique SKUs) and order line quantities. They take on many shapes and sizes. E-commerce orders may be predominantly single-line, single-piece. Wholesale orders may have high split-case order line quantities.

Considering order profile when determining an SKU batch factor can sometimes reveal an unexpected limitation: bins aren't big enough! An initial calculation may suggest you can achieve a batch factor of 10 — that is, you can pick an average of 10 order lines per bin presentation.

However, you could be faced with an average order line quantity of 20.

To achieve that initial SKU batch factor of 10, you must be able to present a bin containing 200 SKUs, on average. This could make for a mammoth of a bin that is both impractical and unviable.

Order Availability

If you consider an entire day (or shift) of orders, it will be easier to batch orders together for assignment and achieve a maximum SKU batch factor. In most real-world environments, all orders aren't available at the same time for fulfillment.

Instead, a WMS or ERP releases the orders throughout the day in groups or waves. Understanding the wave logic and number of releases can impact your batch factor.

For example: You have 10 orders for footballs today. You might assume you can assign them all at once to one operator and achieve a 10:1 ratio — SKU batch factor of 10. Therefore, you design the system to rely on one robot for those 10 orders.

In actuality, the 10 footballs are split over 5 waves of orders, and only 2 of them are available for grouping at any point in time. You've now under-designed the system by 5x because you – or your solution provider – didn't properly account for order release and waving.

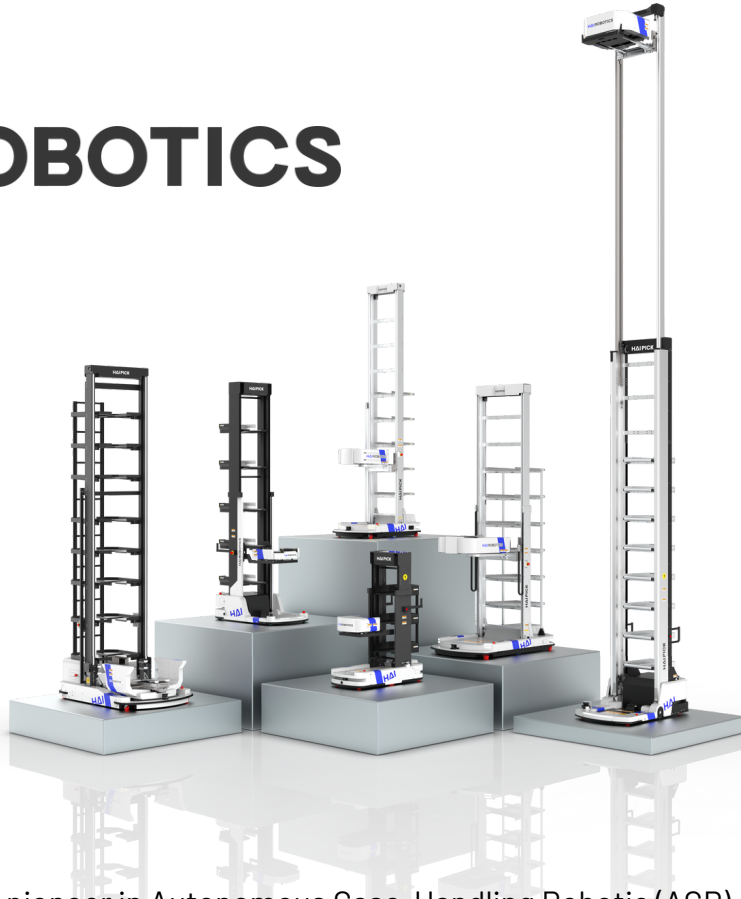
Talk to an automation manufacturer, integrator, or consultant, and request data analysis training or reviews. Most companies will be happy to do data workshops to help you better understand the SKU set – and design a right-sized ASRS to optimize order picking and fulfillment, and boost overall efficiency.



Visit HaiRobotics.com to learn more, and contact us today!



ABOUT HAI ROBOTICS



Hai Robotics is the pioneer in Autonomous Case-Handling Robotic (ACR) systems. We are committed to reducing our customers' storage footprints, boosting throughput with increased speed and order accuracy, maximizing workflow efficiencies with reduced operating costs, and improving worker productivity.



99.99%

Achieve picking
accuracy of 99.99%.



3-4 TIMES

Boost your
operational
efficiency 3-4 times.



400%

Increase storage
density by 80-400%.

