Intelligent Cold Chain Logistics Solution
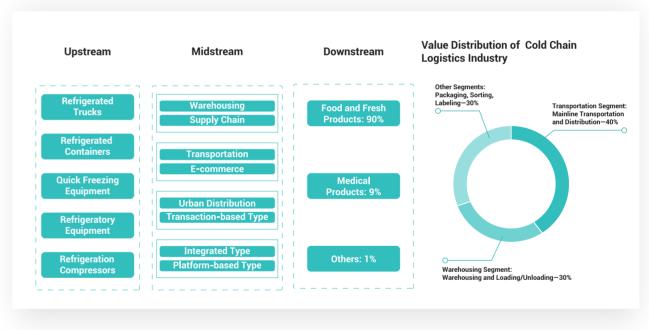
Multiway Robotics

The Warehousing Segment Accounts for 30% of the Value Chain

With a Limited Level of Intelligence and Informatization

In the midstream sector, the warehousing segment represents approximately 30% of the value chain, yet it maintains a relatively low level of informatization. According to the China Federation of Logistics & Purchasing (CFLP), the proportion of cold storage facilities that have accomplished initial informatization construction is less than 40%.

Overview of the Supply Chain in Cold Chain Logistics Industry

Upstream	Midstream	Downstream	Value Distribution of Cold Chain Logistics Industry
Refrigerated Trucks	Warehousing / Supply Chain	Food and Fresh Products: 90%	Other Segments: Packaging, Sorting, Labeling—30%
Refrigerated Containers	Transportation / E-commerce	Medical Products: 9%	Transportation Segment: Mainline Transportation and Distribution—40%
Quick Freezing Equipment	Urban Distribution / Transaction-based Type		Warehousing Segment: Warehousing and Loading/Unloading—30%
Refrigeratory Equipment	Integrated Type / Platform-based Type	Others: 1%	
Refrigeration Compressors			

An Insight into the Present State of Traditional Cold Storage Facilities

The traditional logistics warehousing model no longer meets the cold chain industry's warehousing requirements. The cold chain industry has raised higher demands for intelligent and informatized logistics warehousing.
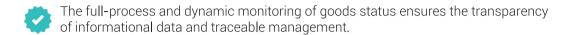

》 Challenging Environment

》 Labor Shortage

》 Low Level of Intelligence

Benefits of Intelligent Intralogistics Solutions

✅ The full-process and dynamic monitoring of goods status ensures the transparency of informational data and traceable management.

✅ The automated handling and storage modes increase cold chain logistics efficiency, enhance safety, and reduce losses.

✅ Lean management of cold chain operations optimizes processes for higher efficiency and competitiveness.

✅ 24/7 unmanned operations reduce operational and management costs, enhancing the overall enterprise efficiency.
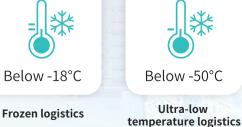
Elevate the cold chain logistics system to a modernized level

Improve the digital capabilities of cold chain logistics

Cold Storage is a Crucial Link in the Cold Chain Categorized into 5 Major
Types Based on Temperature Ranges

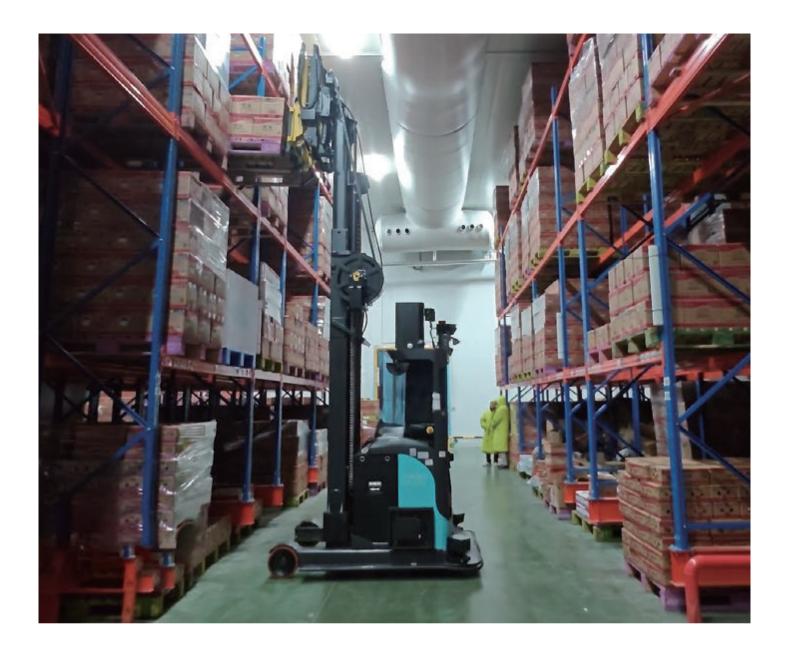| 10°C~25°C	0°C~10°C	-2°C~2°C	Below -18°C	Below -50°C
Other temperature-controlled logistics	**Refrigerated logistics**	**Chilled logistics**	**Frozen logistics**	**Ultra-low temperature logistics**

