Industrial robotics

Periphery

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What are the components of a robotic solution ?

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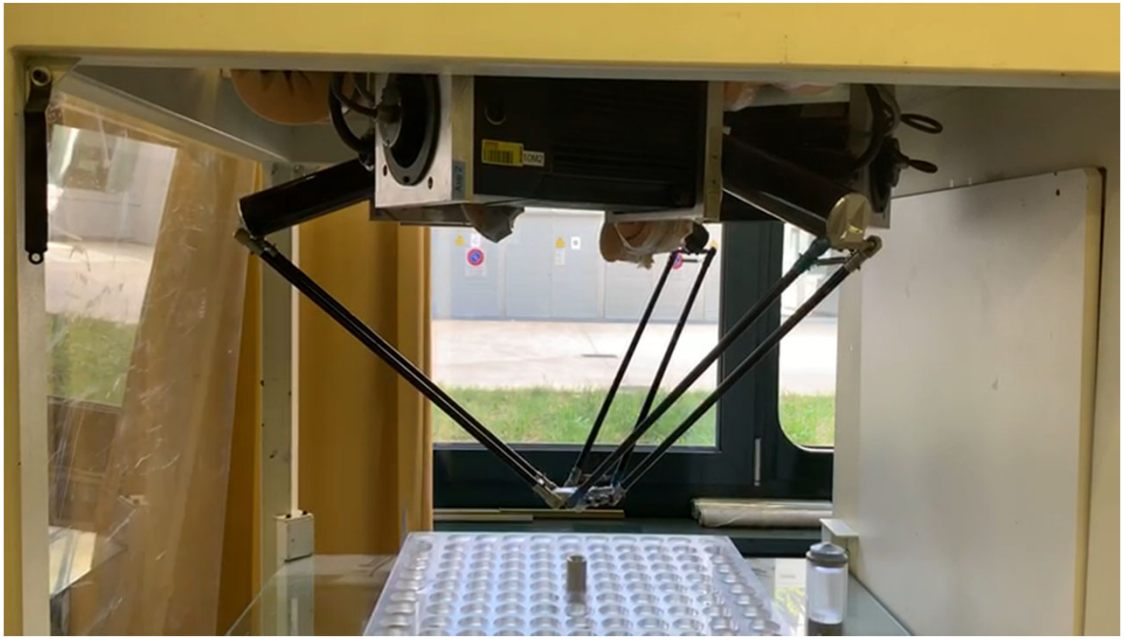
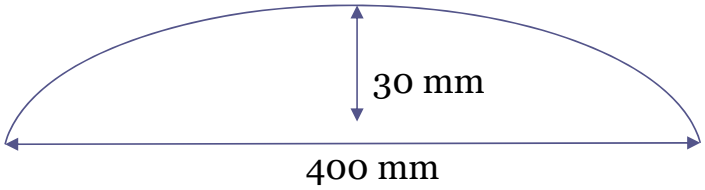


August 2019
0,4mm RMS_error @30 Ge acceleration pick_and_place



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A robot alone is useless!

There are physical and information interfaces between the robot and the components to be processed.

The various functions of the periphery are summarized as follows:

1. ***Present the parts to the robot at a specific location***
2. ***Recover the parts after defined operation (s), in a defined sequence;***
3. ***Ensure a relationship between the component reference frame and that of the robot (relative positioning);***

   this function is essentially provided by the gripper which is fitted with an appropriate shape or system

4. ***Ensure a reversible robot-component link to allow the required operation;***

   By normal and frictional forces,

   By magnetic forces (transfer of cans or jars with iron lids),

   By vacuum; to ensure very short pick-up times, it can be effective to control the pick-up by contact with the part (reflex gripper);

(!) *an* ***on-board "tool" changer*** *may increase the flexibility of the robot, but brings* ***additional mobile mass****, complication and additional dimension errors; it is also possible to provide a fixed tool changer; in the latter case, the tool change will take longer;*

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5. ***Correct** relative positioning errors between elements to be assembled by position sensors, by force sensors or by passive (RCC: Remote Compliance Center) or active compliant systems;*

6. ***Ensure all other operations** related to the work to be performed (press, US welding, machining, gluing, packaging, ...);*

***(!)** Operations can be performed by a tool that the robot picks up and moves or by a machine that is fed by the robot;*

***(!)** Toolholders allowing interchangeability ensure greater flexibility by the fact that the robot can change tools autonomously.*

