



CIND Dimensioner In-Motion Train the Trainer

Agenda

1. [Introduction to the Product](#)
2. [Standard Process](#)
3. [CIND Dimensioner - Dimensions](#)
4. [System Performance Data](#)
5. [How the System Works: Features and Applications](#)
6. [Pallet Mover Identification](#)
7. [Pallet Positioning during Measurement](#)
8. [Dimension Measurement](#)
9. [Stackability - Label Detection](#)
10. [Stackability - Geometrically](#)
11. [User Screen / User Interface](#)
12. [Pre-scanning with Zebra Barcode Scanners](#)
13. [Training Activities / Exercises](#)
14. [Pallet Mover Registration](#)
15. [Re-calibration of System](#)
16. [Ground and System Calibration](#)
17. [Data Dashboard \(QuickSight\)](#)
18. [CIND Support](#)

Introduction to the Product

Hardware

- **Stereo Cameras (3)** - Left, Right, and Top, used for 3D measurement.
- **Barcode Cameras (4)** - Left, Right, Top, and Front or back, for automatic barcode scanning.
- **Processing Units**
 - **Processing Unit** - Monitoring, operation & reporting
 - **MID - Processing Unit** - Sealed system, compliant with legal-for-trade (NTEP) requirements.
- **Power supply** - The system operates from a single main power connection.
- **USB sticker** - Inserted at the front of the CargoServer for log retrieval via scanning (NTEP only).
- **Manual Handscanner** - Serves as a fallback if barcode cameras fail to detect a barcode
- **Traffic Light Indicators** - Provide visual guidance for the operator
 - **Green:** Measurement can start.
 - **Yellow:** Measurement in progress; the next package must wait until green.
 - **Red:** A critical issue has occurred (e.g., calibration lost).
- **Network Connectivity** - Connects the system through either a modem or a fixed internet connection.
- **User Screen (2)** - Allows operators to monitor and follow the process.
- **Lighting (4 fixtures)** - Must remain continuously active to ensure accurate measurements and reliable barcode reading.

Introduction to the Product

Certification

- MID certified and approved for legal for trade use

Documentation

- Images captured from multiple angles per passage
- Supports deviation handling, customer dialogue & quality control

Capabilities

- Handles cargo types within defined specifications
- Reliable on black plastic and reflective surfaces



Introduction to the Product

Key Operational Notes

- MID is intended for legal-for-trade measurements; CargoServer is the user interface.
- Manual hand scanner provides a reliable backup option.
- Regular calibration verification are critical for maintaining system accuracy.

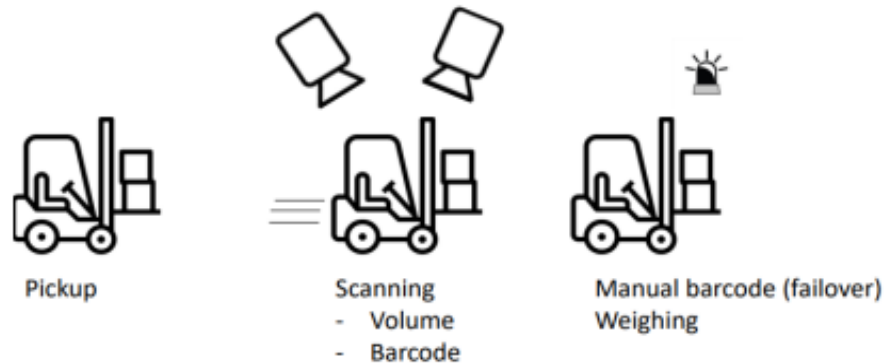
Calibration and System Sensitivity

- Auto Check Calibration Mode continuously monitors calibration during operation, as long as calibration remains intact.
- The system is sensitive to movement, avoid maintenance unless advised by CIND.
- Proper protection of the system is essential for reliable operation.

