EVST | Robotics

EVST Mobile Manipulators

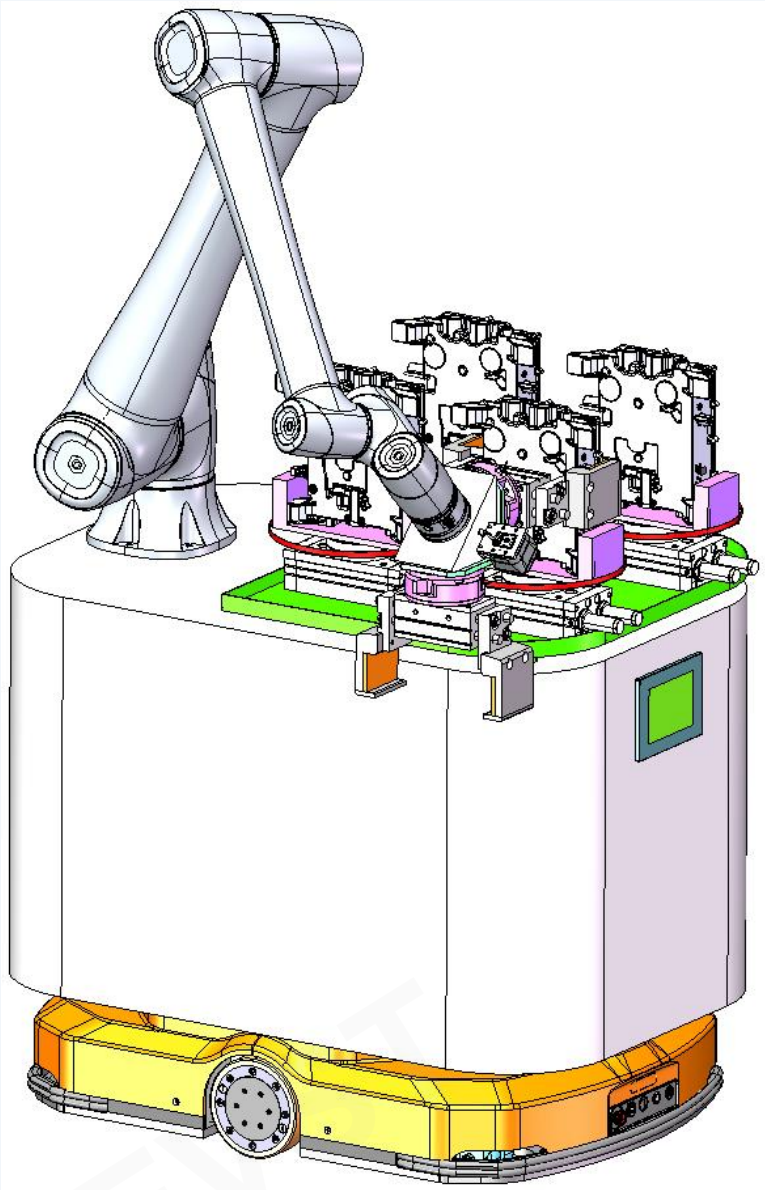
EVST Alpha / Beta / Gamma Series

Mobile Manipulators · Flexible Machine Tending

Coordinated handling, vision, mobility and control: one robot serves multiple machines

Two-stage monocular/binocular 2.5D/3D vision positioning: wide-angle ±0.25 mm, then precision positioning down to ±0.1 mm

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Specifications are typical or nominal values for the standard configuration. Actual cycle time, accuracy and runtime depend on site conditions and are confirmed after a site assessment.

EVST Mobile Manipulators

• Positioning: Mobile manipulators for CNC and precision manufacturing. Standard, Precision and Heavy-duty lines cover single-machine tending through full-line logistics.

• Core technology: Two-stage monocular/binocular 2.5D/3D vision positioning (wide-angle ±0.25 mm, then precision positioning down to ±0.1 mm) with integrated algorithmic compensation.

• Application examples: Motorcycle powertrains, gears and housing machining. Delivery covers design, mechanical and electrical engineering, software and on-site commissioning.

• Open ecosystem: Supports custom development and mainstream CNC machines, industrial robots, cobots and host systems, with open APIs and SDKs.

