



PROMAT

2015

McCormick Place South | Chicago
March 23-26, 2015
promatshow.com

Automated Case Picking

Sponsored by:

VANDERLANDE

Presented by:

Andy Williams – BDM

Ainsley Guinn – System Design Lead

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Automated Case Picking



Agenda

- **Business drivers for store deliveries**
 - Store friendly delivery
 - Minimum amount of roll cages
 - Optimized operator performance
- **Area details**
 - Depalletizing
 - Palletizing
- **Design principles**
 - Ergonomic design
 - Modular build for flexibility and scalability

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1. Business drivers

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Business drivers for store delivery

- A. Shop costs: store friendly delivery
- B. Transport costs: roll cage/pallet fill
- C. Warehouse costs: investment versus operational costs

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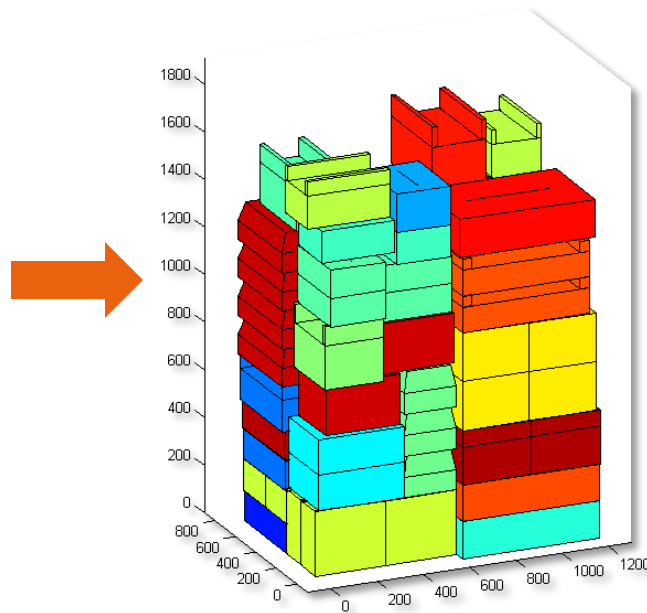


1A. Shop costs

Load forming logic

- Load Forming Logic (LFL) is *order distribution* and *stacking* software for *automated* and *manual mixed palletizing*

cdo_number	sku_desc	quantity
298087	amstel radler 6bl	3
259164	liefmans fruitesse 4fl	3
52363	es vuilniszakken	2
131221	ah fries roggebr doos 500	2
159456	tena lady extra	2
213981	ah ontbijtk mi suik gesn	1
222093	ah branflakes	1
268505	ariel wit vloeibaar	1
268525	ariel excel gel color	1
268526	ariel excel gel wit	1
274146	alfa edel pilc bl	1



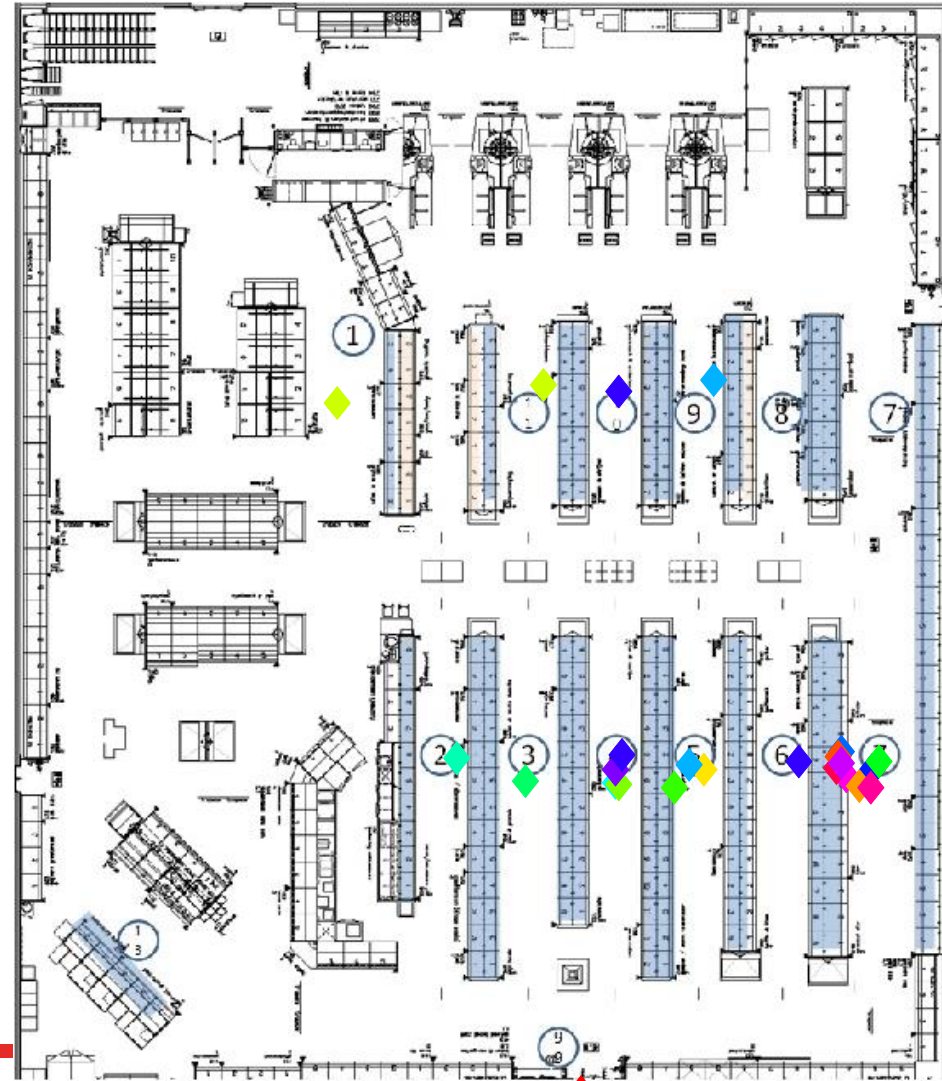


Store friendliness

- For all orders, it is computed how many containers at least need to visit an aisle
- This number is compared to the actual number of containers that is assigned to an aisle
- The ratio is an indicator for store friendliness

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748 cases, 309 SKUs, 20 containers
Containers/aisle score: 96%



