



精密設備機械設計

Mechanical Design of Precision Equipments

6. Holding Module Design

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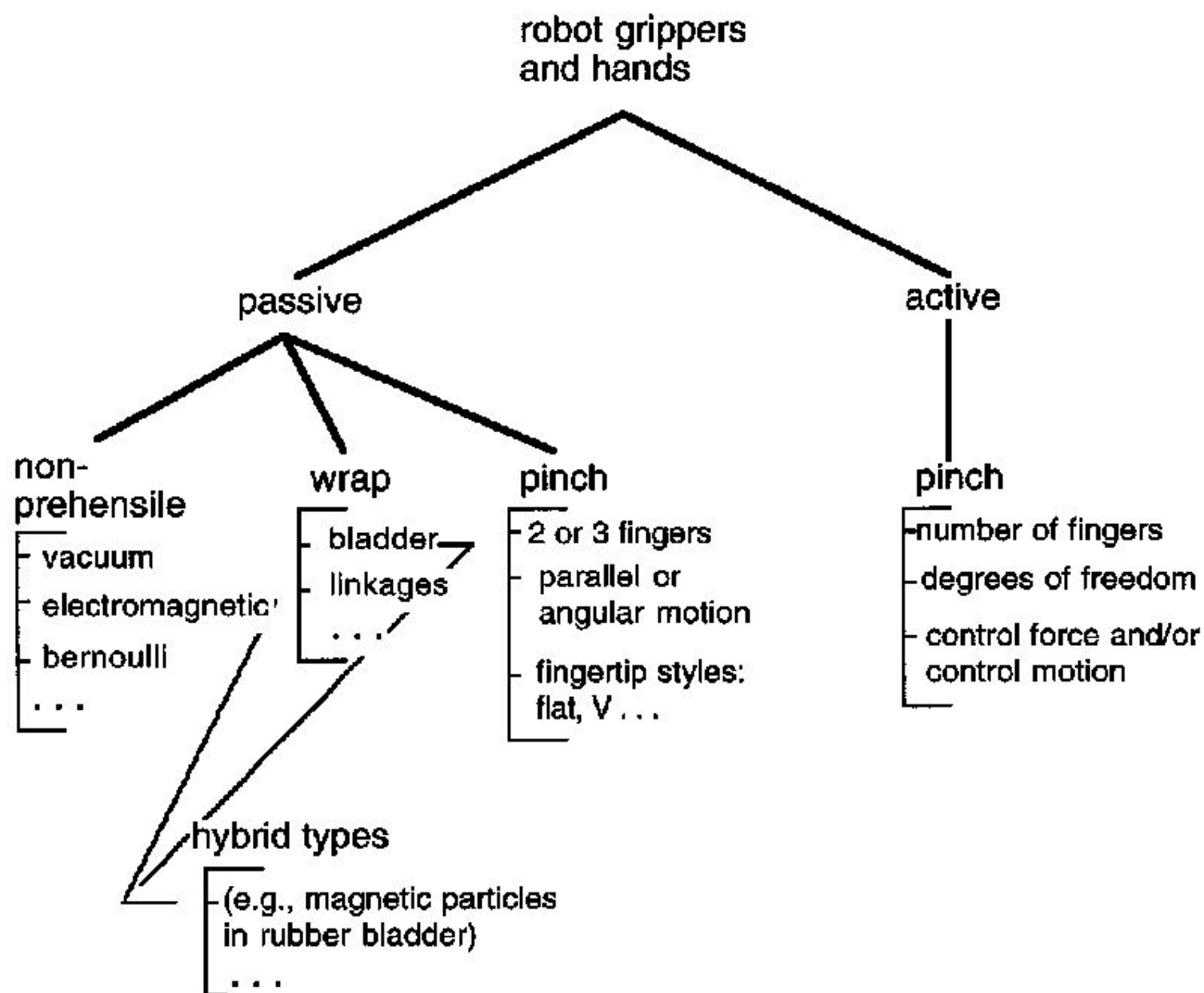
Contents (課程內容)

1. Introduction
2. Holding/Gripping Mechanism (夾持/抓取機構)
3. Practices (課程練習)



Grasping principles

<p>Friction Gripper</p> <p>Macro/Meso/Micro</p>	<p>Jaw Gripper</p> <p>Macro/Meso/Micro</p>	<p>Needle G.</p> <p>Macro</p>	<p>Magnetic Gripper</p> <p>Macro/Meso/Micro</p>
<p>Suction G.</p> <p>Macro/Meso/Micro</p>	<p>Bernoulli</p> <p>Meso/Micro</p>	<p>Adhesive G.</p> <p>Micro</p>	<p>Liquid-solid transition Gripper</p> <p>Meso/Micro/Macro</p>
<p>Electrostatic G.</p> <p>Meso/Micro</p>	<p>Van der Waals</p> <p>Meso/Micro</p>	<p>Acoustic G.</p> <p>Macro/Meso/Micro</p>	<p>Laser</p> <p>Micro</p>