±0.1 mm

Precision vision positioning

20 kg / 1700 mm

Cobot payload / reach

6 h

Rated runtime

Seconds to minutes

Supported tending cycles

■ Three Product Lines

• EVST-Alpha Series · Standard: Flexible CNC tending
• EVST-Beta Series · Precision: Flexible chip handling
• EVST-Gamma Series · Heavy-duty: Full-bin transfer / large-part tending

Product Family

EVST-Alpha Series

Standard · Flexible CNC Tending

- CNC tending: 3-5 machining centers per robot, subject to cycle-time calculation
- 6-axis cobot: 20 kg payload / 1700 mm reach / ±0.1 mm repeatability
- Monocular/binocular 2.5D/3D precision vision positioning; four-position storage fixture (contoured nests + drip tray)
- Application example: Two-operation aluminum-part tending, approx. 65 s/part

EVST-Beta Series

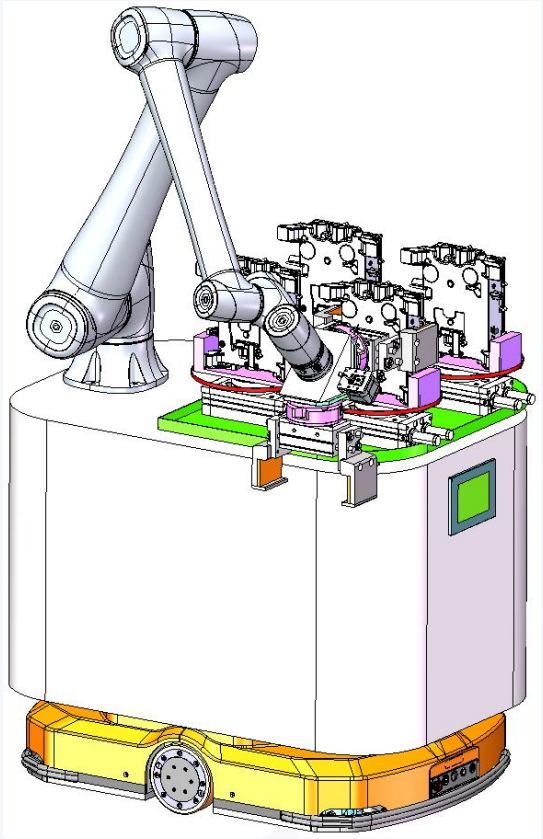
Precision · Flexible Chip Handling

- Flexible handling of chips / precision components; end-effector force control for hand-like pick-and-place
- Monocular/binocular 2.5D/3D precision vision positioning down to ±0.1 mm
- Fast changeovers for high-mix, low-volume production; cycles in seconds

EVST-Gamma Series

Heavy-duty · Full-bin Transfer / Large-part Tending

- Full-bin transfer and large-part tending; rated payload up to 1000 kg
- Onboard powered roller conveyor holds two bins; two-way transfer with buffers / transfer conveyors
- Monocular/binocular 2.5D/3D precision vision positioning guides picking; pneumatic tool changer enables automatic changeovers
- Application example: Gear-grinding line; 5 robots serve 16 machines



EVST-Alpha Series (Standard)

Note: Base dimensions, chassis payload, arm, battery capacity and base color are customizable. Cycle times are calculated for the customer's actual products.

Six Advantages

01 Two-stage Positioning

Two-stage monocular/binocular 2.5D/3D vision positioning: ±0.25 mm wide-angle initial positioning, then precision positioning down to ±0.1 mm, with integrated algorithmic compensation.

02 Multi-Machine Coverage

One robot serves 3-5 CNC machines (subject to cycle-time calculation) and supports tending cycles from seconds to minutes.

03 Laser SLAM Navigation

Laser SLAM navigation, with optional QR codes or reflectors. Docking accuracy: ±10 mm, ±1°.

04 Safe & Reliable

Front/rear lasers for 360° protection, contact bumpers, emergency stops on all four sides, real-time obstacle detection and robot collision detection.

05 Open & Compatible

Custom development; compatibility with mainstream CNC machines, industrial robots / cobots and host systems; RS485 / CAN / I/O expansion and open APIs / SDKs.

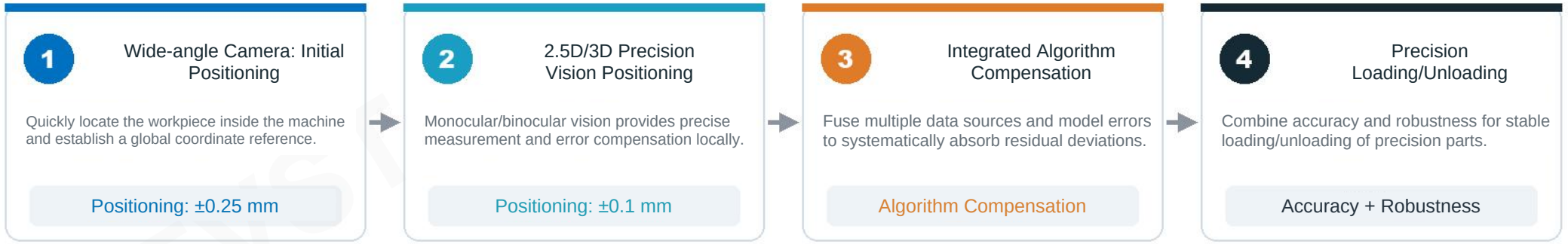
06 Designed for Oily Environments

Anti-slip tires, reinforced supports, modified suspension and an underbody antistatic chain for metalworking sites.