■ Regional Assortment
 ■ National Assortment
 Others Fresh

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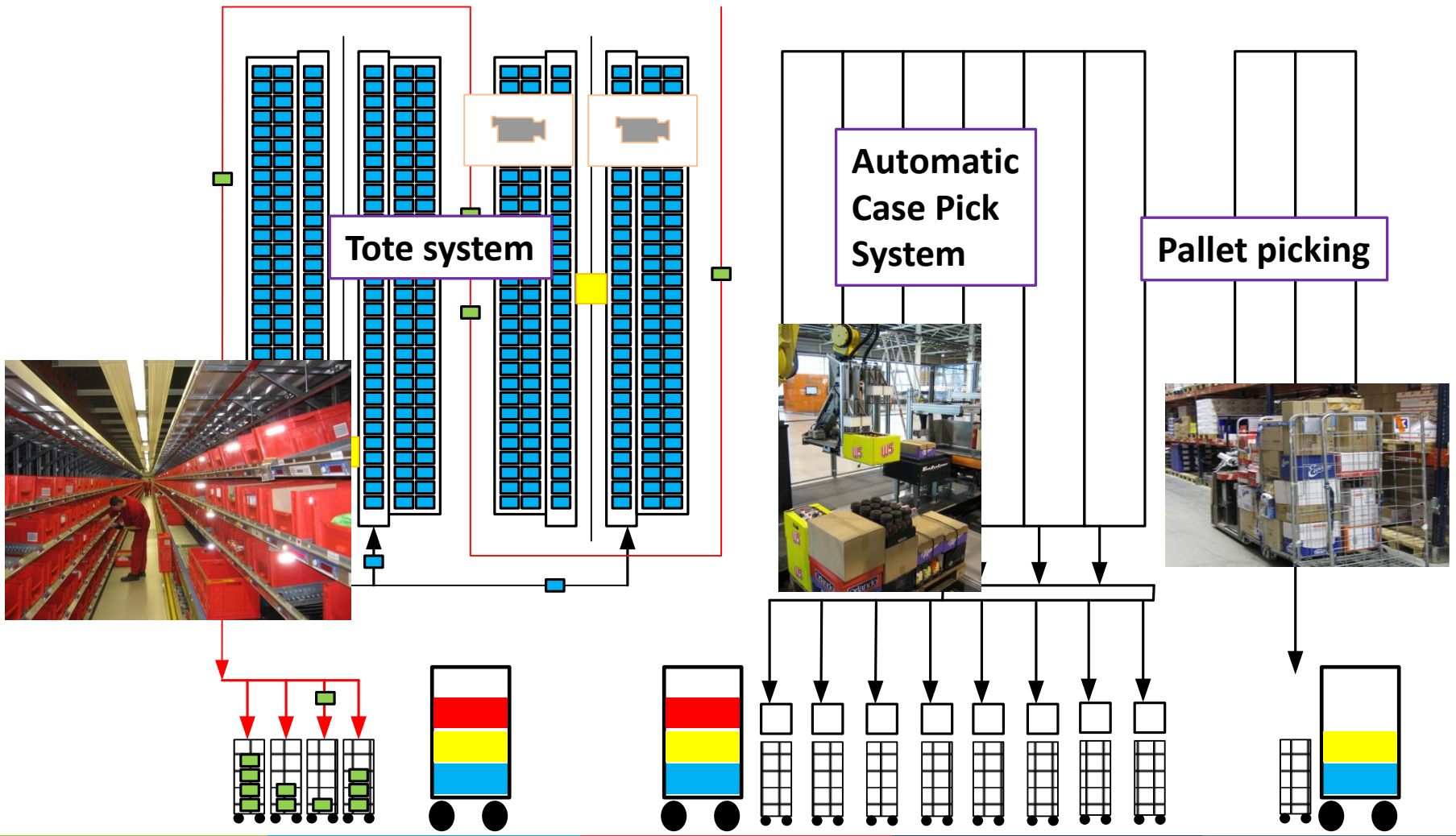
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1B. Transport costs

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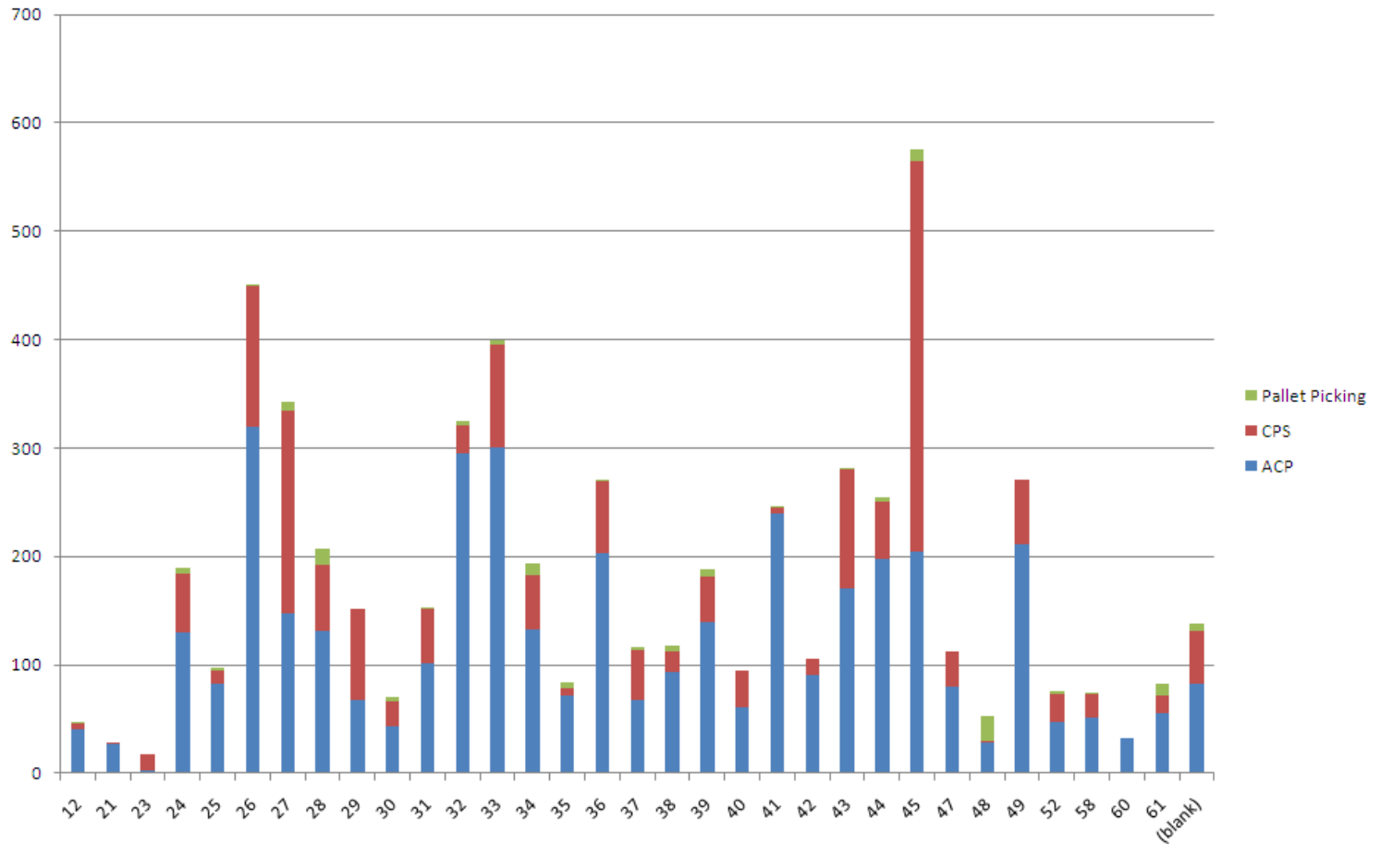
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All family groups will be split



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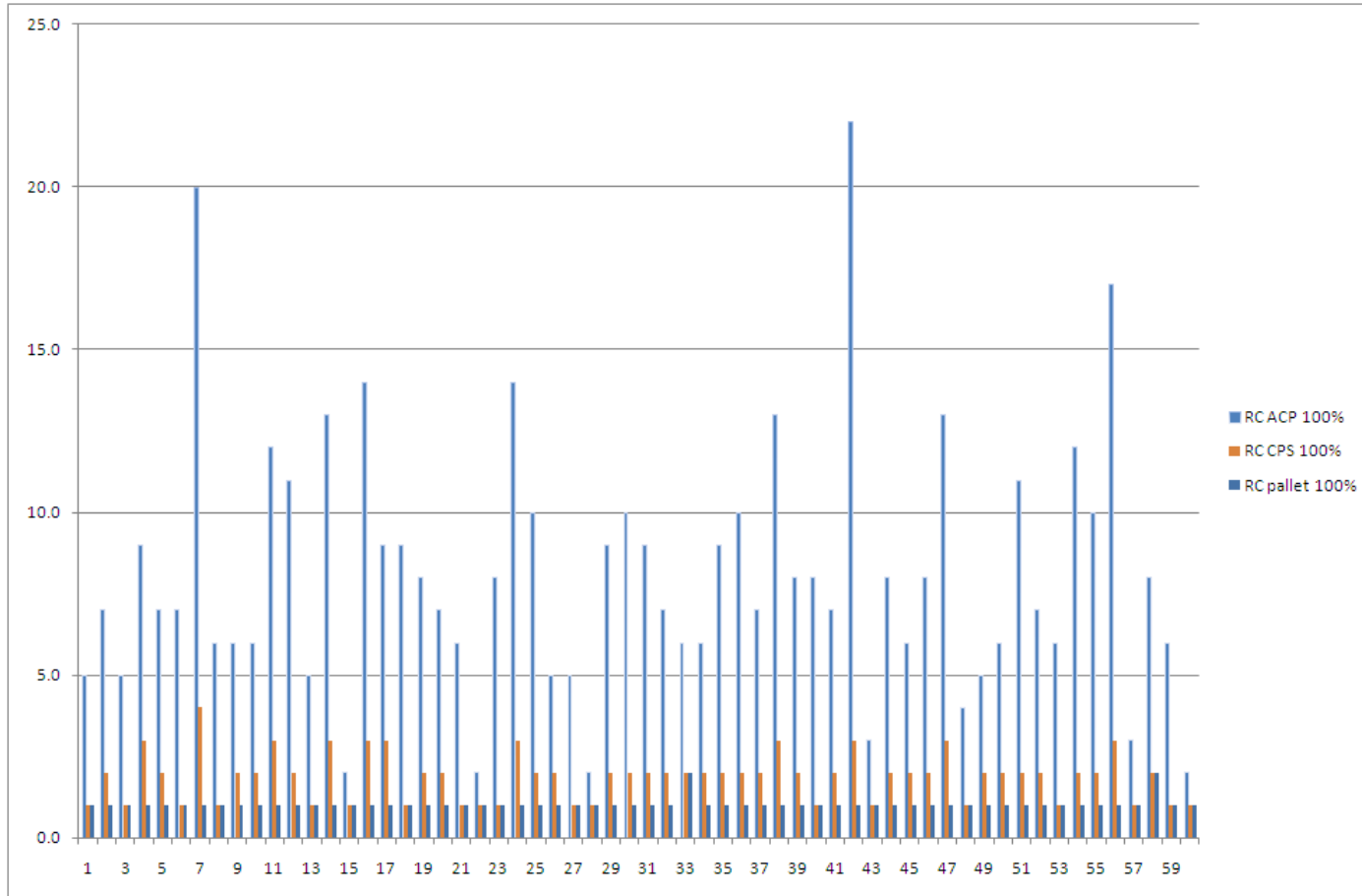


