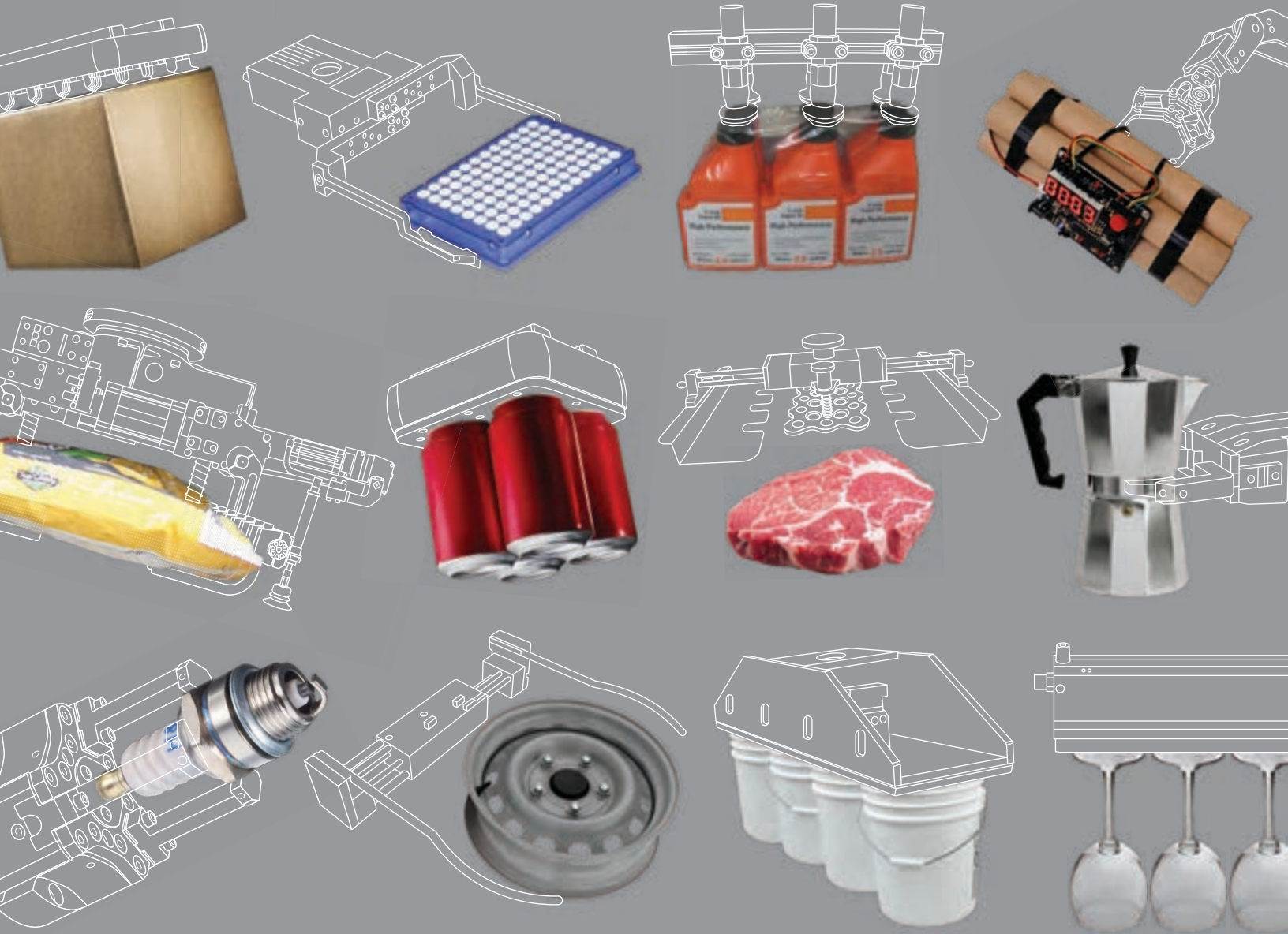


Precision Robotic Gripping



***We can help you handle
just about anything***

From off-the-shelf to full custom — use our expert knowledge in selecting and designing successful handling solutions.

At Applied Robotics we don't just sell grippers — we expertly design and manufacture them. Think of us as a trusted technical resource and extension of your engineering team.

