



AUTOMATIC PARCEL INFEEED SYSTEM



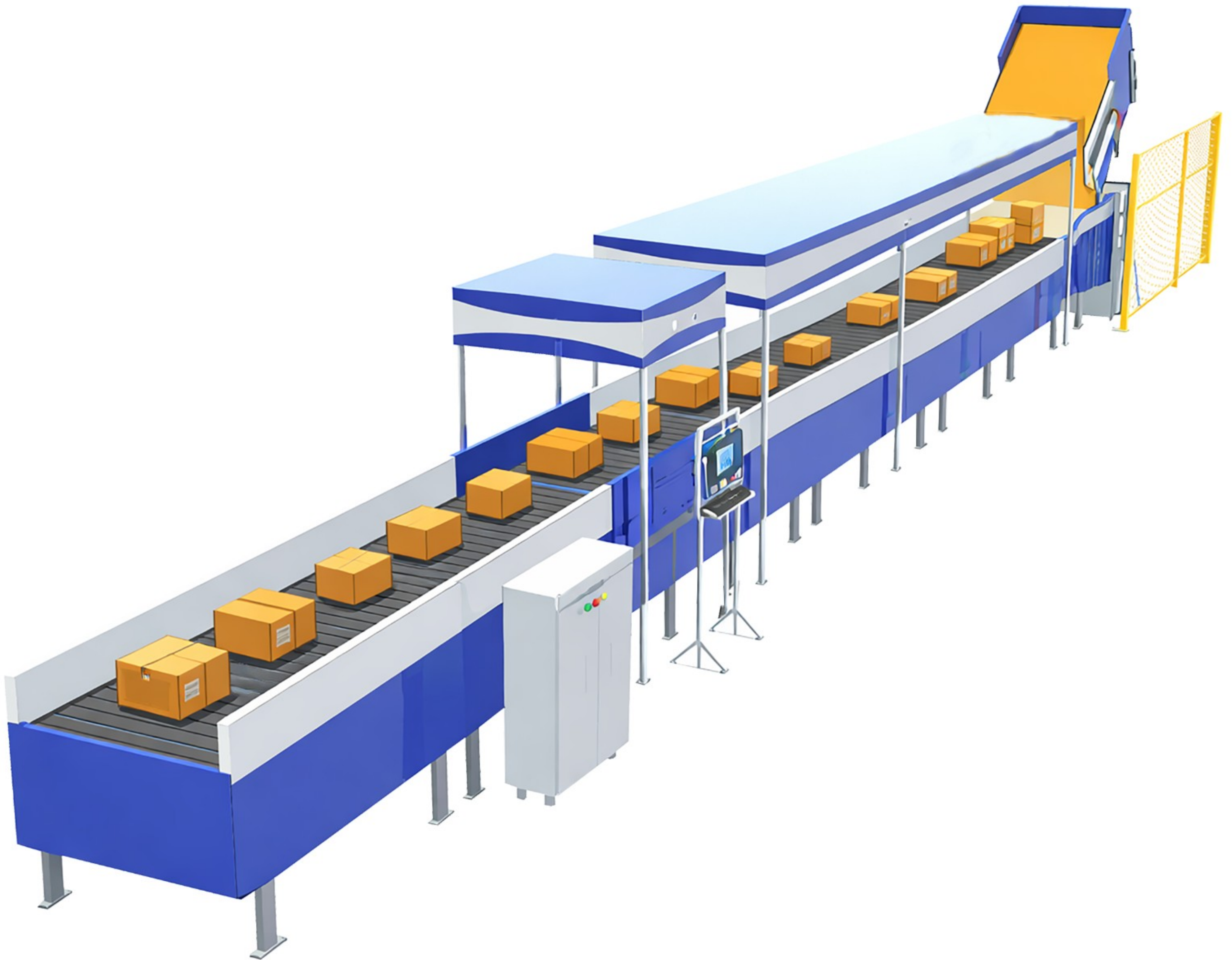
MAKE IN INDIA



MT-MKT-API-01, V1.0



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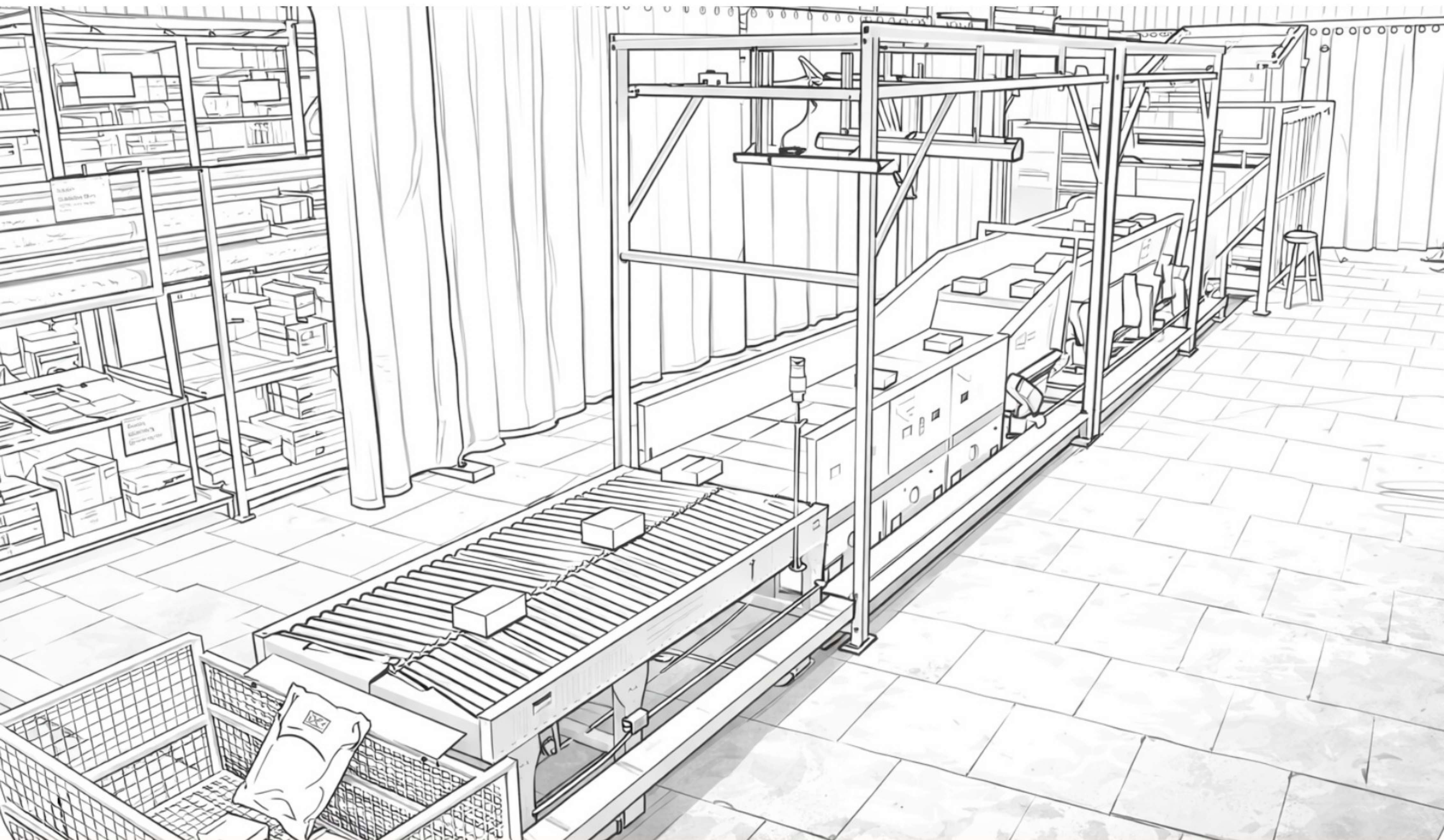


AUTOMATIC PARCEL INFEED SYSTEM

High-Throughput Automated Parcel Induction for Sorting & Logistics Operations

The Automatic Parcel Infeed System is engineered to bulk-feed, separate, align, and singulate large volumes of parcels into high-speed automated sortation lines. Designed for continuous induction at capacities of 3,000–10,000+ parcels/hour, the system transforms a mixed 3D bulk flow into a single-file, evenly spaced, 2D flow—optimized for scanners, DWS systems, and sorter induction. It eliminates overlapping, side-by-side items, and jam formations, ensuring predictable throughput and smooth downstream performance across Cross-Belt Sorters, Linear Sorters, Tilt-Tray Sorters, and robotic sortation platforms.

Automatic Parcel Infeed System



SYSTEM ARCHITECTURE

The complete infeed line is composed of the following units:

01

Tipper System
(Automated Bulk Unloading)

02

Bulk Entry Receiving Chute

03

Receiving Conveyor

04

De-stacker /
Initial Separation Conveyor

05

Multibelt Parcel Singulator System (AI + Vision-Driven)

06

Output Herringbone (Cantering) Conveyor

Each subsystem integrates seamlessly via PLC-based interlocks, ensuring controlled, safe, and efficient parcel induction.

1. TIPPER SYSTEM – AUTOMATED HYDRAULIC BULK UNLOADING

System Overview

The Tipper System unloads bulk parcels from roll cages, bins, bags, or containerized trolleys with minimal manual effort. Using dual synchronized hydraulic cylinders, it tilts containers to a programmable angle, allowing gravity-based, controlled discharge into the receiving chute.

Engineered for high-mix logistics environments, it improves ergonomics, reduces manual handling, and enhances unloading productivity.

Technical Description: Hydraulic Powered Tipper

A precision-built dual-cylinder hydraulic tilting mechanism ensures:

- Smooth & balanced tipping motion
- Encoder-based angle control
- Controlled acceleration/deceleration
- Automatic return cycle