Standard Process

The standard process is as follows:

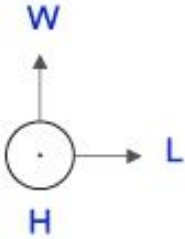
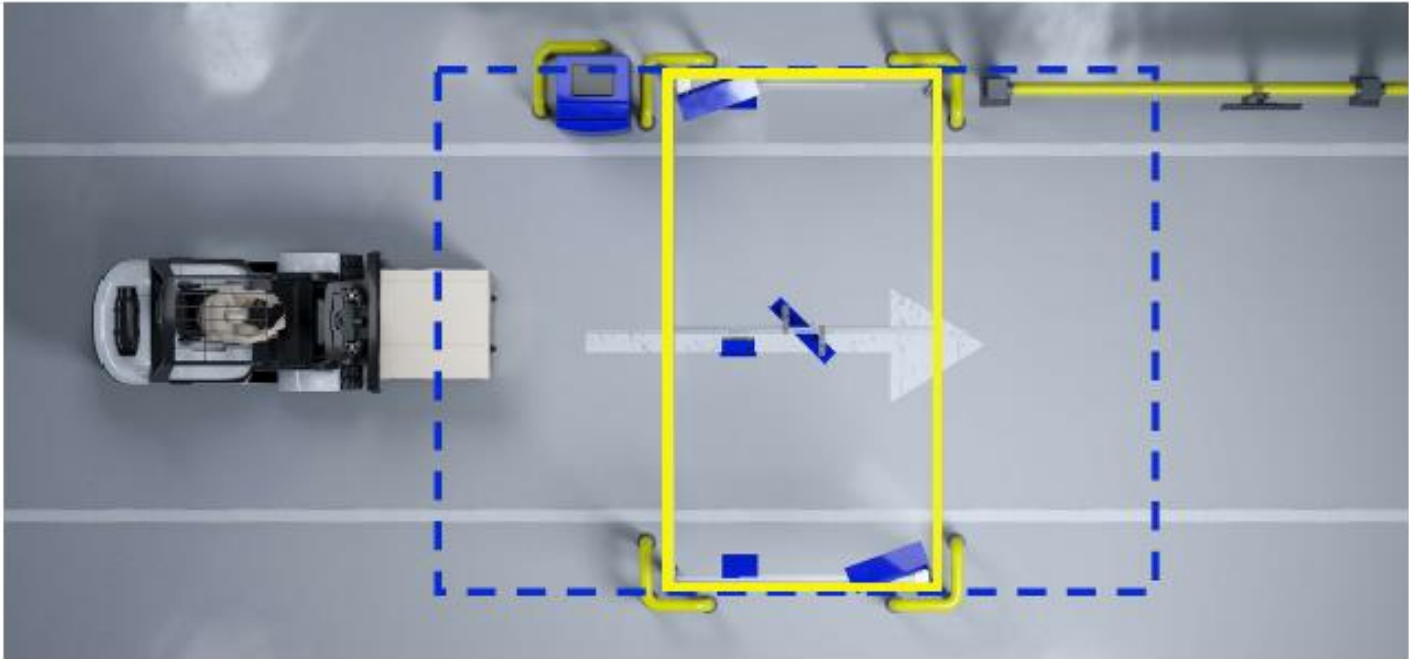
1. The pallet must be lifted by the forklift and must not be pushed along the ground.
2. The forklift drives through the Scanning Station.
3. The pallet dimensions and ID of the forklift are captured automatically.
4. Barcode is scanned automatically (manual barcode scanning as fallback)
5. When the green screen is displayed, the forklift can proceed to its destination



CIND Dimensioner - Dimensions

measurement area
(W4m x L6m x H4m)

CargoSpect portal
(W4m x L2m x H4m)