STEP 1

WORKPIECE ANALYSIS

- tube pan/angel food cake pan
- 10" x 10" x 4"
- slightly angled sides
- 400° handling temperature
- 680g filled weight

STEP 2

APPLICATION ANALYSIS

- Force requirement
- Stroke requirement
- Finger length requirement
- Machine or robot acceleration
- Environmental conditions (temperature, dirt, liquid, etc.)
- Maintain grip after air loss
- Sensing requirements

STEP 3

SELECTION OF PROPER GRIPPER

- Type of gripper (e.g., pneumatic, vacuum, servo electric, etc.)
- Force xxx, stroke xxx requirement
- Model number, size
- Special features (sealed, high temperature, dirty environments)

STEP 4

REAL WORLD TESTING

- Dimensional verification
- Load capacity analysis
- Long-term cycle testing
- Maintenance requirement testing
- Simulated product trials
- On-site testing

STEP 5

DELIVERY

- Custom or standard gripper solution with accessories

**WE ARE THE
GRIPPER EXPERTS**

- Expert resource for selecting off-the-shelf solutions
- Expert engineering for custom-designed solutions
- Finite Element Analysis plus real-world testing for reliable solutions
- Depth of product line and true one-stop-shopping

Precision Gripping Solutions

It all begins with your application... and each application is unique.

The trouble is there seems to be just as many gripper choices as there are applications. Let our expertise guide you through the selection process. We partner with you to examine your work piece and gripping requirements to select a precision tool that provides the performance you need and exceptional service life. Grippers are an integral part of manufacturing today. They provide, among other things, very different gripping strengths and handling dexterity for manipulating objects of various sizes, weights, and fragility levels. Call +1 (800) 309-3475 to discuss your specific application with one of our automation professionals.

There are many factors to consider when choosing a gripper:

- **What is the purpose of the work cell**— Machine tending? Material handling? Assembling items? Testing products? Welding?.
- **How much flexibility and control are necessary to perform the task**—Does it need to pick up the same part from the same location or pick random parts from several locations? Are there space constraints?
- **How much weight needs to be handled**— and how fast does the robot need to move to achieve the throughput requirements?
- **What type of environment is the equipment operating in**—harsh/heavy industrial, food processing, clean room, or a hazardous environment requiring an intrinsically safe device?

No matter what you need to pick up, we have a gripper to do it.

THE FOLLOWING OUTLINES the various types and styles of grippers available. There are as many grippers as there are applications — too many to cover here, but this overview breaks down the numerous variations available. One of our automation professionals can discuss your specific gripping needs with you.

Pneumatic 2 or 3 Finger Grippers

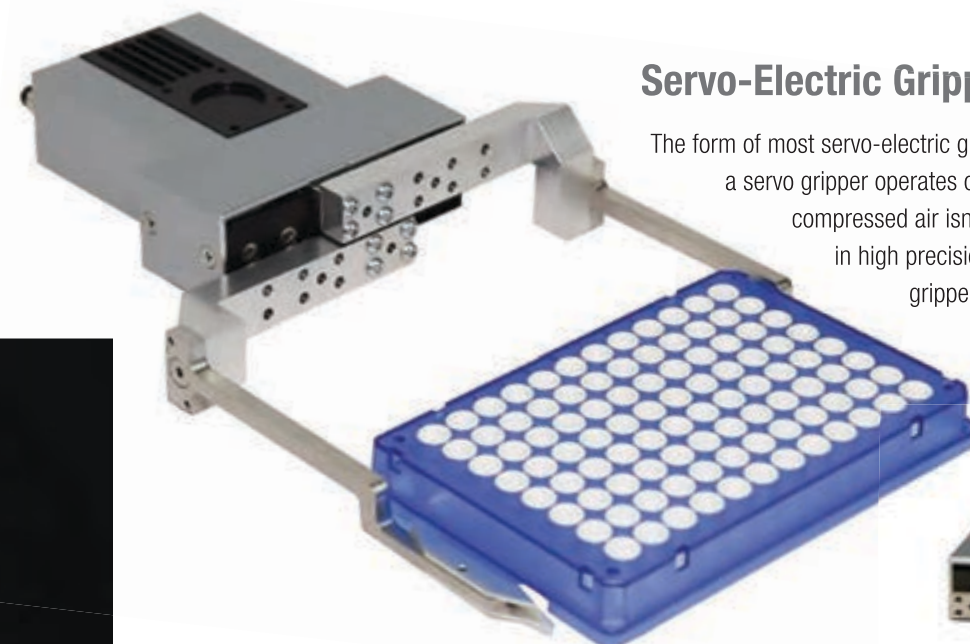


Pneumatic-actuated grippers are driven by compressed air that pushes a piston linked to the gripper's "fingers". These versatile grippers are the most common type and are available in either two or three finger designs in many sizes and capacities.

