

# How To

## Specify End-of-Arm Tooling for Packaging & Palletizing Automation Cells

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In relation to an entire automation project, the Robotic End-of-Arm Tool (also called EOAT or end effector) is one of the most critical and dynamic aspects to getting more out of your robot. EOATs can provide your automation cell with the means to accomplish multiple tasks and operations, with the goal of increasing robot efficiency. The complexity of these tasks will determine the final design and use of the EOAT. Robot (articulating and Cartesian) payload and reach, combined with the EOAT, will play a major role in the success of your automation cell. While build-your-own tools have been around for a longtime, when you need a tool that can integrate several functions to be operated in sequence, or difficult to handle parts then your production will benefit from a custom engineered tool, specifically for the packaging or palletizing needs of your work-cell.

Robotic automation cells designed to package and palletize finished goods are becoming more complex. From de-molding plastic covers and placing them in a carton to reducing the size of an 18 part array, or pallet and slip sheet handling – the EOAT plays an important role in both the handling and manipulation of heavy and bulky items, carrying out secondary operations prior to packaging (such as degating), or assembly.

### Vacuum Technology

A vacuum tool consisting of cups and spring arms performs especially well on same size cartons or individual parts. A custom vacuum plate tool with foam face, valves for each vacuum port, independent vacuum zones and vacuum pump will secure and place products individually or in complete pallet layers. Products can include cartons, cans, bottles, sealed bags and others. The vacuum plate tool advantages are:

- Gripping power remains constant whether single part or entire layer
- Flush edge design for carton inbox applications
- Quick Connection
- Multi stage ejector technology
- Adjustable vacuum module easy maintenance
- Blow off release system
- Retrofit with existing pump

Either style tool can be built to pallet size dimensions. These vacuum tools are powered by one of two methods; venturi generators or vacuum pumps (also called turbines or blowers). The choice of a vacuum source is often determined by energy costs;

venturi generators use compressed air while vacuum pumps use electric motors. Air flow (SCFM) and “depth” of vacuum (in/Hg) are other considerations which will help arrive at the proper design.

### Pneumatic Jaws

A second style of palletizing EOAT can secure cartons using pneumatically stroking jaws. This EOAT can grip single or multiple cases and is designed to pick pallets, place them in position and cover the pallet with a slip or tier sheet. By using such an advanced design, this EOAT will then be able to palletize the product.



A specialized EOAT is often used to palletize woven plastic or paper bags containing many products including grain, chemicals, dog food, minerals and plastic resins. Because vacuum tools may not secure the bags due to air leakage, a “clam shell” bag gripper with pivoting stainless steel fingers is used

instead. The bags are presented to the robot on a roller conveyor allowing the custom spaced fingers to lift upwards between the rollers and secure the bag against the spring plate. When in position, the fingers open and the bag is positioned on the pallet. Most palletizing cells will require in-feed conveyors; a pallet feed system, safety guarding and a robot properly sized for reach and payload.

As with any automation cell, cost and complexity must be balanced against the expected return on investment (ROI) and the anticipated increase in production. A well engineered EOAT can increase repeatability while decreasing operator workload and allow for a higher percentage of automation function within the cell.



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