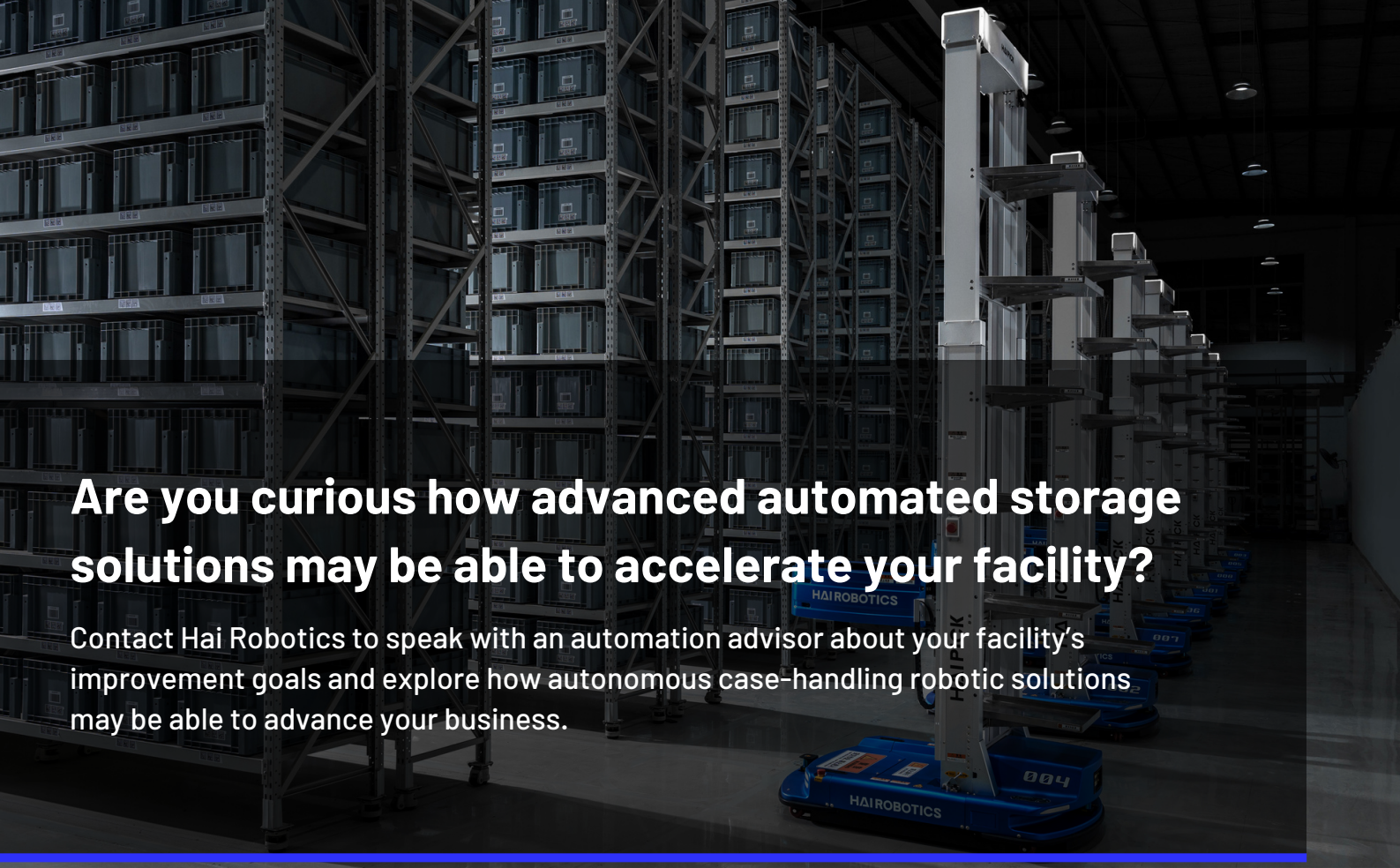
WHY ACRS?

Our high-capacity ACRs provide a remarkably small footprint with a vertical reach 32+ feet high, allowing for our solutions to reduce a facility's storage footprint up to 75%. Combined with highly effective AI-driven software, our robotic equipment manages the efficient storage, movement of material, and workflows while improving worker efficiency by 200-300%.



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HAI ROBOTICS



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Contact Hai Robotics to speak with an automation advisor about your facility's improvement goals and explore how autonomous case-handling robotic solutions may be able to advance your business.

United States

40748 Encyclopedia Circle,
Fremont, CA 94538
+1(510)573-0295
info.us@hairobotics.com

Europe

Polaris Avenue 136, 2132 JX Hoofddorp,
The Netherlands
+31-(0)23-3039101
info.eu@hairobotics.com

Headquarters

No. 99, Gushu 2nd Road, Nanchang Community,
Xixiang Subdistrict, Baoan District, Shenzhen, China
+86-0755-23208112
sales@hairobotics.com

Singapore

Units #09-41 and #09-42 at 1 Maritime Square,
Harbourfront Centre, Singapore 099253
+65 6908 0616
info.sea@hairobotics.com

Hong Kong, China

Floor 6, Hung To Centre, Kwun Tong, Kowloon,
Hongkong, China
+852 9533 3001

Japan

Saitama, Iruma District, Miyoshi,
Chikumazawahigashi, 4 -6
+81-49-265-6930
info-jp@hairobotics.co.jp

Korea

27F, Trade Tower, 511 Young Dong St, Gangnam-gu,
Seoul 06164, Korea
www.hairobotics.kr
info.kr@hairobotics.com