Integrated Hardware and Software Intelligent Logistics Solutions

Intelligent cold chain logistics solutions empower the digitalization of operation and management

Unmanned forklift solutions for cold storage refer to unmanned forklift systems that operate stably in low-temperature environments, which include vehicle solutions, sensor solutions, algorithms, and low-temperature system applications. These vehicles can seamlessly switch between low-temperature and normal-temperature environments, facilitating efficient operations in cold storage facilities for tasks like access, loading, unloading, and transportation.

3 Innovative Technologies
Enabling Mobile Robots to Adapt to Temperature Changes in Different Environments

Intelligent Constant Temperature Technology

1

Ensures stable operation in high and low-temperature environments

Condensation Defrosting Technology

2

Addresses frosting caused by temperature differences, reduces battery consumption and improves navigation accuracy
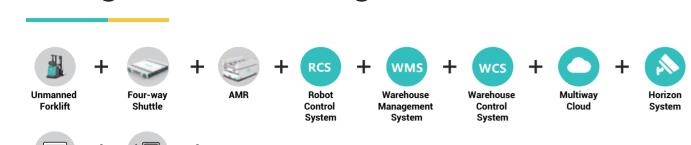

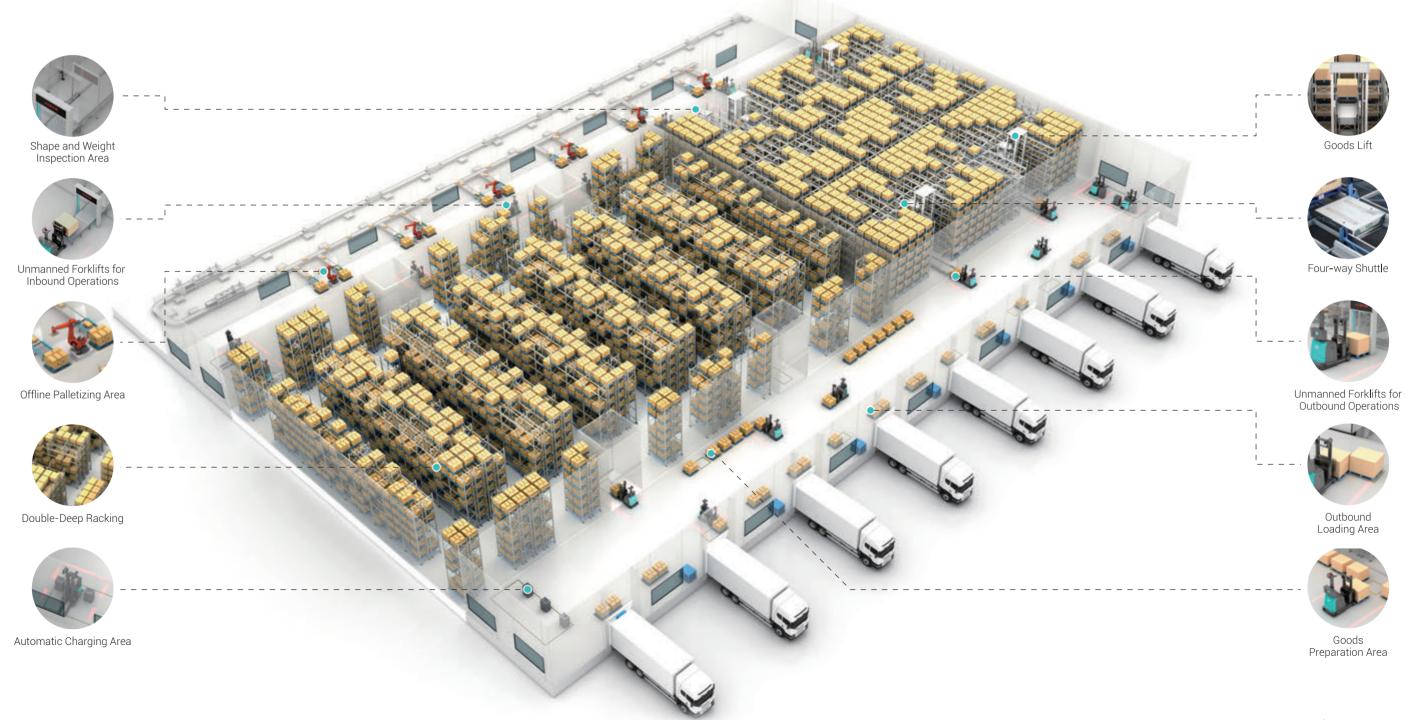### Wireless Charging Technology

3

Utilizes contactless charging instead of traditional charging methods, avoiding safety hazards such as fires

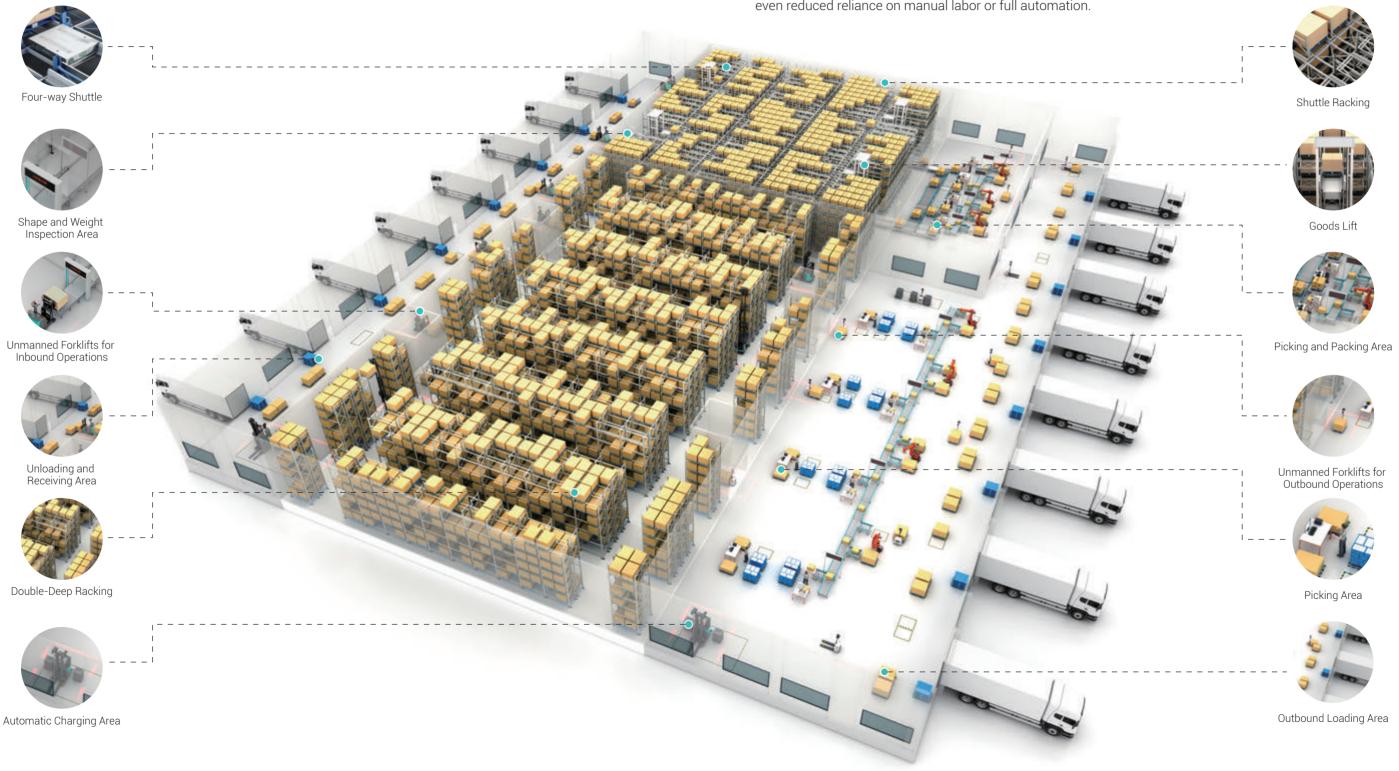# Intelligent Cold Chain Logistics Solutions for Food Processing