System Performance Data

Feature	Value
Maximum forklift speed	7 km/h (4.4 mph) ¹
Minimum forklift speed	1 km/h (0,6 mph)
Max processing time	From the time when the forklift enters the measurement zone until the dimension measurement is done: Max 10 s
Maximum pallets per hour	500
Supported forklift types	All forklifts that allow mounting of Cinds identification codes
Max size of object	W 240cm (94 inches), L 240 cm (94 inches), H 254 cm (100 inches)
Min size of object	W 50 cm (20 inches), L 24 cm (12 inches), H 24 cm (12 inches)
Temperature limits	+5 - +40 degrees Celsius
Accuracy	+/- 2 cm as per MID/NTEP requirement
Supported barcodes	GS1-128, Code 128 labelled according to GS1 Logistic Label Guideline. Minimum width of the symbol's thinnest bar is 0,495 mm (X-dimension)

¹ If automatic barcode readings are installed the maximum speed might be lower.

How the System Works: Features and Applications

Driving and Operation

- System operates while driving through at 1-7km/h (0.6-4.4 mph)
- Allows smooth workflow without stopping for measurements.
- Important: Keep a constant speed through the measurement area, do not change speed during scanning.
- Do not exceed the maximum speed of 7 km/h (4.4 mph).
- Drive straight through the measurement area. Avoid S-line driving.

Traffic Light Indicators

- Green: New measurement can start
- Yellow: Measurement in progress, the next measurement must wait until green light
- Red: A critical issue has occurred e.g., calibration lost.

Scanning & Stackability

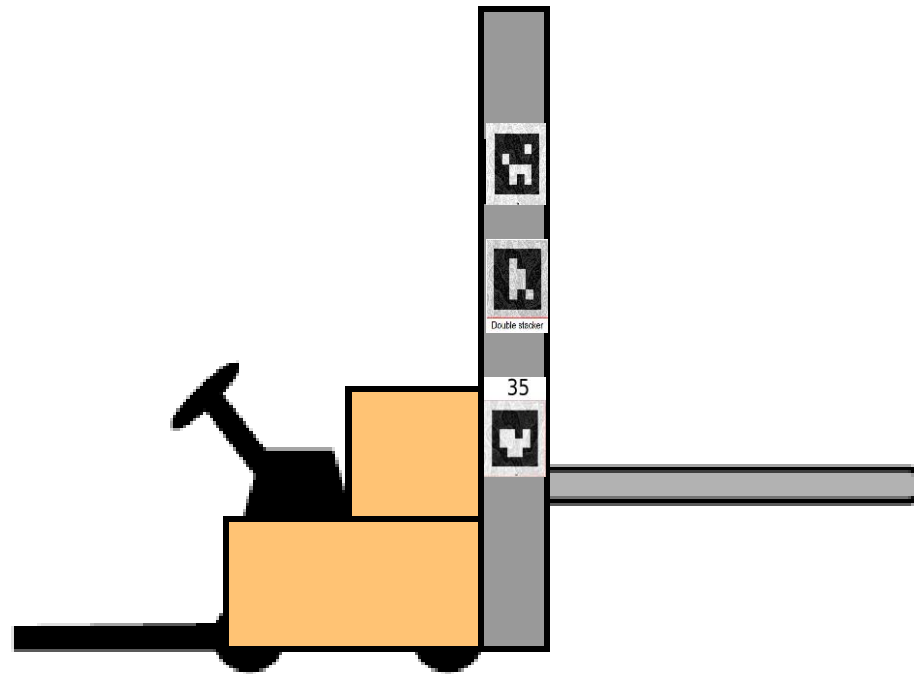
- Captures the dimensions of the pallet (including the skid)
- Captures barcodes/AWB for identification.
- Stackability Checks:
 - Stackable (GEO) – determined using the point cloud generated by the MID dimensioner.
 - Stackable (TEXT) – determined via barcode/label information

Result and User Feedback

- NTEP Screen – Legal for trade verified results
- CargoServer (User Screen) – User Interface for monitoring and decision-making