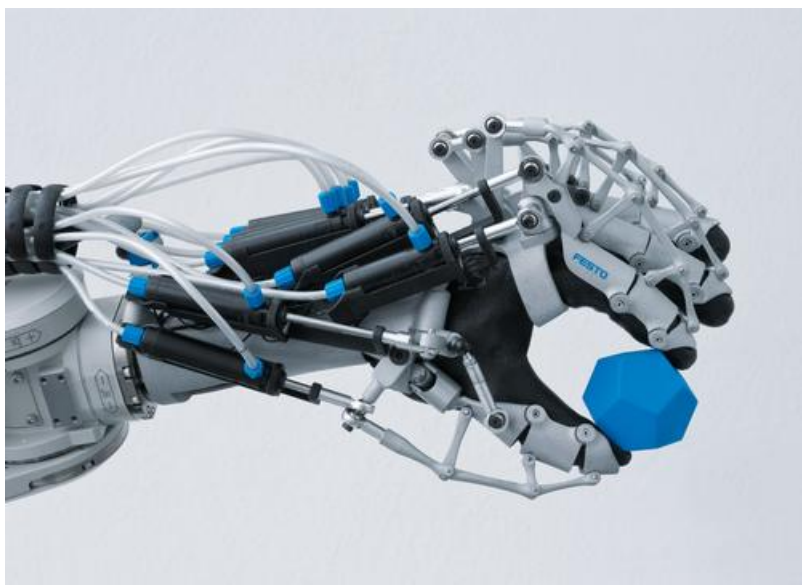


Holding/Gripping Mechanism

1. Mechanical Grippers
2. Non-prehensile Grippers (非抓握式)
3. Hybrid Grippers
4. Robot Arms
5. Dual Arm Robot/Manipulator

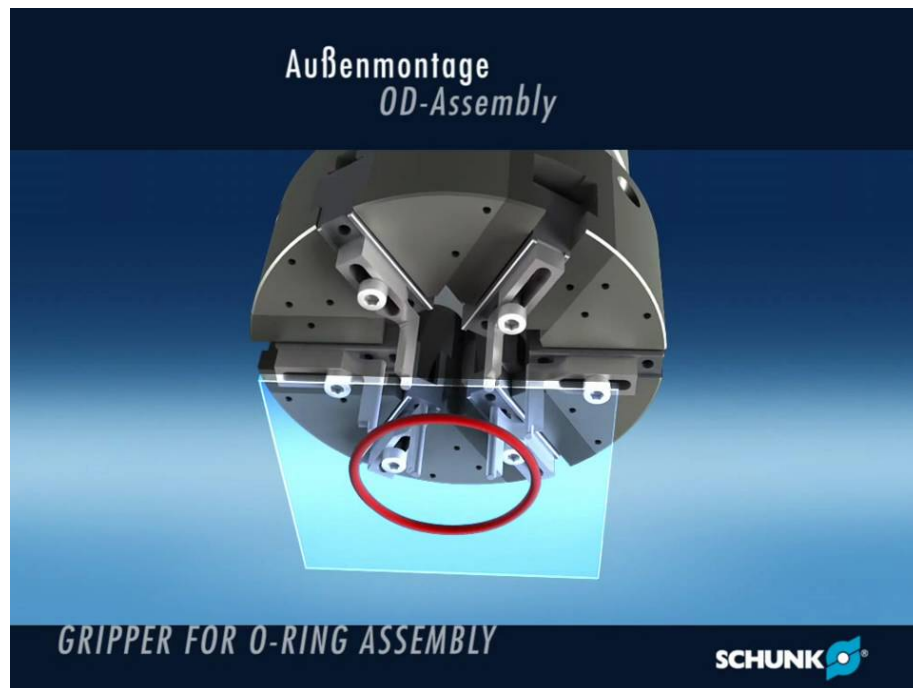