Unmanned Forklift + **Four-way Shuttle** + **AMR** + **RCS** Robot Control System + **WMS** Warehouse Management System + **WCS** Warehouse Control System + **Multiway Cloud** + **Horizon System** +

Inbound and Outbound Workstation + **Smart Terminals and Peripherals** + ...

The collaboration between unmanned forklifts and intelligent four-way shuttles in cold storage facilities is of high efficiency, which allows flexible configuration of vehicle types to handle peak and off-peak demands.Following the first-in-first-out principle, Multiway solutions help reduce the loss rates of goods. Visualized management of inbound and outbound data for raw materials, semi-finished, and finished products not only achieves cost reduction and efficiency improvement in handling and warehousing processes but also integrates the logistics system into the entire production cycle, forming a highly efficient closed-loop system.

Shape and Weight Inspection Area

Unmanned Forklifts for Inbound Operations

Offline Palletizing Area

Double-Deep Racking

Automatic Charging Area

Goods Lift

Four-way Shuttle

Unmanned Forklifts for Outbound Operations

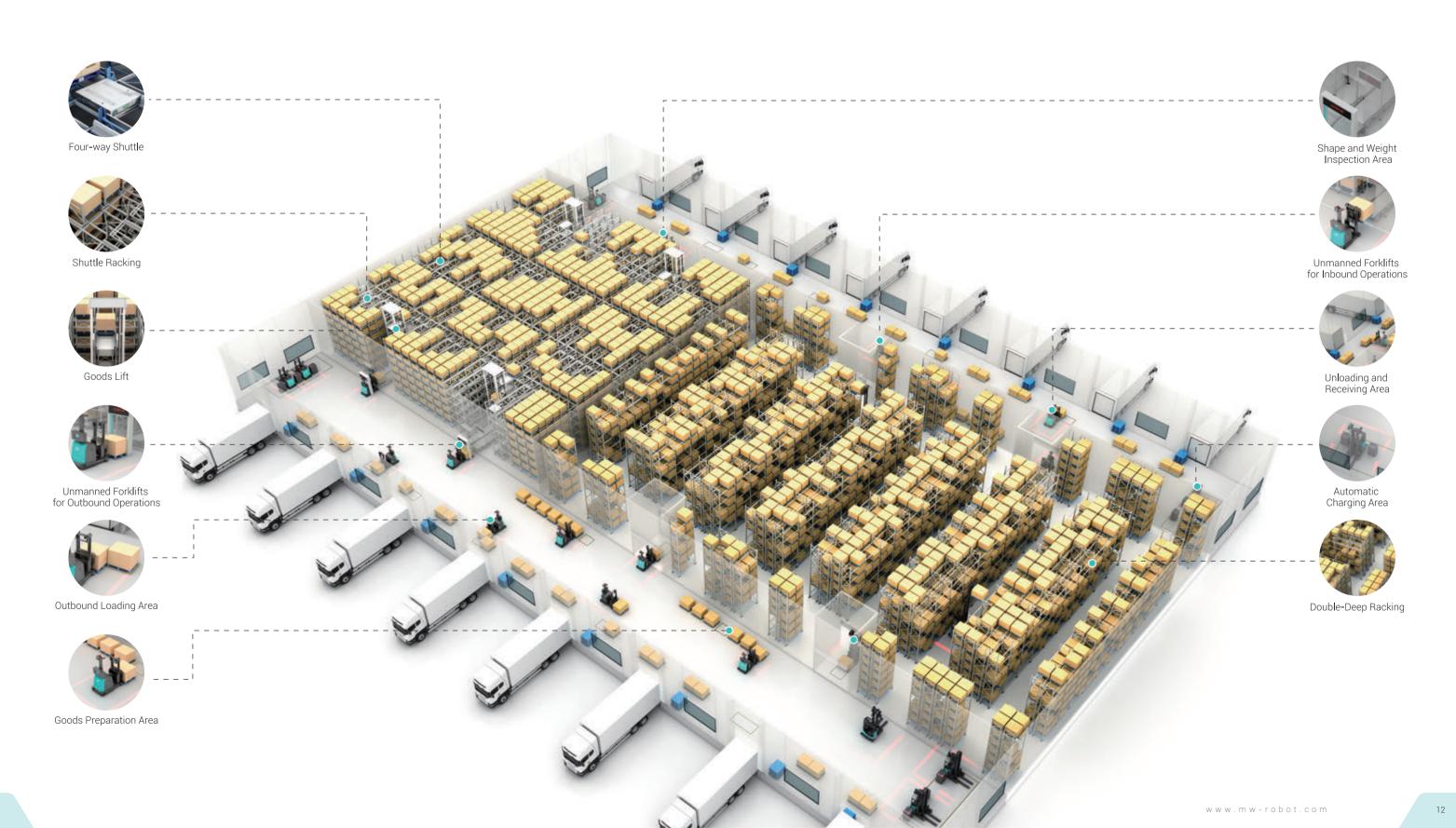Outbound Loading Area

Goods Preparation Area

Intelligent Logistics Solutions for E-commerce Cold Chain Warehouses

The pain points for the logistics supply chain of products requiring specific temperature control include high demand for safety, challenging operating conditions, significant variations in product specifications, lower standardization levels, high loss rates, and difficulties in handling a multitude of small e-commerce orders. To tackle the issues of high energy consumption, low efficiency, and operational costs that are inversely proportional to management levels in traditional cold storage facilities, automated three-dimensional cold storage facilities have emerged as a solution. To meet the ever-growing demands of the cold chain logistics sector, such cold storage facilities are characterized by high-density storage, automated conveyance, intelligent management, and even reduced reliance on manual labor or full automation.

