



Design and manufacturing of plastic injection mould

09 – Ejection system

The role of ejection system

- Cause of shrinkage the product will suit tightly to the core
- Demoulding of the part from the mould

2

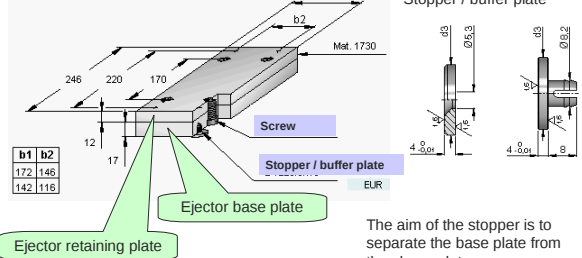
Location of the ejection

- Close to the critical areas
- So large area as it can
- The deformation of the part is forbidden
- Aesthetical viewpoint (the mark of the ejection bar)

3

Ejector plates

F 90 / 246 246

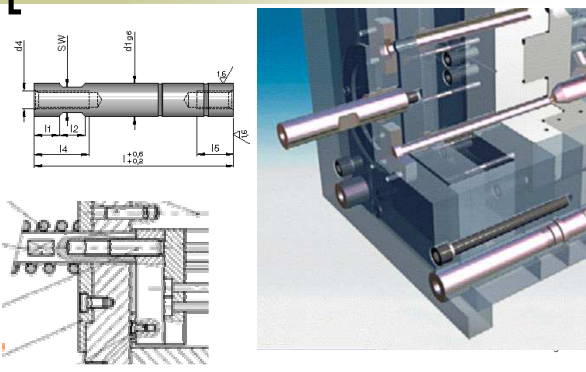


The base plate is thicker than the retaining plate, cause of higher stress and load.

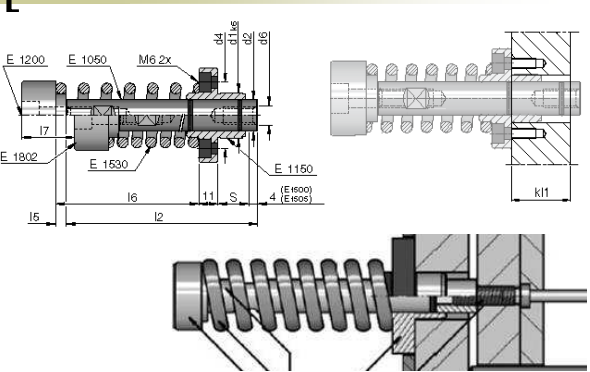
The aim of the stopper is to separate the base plate from the clamp plate.