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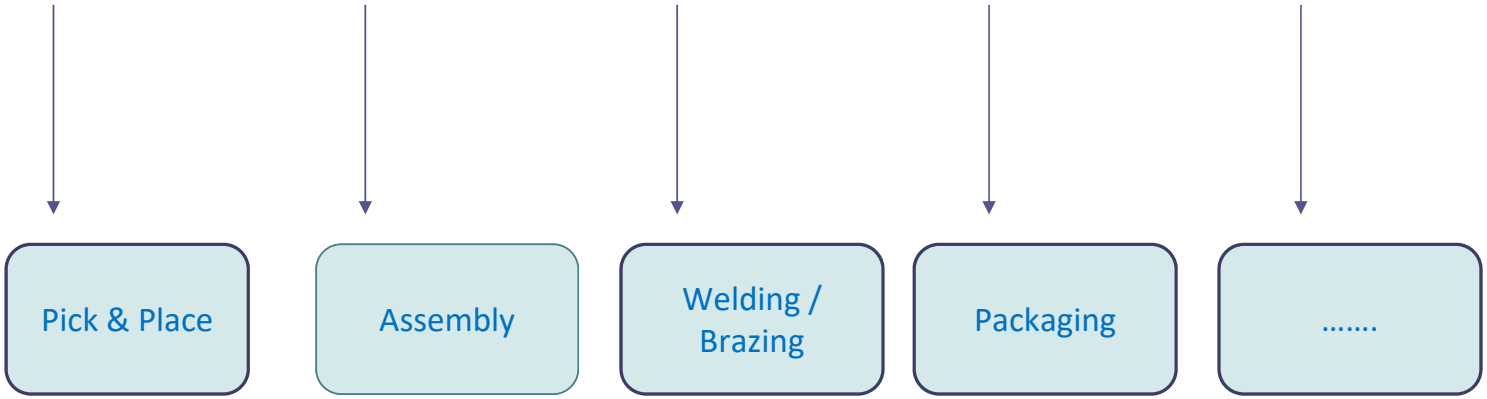
The periphery is all that is outside the function of the robot's motion-

Peripheral components are closely linked to the application to be made.




Conveyor
Vision
Robot
Vibrating Bowl
Robot accessories
Tool Changer
Grippers
Centering systems

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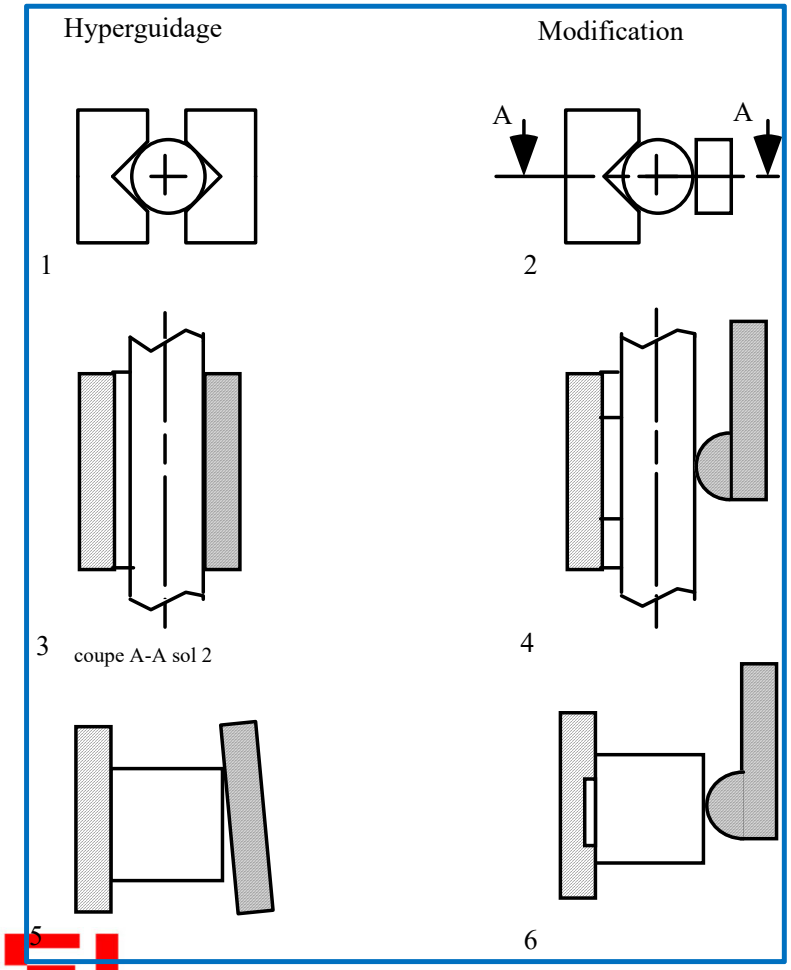
Grippers - concepts

A gripper will perform the following two functions:

- **Catch / release** (Unilateral – Bilateral or Multilateral)
- Referencing

Grippers - concepts



Some examples of grips with **over constraint**; if necessary (reduction of contact pressure), the punctual contact can be replaced by a plate mounted on a joint or an elastic element.

Unilateral link

Fig.2
Holding and positioning device for SMT assembly.

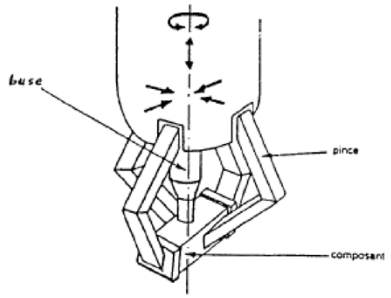


Fig.3
Bottle pick-up with special suction cups.