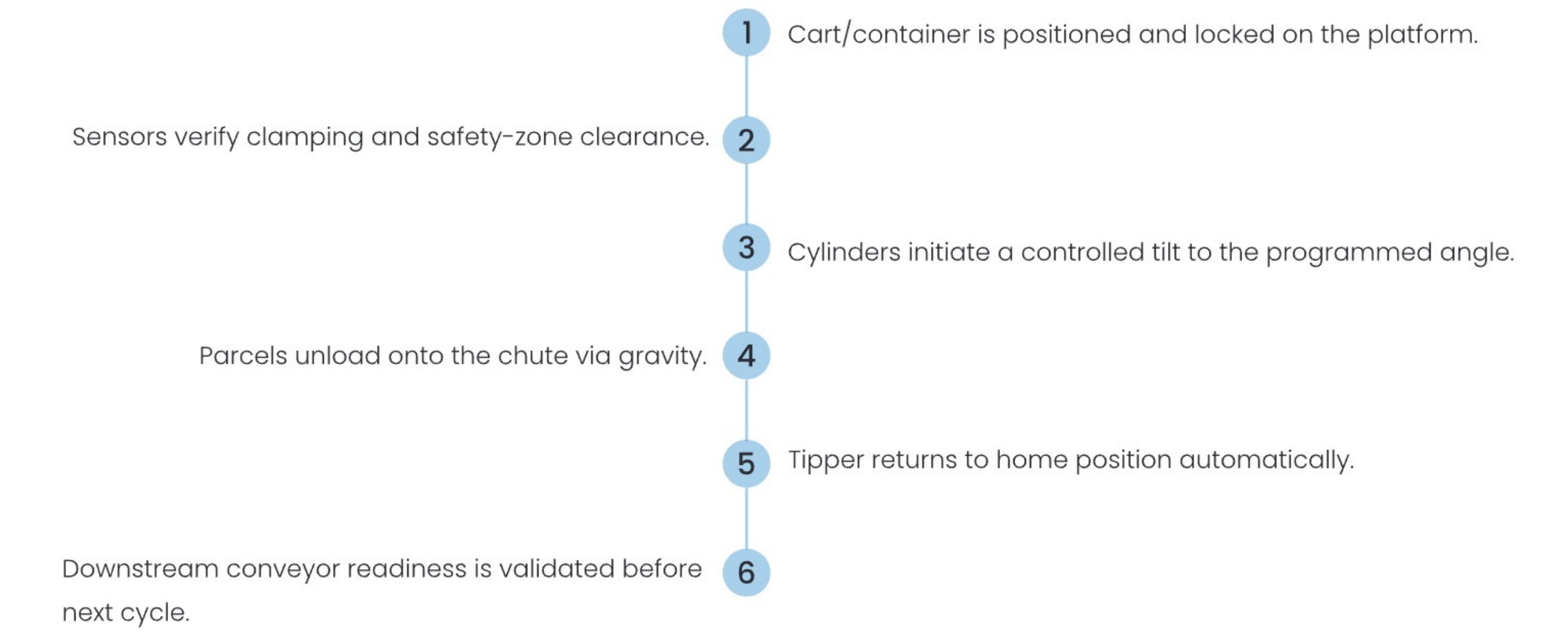
The compact hydraulic power pack provides consistent flow and pressure, while check valves and safety-lock valves ensure safe load holding.

Key System Dimensions

Parameter	Specification
Tipper Body	W 2000 × L 2300 × H 2200 mm
With Safety Fencing	W 2300 × L 3300 × H 2400 mm
Dumping Capacity	Up to 1000 kg (cart + load)
Dump Rate	Up to 55 dumps/hr

Programmable Angles90°, 112.5°, 135° (encoder controlled)

Working Principle



Automatic Parcel Infeed System

Safety & Control



Safety Light Curtain

Prevents motion upon intrusion.



Door Interlocks

Locks movement when gates are open.



Mechanical Maintenance Lock Post

With sensor feedback.



Emergency Stop Stations

At multiple access points.