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Risk: More pallets/roll cages due to different zones



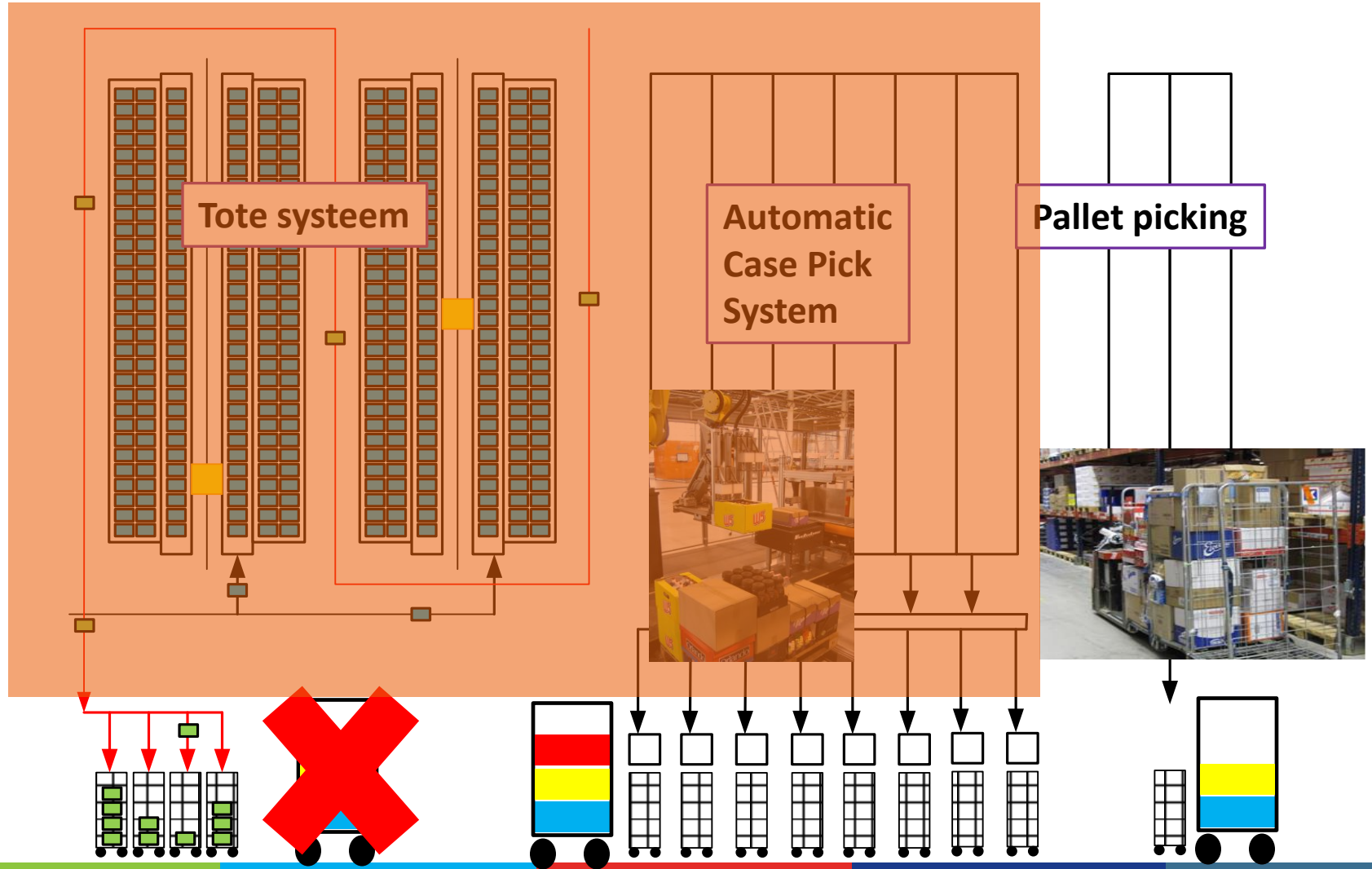
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Transport costs

OrderNr	Theoretical minimum	RollContainers AH	LFL containers	Manual Containers VI	Total VI containers
1	2	2	2	0	2
2	12	14	14	1	15
3	7	9	8	1	9
4	14	18	19	1	
6	5	8	5	1	
7	8	12	11	1	
8	11	14	13	2	
9	7	10	8	1	
10	8	11	10	1	
11	32	43	38	5	
12	35	47	39	4	
13	0	2	2	2	
14	12	17	15	1	16
15	10	16	12	2	14
	4	5	1	1	6
18	9	12	11	1	
19	9	14	12	1	
20	9	12	10	1	
21	16	21	21	2	
22	10	15	11	2	
23	6	9	7	1	8
24	16	22	19	3	22
25	8	12	10	1	11
26	17	21	17	4	21
27	9	14	10	2	12

Savings in combination with optimized store friendliness

	Total 269 orders:
manual	4337 containers
automated	4164 containers
Reduction	173 containers (4%)
	Containers / order
manual	16.1 containers
automated	15.5 containers