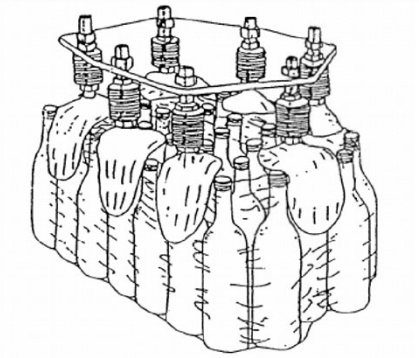
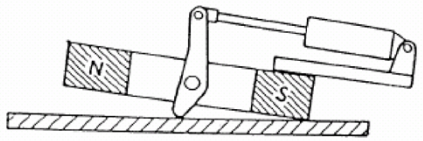
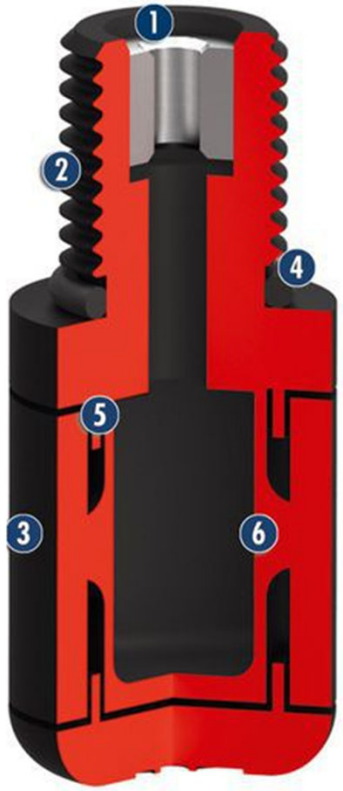


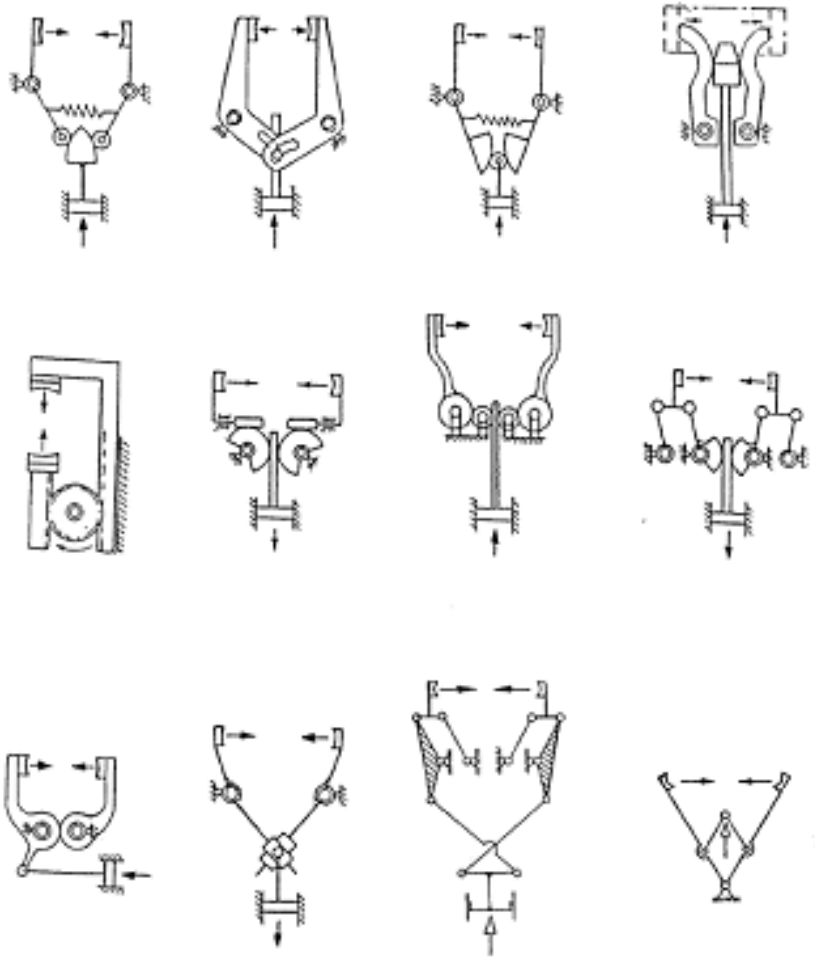
Fig.4
Permanent magnet with mechanical ejection system.