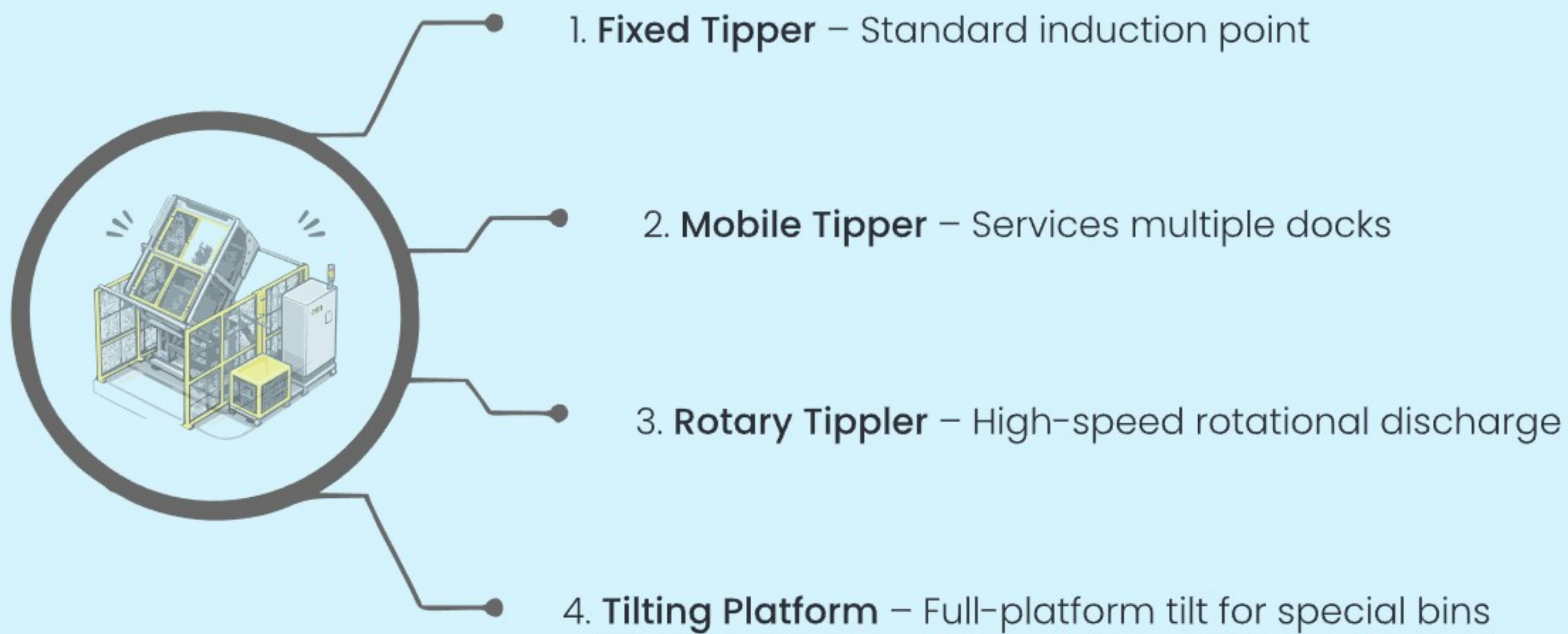
PLC-HMI Interface

Diagnostics, error logs, cycle counts.

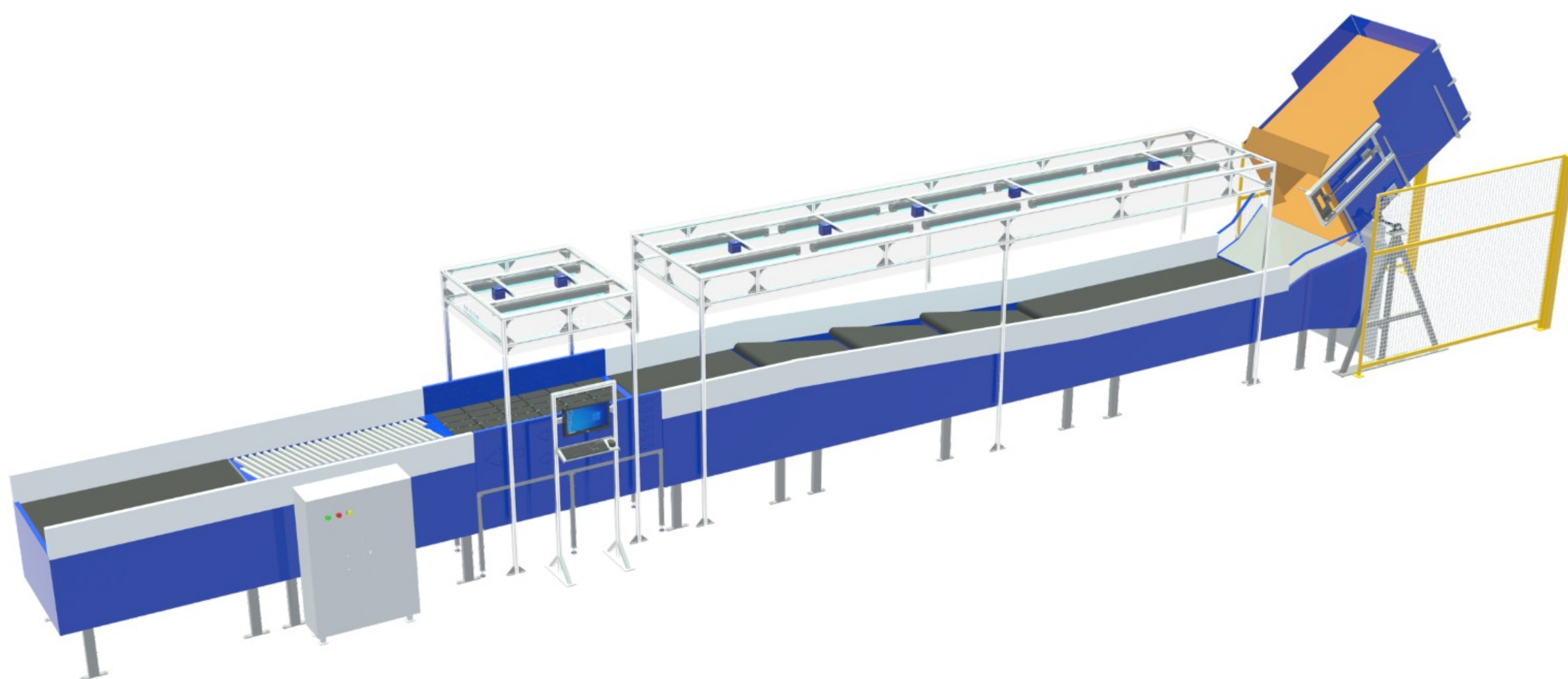


Automatic Parcel Infeed System

Variants



Applications



2. PARCEL SINGULATOR SYSTEM

AI + 3D Vision Driven High-Accuracy Singulation

Muvro's Multibelt Parcel Singulator is an advanced AI-enabled system engineered to convert random, overlapped parcel flows into a single-file stream with uniform spacing.

It uses:

- 3D stereo vision
- YOLO-based object detection
- OTSU & edge-fusion segmentation
- Multi-belt dynamic motion control

Achieves 99% singulation accuracy even for heavily overlapped items.

