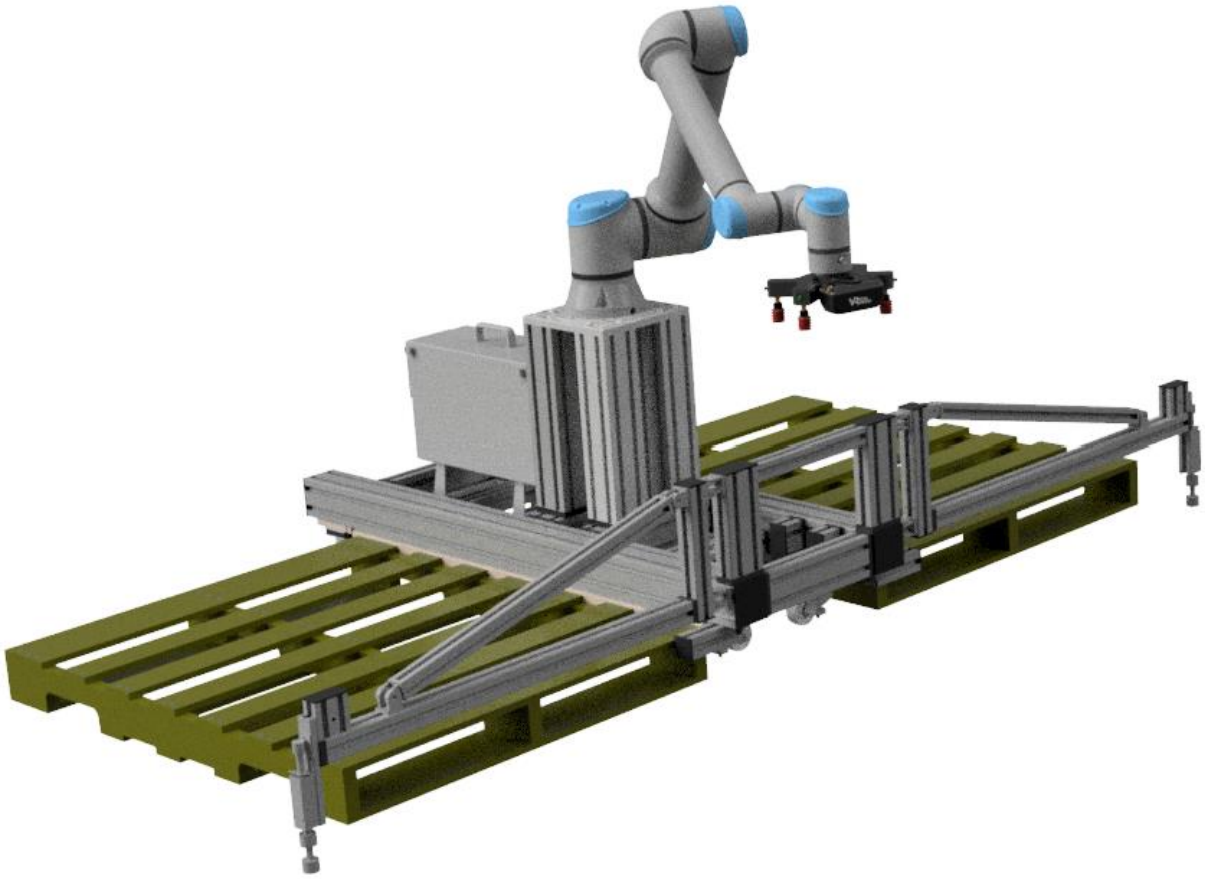
Portable Vision Guided Palletizer



Overview

The Portable Vision Guided Palletizer provides unprecedented flexibility for automating palletization tasks. The Palletizer can be quickly deployed to different work areas. Thanks to vision guidance from the VIM-303 camera, the robot can pick boxes from a table, a cart, a mobile robot, a gravity roller conveyor, or a from a powered conveyor, picking the box even while moving - anywhere within the field of view of the arm-mounted camera.

