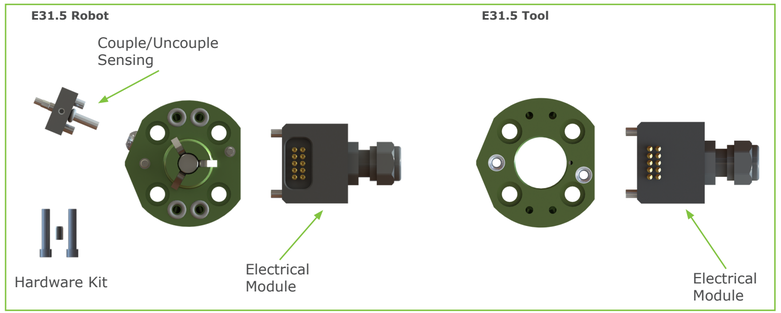
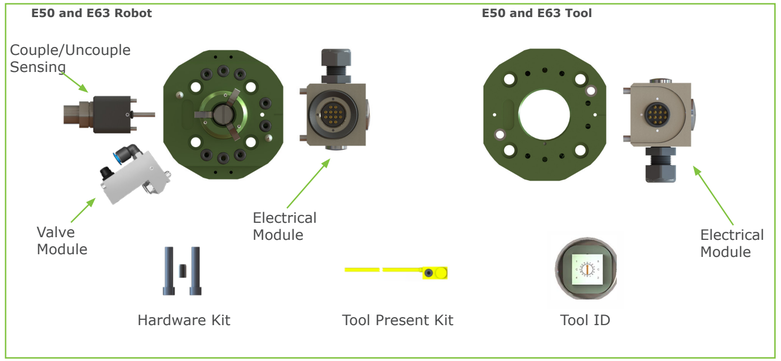
SUPERIOR FEATURES FOR TODAY'S PRODUCTION ENVIRONMENTS

- **Locking mechanism as secure at 5 million cycles as first cycle**
- **Positive retract**
- **Improved size to payload ratio**
- **Minimal maintenance**
- **Couple/uncouple sensing**
- **Direct bolt to ISO 9409-1 patterns**
- **Noise Emissions <70 dB(A)**
- **Lifetime warranty on coupling m chanism parts**

Epsilon™ Light Duty Utility Modules

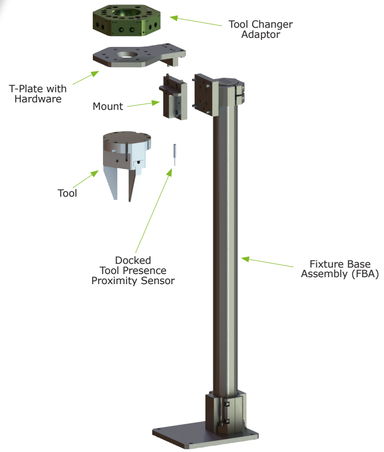
A host of support items complement our automatic tool changers. From high power to pneumatics to coolant and data communications, we offer everything needed to automatically connect seamlessly.
Epsilon™ has what you need to control these connections, all packaged in attractive utility modules that mount neatly to the side bosses of the tool changers.





ACCESSORIES

Tool Stands — Applied Robotics tool stands feature a compact, universal design with the high moment
capacity required to safely and securely hold tooling when not in use.
Spring loaded compliancy and tool presence sensing are available as well as specialized heavy-payload versions.



Examples of configuration.

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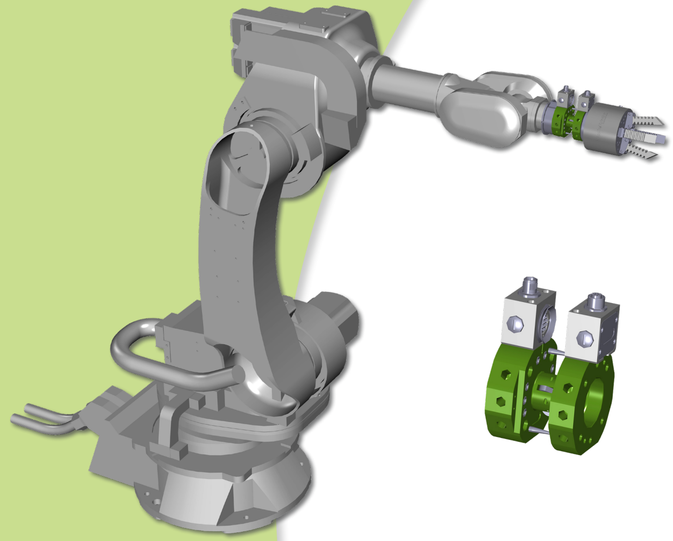
Epsilon™