Key Capabilities



AI-Powered Detection

- YOLO + OTSU algorithms for fast
- multi-parcel recognition
- Depth sensing for stacked parcel separation



Real-Time 3D Vision

- High-accuracy depth
- Orientation detection
- Multi-plane segmentation



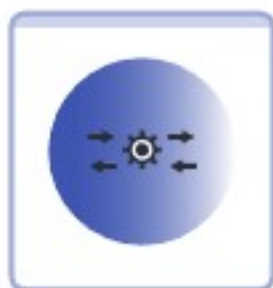
Modular 30-48 Belt Architecture

- Independent drive
- Variable speed
- Two-direction control



Parcel Handling Range

- Handles sizes from 150x150x1 mm up to 600x700 x500 mm (extendable)

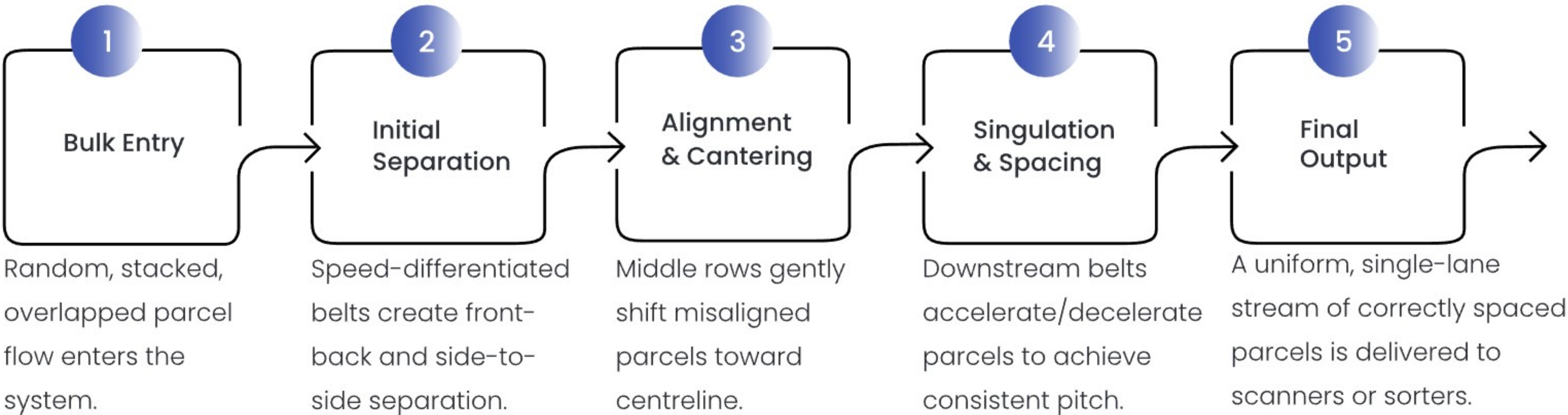


Throughput

- 3,000-10,000 parcels/hour

Singulation Process Flow

Working Stages of Parcel Singulation



3. INFEED CONVEYOR (Waterfall Cascading Design)

System Overview

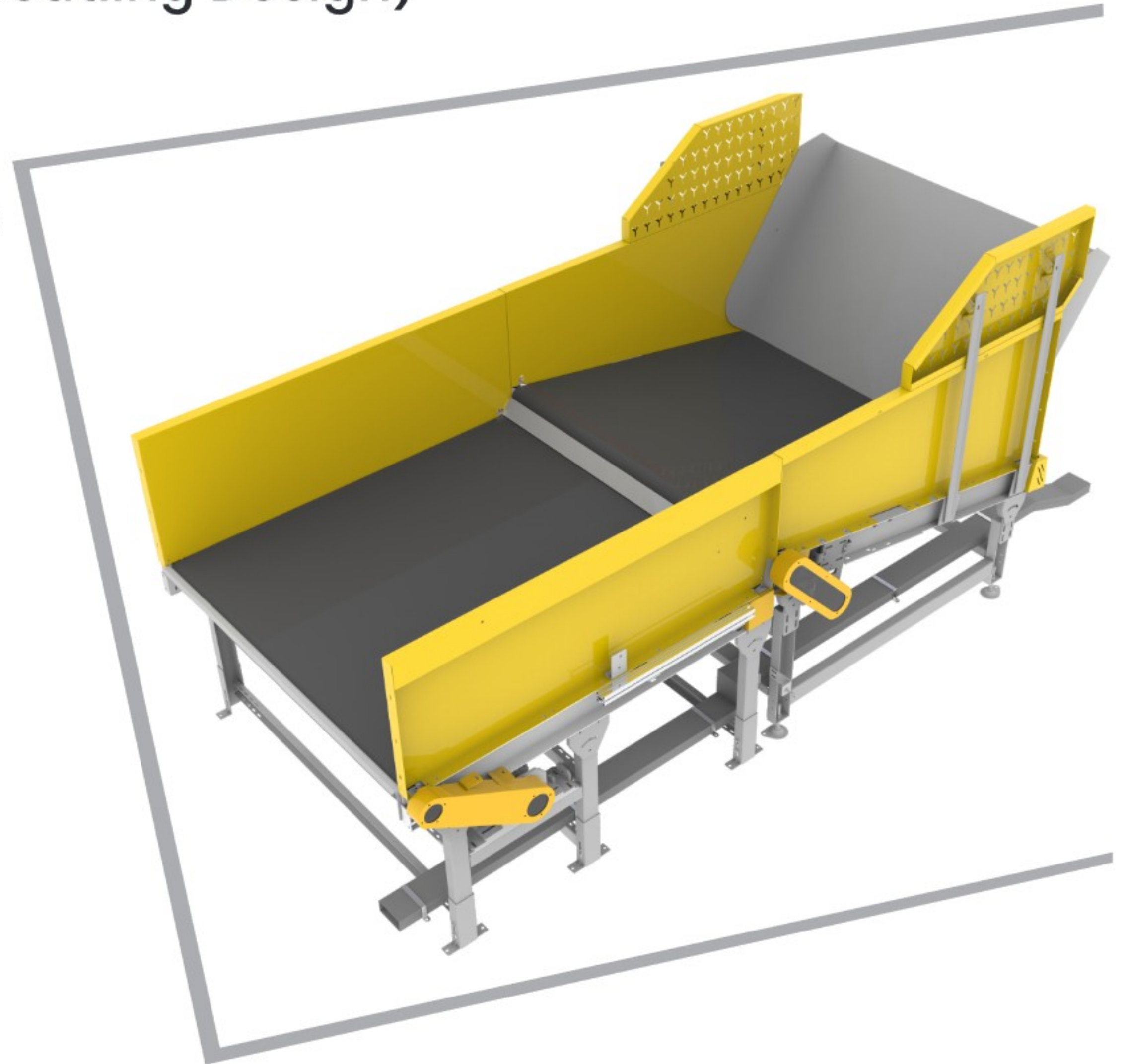
The Infeed Conveyor uses 3–4 independent belt modules installed at an incline.