Pneumatic finger grippers are available for harsh environments, food applications, clean rooms, and some even meet requirements for intrinsically safe environments. All are high precision with extremely long service lives. Other specialty designs include O-ring grippers, needle grippers, and inflatable bladder grippers with inner or outer clamping.



Servo-Electric Grippers



The form of most servo-electric grippers is much like that of a two finger pneumatic gripper. However a servo gripper operates on electric power rather than compressed air. For applications where compressed air isn't available or allowed, a servo gripper is the answer. They are also ideal in high precision applications where specific force is required. Also unlike a pneumatic gripper that opens and closes the same stroke amount every cycle, a servo gripper can be programmed with multiple stop points enabling the handling of multiple sized objects on the fly.



Vacuum Grippers

Vacuum grippers use foam or suction cups driven by compressed air that runs through a vacuum generator. They are popular in many applications including stacking, palletizing, and bin picking. They can lift a variety of profiles such as flexible packages, odd shaped objects, boxes, cans, and even groups of objects simultaneously for packaging applications. Many vacuum applications use either a single cup or a

modular array of cups. Sometimes the modular systems use foam in place of cups depending on what needs to be lifted. Modular vacuum grippers are available in various sizes ranging from 150mm x 150mm to 1200mm x 1000mm. Cups are available in a variety of sizes and materials to fit your application. If a standard vacuum gripper doesn't fit your needs, we can design a custom vacuum gripper as described below.



Palletization Grippers

Palletization grippers are used to neatly stack outgoing product on a skid or to off-load incoming product from a skid. Bags or boxes usually come out of production on a conveyor system where the robot lifts them off and stacks them on a pallet. From various sized boxes, 5lb bags of sugar, 40lb bags of wood pellets, or even 100lb bags of cement — we have a palletizing gripper to fit the application. The Applied Robotics Palletizing Gripper (ARPG) is available in three adjustable sizes, the ARPG Mini, ARPG 50 and ARPG 100 and can be configured with either tines for bag use or paddles for box applications. All are ready to start stacking bags and boxes to give your packing crew's backs a well-deserved rest.