Pallet Mover Identification

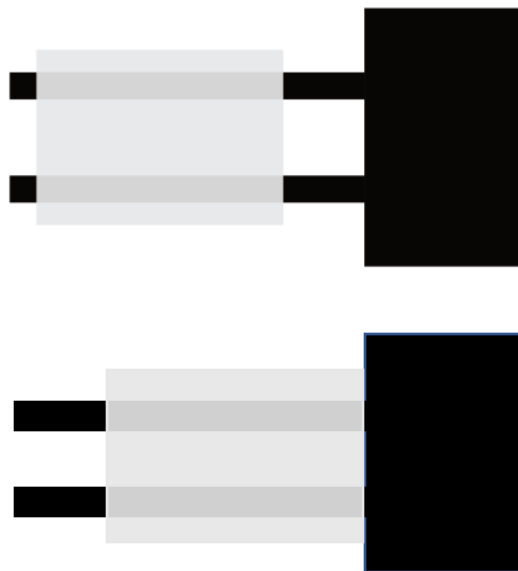
When entering the measurement zone, the pallet mover is automatically identified using ArUco markers mounted on both sides.



Pallet Positioning during Measurement

To ensure accurate measurement results, the pallet must be positioned correctly on the forklift forks before entering the measurement system. Proper placement ensures optimal scanning performance and prevents measurement errors.

Correct placement



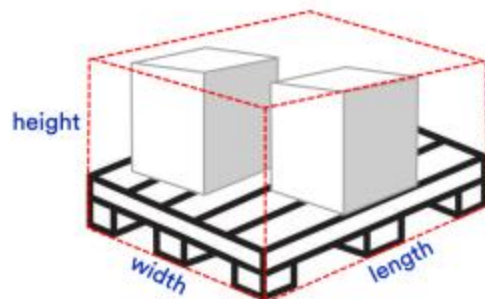
Not correct placement



Dimension Measurement

The system uses stereo vision (3D cameras) to capture objects within its measurement zone. It tracks the movement of the vehicle and builds a 3D model of both the vehicle and its cargo. Once the forklift has passed through the measurement zone, the system identifies and separates the cargo from the forklift.

The system then calculates the cargo dimensions (length, width, and height) with an accuracy of ± 2 cm. It measures exactly what is visible, meaning that any exposed plastic, packaging, or other material extending beyond the pallet will be included in the final dimensions.



Point cloud illustrating plastic extending beyond one side of the load.

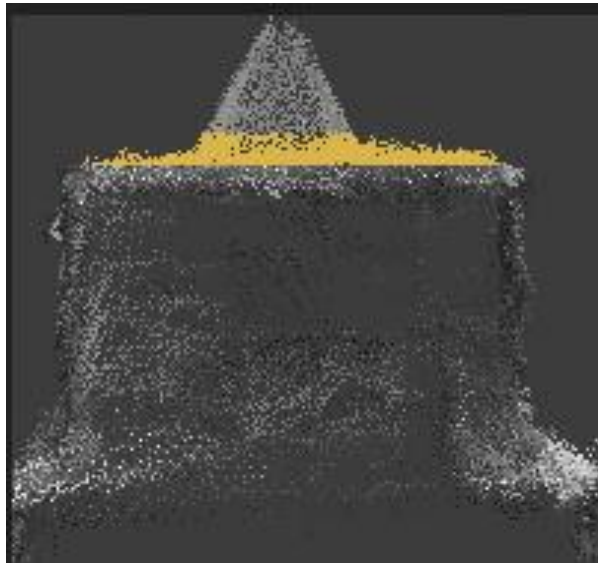
Stackability – Label Detection

The Scanning Station can be extended via a software option that identifies text-based labels. Examples of such labels are labels with text “DO NOT STACK”. These labels are detected using the barcode cameras, and the text to detect is configurable. The system supports all letters in the Latin alphabet, enabling reliable detection of labels written with standard Latin characters. Detected label information is included in the data output.