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1C. Operational costs

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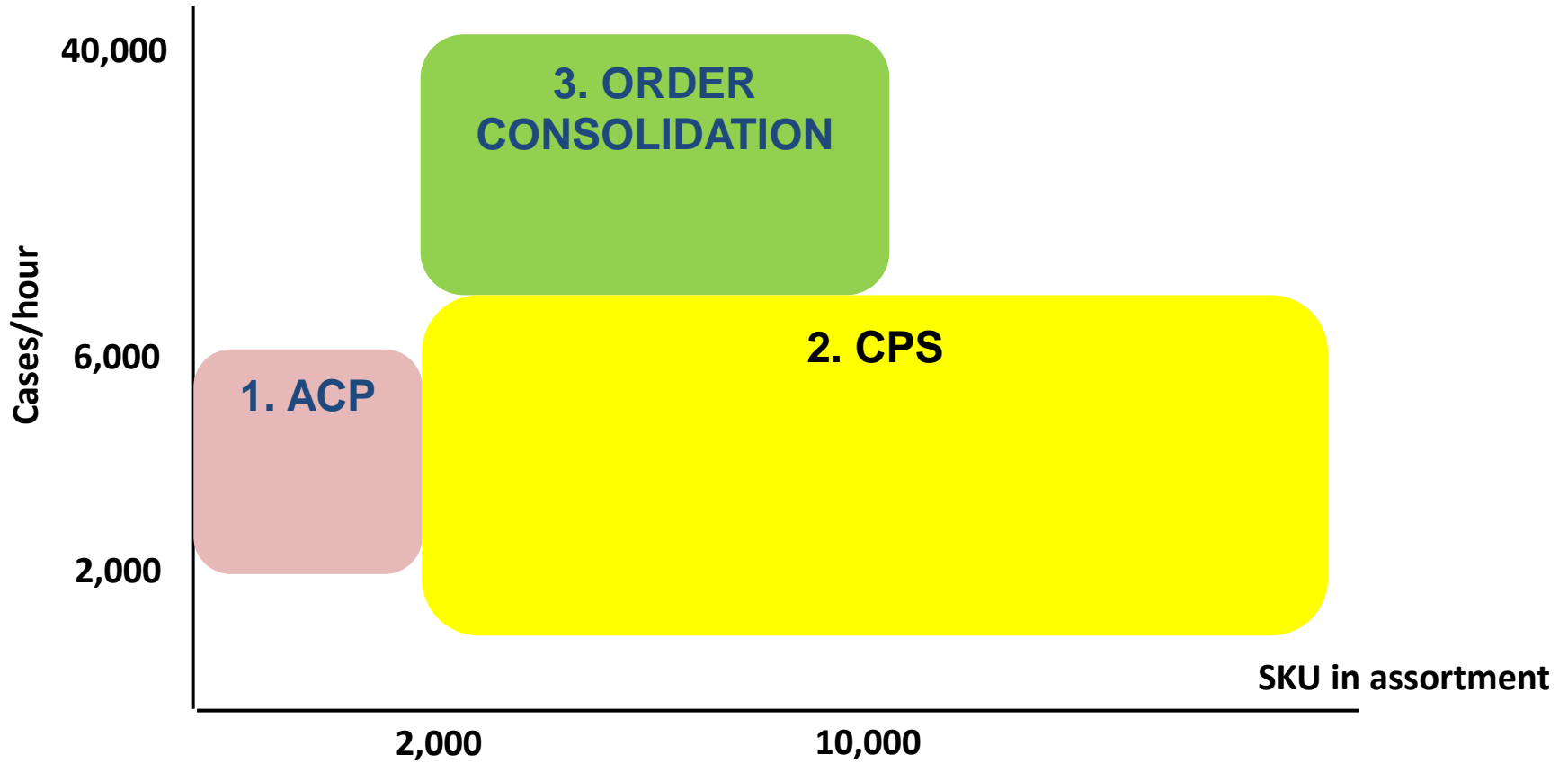


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Food retail solutions



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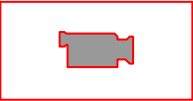
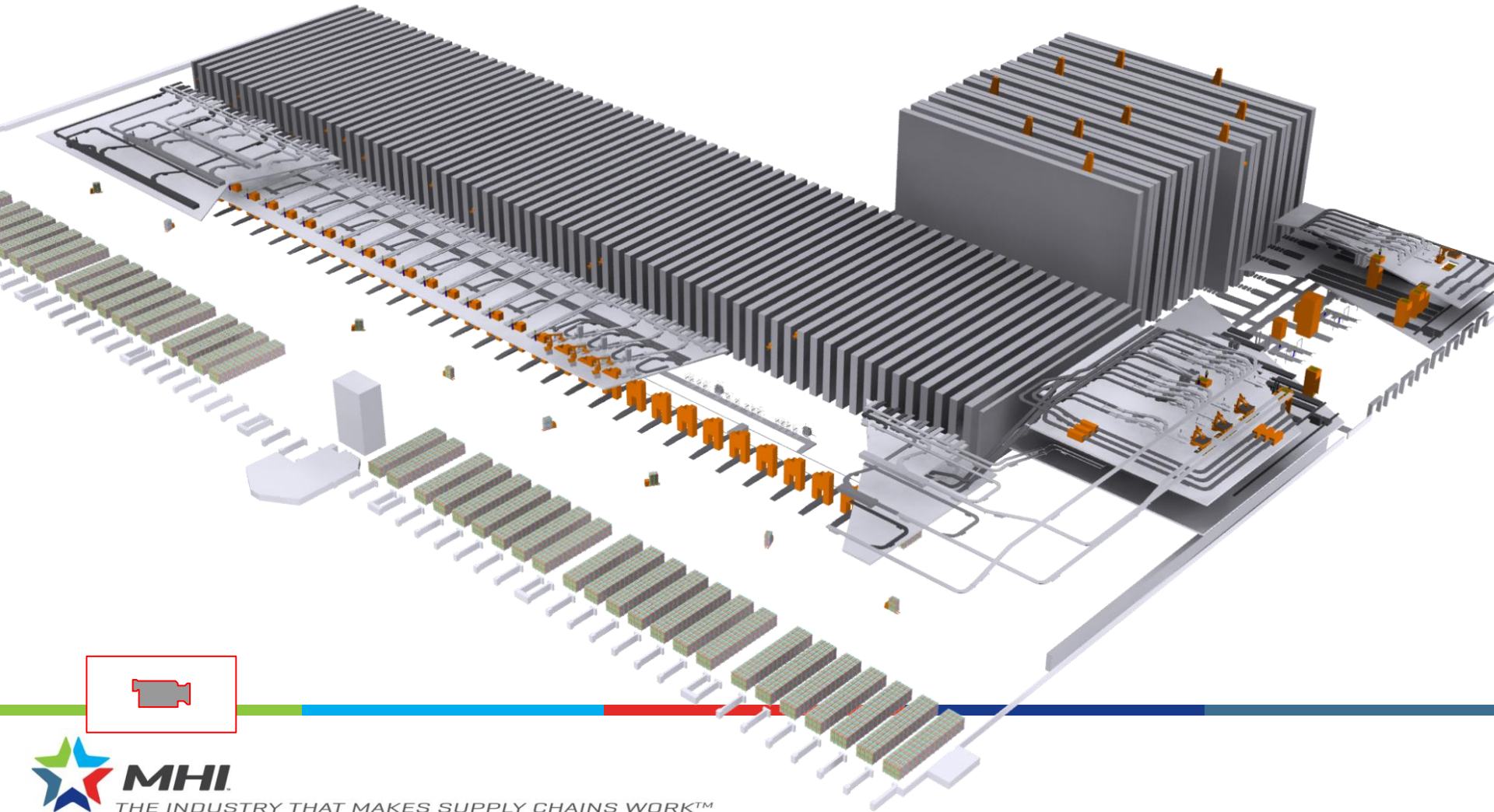