At a glance: 3-5 CNC machines per robot (subject to cycle-time calculation) | Cycles from seconds to minutes | Pneumatic tool changer for gripper changes

Core Technology: Two-stage Precision Vision Positioning

Two-stage 2.5D / 3D Precision Vision Positioning



Technology: Wide-angle positioning (±0.25 mm) > 2.5D/3D precision vision (down to ±0.1 mm) > Algorithm compensation > Precision loading/unloading

Vision Hardware

- Monocular/binocular 2.5D/3D cameras
- Wide-angle initial positioning: ±0.25 mm; establishes a global coordinate reference
- Precision vision positioning: down to ±0.1 mm
- 2D / 2.5D calibration and positioning; pattern presence/absence detection

Mechanical Compensation

- Floating coupling: XYZ translation + angular compensation about all three axes
- Contoured gripper fingers locate parts using external profiles and process holes
- Pneumatic tool changer supports multiple gripper types
- Arm end-effector force control for compliant, hand-like pick-and-place

Software Algorithms

- Integrated algorithmic compensation: models and corrects multiple error sources
- Measurement: diameter / width / grayscale area
- Recognition: OCR, barcodes and QR codes

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Technical Specifications · Overview

Specifications

■ Robot Arm / Mobile Chassis / Navigation

Item	Specification
Arm type	6-axis cobot, 20 kg / 1700 mm
Reach	1700 mm
Joint range	360° on all axes
Arm payload	20 kg
Repeatability	±0.1 mm
Vision positioning	Down to ±0.1 mm (two-stage vision)
Base dimensions (L × W × H)	1150 × 800 × 760 mm
Base weight	500 kg (estimated; excludes arm)
Turning diameter	1220 mm
Rated payload	400 kg (Gamma Series: up to 1000 kg)
Drive type	Two-wheel differential drive
Navigation	Laser SLAM (optional QR codes / reflectors)
Navigation accuracy	±10 mm, ±1°
Unladen / laden speed	≤ 1.5 m/s
Minimum aisle width	950 mm
Gradeability	≤ 3°

■ Battery / Environment / Safety / Cycle Time

Item	Specification
Battery type	Lithium iron phosphate (LFP)
Battery capacity	48 V / 80 Ah (some models: 48 V / 60 Ah)
Rated runtime	6 h
Charging time	≤ 2 h (5-100%), automatic / manual
Charging method	Automatic charging dock / manual plug-in
Temperature range	0-50 °C (operating environment: 0-40 °C)
Humidity	10-90%, non-condensing
Laser obstacle avoidance	Front/rear lasers, 360° protection
Contact protection	Contact bumpers + emergency stops on all four sides
User interface	Touchscreen + audible/visual alerts + marker lights
Communication	Wi-Fi (RS485 / CAN / I/O expansion)
Tending cycle time	Cycles from seconds to minutes
CNC machines per robot	3-5 (subject to cycle-time calculation)
Changeover	Pneumatic tool changer / quick-change grippers
Machine signals	I/O: material request / clamp / cycle complete
Base color	Customizable

Note: Customizable arm, chassis payload, base dimensions, battery capacity and base color. Actual cycle time, accuracy and runtime are confirmed for each project.

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Vision System · Specifications

Vision System

■ 2.5D / 3D Camera Specifications

Item	Specification
Wide-angle camera	Initial positioning ±0.25 mm (global coordinate reference)
Sensor type	CMOS, global shutter
Pixel size	3.2 μm × 3.2 μm
Sensor format	1/1.7"
Resolution	5 megapixels
Lens mount / focal length	M12-mount / 12.4 mm
Total weight	500 g
2.5D working height	180 ~ 250 mm
2.5D positioning accuracy	±0.26 mm (100 mm from code)
Vision tools	Calibration / positioning / presence detection / measurement / recognition

■ Vision tools

• 2.5D / 2D calibration; 2.5D / 2D positioning

• Pattern presence/absence detection

• Measurement: diameter, width, grayscale area

• Recognition: OCR, barcodes / QR codes

■ Precision Vision Positioning & Two-stage Strategy

Item	Specification
Monocular / binocular 3D camera	Precision vision positioning down to ±0.1 mm
Stage 1 · Wide-angle Initial Positioning	±0.25 mm; establishes a global coordinate reference
Stage 2 · Precision Vision Positioning	±0.1 mm; precise measurement and error compensation
Algorithm compensation	Multi-source error modeling and correction
3D vision applications	Guides bin / product picking and detects bin height
Target protection	Pneumatic cover closes during machining and opens for imaging

■ Why Two-stage Positioning?