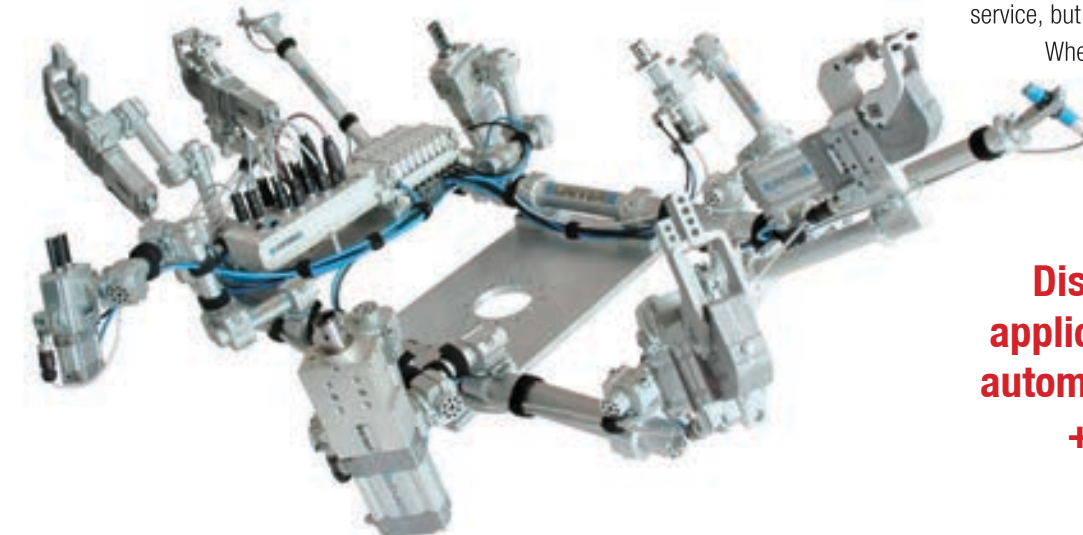


Custom Grippers

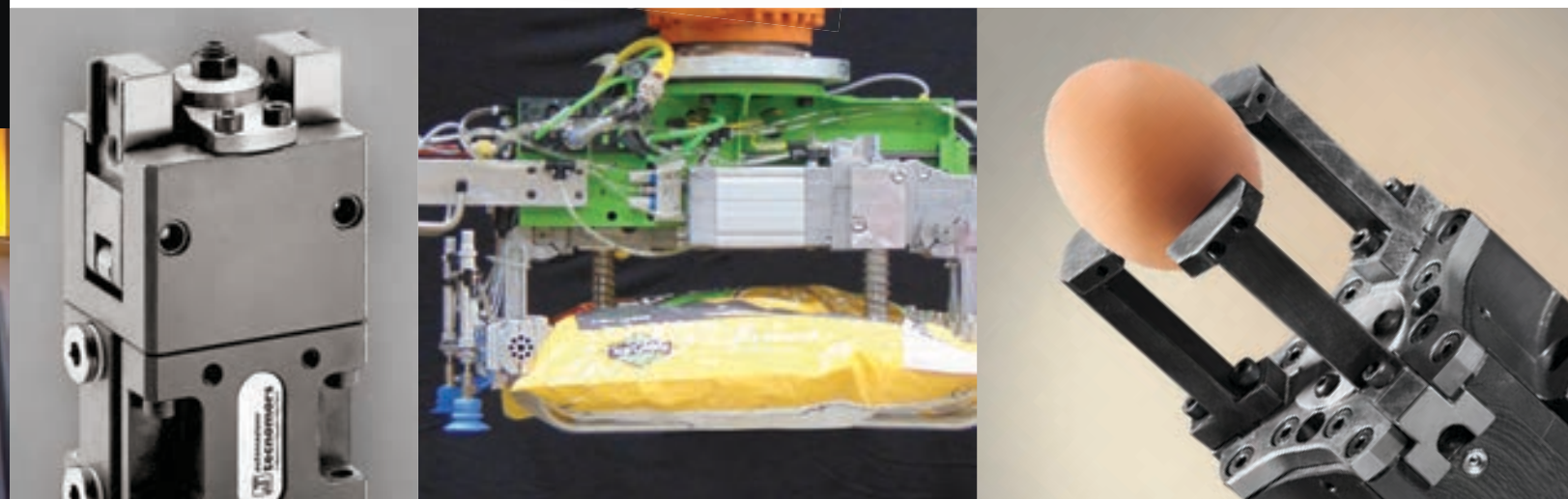
Sometimes nothing off the shelf fits the application — especially for large, cumbersome, or odd-shaped objects. Applied Robotics designs customized gripping systems that are engineered for the forces the tool and workpiece will be subjected to through movement of the robot or the automatic machine while under load. Custom gripping systems are usually

constructed using structured aluminum framing to position the contact points (clamping or vacuum) in the optimum locations. Torque, moment, and forces applied to the end effector by an emergency hard stop from full speed are examined using finite element analysis. This guarantees not only that the tooling holds together and provides a lifetime of dependable service, but that the tooling retains the work piece.

Whether the custom gripping tool is based on mechanical clamping or vacuum cups, the design will be robust and reliable.



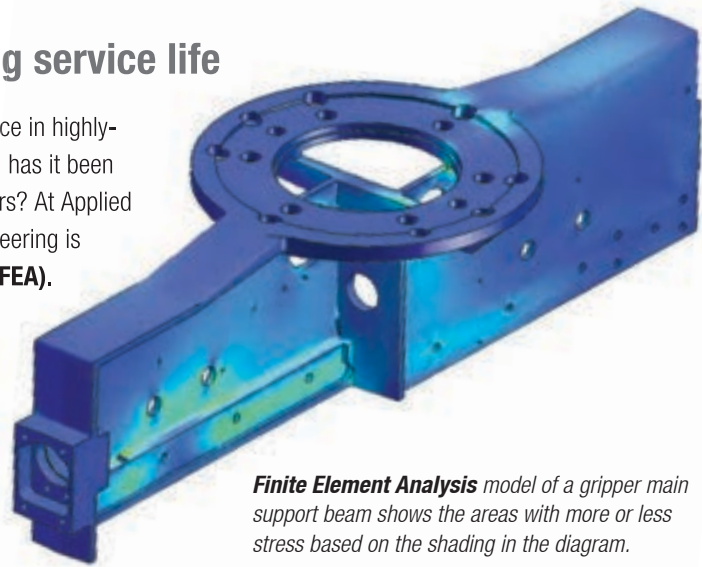
Discuss *your* gripping application with one of our automation professionals at +1 (518) 384-1000



Engineering and testing for performance and long service life

We specialize in custom end-of-arm robotic tools that are engineered for years of service in highly-productive factory environments. While a tool can be configured to grip the work piece, has it been designed with the structural integrity necessary to perform the task for the next 10 years? At Applied Robotics, part of how we ensure the quality, and cost- and time-efficiency of our engineering is through **finite element method (FEM)** also referred to as **finite element analysis (FEA)**.