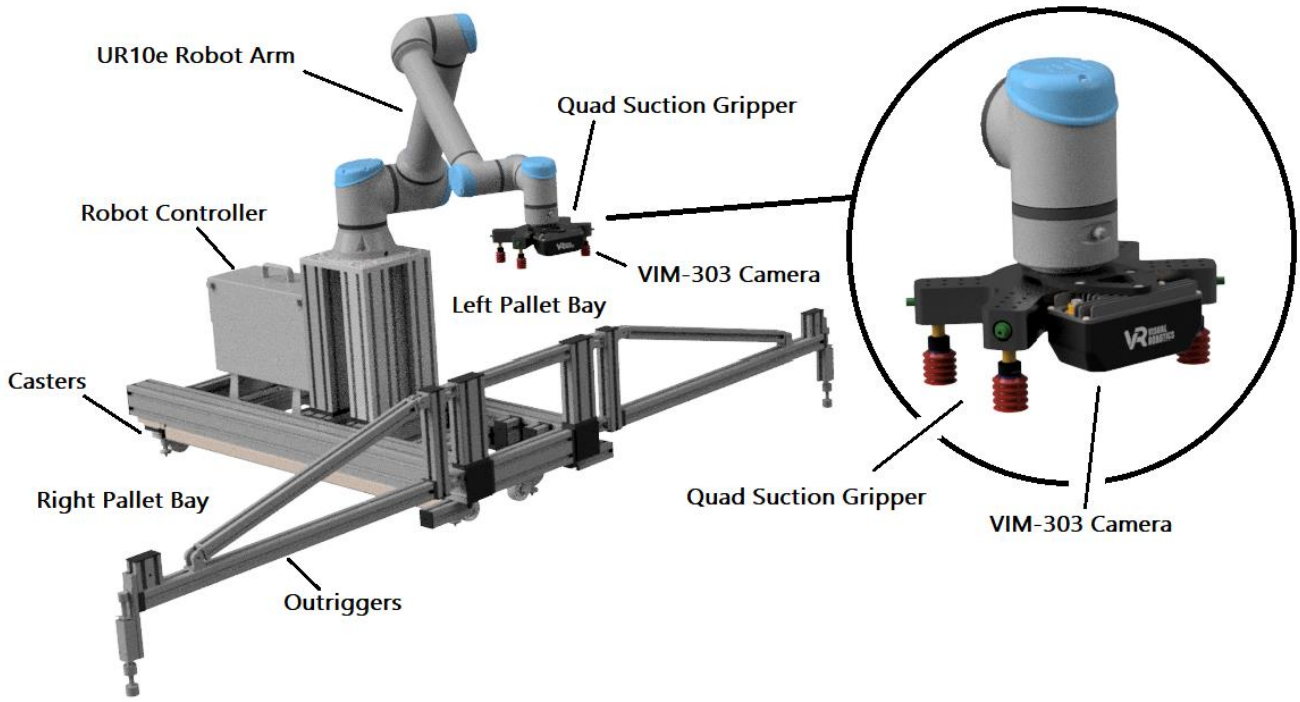
Multiple picking locations can be selected, allowing the robot to palletize several product lines. Boxes are discriminated by size, enabling complex pallet arrangements or palletizing different sized boxes onto different pallets. Multiple pallet configurations are easily set up and selected.

Features

- Portable
- Rapidly redeployable
- Flexible box picking
    - Table
    - Cart
    - Gravity roller conveyor
    - Powered conveyor
    - Multiple conveyors
    - AMR (mobile robot)
- Dual pallet bays
- Palletize by size
- Easy selection of pallet configurations
- Efficient use of equipment
- Return on Investment in under 1 year