• Vision-only systems have limited robustness: oil, chips and lighting changes can destabilize a single image capture.

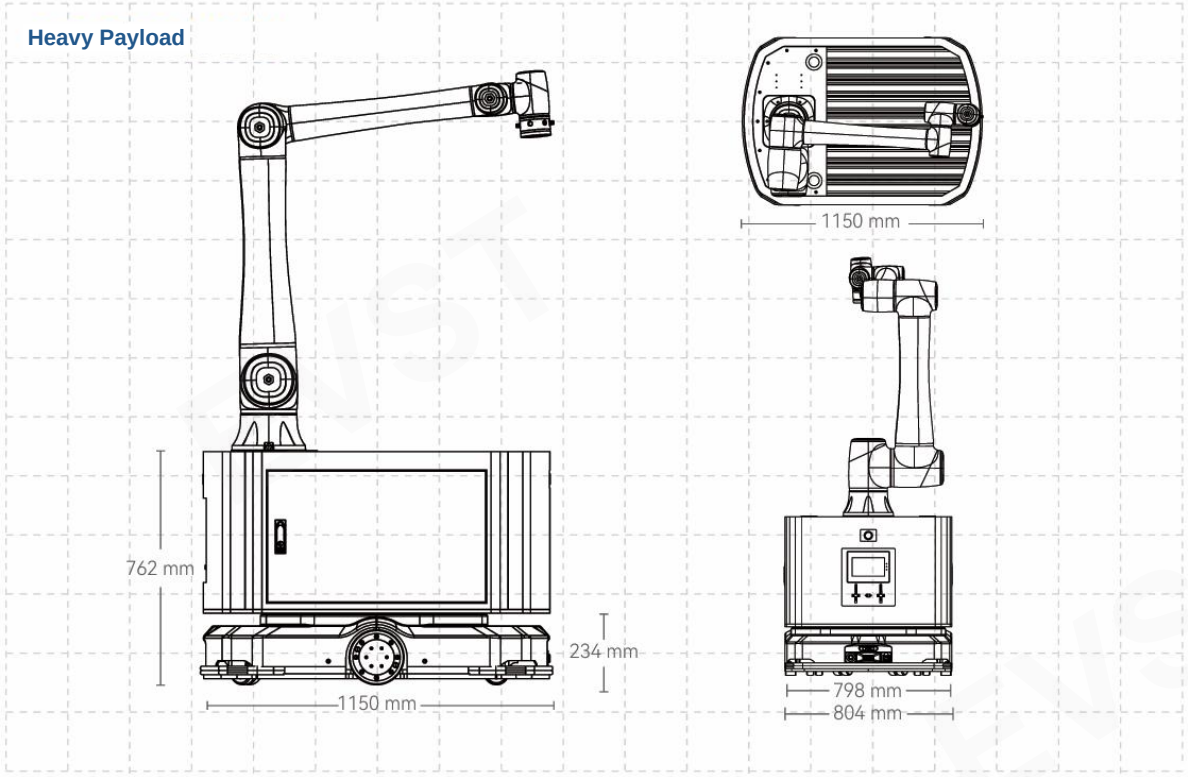
• Single-stage vision trades field of view against accuracy: a wider view reduces accuracy; higher accuracy restricts the view.

• Two-stage approach: Wide-angle global reference → precision vision measurement in a smaller area → integrated algorithmic compensation for residual errors, combining accuracy and robustness.

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Mobile Base · Dimensions & Clearance

Dimensions & Clearance



Base: 1150 × 800 × 760 mm (platform height); turning diameter: 1220 mm (customizable)

■ Key Dimensions & Clearance

Item	Parameter
Base length	1150 mm
Base width	800 mm
Platform height	760 mm
Lift-type base dimensions	1400 × 800 × 830 mm
Turning diameter	1220 mm
Minimum aisle width	950 mm
Traversable gap	≤ 30 mm
Traversable step	≤ 5 mm

■ Structure & Customization

• Dimensions and clearance figures are for the standard model and can be customized for site conditions.

• Integrated frame, reinforced supports and modified suspension. The platform directly accepts a cobot arm, storage fixtures and roller conveyors.

• Anti-slip tires for oily floors; underbody antistatic chain.

• Front/rear LiDAR + contact bumpers for 360° protection.