Four-way Shuttle

Shape and Weight Inspection Area

Unmanned Forklifts for Inbound Operations

Unloading and Receiving Area

Double-Deep Racking

Automatic Charging Area

Shuttle Racking

Goods Lift

Picking and Packing Area

Unmanned Forklifts for Outbound Operations

Picking Area

Outbound Loading Area

Intelligent Logistics Solutions for 3PL Cold Chain Logistics

This solution meets the needs for digitalizing 3PL cold chain warehousing, logistics, and transportation and plays a crucial role in three major scenarios: high-bay warehousing, cargo handling, and production line transportation, as well as in heavy-load and special operating conditions. Third-party logistics enterprises can benefit from this solution when tackling challenges such as high logistics volume, strenuous manual handling, and chaotic cargo information management throughout the warehousing and logistics processes.

Four-way Shuttle

Shuttle Racking

Goods Lift

Unmanned Forklifts
for Outbound Operations

Outbound Loading Area

Goods Preparation Area

Shape and Weight
Inspection Area

Unmanned Forklifts
for Inbound Operations

Unloading and
Receiving Area

Automatic
Charging Area

Double-Deep Racking

Why Choose Intelligent Cold Chain Logistics?

Traditional Cold Chain Warehouse   VS   Intelligent Cold Chain Warehousing System

Storage

Limited Storage Capacity

Manual forklifts require wide laneways, resulting in significant space wastage.

Large Storage Capacity

The storage capacity of the stereoscopic warehouse exceeds that of conventional warehouses by over 30%.

Efficiency

Low Efficiency

Working in low-temperature areas during peak inbound and outbound periods is beyond human physiological limits.Simultaneous operation of multiple forklifts can interrupt the workflow, cause severe congestion, and reduce efficiency.