Components

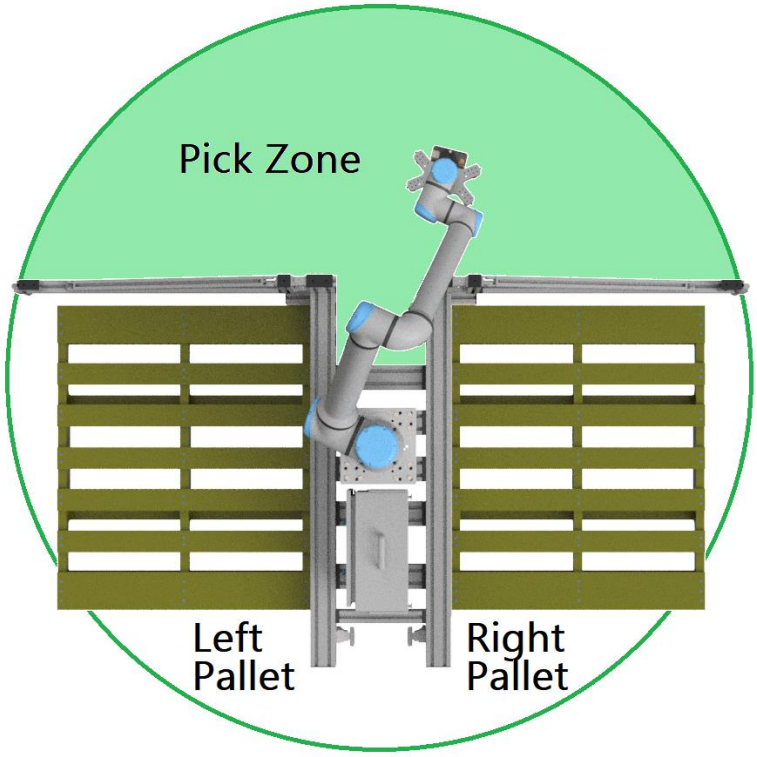
The Palletizer is composed of a Universal Robots UR10e robot arm mounted on a sturdy frame with outriggers to provide stability during reach. Two pallet bays are provided, with easy access for a forklift or a pallet jack. The frame is mounted on casters for portability. The robot is controlled by a VIM-303 Vision Guidance Camera. Boxes are grasped with a Quad Suction Gripper, which uses compressed air to create vacuum.



Operation

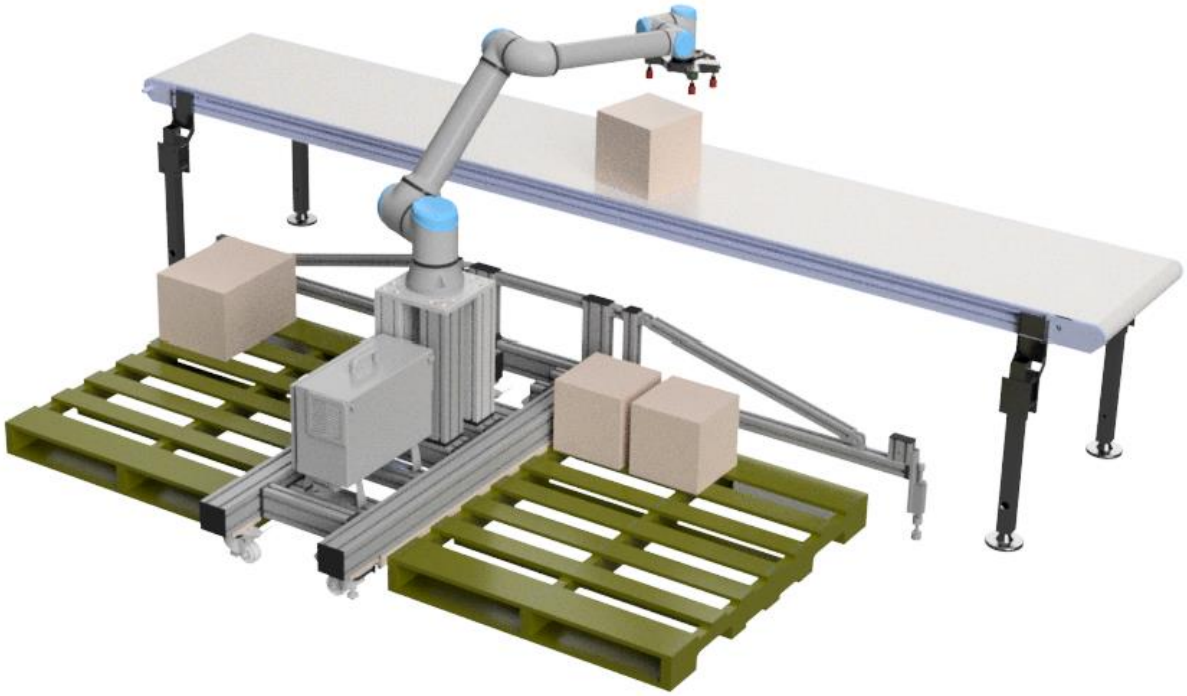
The Palletizer is rapidly deployed to different work stations. Simply push the Palletizer to the desired location, engage the brakes, and deploy the outriggers. Connect power and compressed air.