Scope of Supply

EVST Mobile Manipulator - Standard Scope of Supply

Mobile Platform	Mobile Base (Differential Drive)	Laser SLAM / QR Code / Reflector Navigation	Automatic Charging Station	Onboard Powered Roller Conveyor / Buffer Station	Marker Lights / Emergency Stop / Anti-collision Strip
Manipulation Unit	6-axis Collaborative Arm (20 kg Payload / 1700 mm Reach)	Pneumatic Tool Changer / Gripper Rack	Contoured Pneumatic Gripper / Vacuum Cup / Dual Vacuum Cups	Floating Joint (XYZ Translation + Angular Compensation)	Robot Mount / Cable Ducts / Pneumatic Lines
Sensing System	Monocular/Binocular 2.5D/3D Precision Vision Positioning	Wide-angle Initial Positioning ±0.25 mm	Precision Vision Positioning ±0.1 mm	Integrated Algorithm Compensation	Position / Presence Sensors
Control & Electrical	Industrial PC / Air Pump / Valve Island	I/O Modules (RS485 / CAN / I/O Expansion)	Wi-Fi Router / AP Network	48 V LiFePO4 Battery / BMS	Marker Lights / Audible & Visual Alarm
Software System	Deployment Software: Mapping / Station Setup / Application Deployment	Fleet Scheduling: Work Orders / Route Planning / Traffic Control	Operation Monitoring / Statistics / Alarms	Peripheral Interfaces (Machine Call / MES / WMS)	Open API / SDK for Custom Development
Auxiliary Stations	Storage Fixtures (Contoured Supports + Drip Tray)	Smart Material Storage / 3-axis Gantry Robot	Loading/Unloading Conveyor / Pallet Recirculation Line	Material Bin Transfer Module (XYZ 3-axis)	Chip Blow-off / Code-scanning Station Air Knife / Target Protection

Standard scope shown above. Auxiliary stations can be tailored to the site: smart storage, 3-axis gantry robots, loading/unloading conveyors, chip-blowing and scanning stations, air knives, target protection and gripper racks. Full-line control and dispatching systems are also available.

Software · Dispatching & Network

Software & Dispatching

Deployment Software

- Robot parameter setup, testing and monitoring
- Map creation and station setup
- Application deployment
- Map synchronization between scheduler and robots

Dispatching Software

- Task/order and robot management
- Route planning and traffic control
- Operation monitoring, statistics and alarms
- Peripheral interaction (machine requests / host systems)

■ Wireless Network Requirements

Item	Requirement
Wireless protocol	IEEE 802.11 a/b/g/n (2.4 / 5 GHz)
Bandwidth	≥ 100 Mbit/s
Signal strength	Travel routes ≥ -60 dBm; AP coverage ≥ -65 dBm
Signal-to-noise ratio (S/N)	≥ 20 dB
Network latency	1000-byte ping: average ≤ 100 ms

■ Control System & Interfaces

Item	Description
Host communication	Wi-Fi network; centralized multi-robot dispatching
Expansion interfaces	RS485 / CAN / I/O; supports various mounted mechanisms
Machine interaction	Machine requests material → robot responds → completion feedback
Open compatibility	Custom development; supports mainstream CNC machines and industrial robots / cobots
System integration	Supports MES / WMS and other host systems; open APIs / SDKs
Data	Traceable exports of output, utilization and alarm records

Site & Environment Requirements

■ Mobile Manipulator Operating Environment

Item	Requirement
Operating temperature	Indoor, 0-40 °C
Operating humidity	10-90%, non-condensing
Floor unevenness	< 3 mm within 1 m²
Floor gradient	< 0.05 (precision docking points: < 0.01)
Step height	< 5 mm
Floor gap width	< 8 mm
Obstacle capability	Slope ≤ 3°; step ≤ 5 mm; gap ≤ 30 mm
Air quality	Free of dust and flammable, explosive or corrosive gases
Static electricity	Use static-dissipative flooring materials
Floor load capacity	Suitable for operation of the loaded mobile manipulator
Cleanliness	Keep the area free of water, oil and debris; remove dust regularly

■ Customer Site Preparations

• Network: Provide APs and channel planning for required coverage (2.4 / 5 GHz dual band).

• Power: Provide charging-dock power points and capacity; reserve an automatic charging area.

• Floor: Build and inspect flooring to the specified unevenness, gradient, step and gap requirements.

• Machines: Provide automatic doors / air connections or assist with automation retrofits.

• Signals: Provide an I/O list for machine requests, clamp confirmation, machining completion, etc.