High Efficiency

The 24-hour unmanned operation ensures time and efficiency optimization, with unmanned forklifts/shuttles performing inbound and outbound tasks at speeds exceeding manual operations by 50% to 200%.

Efficiency

Lack of Information Transparency

Information about materials is disorganized, making it difficult to manage both old and new stock. Manual goods picking and placing can also be challenging.

Traceable and Transparent Information Management

The intelligent warehousing system seamlessly integrates with the factory's MES/ERP systems, enabling end-to-end tracking of goods. Such information transparency helps avoid irregularities and errors in inbound and outbound operations.

Management

Disorganized Management

Paper-based material control records can result in high error rates in reconciliation information and a lack of reminders for disposing of defective materials.

Information management

The intelligent warehousing system seamlessly integrates with the factory's MES/ERP systems, enabling end-to-end tracking of goods. Such information transparency helps avoid irregularities and errors in inbound and outbound operations.

Safety

Safety Issues

Frequent switching between high and low temperatures poses a significant risk of physical injuries.

Safety and Reliability

Stable and reliable equipment operation reduces human fatigue and lowers safety risks.

Cold Chain Robot Solutions

Model	Pallet Stacker L14	Pallet Stacker L16	Pallet Stacker L20	Reach Truck R14	Reach Truck R16	Reach Truck R20
Customrized	Cold Chain Version					
Cold Chain Environment	-25℃~45℃	-25℃~45℃	-25℃~45℃	-25℃~45℃	-25℃~45℃	-25℃~45℃
Laser	●	●	●	●	●	●
Wi-Fi	●	●	●	●	●	●
Rate Load(kg)	1400	1600	2000	1400	1600	2000
Lifting Height（mm）	5400	5400	5400	4700~9000	4700~9500	6400~9500
Aisle Width（mm）	3000	3000	3000	3230	3250	3280
Dimensions L×W×H（mm）	2115x1085x (2350~2815)	2115x1085x (2350~2815)	2180x1085x (2350~2365)	2620x1550x (2350~3930)	2620x1550x (2350~3930)	2620x1550x (2350~3930)
Movement	Bidirectional	Bidirectional	Bidirectional	Bidirectional	Bidirectional	Bidirectional
Travel Speed（m/s）	1.5/1.38	1.5/1.38	1.5/1.38	2/1.5	2/1.5	2/1.5
Position Accuracy（mm）	±20	±20	±20	±20	±20	±20
Angular Accuracy（°）	±1	±1	±1	±1	±1	±1
Charging Mode	Manual/Auto	Manual/Auto	Manual/Auto	Manual/Auto	Manual/Auto	Manual/Auto
Battery Type	LiFePO4	LiFePO4	LiFePO4	LiFePO4	LiFePO4	LiFePO4
Rate Capacity（Ah）	24V 200Ah (With Heating Package)	24V 200Ah (With Heating Package)	24V 200Ah (With Heating Package)	48V 450Ah (With Heating Package)	48V 450Ah (With Heating Package)	48V 450Ah (With Heating Package)
Discharge Rate/Runtime (h)	5-6h	5-6h	5-6h	5-6h	5-6h	5-6h
Pallet Pose Identification	—	—	—	○	○	○
High-bay Detection	—	—	—	○	○	○
Goods Presence Detection	●	●	●	●	●	●
Control Box Heating Package	●	●	●	●	●	●
Condensation Defrosting Technology	●	●	●	●	●	●

● Standard ○ Optional — Not Available

The dimensions can be customized to satisfy project requirement

ROI: One-time Investment, Long-term Value Returns

Replacing manual forklifts with one unmanned forklift, with a two-shift operation, can be cost-effective in 2 to 3 years.

ROI

Cost of purchasing a vehicle

Cost of purchasing a vehicle

Cost of purchasing a vehicle

Other benefits and management costs

Costs

STC — Total Costs of Manual Forklift

TFC — Total Costs of Unmanned Forklifts

T_0

Costs of Using Manual Forklifts

Formula: Total Cost = Vehicle Purchase Cost + Labor Costs + Other Benefits and Management Costs

0

2 Years

Time

The following costs are not included:

Yearly increases in employee salaries

Yearly increases in employee salaries

Cost of occupational injury compensation

Cost of cargo losses

Multiway Robotics

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