The robot can pick stationary or moving boxes anywhere within the pick zone. Boxes are located visually using the arm-mounted VIM-303 camera. Box dimensions are measured as they are picked, enabling palletization by size. Boxes can be palletized on either the left or right pallet. More than one input source, such as two conveyors, can be provided in order to implement more complex palletization scenarios.

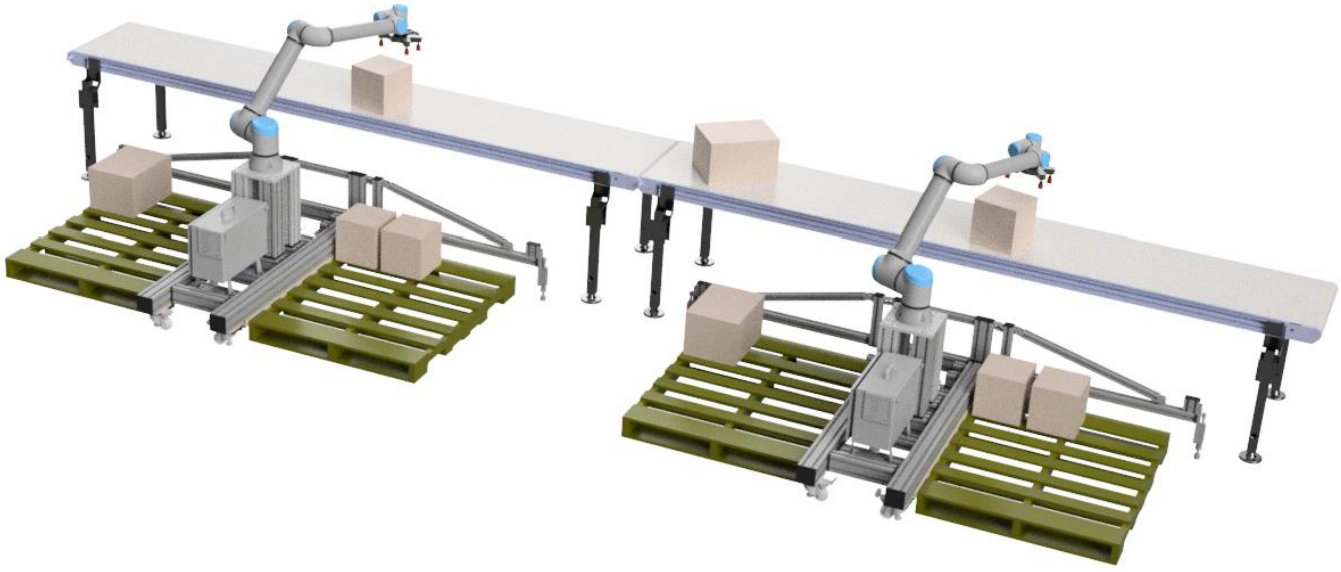


Use Case – Palletizing from a Powered Conveyor

The Palletizer can pick stationary boxes from the end or boxes in motion from a powered conveyor. The camera detects the location of the moving boxes, requiring no electrical connection or mechanical alignment to the conveyor. Boxes need only to be within the field of view of the camera to be picked. Boxes can be palletized by size, such as palletizing large boxes on the left pallet and small ones on the right.