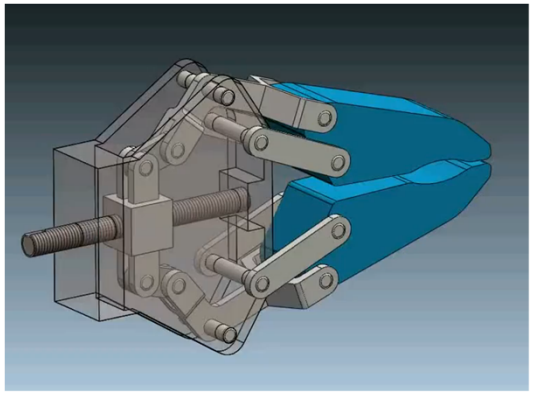


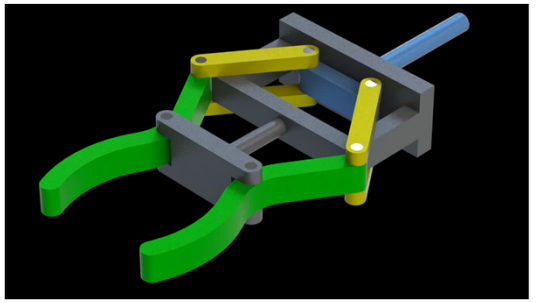
Expanding gripper / pneumatic LOG



Bilateral links / symetric







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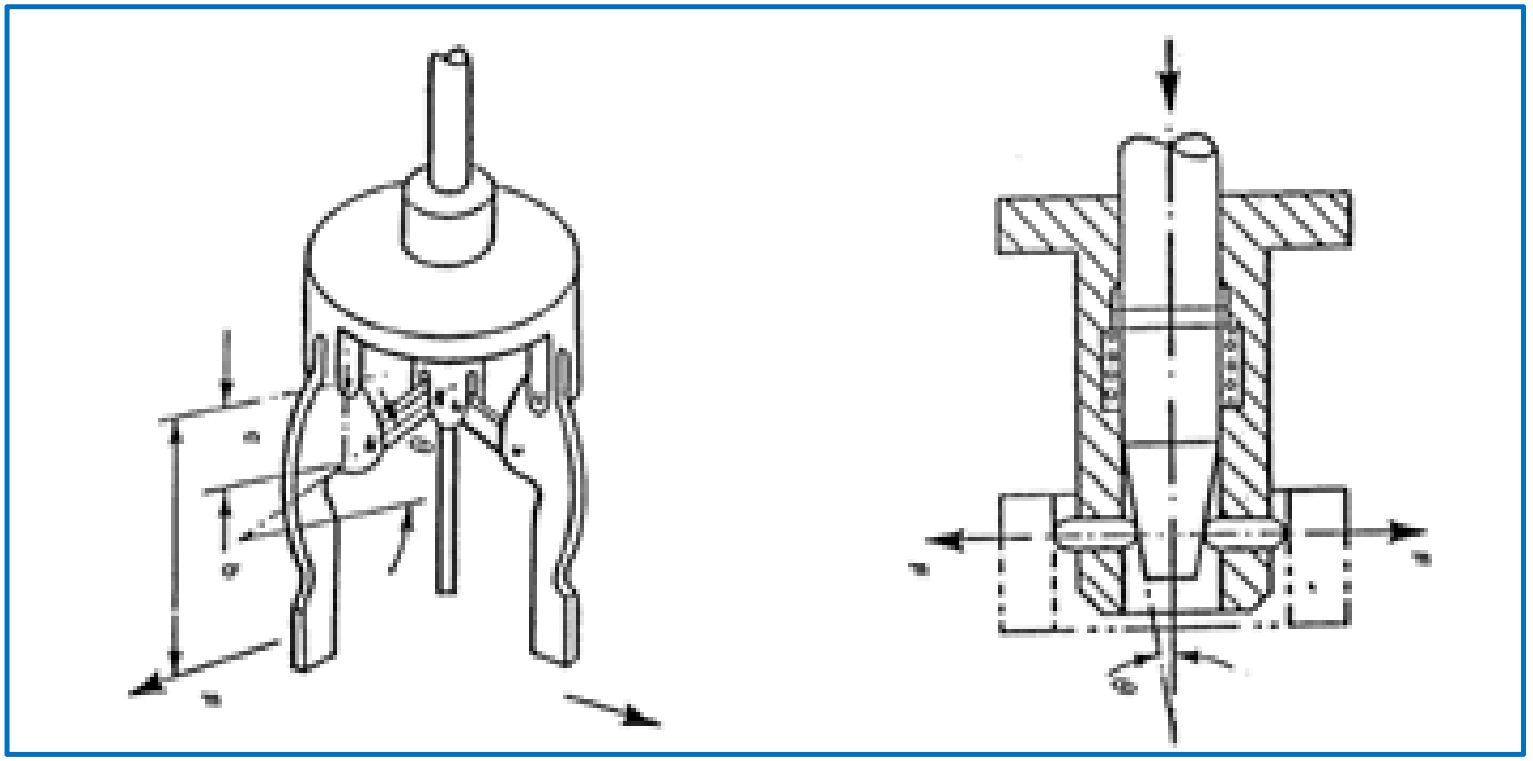
Multilateral links