4

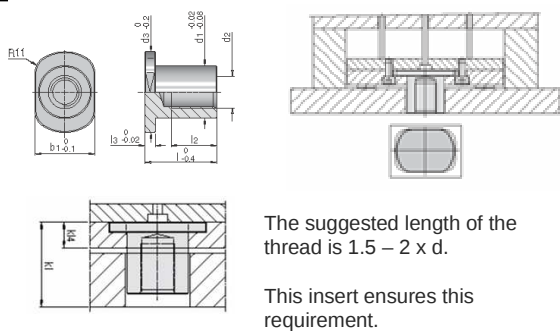
Moving of the ejection plates



Moving of the ejection plates

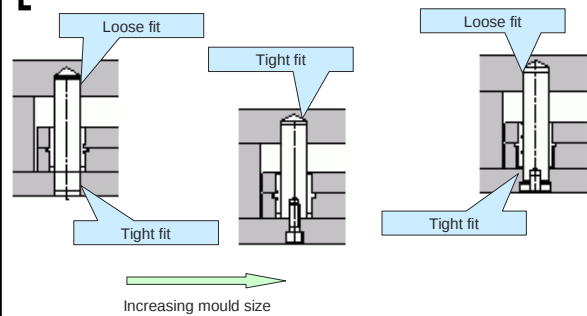


Moving of the ejection plates



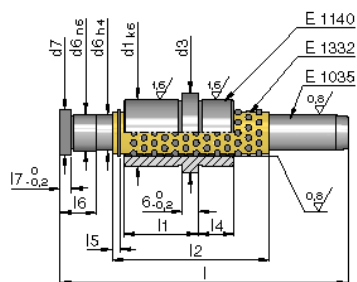
7

Guide of the ejection plates



8

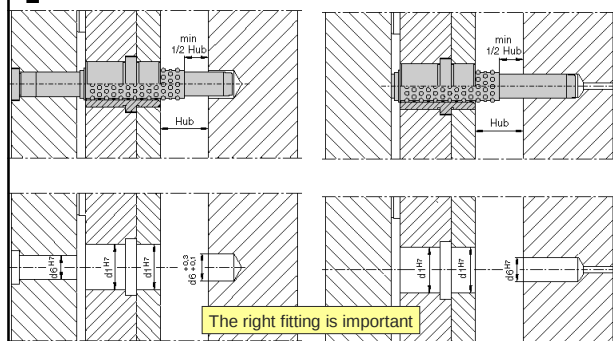
Guide of the ejection plates



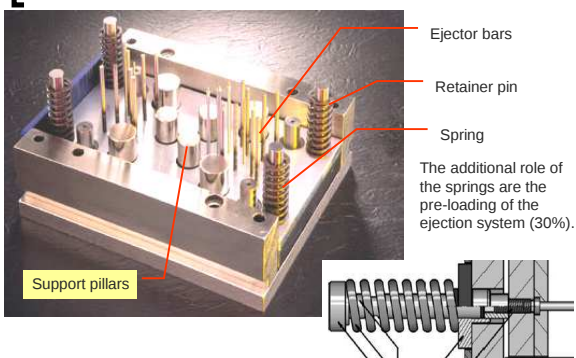
Ball-roll guide bush

9

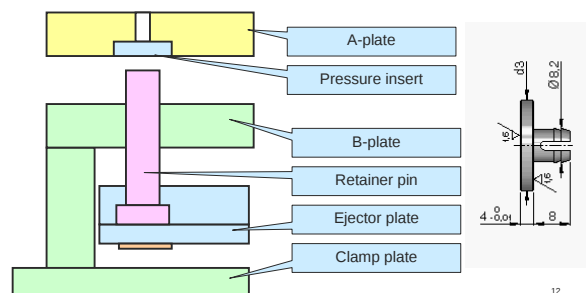
Guide of the ejection plates



Re-moving of the ejection plates

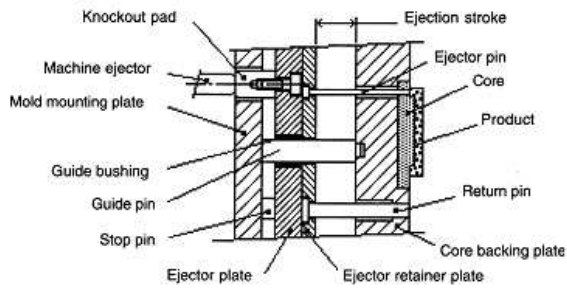


Retainer pin



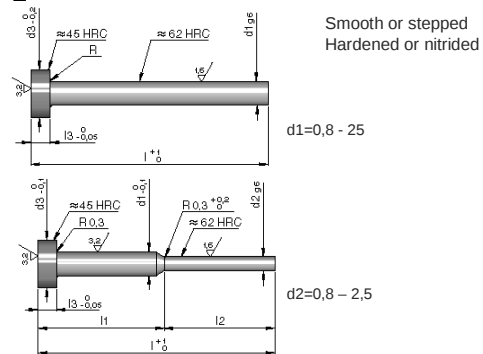
12

Summary



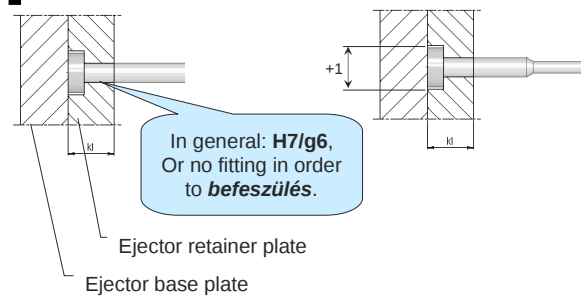
13

Cylindrical ejector pin



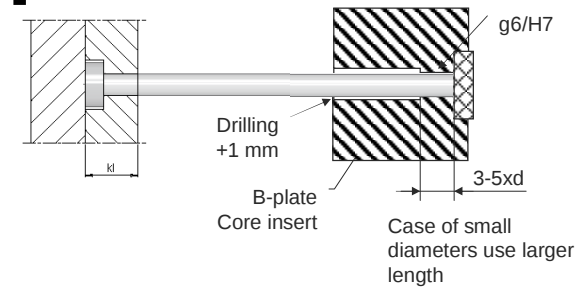
14

Fit in the ejector retainer plate



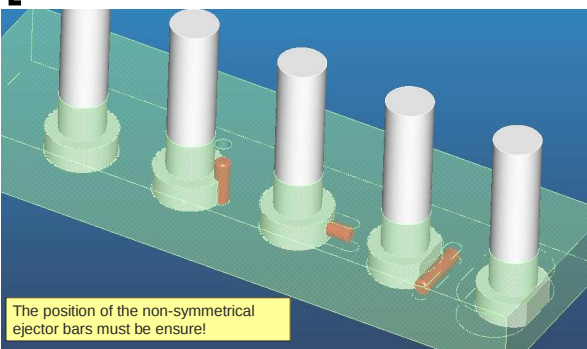
15

Guide in the B plate or core insert