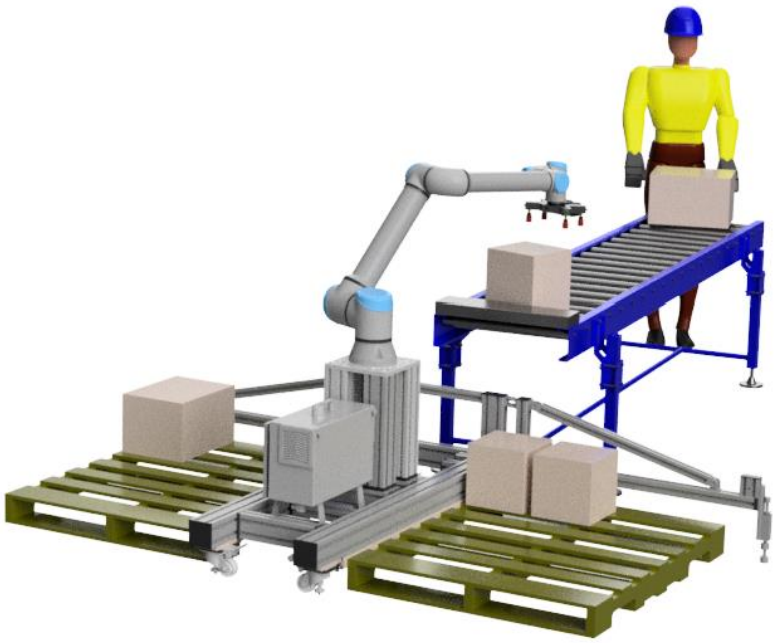


For increased throughput or to palletize more than two different sized boxes, multiple Palletizers can be used in sequence on a powered conveyor, made possible by their ability to pick boxes in motion.

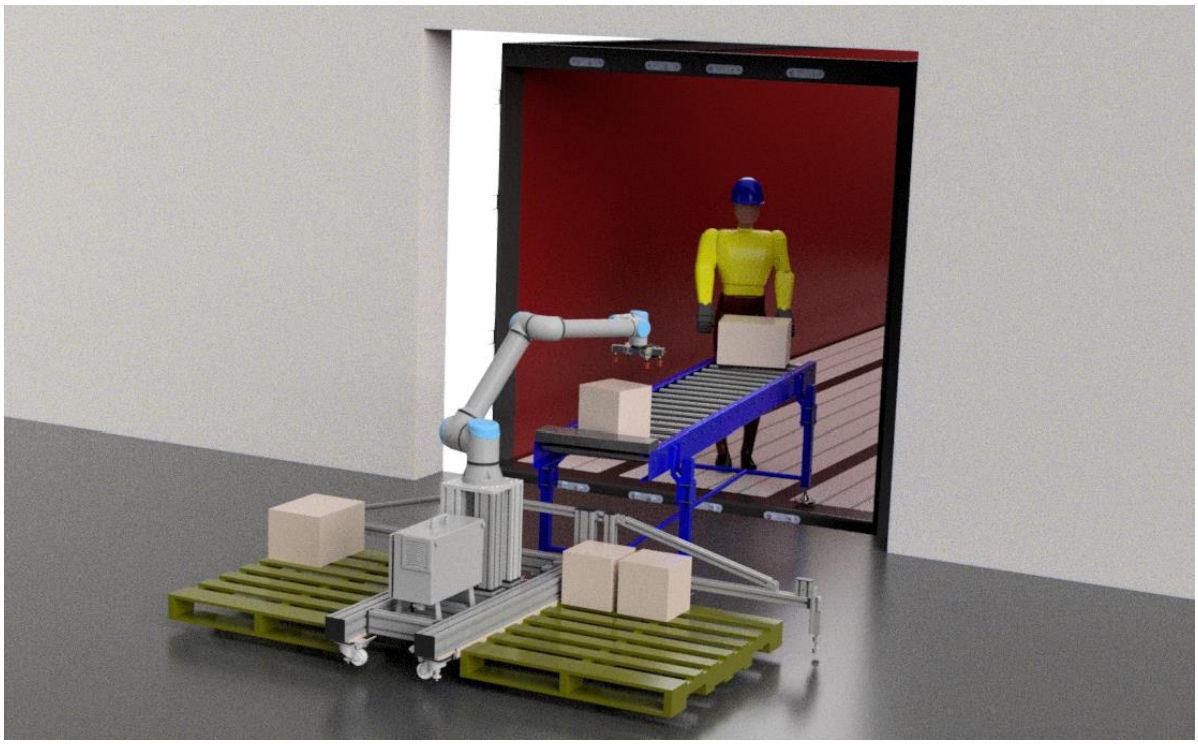


Use Case – Palletizing from a Gravity Roller Conveyor

The Palletizer can pick boxes from the end of a gravity roller conveyor. Positioning of the conveyor is uncritical, requiring only that the box be within the field of view of the arm-mounted camera.