Stackability – Geometrically

The Dimensioner In-Motion can be extended via a software option that analysis geometrically. It evaluates several geometric parameters to determine whether a pallet is stackable. The results of this analysis are included in the data output.



Point cloud used for geometric surface and edge detection.

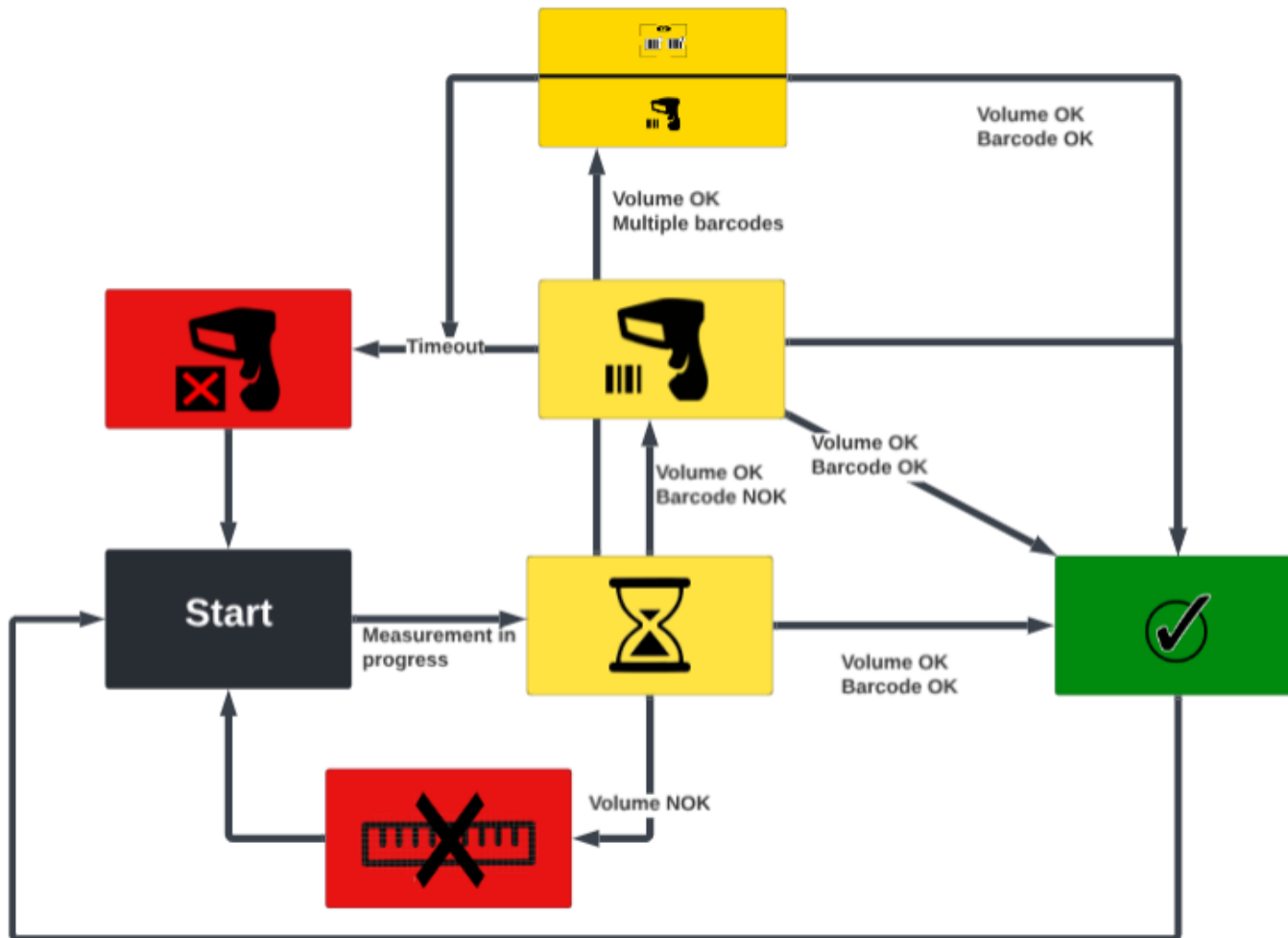


Top-view segmentation identifying load distribution and support areas.