Mechanical Grippers



FESTO Mechanical Hand

Gripper selection software

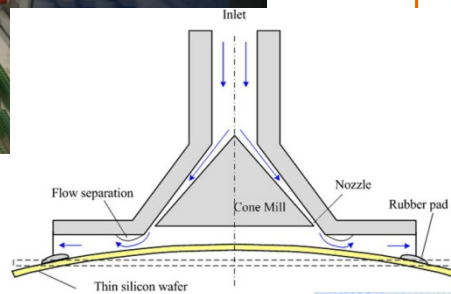
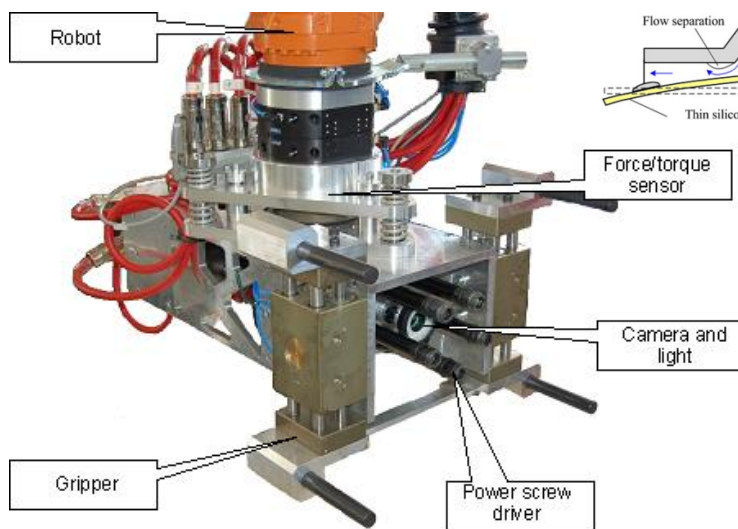
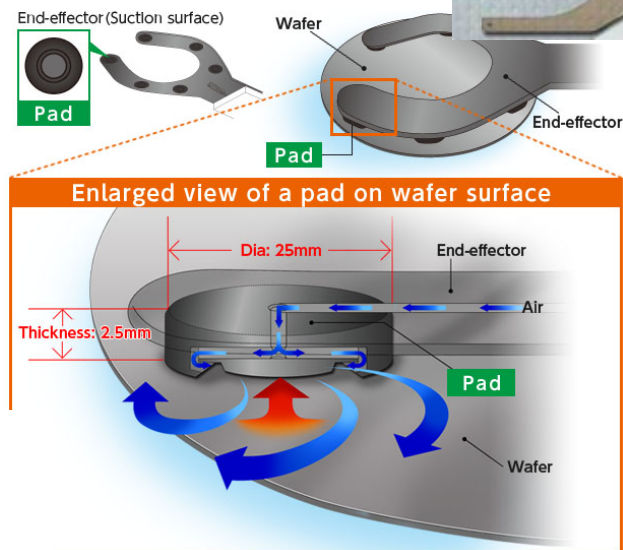
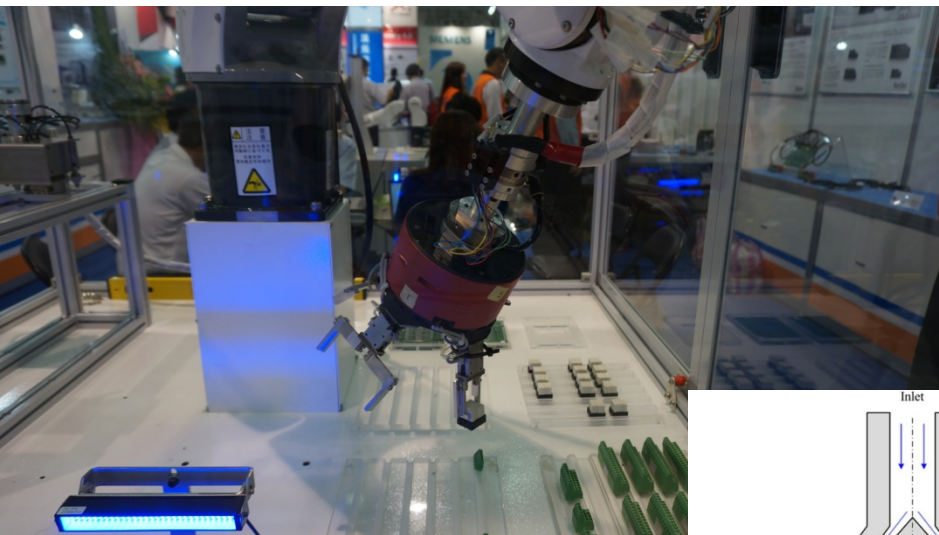


SCHUNK:

1. Modular and Mobile ripping Systems
2. Gripping Meets Industry 4.0



Precision End Effectors





WAFER GRIPPERS

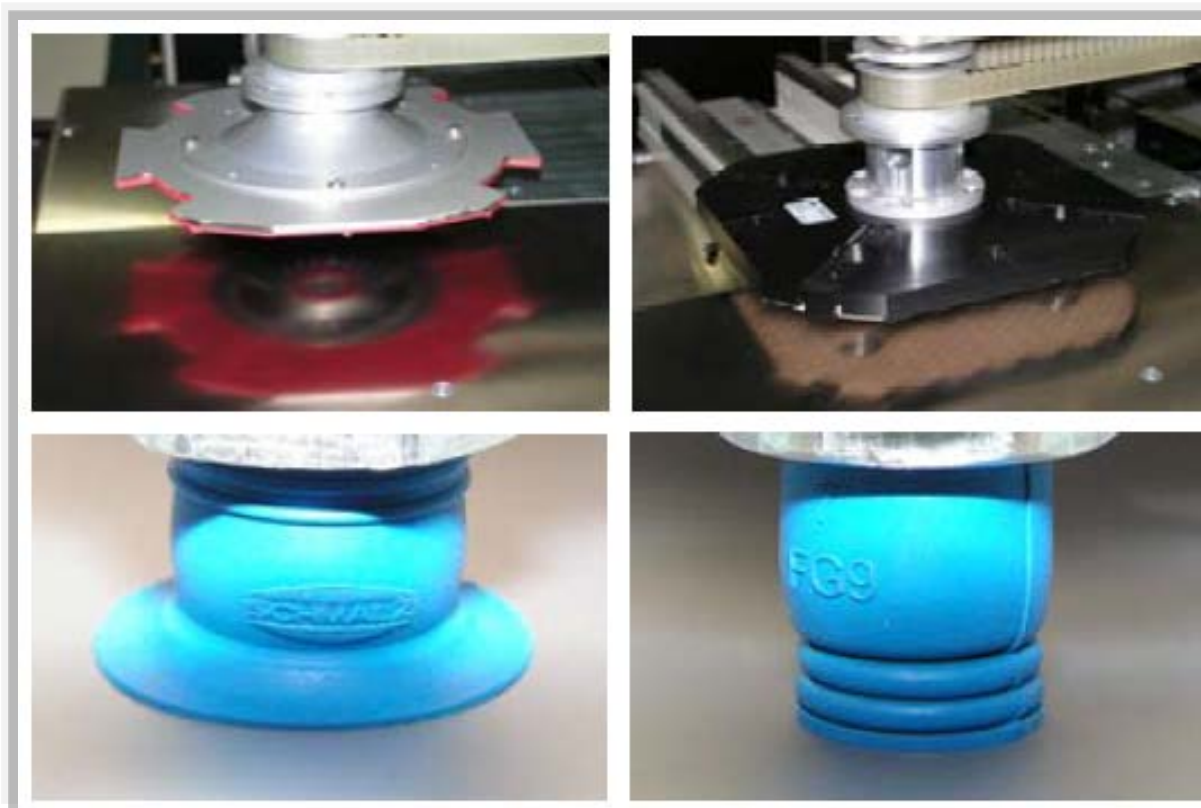
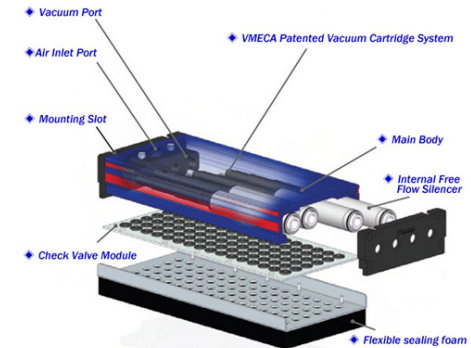
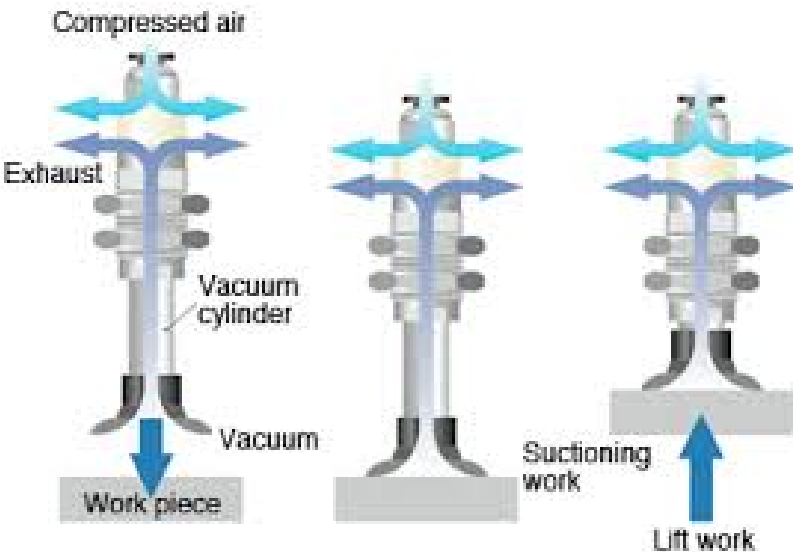


Fig. 1 Overview of the four investigated wafer grippers. The upper left image presents the Bernoulli gripper, the upper right image the area gripper. In the bottom row each image shows one of four suction pads belonging to the investigated flat suction pad gripper (left) and the bellows suction pad gripper (right).