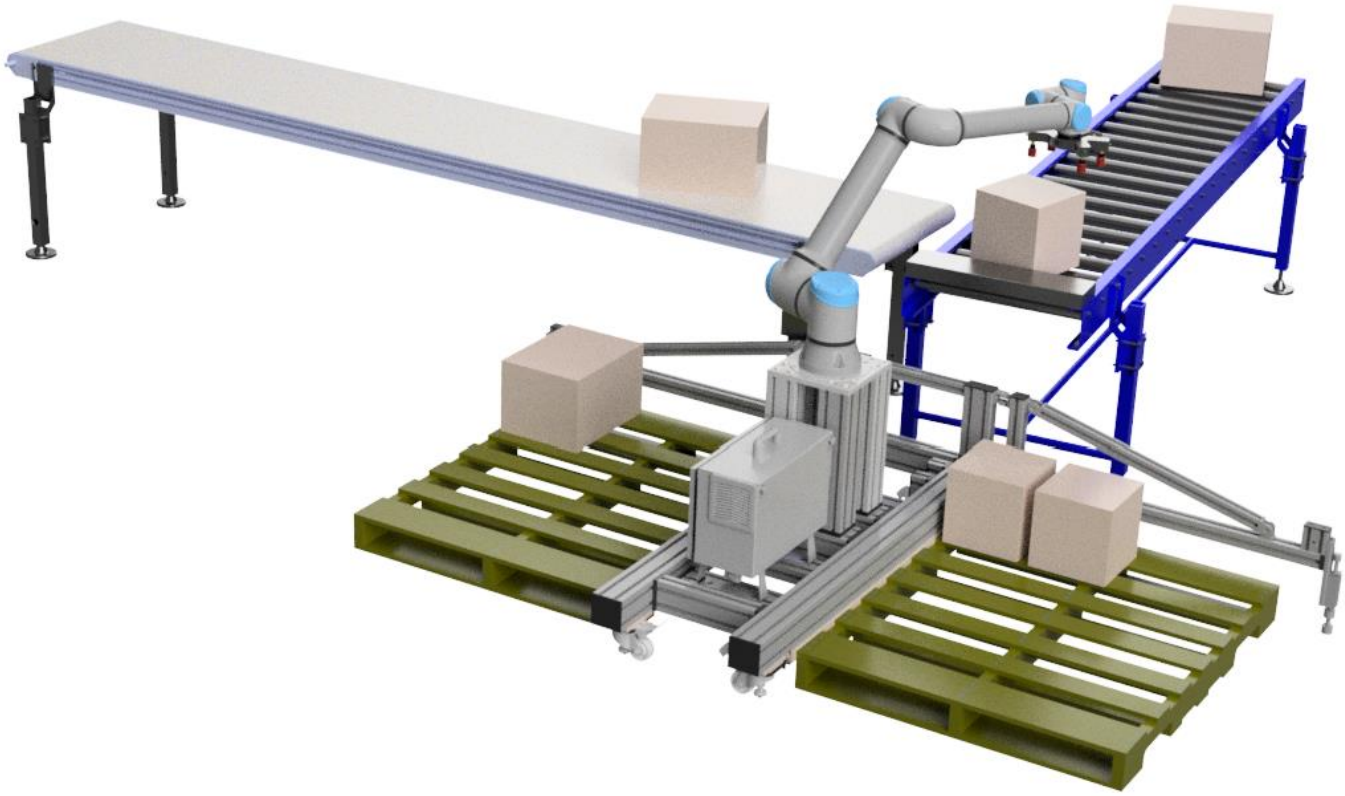


This configuration is ideal for unloading of trucks by a single person. A person empties boxes from the truck and places them on the roller conveyor, while the robot palletizes the boxes when they arrive at the other end.