3-finger gripper for external gripping and for internal gripping

Upto 4 fingers

- More rigid….
- More grip strength
- Hyper-guided

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3 finger centering gripper

Superior Clamping and Gripping

SCHUNK®

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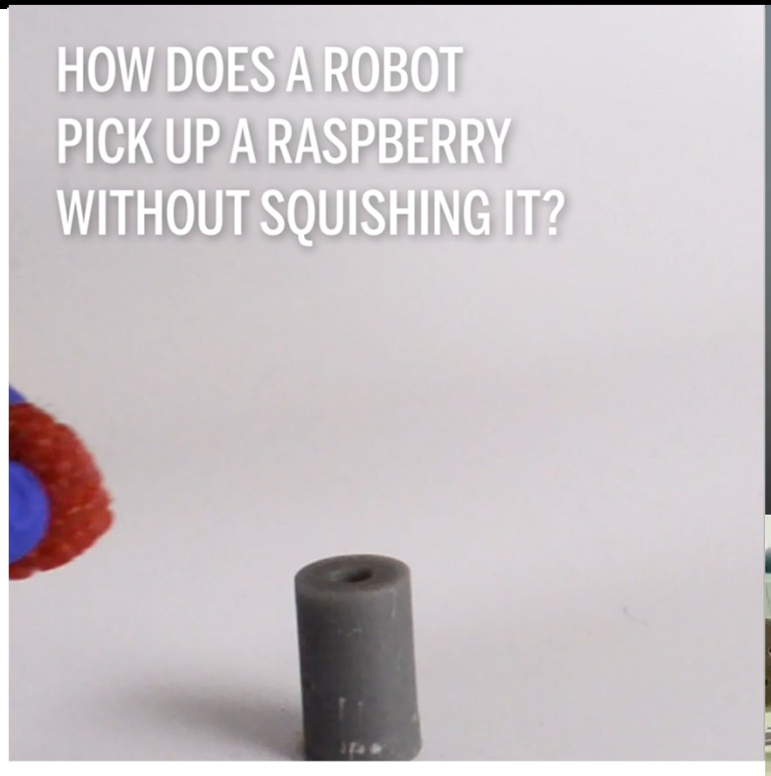
Other grippers


FESTO FinGripper Finger:

Universal Gripper

Soft Grippers



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The reflex grip

A reflex gripper is automatically activated upon contact with the parts to be gripped ….. Without the need for any electrical order from the PLC!

Several principles lend themselves to reflex grippers:

- mechanical.
- vacuum
- magnetic,

mechanical reflex

Pay attention to the shape of the parts!