(Sebastian Nold et al., [INVESTIGATIONS ON THE IMPACT OF WAFER GRIPPERS ON OPTICAL AND ELECTRICAL PROPERTIES OF ALKALINE TEXTURED AND A-SI PASSIVATED SURFACES](#))



Precision Vacuum Pads



Flange connection

- Spring-loaded level compensation (floating attachment) to all common robots and gantries

Control modules

- For common bus systems available; decentral control

Basic body / suction box

- Height adjustable by servomotor (optional)

Suction area

- With suction pads

External vacuum generation (not shown)

- Individually selected from the Schmalz program

Vacuum valves

- For suction area / global vacuum

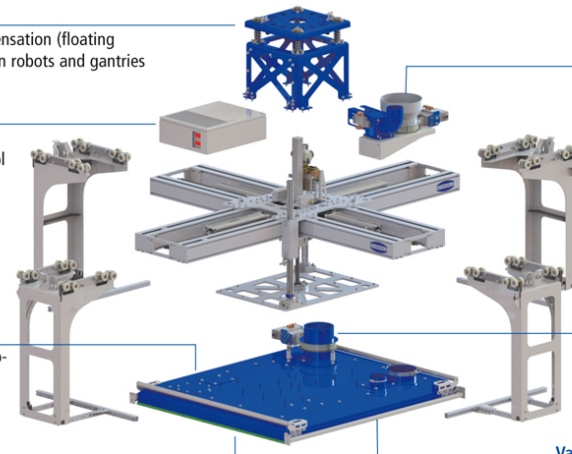
Mechanical gripping modules

- Servomotor-driven (pneumatically as an option)

Venting valve

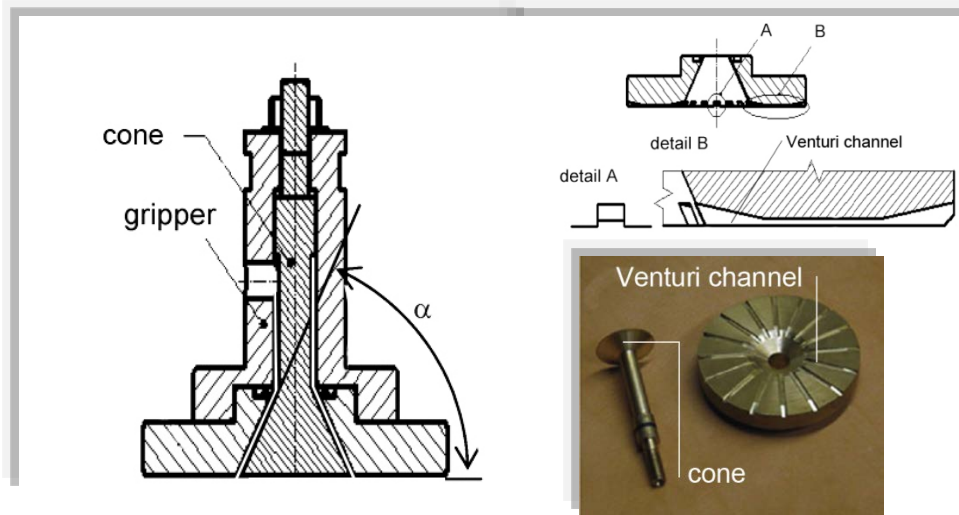
Vacuum curtain (retracted)

- For generating a global vacuum





Medical Bernoulli Gripper

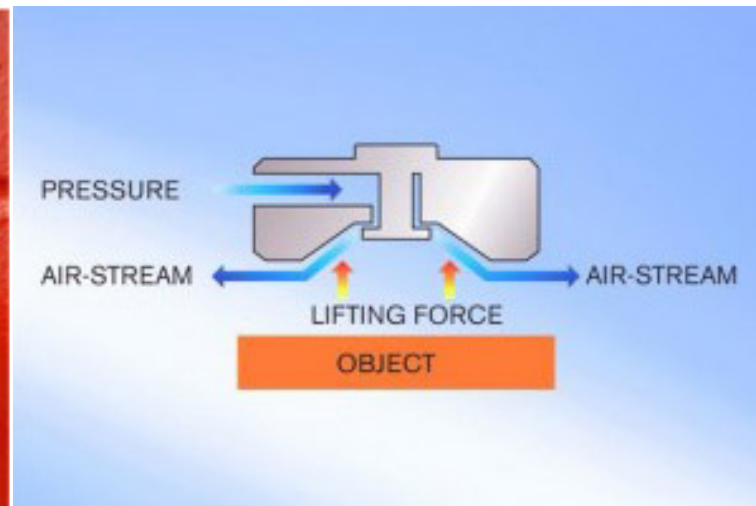


(Left) Leather gripper with an integrated cone. The figure is adapted from Dini (2009).

(Right) Top: Detail of leather gripper with cone and Venturi channels. Bottom: The cone and the gripper face with radial Venturi channels. The figures are adapted from Dini (2009).