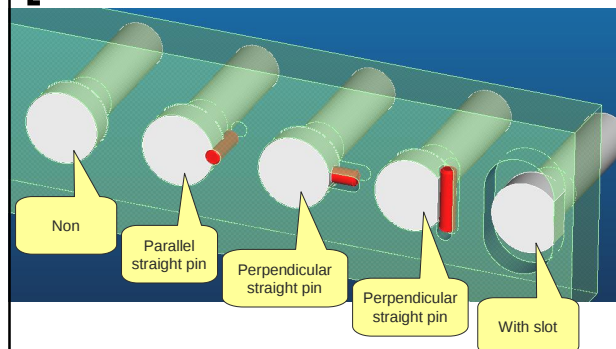


16

Ensure the angle position



Ensure the angle position



Kihajlási veszély

Karcsúsági tényező $\lambda = \frac{l_0}{i_{\min}}$ $i_{\min} = \sqrt{\frac{I}{A}}$

$\bigcirc I = \frac{d^4 \pi}{64}$
 $\square I = \frac{b h^3}{12}$

λ_p : határ karcsúság
 Ötvözetlen acél: 105 – 89
 Ötvözött acél: 112

$\lambda \geq \lambda_p$: rugalmas kihajlás (Euler)
 $\lambda < \lambda_p$: plasztikus kihajlás (Tetmajer)

$l_0 = 0.5 l$

19

Kihajlás

Rugalmas kihajlás:

Törőfeszültség: $\sigma_t = \frac{\Pi^2 E}{\lambda^2}$ $\lambda = \frac{l_0}{i_{\min}}$ $i_{\min} = \sqrt{\frac{I}{A}}$

$F_t = \sigma_t A \Rightarrow F_t = \Pi^2 \frac{I_{\min} E}{l_0^2}$

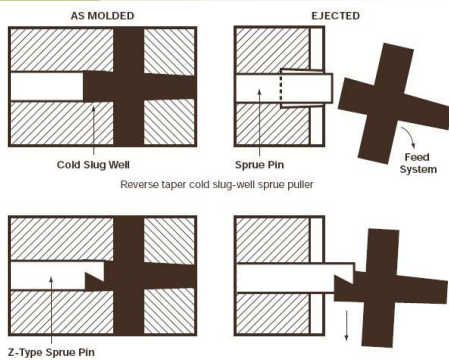
$F_{\text{meg}} = \frac{F_t}{b}$ $b: 2 - 5$ (karcsúsággal növekszik)

Képlekeny kihajlás:

Törőfeszültség: $\sigma_t = 303 - 1.29 \lambda$ (ötvözött acél esetén)