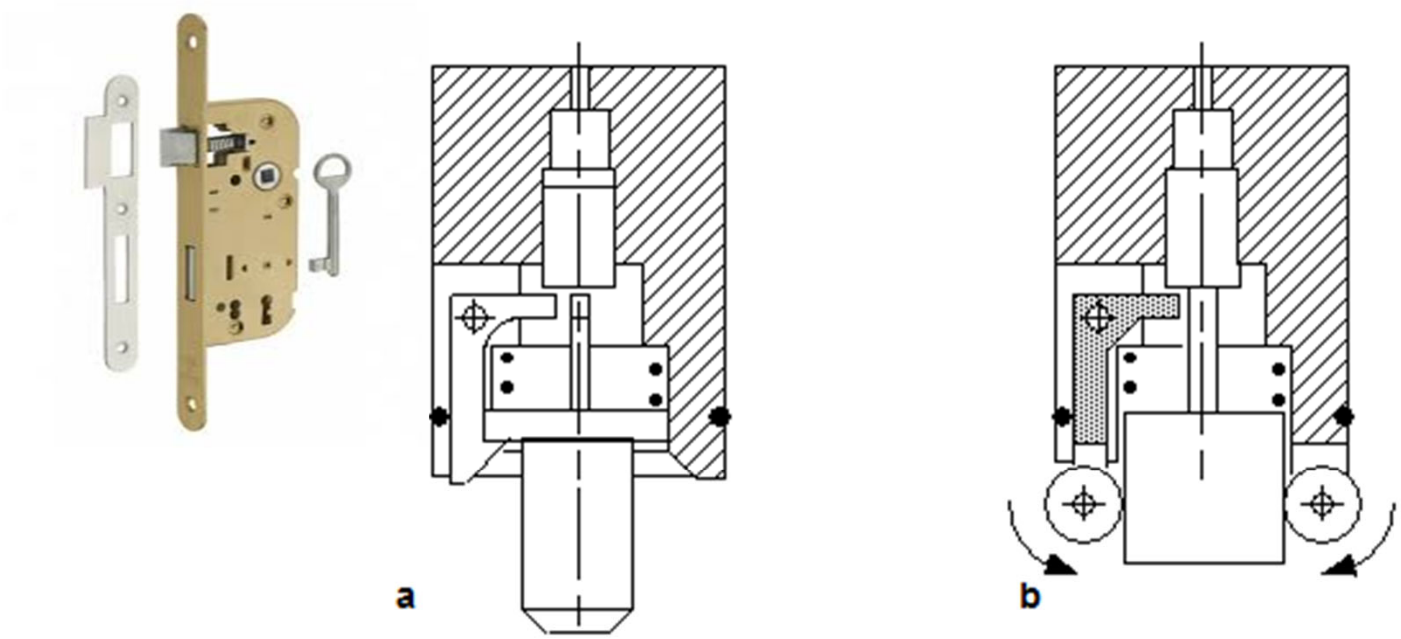
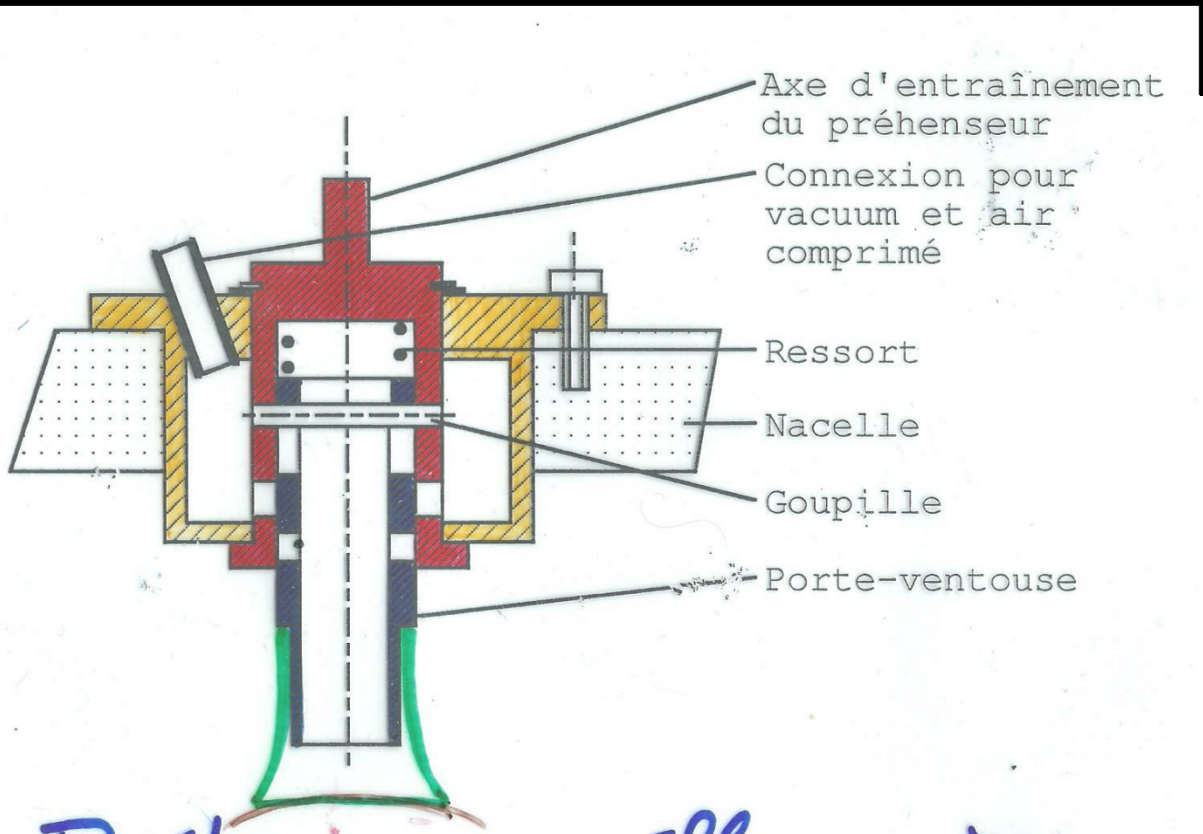


Fig.8. Préhenseurs mécaniques à prise réflexe:
a) à 3 cliquets,
b) à 2 roues libres.