Improved Bernoulli Grippers



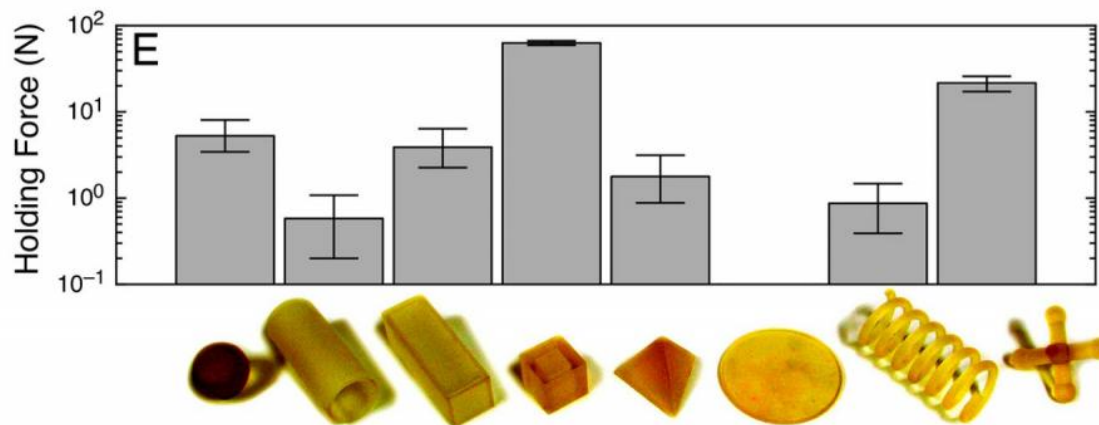
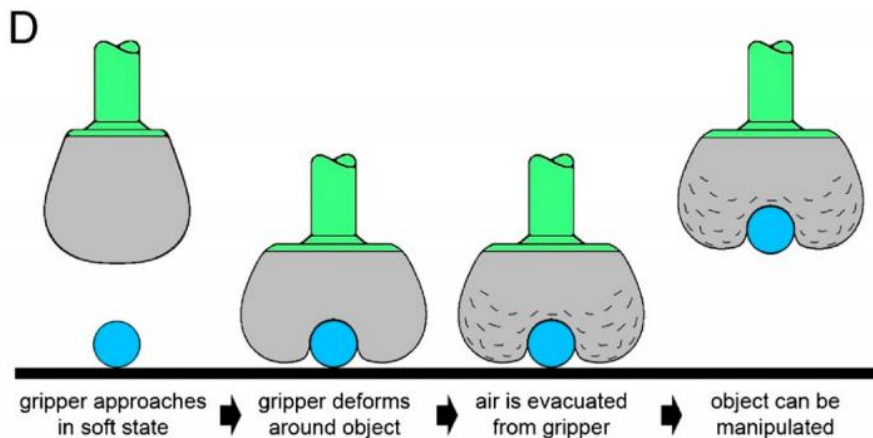
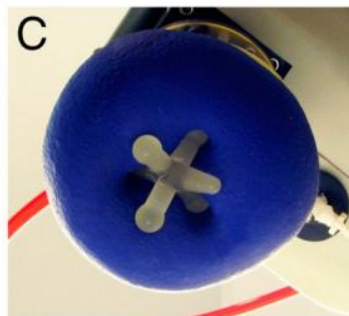
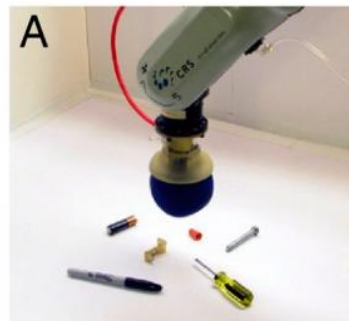
Robot Uses Supersonic Jets of Air to Stick to Almost Anything

(<http://spectrum.ieee.org/automaton/robotics/industrial-robots/robot-uses-supersonic-jets-of-air-to-stick-to-almost-anything>)

An Investigation into Improved Non-Contact Adhesion Mechanism Suitable for Wall Climbing Robotic Applications