Use Case – Palletizing from Multiple Conveyors

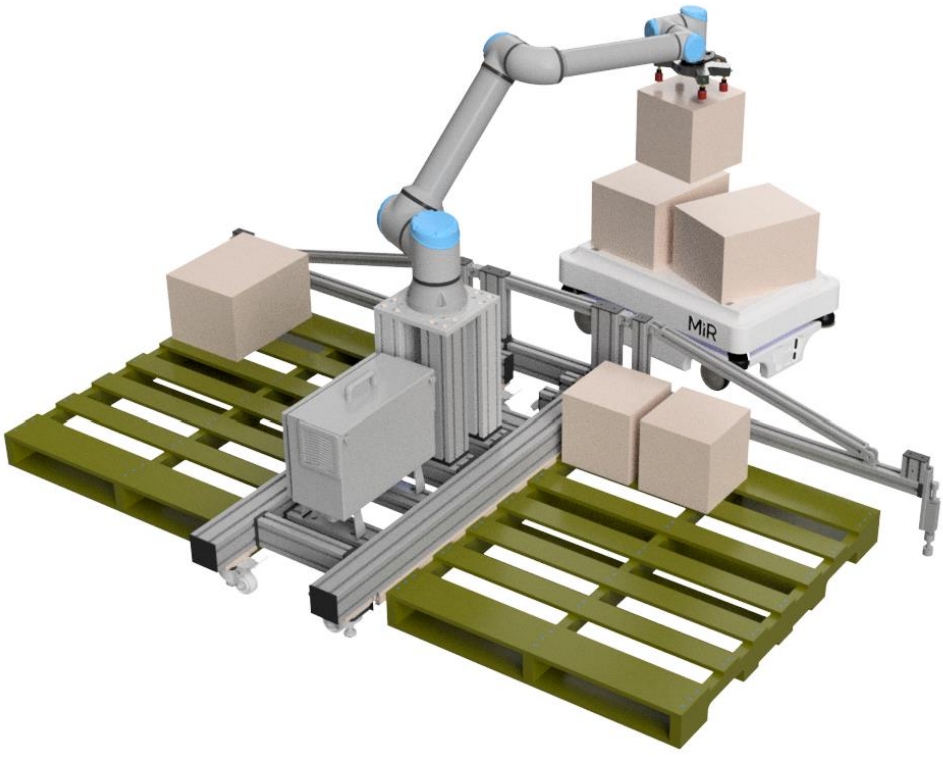
The Palletizer can pick boxes from multiple conveyors. This allows multiple lines to feed a single Palletizer or different sized boxes to be palletized by a single Palletizer. This provides efficient use of the equipment, further enhancing Return on Investment.



Use Case – Palletizing from a Cart or an AMR

The flexibility the Palletizer allows it to pick boxes from a cart. A person can push a cart of boxes into the pick zone of the Palletizer. When the arm-mounted camera detects that the motion of the boxes has stopped, indicating the cart has come to rest, it picks boxes from the cart and palletizes them.

The Palletizer supports a highly automated factory by being able to palletize from an Autonomous Mobile Robot (AMR) such as a MiR. The AMR does not need to precisely dock with the Palletizer, but merely be within the field of view of the arm-mounted camera.



Return on Investment

The Palletizer has been designed to maximize Return on Investment, even in low-volume production environments that are typically challenging for conventional automation techniques. The flexibility of the Palletizer ensures that it can grow with the changing needs of a manufacturing site. The ability to palletize from multiple input streams and multiple methods of input (conveyor, cart, AMR) allows it to be used at maximum efficiency, which lowers operating costs.

The table below shows that the fully burdened labor rate (considering taxes, benefits, and infrastructure), estimated at a 30% adder on top of hourly wage. Assuming a Palletizer purchase price of $120,000, the investment is paid off in 32 months, when using the Palletizer for a single shift, and as little as 11 months when used for 3 shifts.

After the payback period, the Palletizer costs are only electricity and maintenance, resulting in the Palletizer saving over $40,000 per year of labor costs.

Human Labor Costs		
Average salary for warehouse worker (Oregon)		$34,500 / yr ($16.60 / hr)
Fully burdened salary (+30%)		$44,850 / yr ($21.56 / hr)
Robotic Palletizer Costs		
Purchase price		$120,000
Return on Investment (ROI)	Single shift	32 months
	Two shifts	16 months
	Three shifts	11 months