FEA is a numerical method for solving problems of engineering and mathematical physics. It can be applied to perform structural analysis on tooling to verify it will support the loads and forces expected during use. This provides a valuable resource by eliminating the time and costs associated with creating and testing multiple rounds of hard prototypes.



Finite Element Analysis model of a gripper main support beam shows the areas with more or less stress based on the shading in the diagram.

Complementary Products



Rotary Actuators

For applications such as assembly machines where grippers may need to be rotated 90 or 180 degrees but also handle parts and pass them between processes, a Rotary Actuator which supports two grippers can be implemented. For robotic applications a similar type of mounting device without the rotation feature is available and referred to as a Dual Gripper Support.



Power Clamping Units

Sometimes a gripper needs to set a work piece down to complete some other process like machining or deburring. This application needs a "work holding" device and it's where pneumatic or hydraulic power clamping comes into play. Power vices come in many sizes and are a perfect complement to a gripper system in your work cell.



Compliance Devices

Compliance units compensate for misalignments (positions and/or angles) that occur during automatic assembly of various precision parts which need to be press-fit or loose-fit into holes. They reduce assembly failures and down time, enhance product quality, and shorten production cycle time.

Automatic Tool Changers

If you need to switch between more than two tools on the robot, then you need an automatic tool changer. Applied Robotics invented the automatic tool changer and there is a separate brochure dedicated to them. Ask your representative for a copy.



LEARN MORE
Contact our sales department at
+1 (518) 384-1000 or
info@appliedrobotics.com