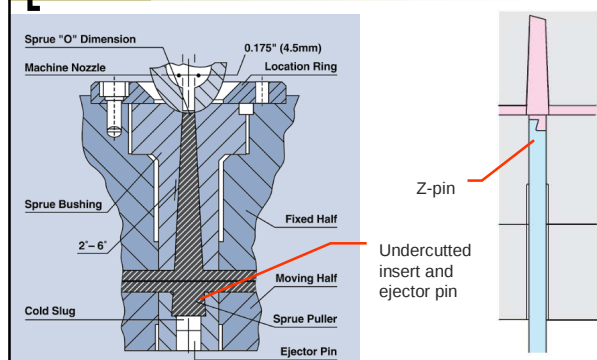
20

Sprue puller



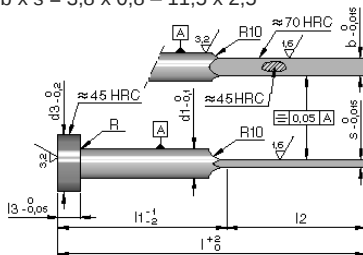
21

Sprue puller



Rectangular / blade ejector pin

$b \times s = 3,8 \times 0,8 - 11,5 \times 2,5$

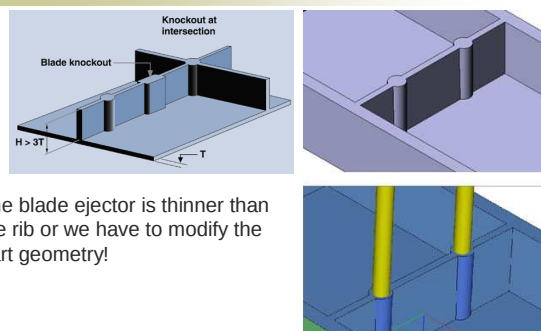


The manufacturing of the rectangular „hole” means some problem!

Késkilőkő
Penge kilőkő
Lapos kilőkő

23

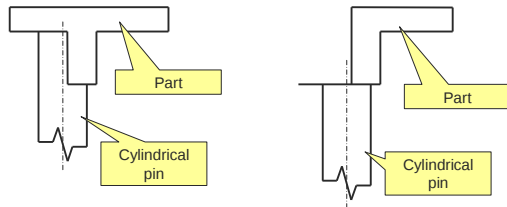
Ejection on the rib



The blade ejector is thinner than the rib or we have to modify the part geometry!