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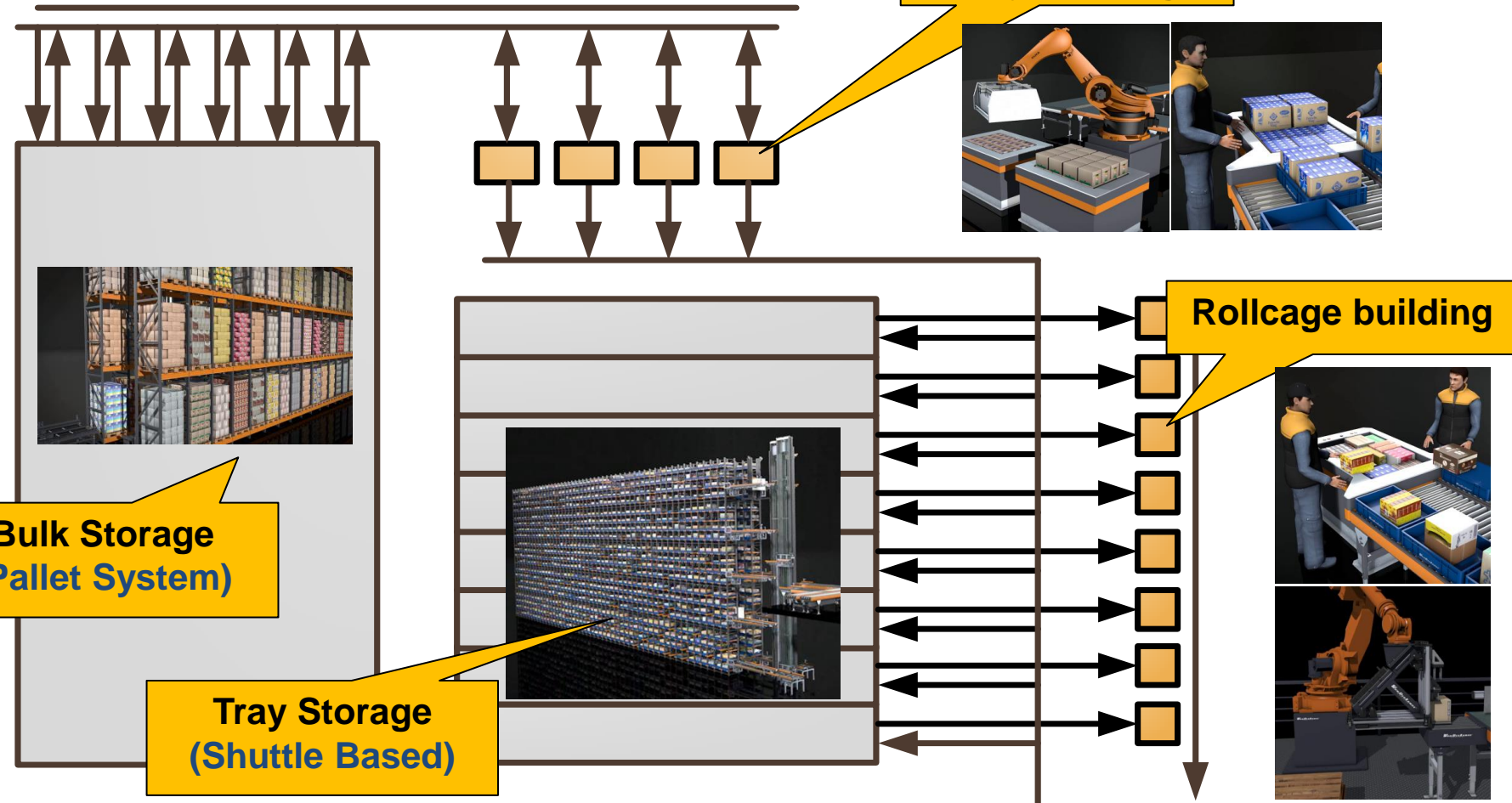
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3. Order consolidation system



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Concept



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2. Area details

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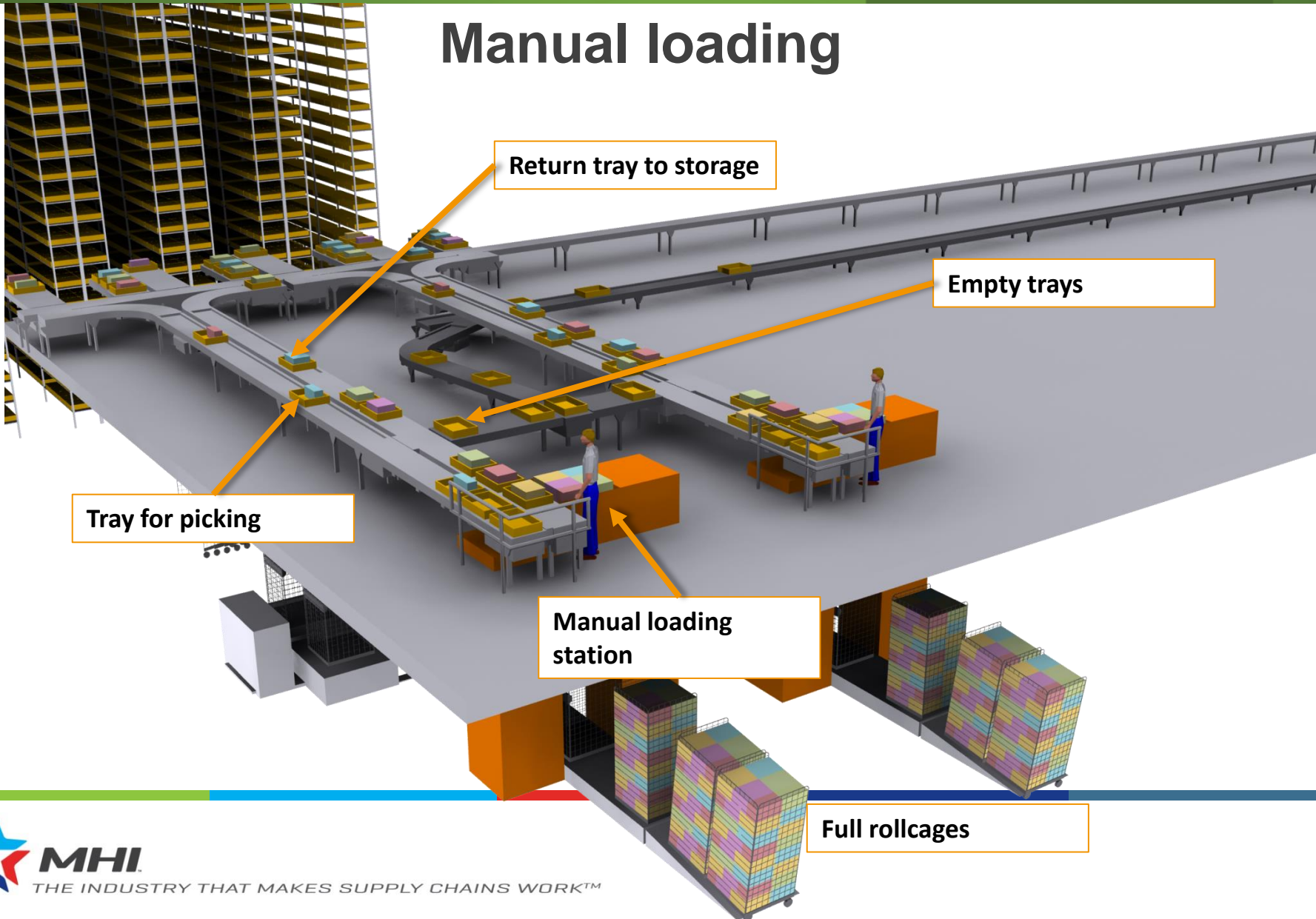
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Areas

- Manual loading
- Robot loading
- Manual and auto depalletizing

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Manual loading



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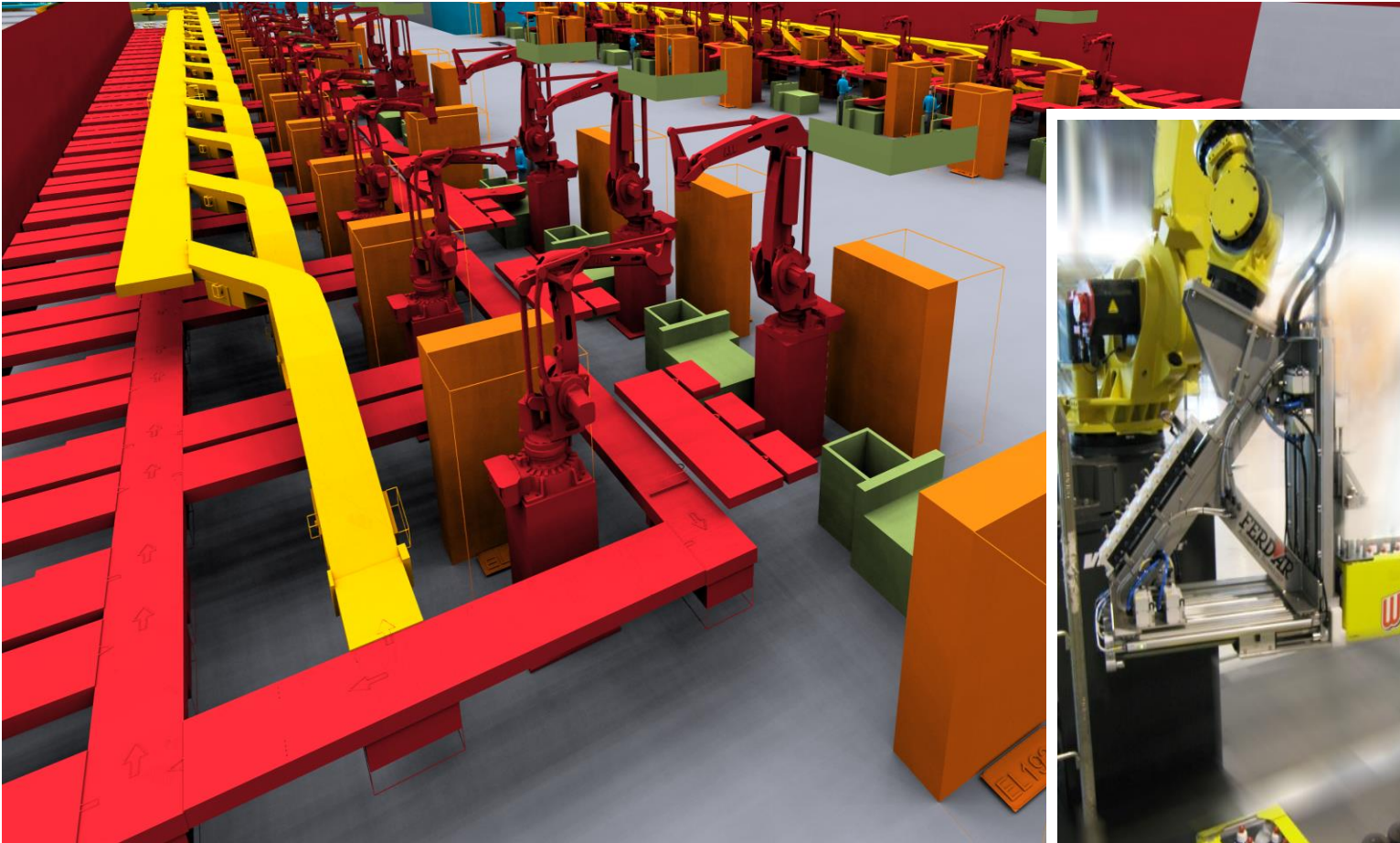