 **Applied Robotics**TM
Solutions in reach

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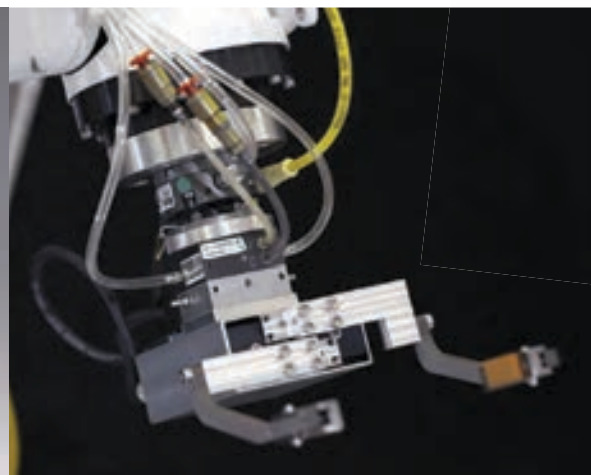
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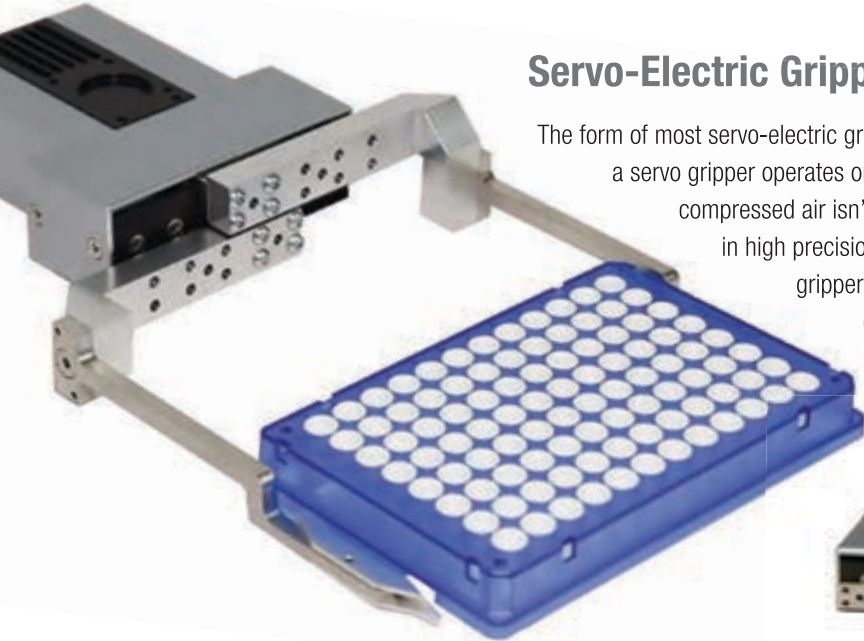
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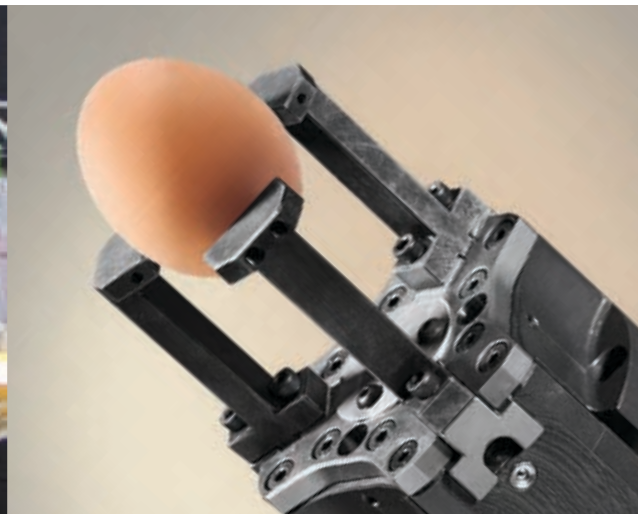
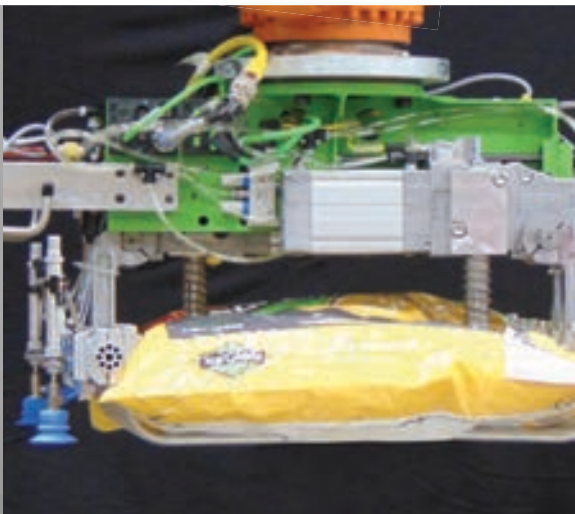
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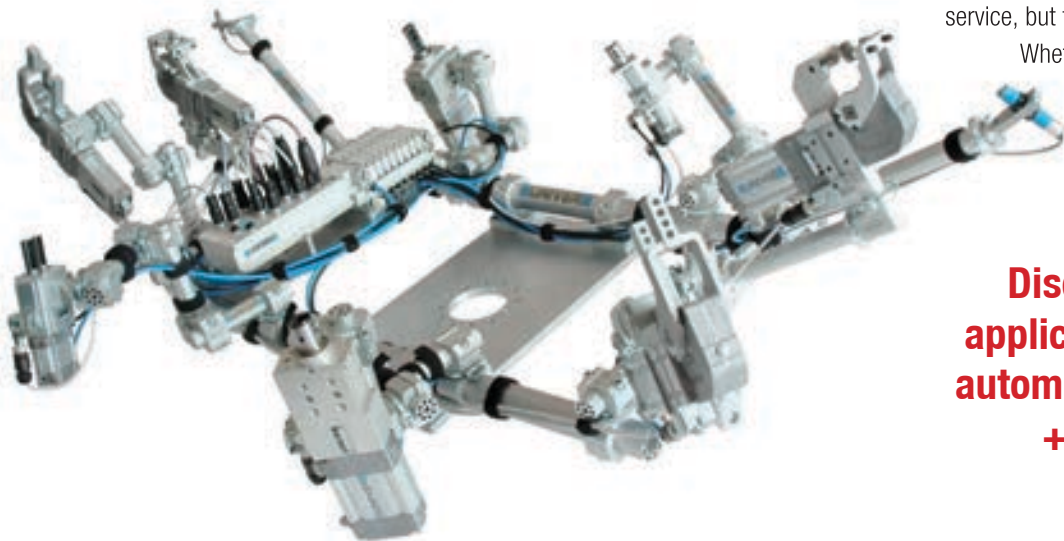


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