A waterfall drop of 250–300 mm between belts:

- Breaks parcel stacks (3D → 2D flow)
- Avoids overlapping
- Ensures uniform entry to the singulator

Features

- PVC flat belts with VFD speed control
- 2D vision-based parcel density monitoring
- Dynamic speed adjustment to prevent jams
- Smooth acceleration for consistent singulation feed



4. MULTIBELT SEGMENTS (Separator / Singulator Core)

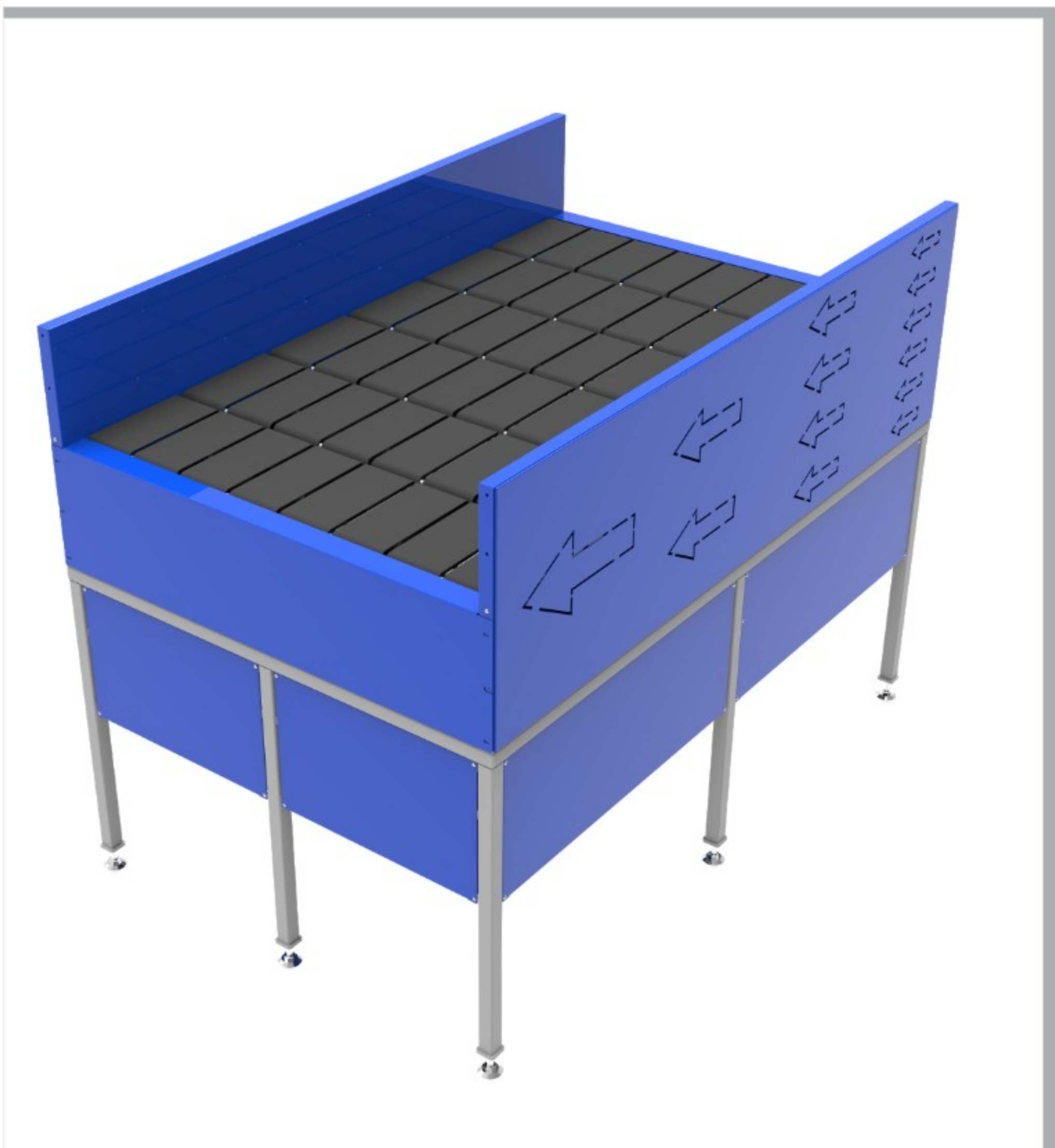
System Design

A matrix of narrow belts (30–48 belts) with:

- Independent servo/BLDC gear motors
- Bidirectional motion
- Modular maintenance-friendly design

Functions

- Accelerate parcels to create gaps
- Decelerate for alignment
- Laterally redirect parcels to centreline
- Break overlapped parcels
- Deliver controlled single-lane flow



5. 3D VISION CAMERA SYSTEM

Highlights

- Working Range: 0.25 m to 20+ m
- Depth Resolution: Up to 1280×800 @ 30 fps
- Depth Accuracy: 0.8% at 2 m
- FOV: 90° × 65°
- Ingress Protection: IP67
- Data Interface: GigE, PoE, RS485

Advanced Features

- Multi-camera sync for wide conveyors
- Hardware depth-to-colour alignment
- IMU for dynamic compensation
- Edge segmentation for overlapped parcels
- Real-time volume & orientation estimation



6. CONTROL SYSTEM

System Architecture

- PLC or PC-based industrial controller
- Real-time belt control algorithms
- HMI-based diagnostics & monitoring
- Ethernet/IP, Profinet or Modbus integration

Operating Modes

1. Variable Speed Mode

Precision speed control in 0.1 m/s steps.

2. Start-Stop Mode

Auto cycling between low-speed and high-speed.

Integration

Fully compatible with:

- WCS/WMS
- Sorters (Loop/Linear/3D/AMR Sorters)
- DWS (Dimensioning-Weighing-Scanning)
- SCADA systems

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7. DISCHARGE (HERRINGBONE) CONVEYOR