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Robot loading



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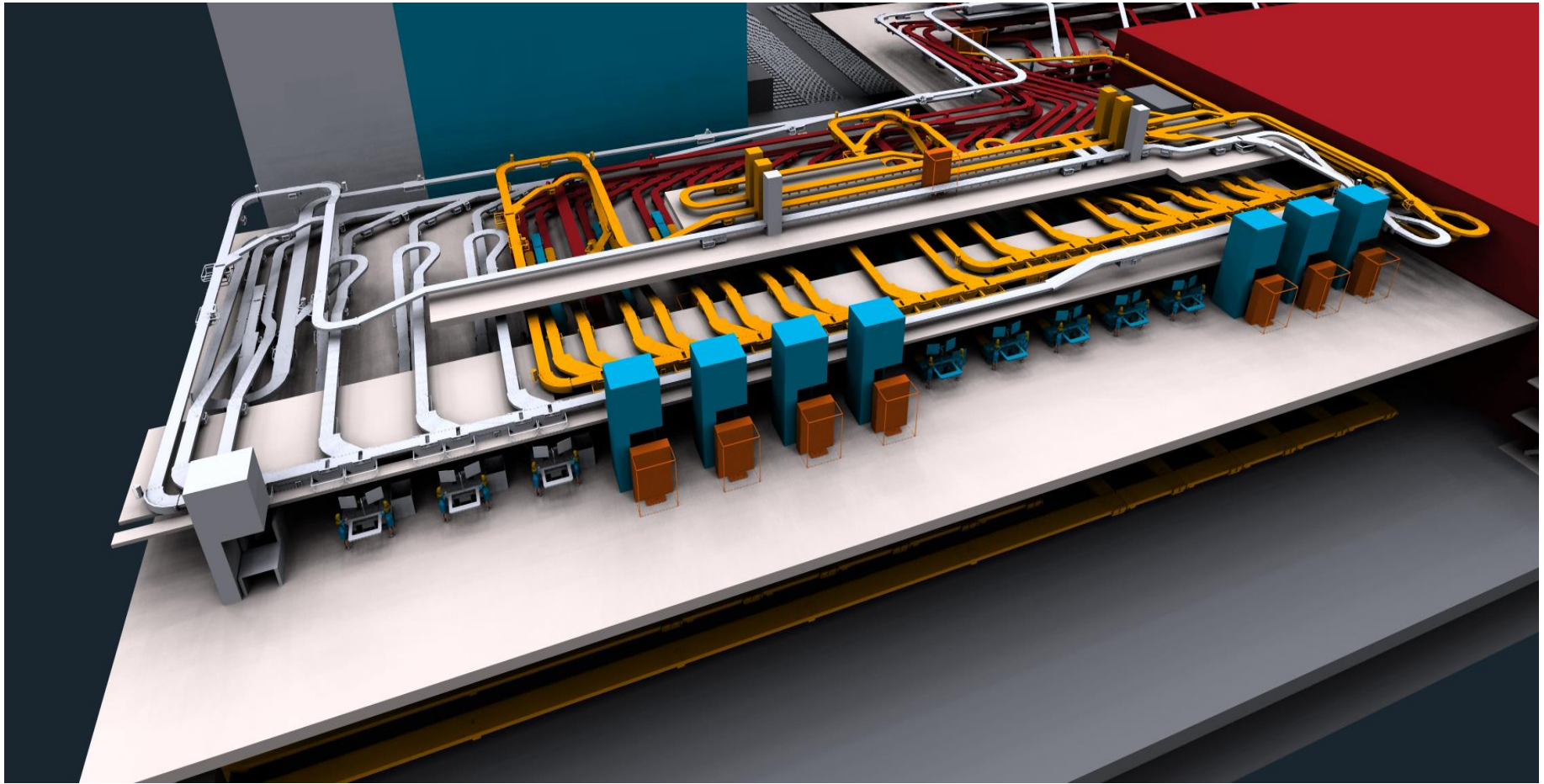


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Depalletizing area



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Detail manual station



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3. ACP design principles

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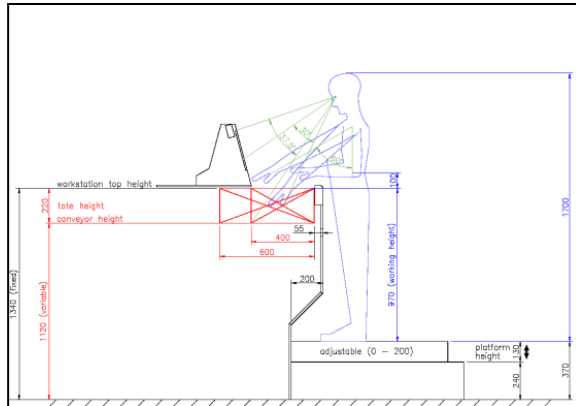
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Order consolidation system



Ergonomic design

- Design principle about **eliminating all ergonomically unfriendly** activities such as picking from pallets
- Ergonomics play a crucial role during design of our workpositions
 - Evaluation according to ergonomic standards (safety, lifting/tilting, body posture, ..)
 - In close co-operation with TNO
- Results in stations where a **high sustainable performance** can be achieved



Revised NIOSH lifting equation: $RWL = LC \cdot HM \cdot VM \cdot DM \cdot AM \cdot FM \cdot CM$
 Regression Equations for FM Multiplier and EXCEL Program for RWL developed by N. Krishnamurthy
 Ref. LC = 23 kg; ENTER desired LC: 21 to 25 kg

LC (21-23) =	23	MULTIPLIERS		
H =	25	HM =	1.00	
V =	75	VM =	1.00	
D =	25	DM =	1.00	
A =	0	AM =	1.00	
FM Code =	2 (1 for ≤ 1 Hr, 2 for > 1 Hr)			
F =	10	FM =	0.29	

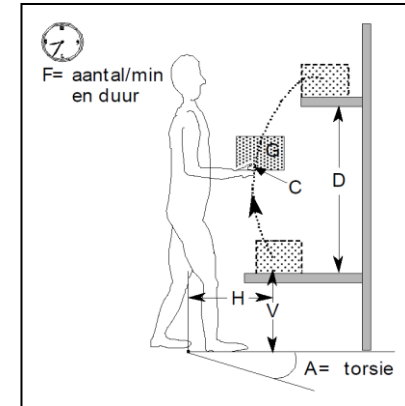
Choose CM from Table below:

C = Grasp	CM Factor:	
l' = Handles	Standing	Stooping
Good [1]	1.00	1.00
Fair	1.00	0.95
Poor	0.90	0.90

NOTATION Load, W = 5 kg

RWL = Recommended Weight Limit (kg) = **6.66**
 Lifting Index = **0.75**

H = Horizontal distance (in cm) from midpoint between the ankles to hands while holding the object. HM = Horizontal Multiplier
 V = Vertical distance (in cm) of the hands from the ground at the start of the lift (≤ 175 cm). VM = Vertical Multiplier
 D = Vertical distance (in cm) that the load travels (≤ 175 cm). DM = Distance Multiplier
 A = Twisting angle (in degrees) of the body while lifting (0 to 135 degrees). AM = Asymmetric Multiplier
 F = Frequency (F) of lifts and the duration of lifting (in seconds, Max. 300 sec.) over a workshift. FM = Frequency Multiplier
 C = Quality of grasp (or coupling), good, fair, or poor, & depending on position (standing or stooping). CM = Coupling Multiplier



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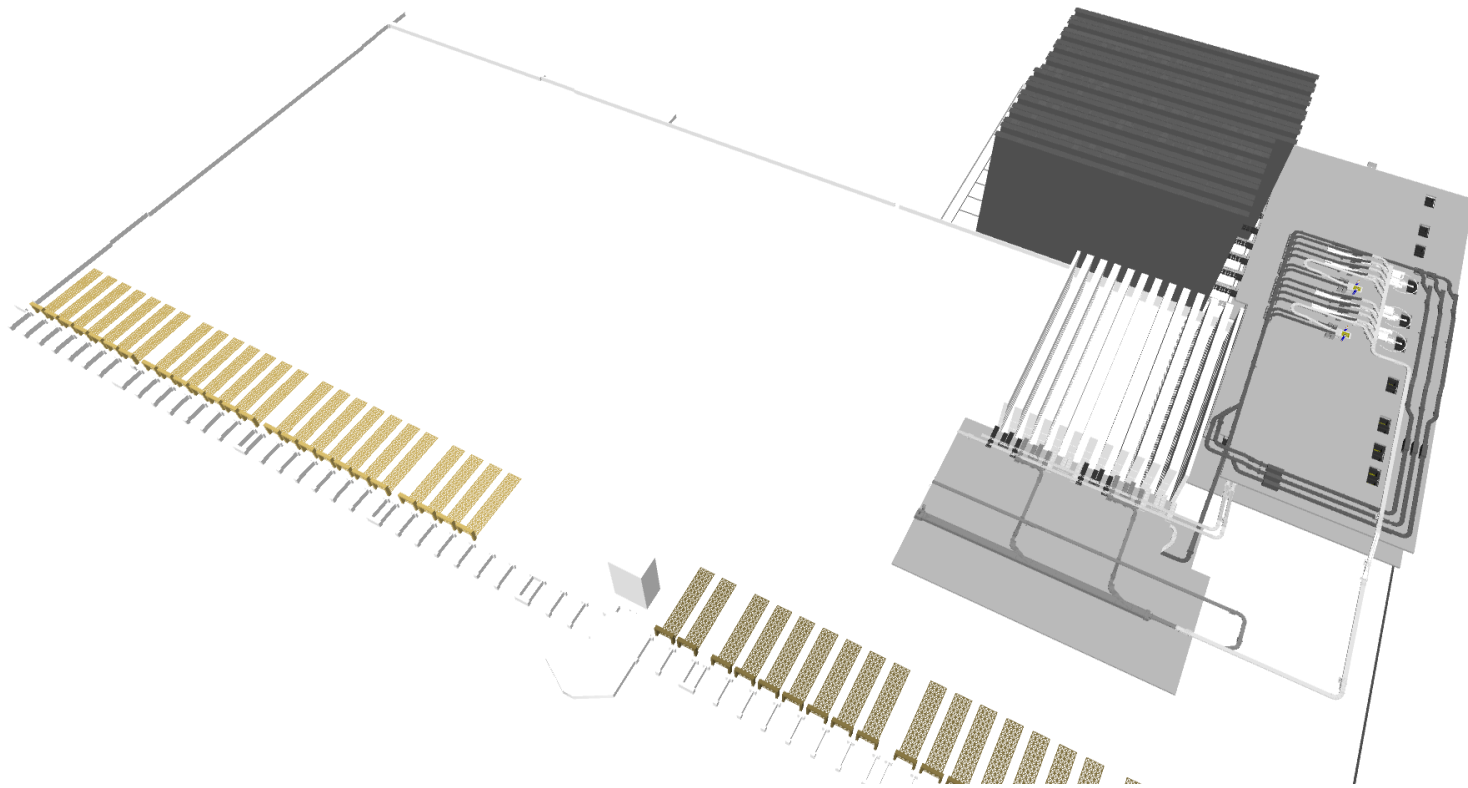


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Modular design = full scalability



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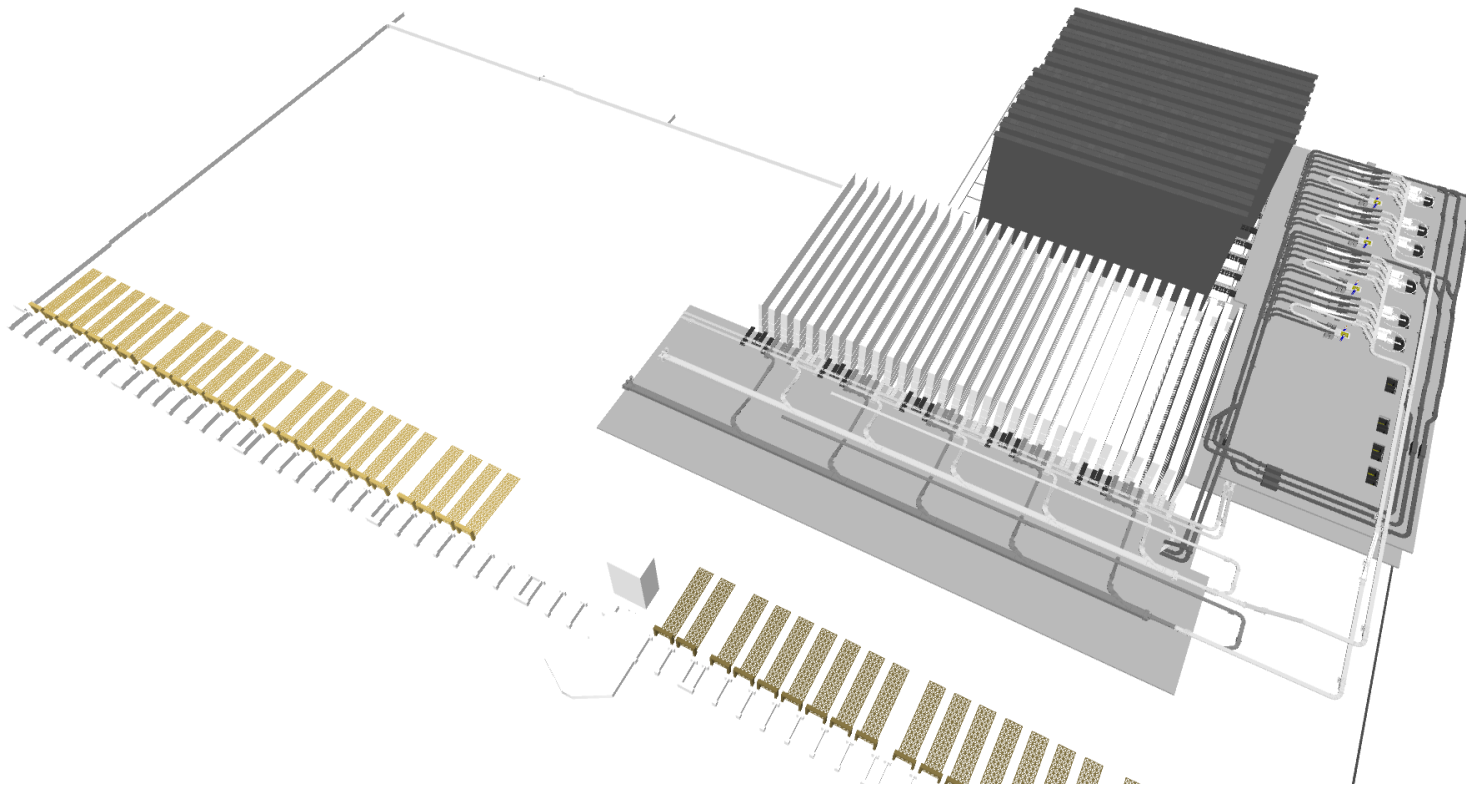