Préhenseur réflexe à vacuum et air comprimé

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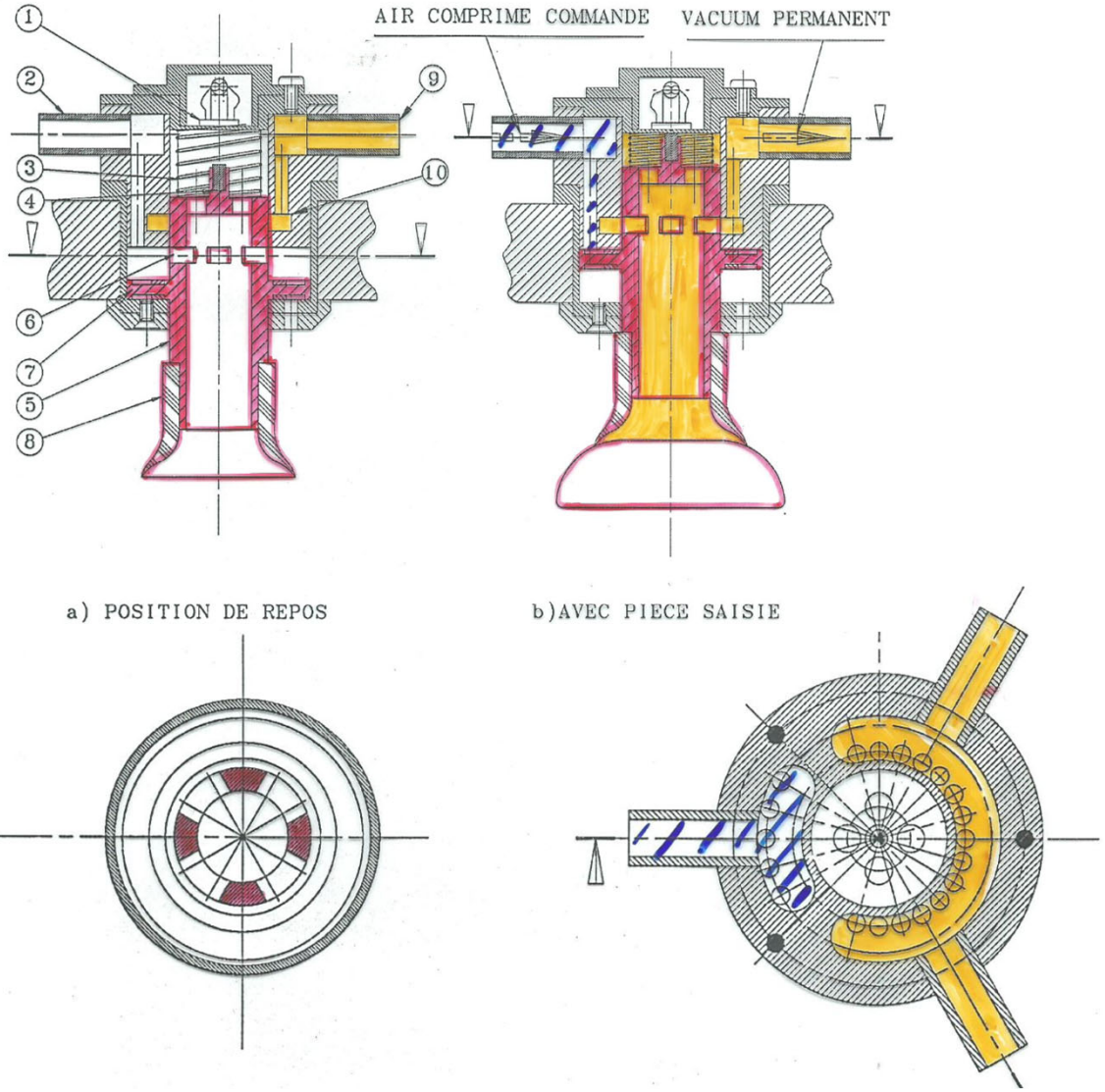
AIR COMPRIME COMMANDE
VACUUM PERMANENT
1
2
3
4
6
7
5
8
9
10
a) POSITION DE REPOS
b)AVEC PIECE SAISIE

Mechanical versus Pneumatic!