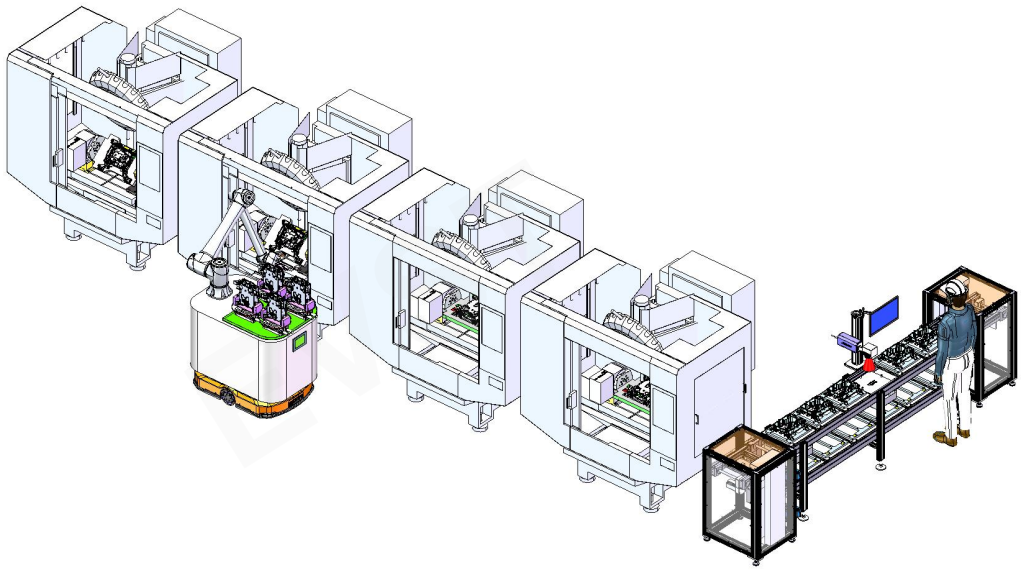
• Safety: Plan pedestrian and material routes; assist with fencing and safety zones.

• Tooling: Provide part drawings, fixture locating details and sample parts for contoured tooling design.

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Application Example 01 · CNC Tending for Aluminum Parts

Motorcycle powertrain machining · Two-operation aluminum parts



3D layout: Loading/marking conveyor + mobile manipulator + multi-station machining centers

■ Overview

- Part: 2000 g aluminum alloy part; one part type, 2 operations
- Machining cycle: 2 parts every 130 s (approx. 65 s/part)
- Machines: Multiple vertical machining centers (OP05 / OP10 / OP20)
- Locating: Machine fixture locating pins (R1 radius at pin tips)

■ Solution Highlights

- Conveying: Two-tier double-speed chain pallet loop, with stop-and-lift positioning at marking and pickup stations
- Marking: Conveyor-integrated laser marker; marking after lift-and-locate
- Robot: EVST-Alpha Series + 6-axis cobot + four-position storage fixture
- Gripper: Dual grippers for one pick / one place; pneumatic quick-change design for changeovers
- Vision: Monocular/binocular 2.5D/3D precision vision positioning; images locate conveyor and machine fixtures

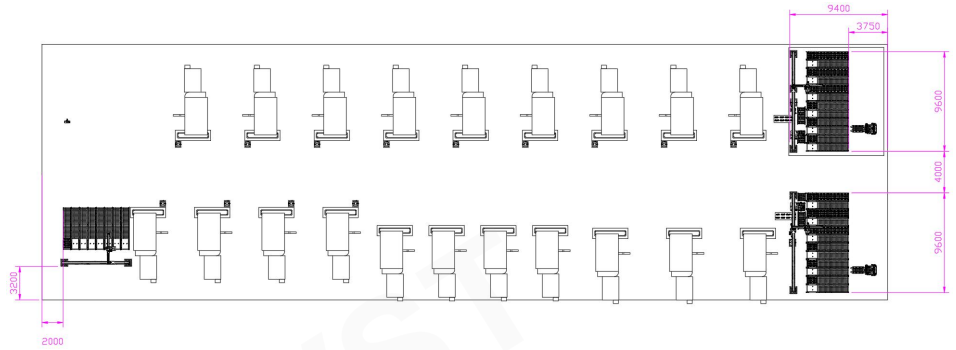
Manually Load Parts onto Pallets → Pallet Conveying / Lift & Locate → Laser Marking → Robot Picks Part > Storage Fixture → Move to Machine / Vision Positioning → Remove Finished Part / Load Blank → Return Finished Part to Conveyor → Outfeed

Application example: CNC tending for aluminum-alloy motorcycle powertrain parts (two operations; machining cycle: 130 s / 2 parts)

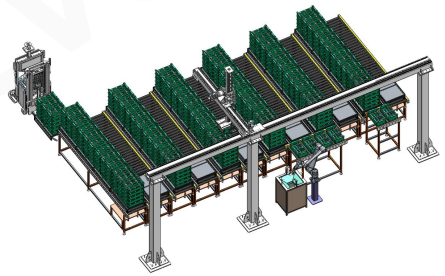
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Application Example 02 · Gear Grinding Machine Tending

Gear manufacturing · High-mix, low-volume production



Line plan: 16 gear grinders + smart storage on both sides + mobile manipulators



Smart storage: Roller conveyors (separate infeed/outfeed zones) + gantry robot + scanning/chip-blowing station