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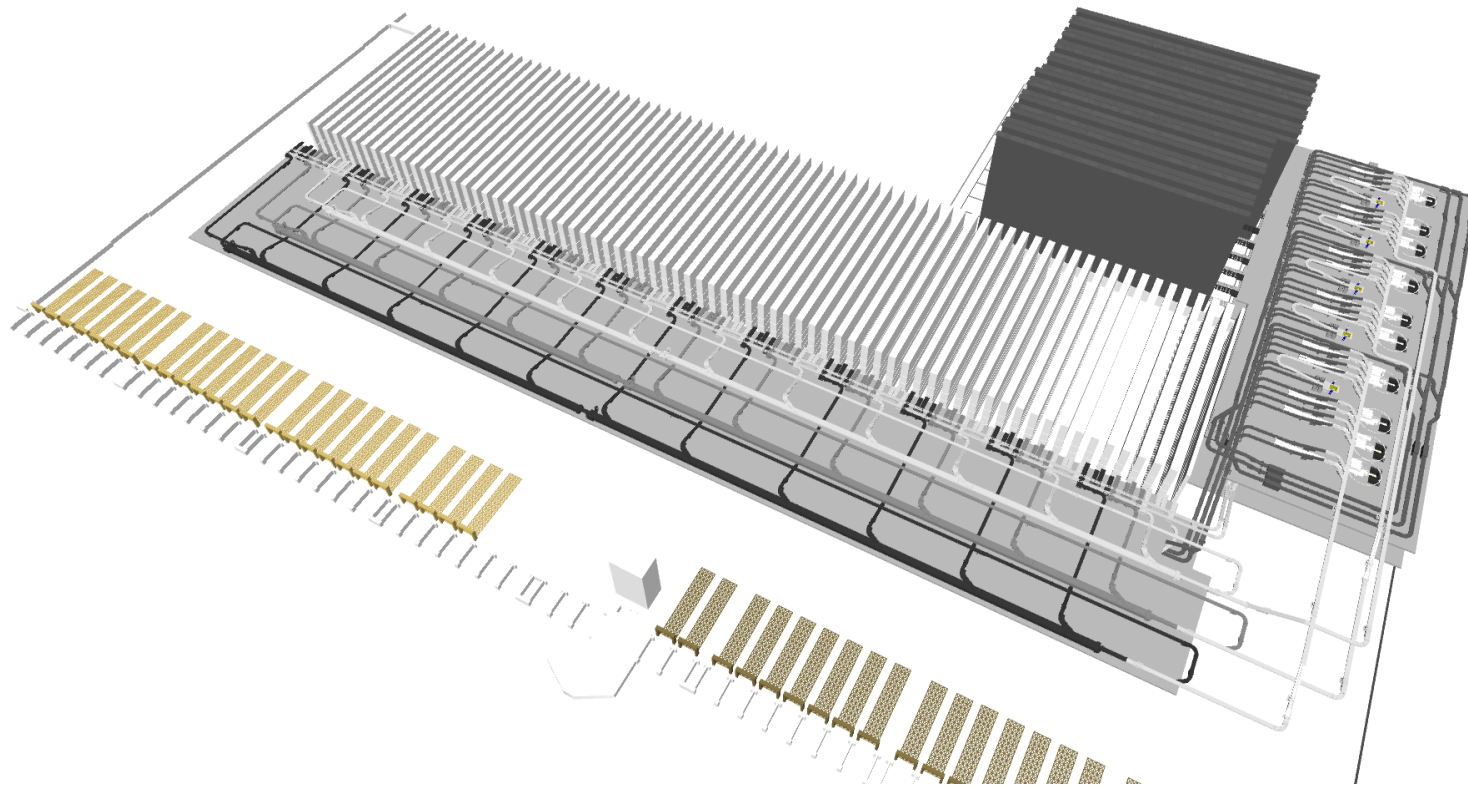


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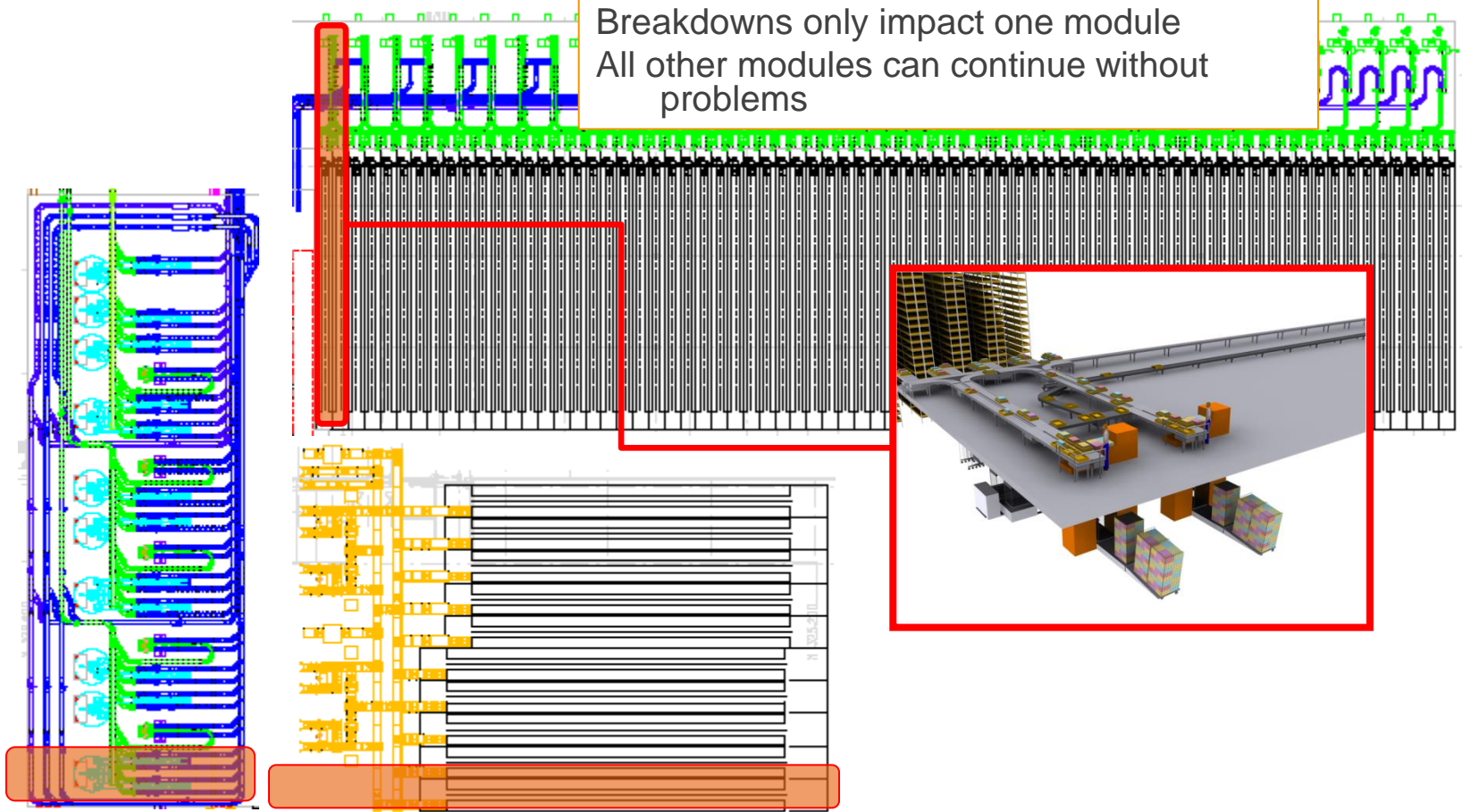
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Modular design = full scalability



Modular design

Breakdowns only impact one module
All other modules can continue without problems



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