Stackability result

User Screen / User Interface



User Screen / User Interface



Barcode-timeout



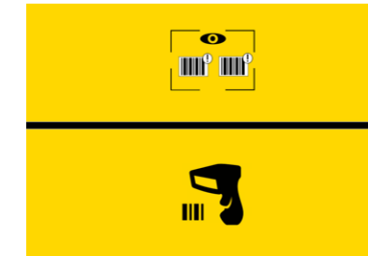
Invalid-passage



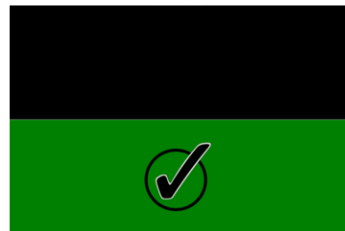
Measuring



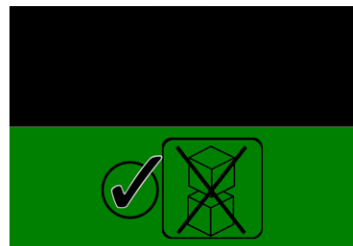
No-barcode detected /
Manual scanning



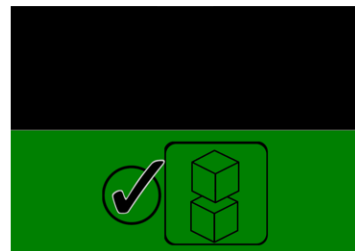
Multi-match_manual
scanning



OK



OK Non-stackable



OK Stackable

User Screen / User Interface



Forklift registration failed



Forklift registration successful



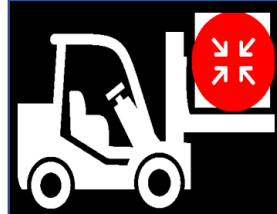
Unregistered forklift



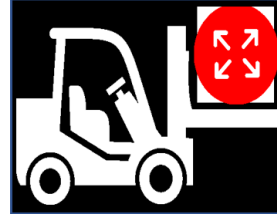
Failed to detect ArUco on forklift



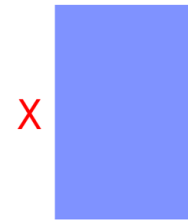
Measurement failed



Cargo under minimum dimensions



Cargo over maximum dimensions



Outside of measurement zone



Forklift driving too fast



Forklift driving too slow



Forklift speed too varied



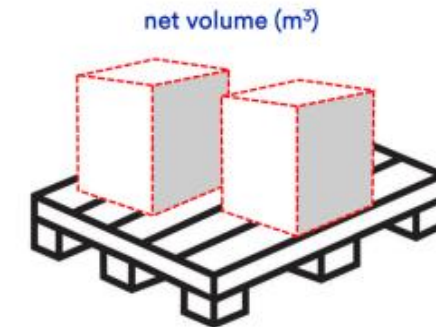
Forklift not driving straight

Pre-scanning with Zebra Barcode Scanners

Pre-scanning with Zebra Barcode Scanners is the process of scanning a barcode before the item enters and passes through the system. Multiple cradles can be connected to the system, allowing support for a large number of scanners.

Step A: Scan Quantity

- The operator scans the quantity (for example, number of packages or repetitions).
- If a quantity is scanned, the system measures the net volume and forwards the quantity to the CargoServer.
- If no quantity is scanned, the system measures the gross pallet dimensions.