Light Duty Automatic Tool Changers



- THE ORIGINAL TOOL CHANGER -

Providing Reliable Solutions Since 1984

EFFECTO®

EPSILON™ — THE BEST ENGINEERED TOOL CHANGERS ARE NOW EVEN BETTER

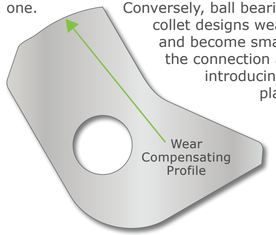
Automatic Tool Changers reside between a robotic arm and its tooling allowing the robot to change tools and support utilities on the fly, with no work stoppage.
A tool changer is productivity. The new Epsilon™ incorporates advantages of three previous generations tool changers with enhancements for today's faster and stronger robots.

- ☐ **Higher strength materials** improves size to payload ratio
- ☐ **Minimal required maintenance** provides low cost of ownership
- ☐ **Direct bolt to ISO 9409-1 patterns** limit the need for robot adaptor plates
- ☐ **Couple/uncouple sensing** available on all models
- ☐ **Optional tool present sensing**
- ☐ **Compatible with our existing utility modules**
- ☐ **Many units share spare parts** for reduced stock requirements
- ☐ **Best-in-class locking mechanism** with self-centering cams

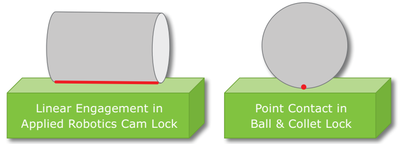
CAM LOCK VS. COMPETITORS' BALL AND COLLET

The Engineered Cam: The Applied Robotics cam lock design has stood the test of time and is known to provide superior reliability and performance.
An engineered part, not just an off the shelf ball bearing, Our purpose built cam lock will outperform ball and collet configurations in every way.
Reduced maintenance requirements and longevity of service ensure a lifetime cost of ownership far lower than any other design. In fact, the cam lock is so robust and reliable, it has a life time guarantee.
Here's why.

Wear: Over time, the Epsilon™ cam's progressive profile continuously compensates for wear, maintaining a rigid connection. At 5 million cycles the cam design locks as securely as it did on cycle one.
Conversely, ball bearings in ball and collet designs wear out with use and become smaller, degrading the connection and potentially introducing a gap and/or play between the robot and tool.



①The Applied Robotics engineered cam locks as securely at 5 million cycles as cycle one.



②Line vs. Point contact, provides more surface area for engagement and also resists rotational movement along the length of the red line, Illustrated above.

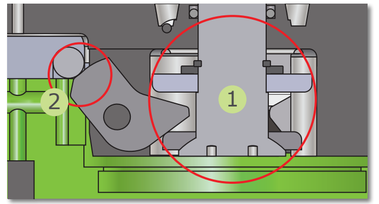
Retract & Release: Epsilon™ cams are controlled by a double-acting piston and drive mechanism.
This double acting cylinder arranged with the cam design enables a "positive retract." Air pressure is applied to one chamber forcing the cams out and into the coupled position while a second chamber is pressurized to move the piston in the opposite direction pulling the cams back in and releasing the connection. This level of control and confidence is not provided by the ball and collet method, which does not allow for "positive retract." A ball and collet design relies on gravity to allow the balls to release the collet.

Disadvantages of Ball and Collet

- ☐ Inherently very heavy
- ☐ Point to point contact is inherently weaker
- ☐ Tool and tool changer will gap with wear
- ☐ Rotational stability in axis direction only given by guide pins

When introduced to dirt and debris that exist in a factory, it's possible for the balls to jam in the locked position, potentially pulling a tool unintentionally out of the stand.

Rotational Repeatability: In addition to providing a positive lock/unlock between the robot and tool, it is of the utmost importance the two sides of a tool changer remain precisely aligned. If the mechanism has mechanical variance due to wear, the repetitive task the robot is performing will lose its repeatability.