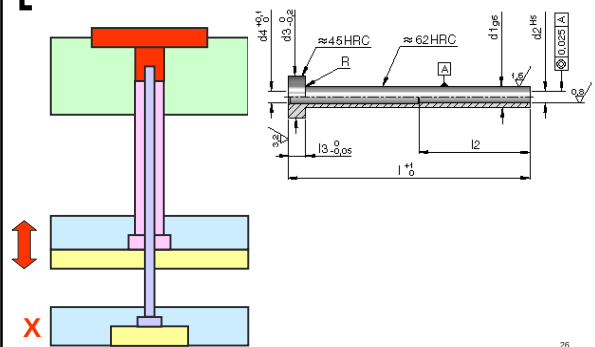
24

Ejection in the rib



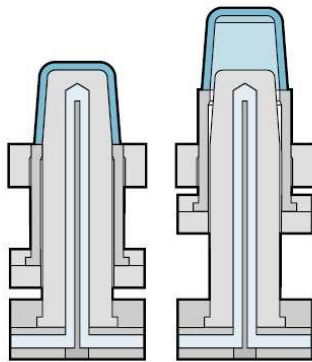
25

Sleeve ejector



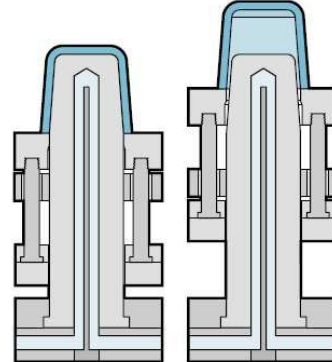
26

Ejector bush



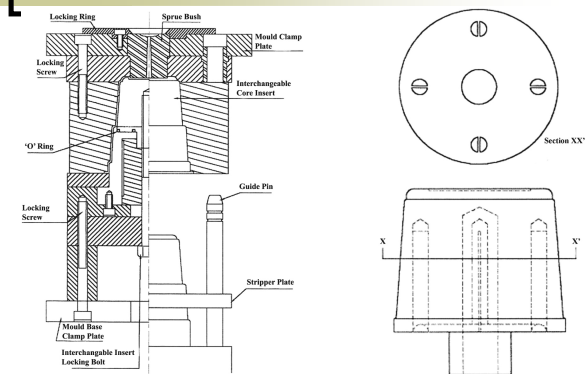
27

Stripper plate

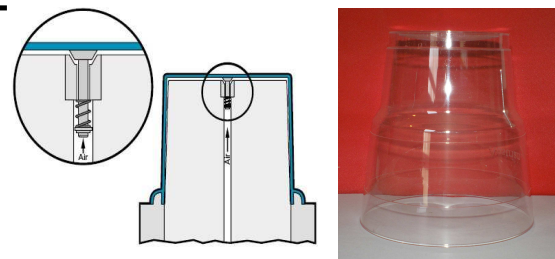


28

Stripper plate



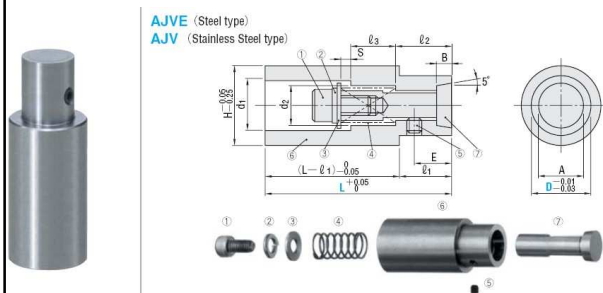
Ejection by air



Thick wall.

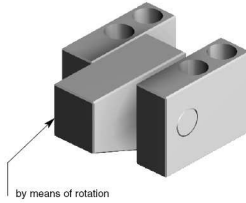
30

└ Air valve for ejection

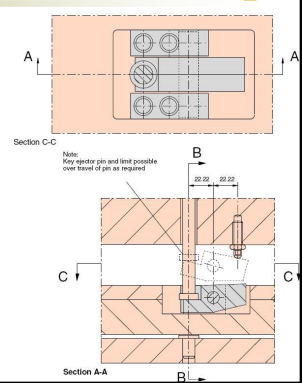


31

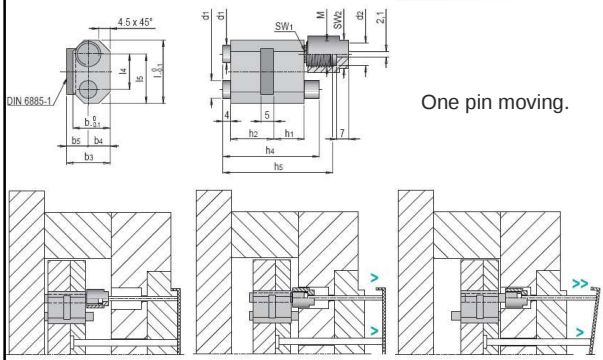
Two steps ejection



One pin moving.

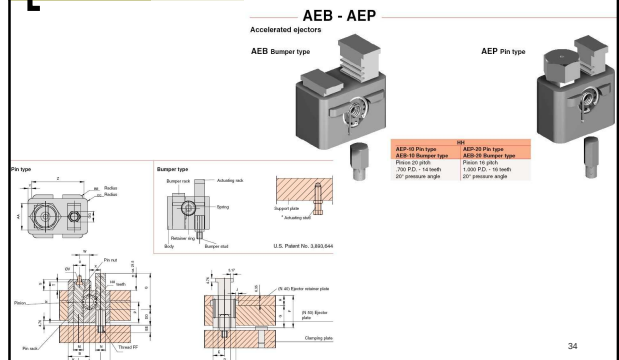


Two steps ejection

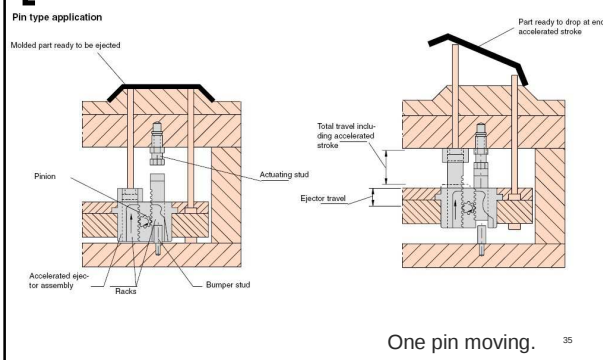


One pin moving.