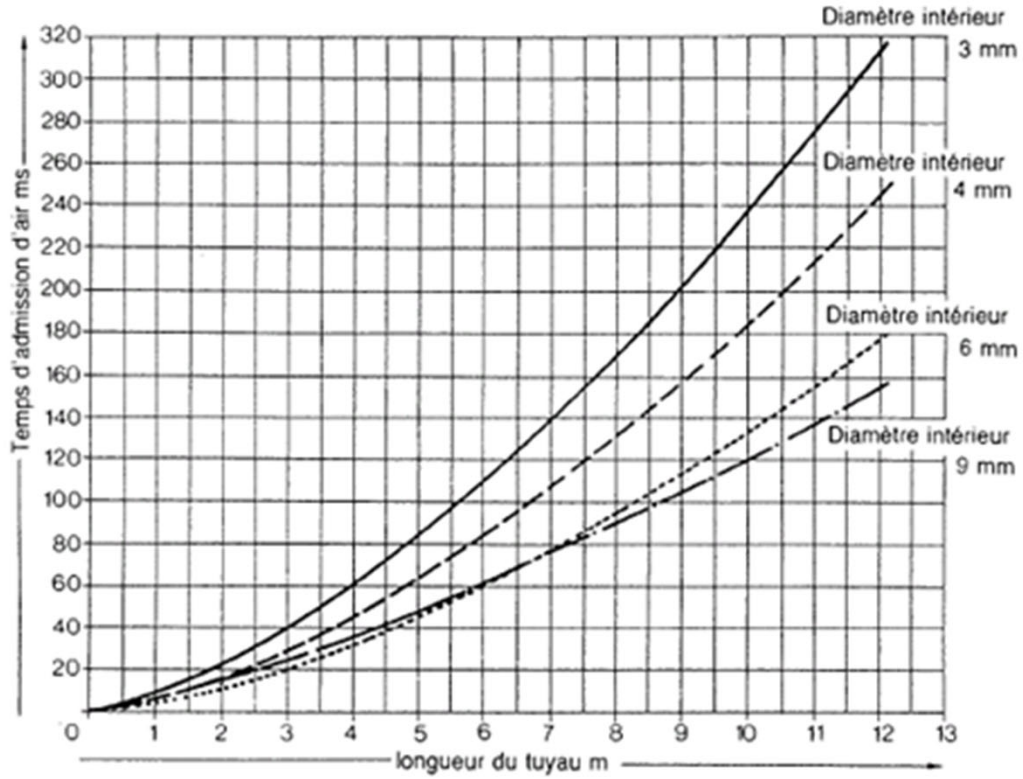

Fig.10 Temps d'admission d'air pour différents tuyaux en fonction de leur longueur; pression de service: 6 bars. Source: Festo

Applications and examples


THE ART OF PRECISION


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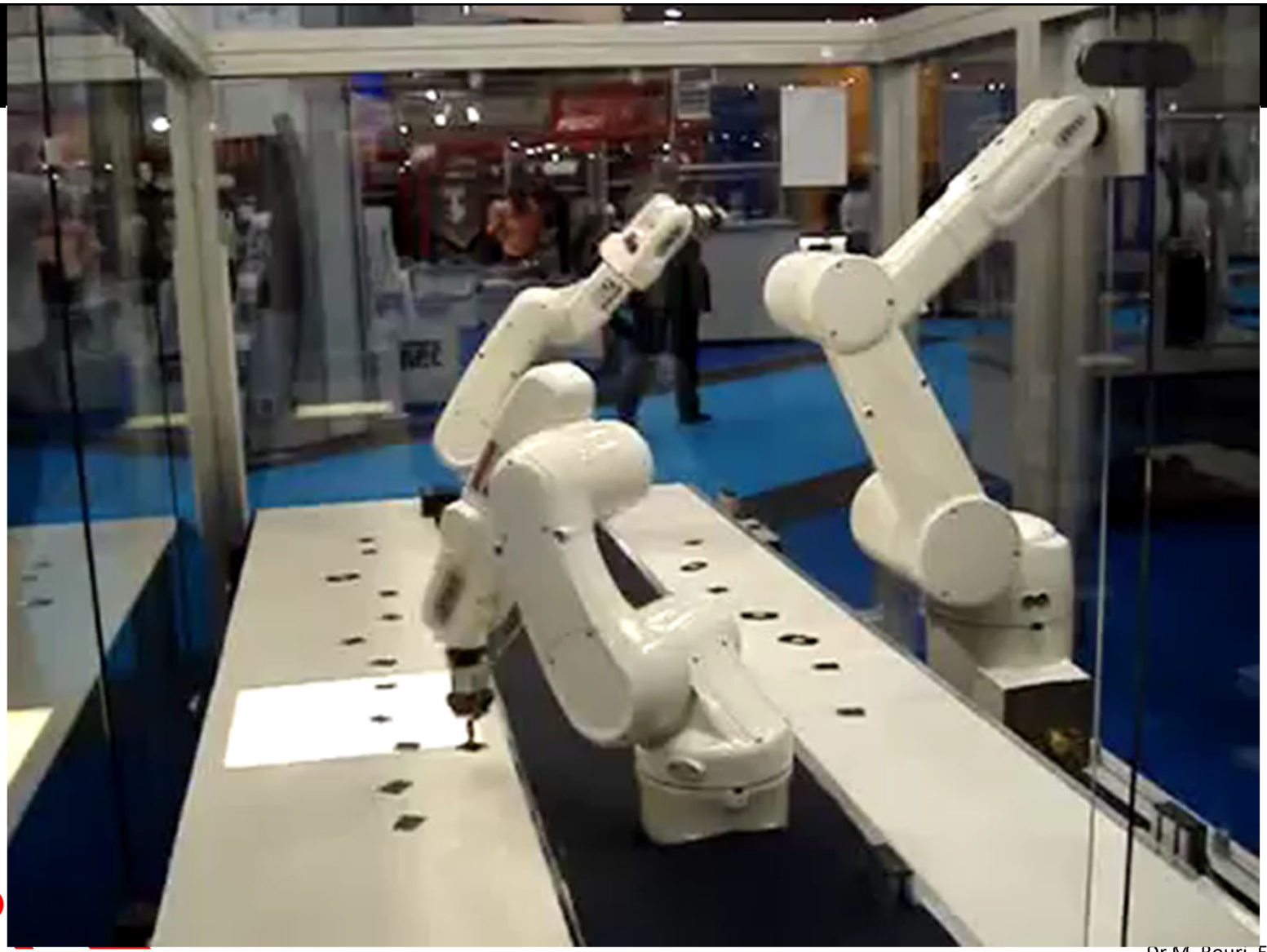
ROBOT COLA



Vibrating bowl

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DELFI Feed Placer

Ls{ xliXiwxe$Q shi$WwQ ehi$
Xiwxe$Q sxsvw$Jvsq $[mviha