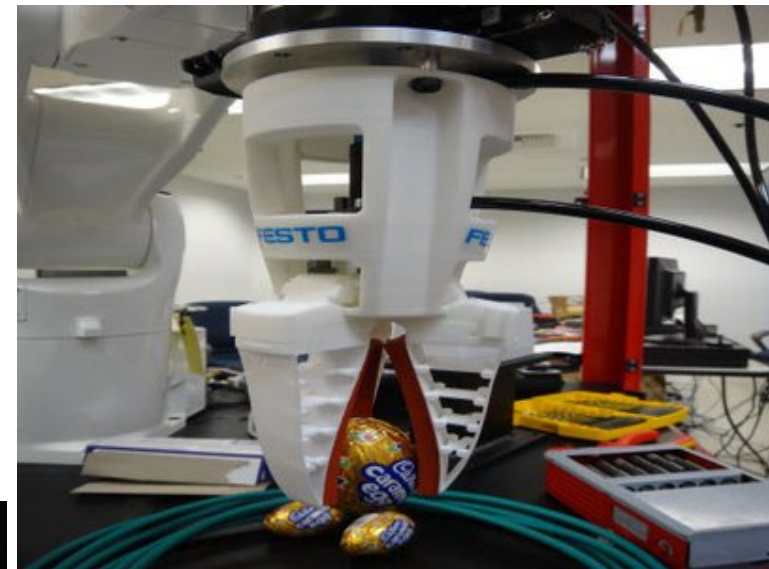
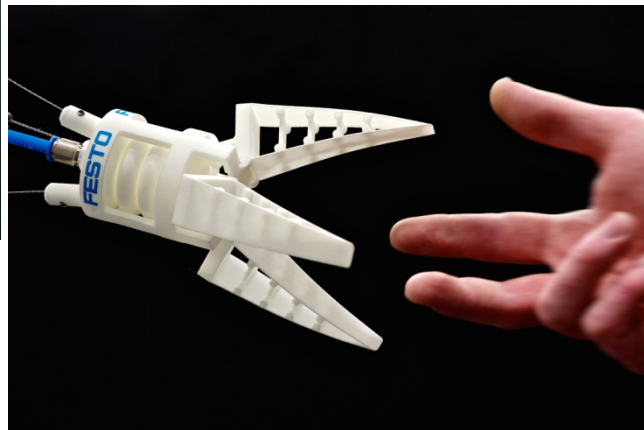
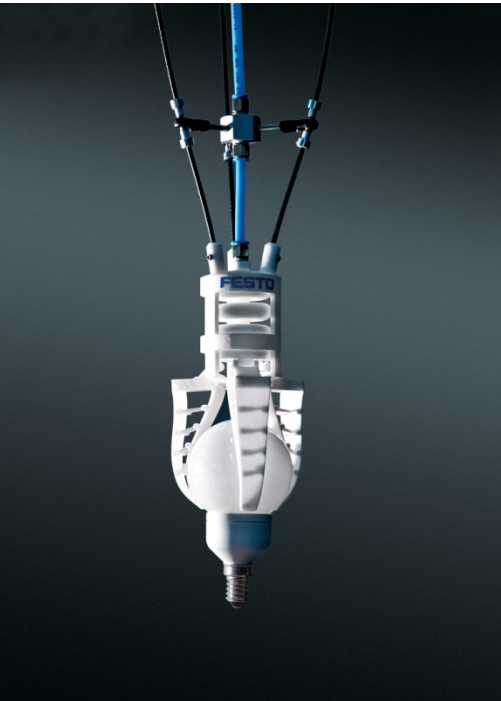


"Jamming" Robot Gripper



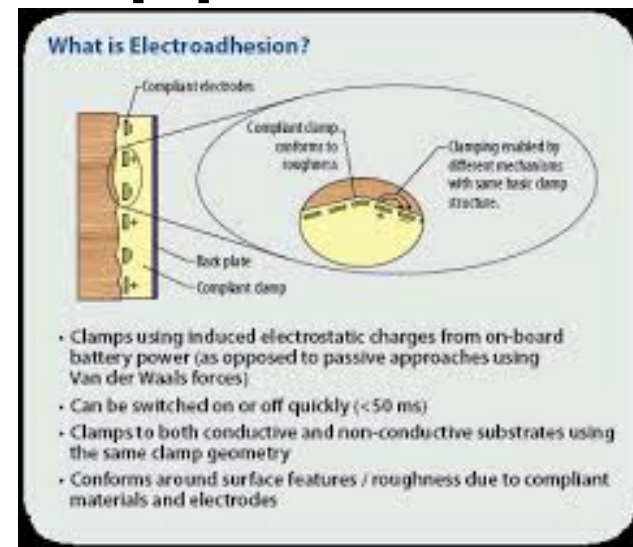
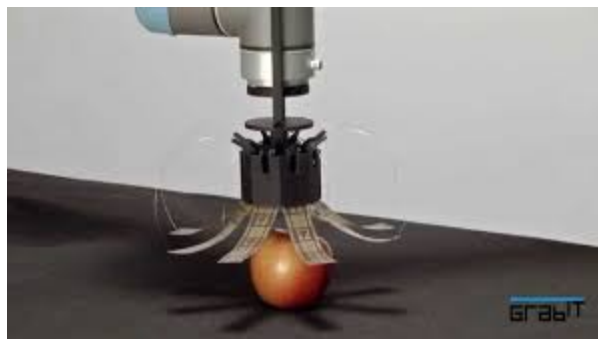