Step B: Scan Barcode and Forklift ID

The operator then scans:

- Barcode
 - Forklift ID
- The order does not matter.
 - If a rescan is required, start a new sequence.
 - The same barcode can be used on multiple forklifts.

```

Pre scanned barcodes:
Forklift: 140 Barcode: 1720058157100000
Forklift: 145 Barcode: 1720058157100000
Forklift: 150 Barcode: 1720058157100000#010
Forklift: 160 Barcode: 1720058157100000
Ongoing scans:

```

Training Activities / Exercises

Practical Exercises

- Technicians will participate in structured, hands-on exercises with the team.
- Exercises will cover operating the system, scanning pallets, checking stackability, interpreting results, and completing a forklift registration as a practical exercise.
- The goal is to ensure the team is comfortable and confident using the system.
- Questions and discussion will be encouraged to clarify procedures and reinforce understanding.

Pallet Mover Registration

Preparation

- Verify that Cind “Aruco Labels” are installed.
- Confirm Pallet Mover Identification is mounted on both sides.
- Confirm Pallet Mover Type Identification is mounted on one side.

Position the Registration Board

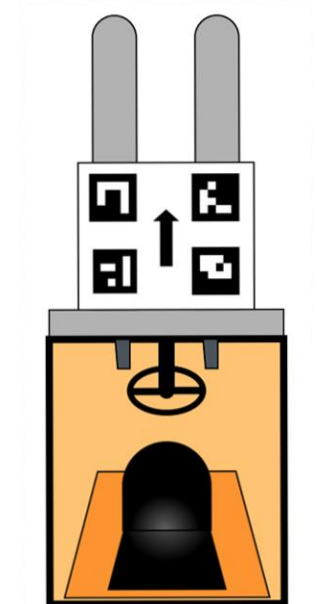
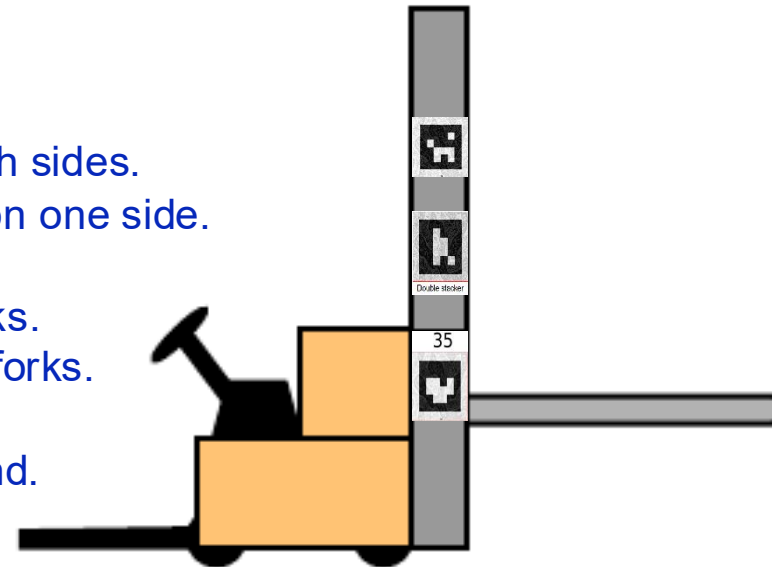
- Place the registration board flat and stable on the forks.
- Ensure the arrow points in the same direction as the forks.
- Center the board between the forks.
- Raise the forks approximately 10 cm above the ground.

Drive Through the Gantry

- Start 5 meters before the gantry.
- Drive straight through at a constant speed.
- Keep the board stable during the entire pass.
- Continue at least 3 meters beyond the gantry.

Confirmation

- Successful registration is indicated by a green check mark and pallet calibration symbol on the screen.



Re-calibration of System

To ensure system accuracy, please follow these calibration hardware guidelines.