Design

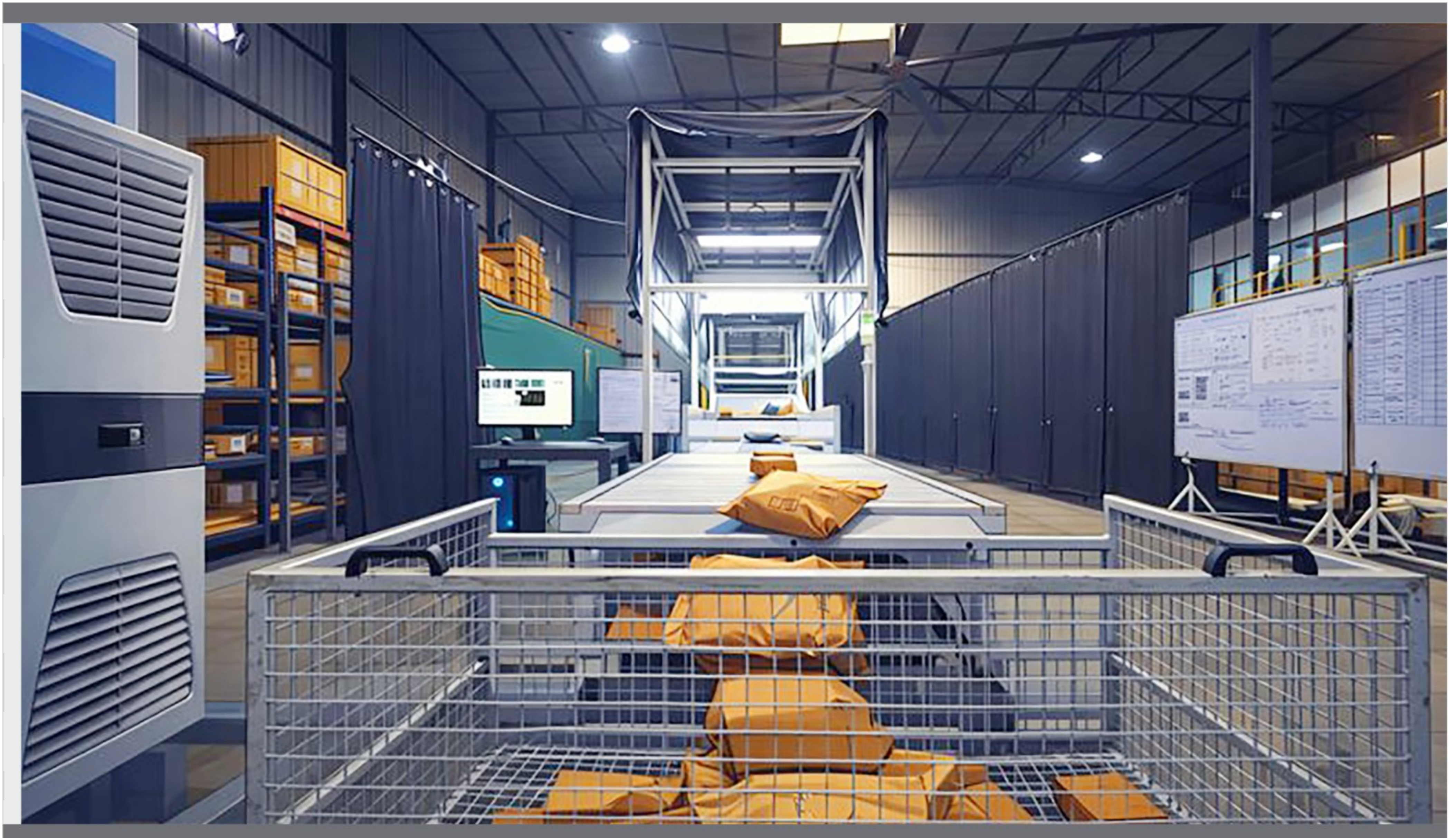
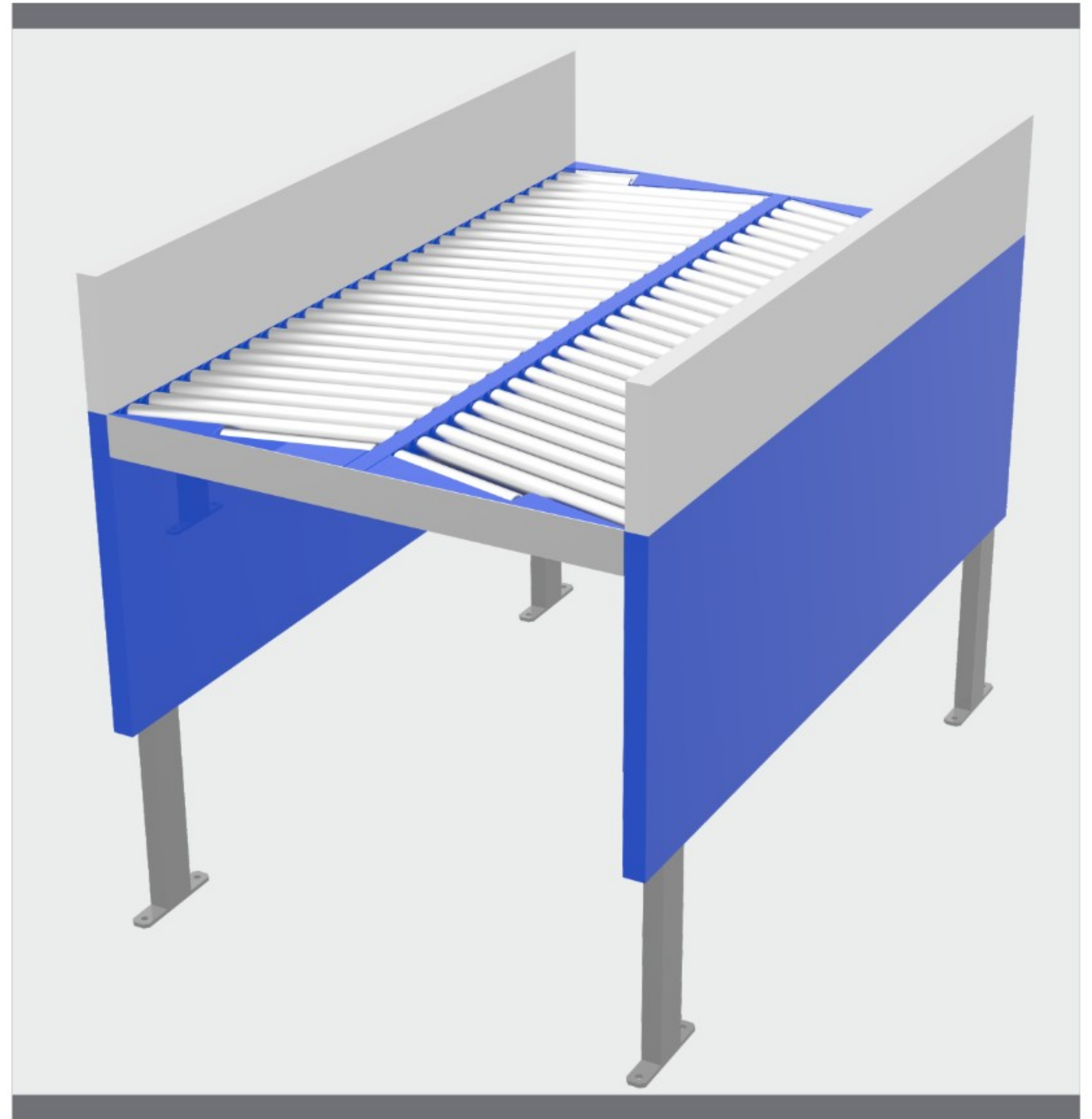
- Angled roller layout for natural self-cantering
- Flat-belt-driven roller actuation
- Pressure rollers for stable drive
- VFD-controlled AC geared motor

Purpose

- Deliver parcels perfectly cantered
- Improve downstream scanning accuracy
- Stabilize parcels entering high-speed sorters

APPLICATIONS

- Parcel hubs & courier networks
- E-commerce fulfilment centres
- Postal sorting facilities
- 3PL multi-client warehouses
- Airport baggage pre-sorting
- Returns processing centres





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