Adaptive gripper based on FESTO FinGripper fingers





Electroadhesive Grippers



Source: SRI.com

*Application of
electroadhesion to
gripping complex-
shaped objects*



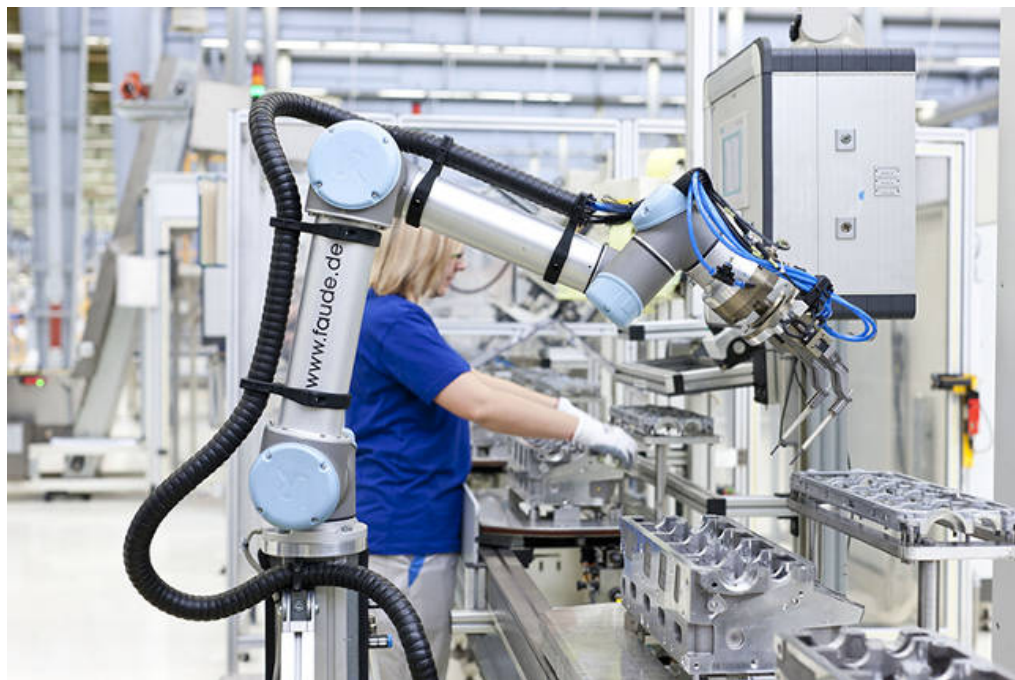
Electroadhesive Robot Grippers from SRI International

(<http://www.hizook.com/blog/2010/10/28/electroadhesive-robot-grippers-sri-international>)



Collaborative Robots

Zacobria Universal-Robots UR5 robot with controller (Case Study: [Wistron in China automates with UR robots](#))





Dual Arm Robot/Manipulator



This DA series dual arm MOTOMAN robot from YASKAWA is working in a biomedical cell. This highly agile and flexible robot features 15-axis. It provides unrivalled degrees of freedom and is designed to work in spaces normally occupied by people. Robotic automation in the biomedical industry is particularly beneficial as tasks can be carry out faster with a higher levels of accuracy and also eliminates exposure to potentially hazardous and dangerous substances.

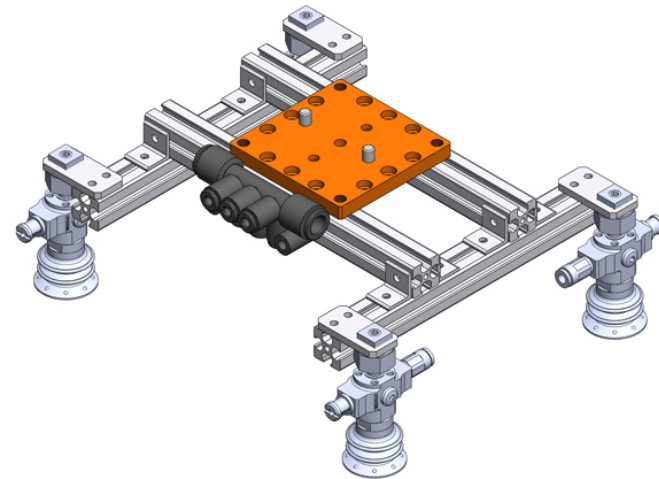


- ◆ New Underactuated Robot Hands from Lacquey and Willow Garage
(<http://www.hizook.com/blog/2012/12/05/new-underactuated-robot-hands-lacquey-and-willow-garage>)
- ◆ Robot Uses Supersonic Jets of Air to Stick to Almost Anything
(<http://spectrum.ieee.org/automaton/robotics/industrial-robots/robot-uses-supersonic-jets-of-air-to-stick-to-almost-anything>)
- ◆ <http://argosysrobotics.cn/fingergripper.html>
- ◆ [OGGB Bernoulli grippers](#)
- ◆ <http://www.se.schunk.com/>
- ◆ https://www.festo.com/cms/nl-be_be/9767_12353.htm



Practices (課程練習)

- 次世代面板廠8.5代線以上，玻璃基板尺寸為 $2,200 \times 2,500\text{mm}^2$ ，厚度為0.7mm，請依此規格設計一理想之夾具，可以進行玻璃基板之夾持與翻轉：
- 參考課程練習之參考資料，完成下列工作：
 1. 零件圖與組合圖
 2. 動畫模擬
 3. 零件表(含各選用零件編號)
 4. 報告電子檔





References (參考資料)



The End.

is another beginning...