Calibration Boards

- System Calibration board
- Three ArUco boards (0, 1, 2)

Handling & Storage

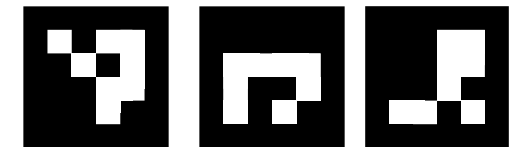
These boards are precision instruments. To ensure accurate measurements:

- Storage: Must be stored indoors.
- Handling: Highly sensitive to bending and scratches.

Support: Always contact CIND before taking any action if you encounter issues or technical difficulties.



System Calibration Board



ArUco Boards 0, 1, 2

Ground and System Calibration

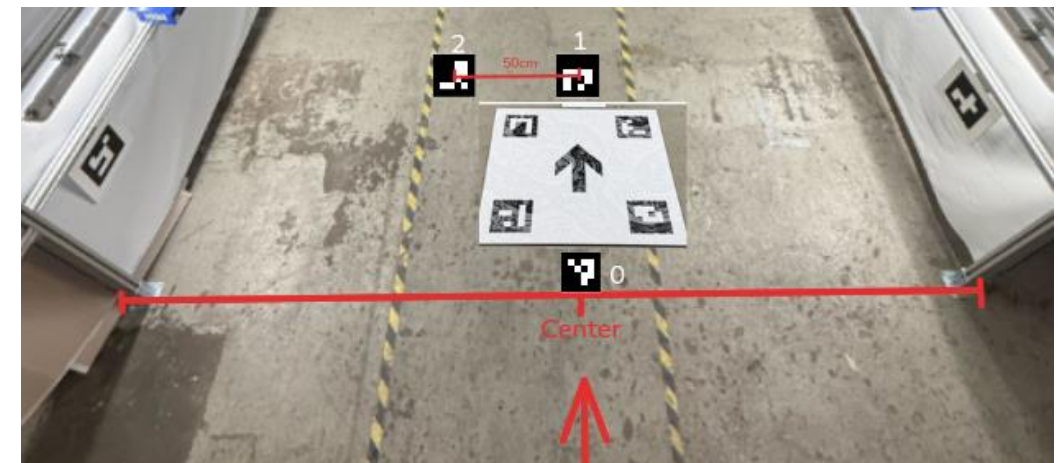
ArUco board placement

- Ensure the center of each board is aligned with the center coordinate (CC). The white bottom section of the ArUco board indicates the start of the measuring zone.
- Measure distances from the front portal. Place ArUco board 0 at the CC of the starting zone.
- Position the System Calibration board 2 cm in front of ArUco board 0.
- Place ArUco board 1, 2 cm ahead of the System Calibration board.
- Position ArUco board 2 to the left of ArUco board 1 with a center-to-center spacing of 50 cm.



System Processing

- After the setup is complete, CIND will perform actions.
- Wait until CIND finishes these actions before proceeding.



Data Dashboard (QuickSight)

User Access & Management

- Login Verification – confirm system access.
- User Permissions – assign role-based, read-only access.

Data Verification

- Data Transfer Check – confirm all measurement and scan data is sent to QuickSight.
- CSV Export – show how to export data for external analysis.

Data Overview

- QuickSight Data Inputs – overview of captured data:
 - Measurements
 - Barcode / AWB details
 - Stackability results (GEO & TEXT): SP (Stackable Pallet) or NSP (Non-Stackable Pallet)
 - Timestamps and operational data



CIND Support

A support ticket is automatically created when you send an email to support@cind.se.

When submitting a ticket, please include the following information:

- Company name and station (terminal)
- Name and contact details
- Timestamp of the incident (and barcode information, if applicable)
- Description of the issue/problem
- Which system is affected

Helpdesk opening hours:

Monday–Friday, 08:00–17:00 CET

Contact details:

- Email: support@cind.se (Helpdesk ticket)
- Phone: +46 36 19 20 30

24/7/365 Hotline Support:

Available as an additional service upon request and not included in the standard service solution.

**Please scan for User Manual &
Declaration of Conformity**