■ Overview

- Application: Automatic gear grinding machine tending; high-mix, low-volume production
- Cycle: Average 130 s/part; 6 parts/bin = 780 s
- Scale: 5 mobile manipulators + 2 smart storage systems serving 16 gear grinders
- Bin transfer: Gantry robot stores/retrieves full bins; two-way transfer via buffer tables and pallet shuttles

■ Solution Highlights

- Smart storage: Roller conveyors (separate infeed/outfeed zones) + gantry robot + scanning/chip-blowing station
- Robot: EVST-Gamma Series; onboard powered roller conveyor holds two product bins
- Flexibility: Rack stores multiple grippers; pneumatic tool changer switches automatically for each product
- Detection: Monocular/binocular 2.5D/3D precision vision positioning for picking and base positioning
- Error-proofing: Probe mechanism automatically identifies product orientation

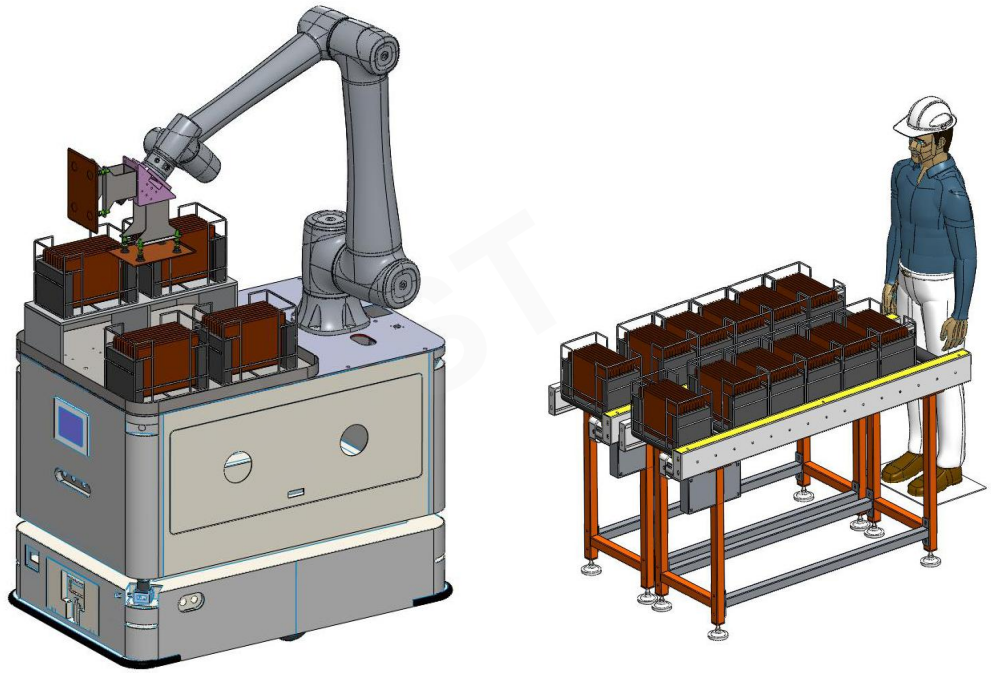
Load Full Pallet onto Roller Conveyor → Gantry Robot Picks Material Bin → Pick Matching Gripper from Tool Rack → Robot Unloads Finished Part from Gear Grinder → Load Raw Part / Return to Buffer Station → Gantry Stores Parts / Blow off Chips & Scan Code → Place Finished Parts in Material Bin → Recharge at Charging Station

Application example: gear grinder tending (5 mobile manipulators + 2 smart storage systems serving 16 gear grinders)

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Application Example 03 · Flexible Rear Cover Tending

Housing machining · Rear cover parts



Mobile manipulator (dual suction cups + part buffer) + bin handling module

■ Overview

• Parts: Rear covers, manually arranged in full bins for loading

• Machines: Machining centers (automatic doors, or manual doors retrofitted with customer assistance)

• Robot: EVST-Gamma Series; dual suction cups for one pick / one place to reduce cycle time

• Scalability: Customizable infeed/outfeed buffer capacity; robot fleet scales with machine count

■ Solution Highlights

• Bin handling module: X/Y/Z 3-axis module + bin gripper for full-bin loading/unloading

• Infeed/outfeed conveyors: Locating and stop mechanisms; customizable length

• Picking: Dual suction cups, one pick / one place; pick outside-in and place inside-out