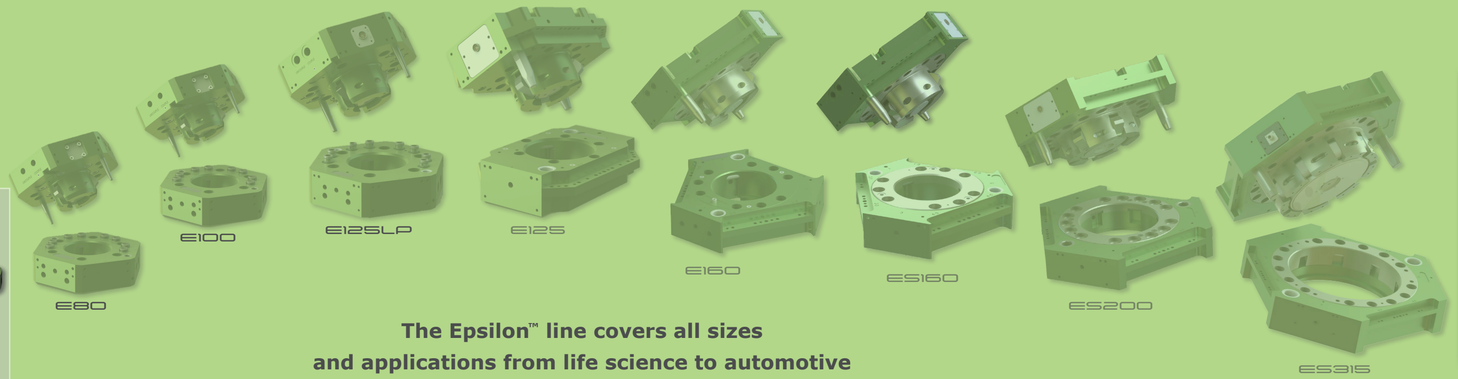


③Floating driver (1) ensures full contact every time it couples & mechanical lock (2) on the larger models (E80 to ES200) prevents tool separation during a loss of power or air pressure

This is another area where the cam clearly and consistently outperforms a ball and collet arrangement. As seen in Figure ③, the cam provides a line contact that will resist rotation. In this scenario the guide pins in the master (robot side) of a cam unit are only responsible for guiding the two halves together, not for preventing rotation of the assembly. The rotational stress is largely absorbed by the cams and associated dowel, not by the guide pins.
Conversely, a ball and collet design is essentially a bearing race. In order to keep the assembly from rotating, the guide pins are forced to shoulder the rotational inertia building up in the assembly as the robot moves. Rotational stresses wear the guide pins prematurely and begin to introduce play between the joined halves of a ball and collet tool changer, destroying repeatability. In time, the pins must be replaced which leads to downtime and expense.
In the worst case scenario, the pins could shear off allowing the entire assembly, tooling and materials to freewheel, damaging products, equipment and potentially causing an injury.
This simply does not happen with the positive locking cam system found in the Epsilon.™

OUR ENGINEERING ADVANTAGES ARE YOUR PRODUCTIVITY ADVANTAGES.

Lab Automation > Docking & Utility Connection > Pick and Place > Dispensing > Small Part Material Handling > Part Feeding > Machining > Stamping > Assembly > Welding > Heavy Load Material Handling



The Epsilon™ line covers all sizes and applications from life science to automotive

Note: Epsilon™ part names correspond to the robot bolt patterns. I.e. use part E100 for a robot with a 100mm mounting surface.

SPECIFICATIONS

Model	Rated payload	Operating moment (Mx, My)	E-Stop moment (Mx, My)	Operating torque (Mz)	E-Stop torque (Mz)	Diameter	Coupled height	Rotational repeatability	User flow	Weight
E31.5	10 kg 22 lb	52 Nm 465 in-lb	79 Nm 700 in-lb	30 Nm 265 in-lb	60 Nm 530 in-lb	46 mm 1.81 in	36 mm 1.42 in	± 0.04°	0.18 Cv	0.13 kg 0.29 lb
E50	25 kg 55 lb	88 Nm 780 in-lb	168 Nm 1,486 in-lb	120 Nm 1,060 in-lb	375 Nm 3,320 in-lb	85 mm 3.35 in	48 mm 1.89 in	± 0.02°	0.27 Cv	0.59 kg 1.30 lb
E63	50 kg 110 lb	112 Nm 990 in-lb	168 Nm 1,486 in-lb	220 Nm 1,945 in-lb	375 Nm 3,320 in-lb	85 mm 3.35 in	48 mm 1.89 in	± 0.02°	0.27 Cv	0.60 kg 1.32 lb

Operating pressure **5 - 7 bar**
Ambient temperature **5 - 60°C**
Sound emissions (sound pressure) **≤ 70 dB(A) in each direction**