• Cleaning: Air knife activates after machining to clear residual cutting fluid

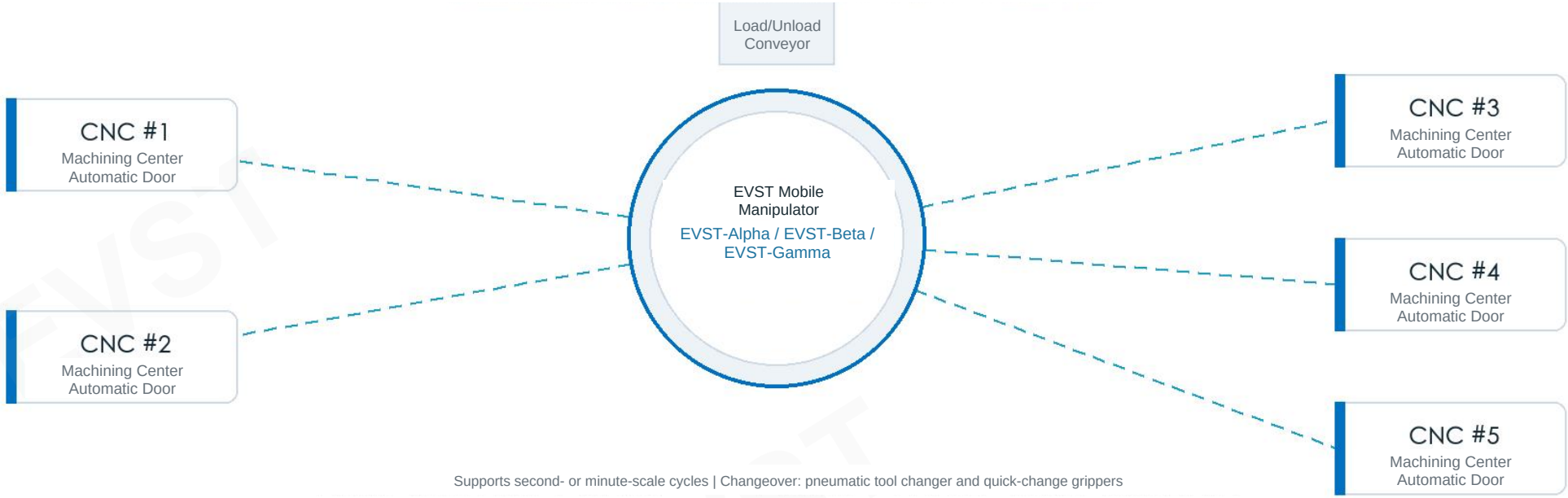
• Target protection: Pneumatic cover closes during machining to block cutting fluid and opens for imaging

Manually Arrange Parts in Trays ▸ Locate Material Bin / Stopper Engages ▸ Transfer Module Loads Full Bin onto Vehicle ▸ Robot Picks Part > Position at Machine ▸ Unload Finished Part / Load Blank ▸ Air Knife Blows off Cutting Fluid ▸ Return Finished Parts to Fixture ▸ Transfer Module Unloads Full Bin

Application example: flexible rear-cover tending (dual vacuum cups for pick-and-place + target protection; cycle time based on actual parts)

Multi-Machine Coverage · Key Figures

Multi-machine Coverage: One Mobile Manipulator Serves 3-5 CNC Machining Centers (subject to cycle-time calculation)



±0.1 mm	3-5 machines	20 kg	6 h	Seconds to minutes	±10 mm
Precision vision positioning	Per robot, subject to cycle-time calculation	Cobot payload (1700 mm reach)	Rated runtime	Supported cycle range	Navigation accuracy (±1°)

Typical Applications

CNC Machine Tending

Automatic handling of aluminum / steel blanks and finished parts; multiple machines and operations

Material Transfer

Automatic bin and pallet transfer between processes and areas

Vision Inspection

Surface defects, dimensional measurement, OCR and barcode recognition

Equipment Operation

Machine material requests, button operation and coordinated automatic doors

Large-Part Handling

High-payload arm + application-specific tooling for large and long parts

Precision Part Handling

Chips, electrodes, panels and optics: end-effector force control

Flexible Assembly

High-precision joint force control for high-mix, low-volume assembly

Smart Operations & Maintenance

Equipment checks, data acquisition and line inspection; open API access

Application areas shown are typical directions; feasibility for a specific line is confirmed in a project review.

Training & After-sales Service

Customer Training

Training Content

- System operation: Electrical and software systems
- Equipment operation and routine maintenance
- Safety awareness and emergency response

Training Scope

- Training scope and schedule are confirmed in the project quotation.

After-sales Service

Service & Warranty

- Service and warranty terms are confirmed in the project quotation.

Contact

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- Web: www.evsint.com/contact/

Why EVST

Full-scope Delivery

- Mechanical, electrical, software and on-site implementation support

Open Ecosystem

- Open APIs / SDKs; custom development supported

Company

- EVS TECH CO., LTD, headquartered in Chengdu, China

Application Videos



THANK YOU

We look forward to building the future of flexible smart manufacturing with you

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Product models, specifications and technical data in this brochure are subject to change without notice.