Two steps ejection

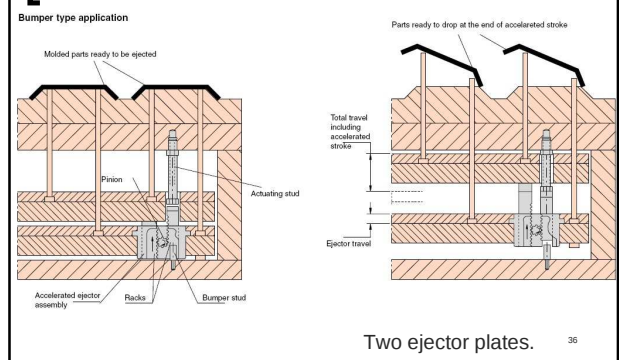


Two steps ejection



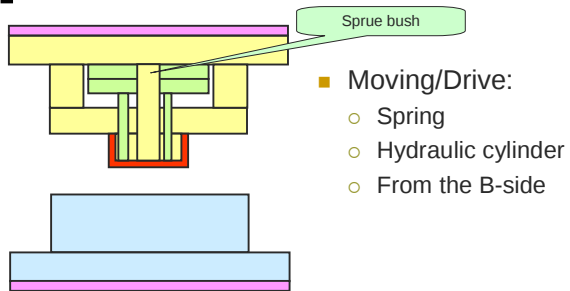
One pin moving.

Two steps ejection



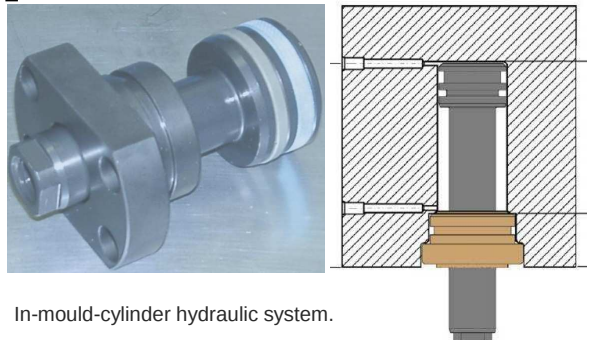
Two ejector plates.

Ejection in the A-side

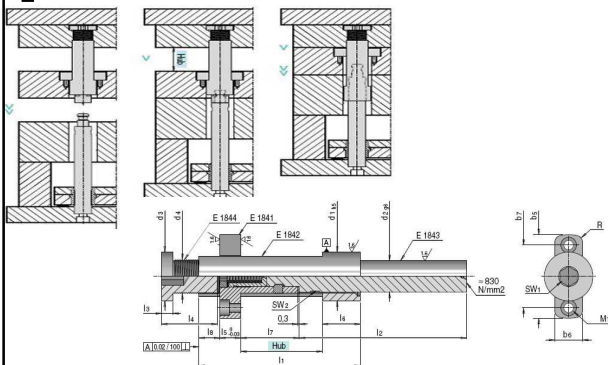


43

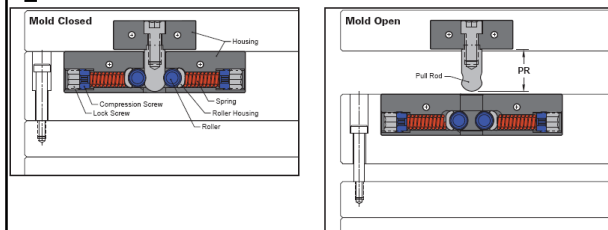
Moving by hydraulic cylinder



Round latch lock

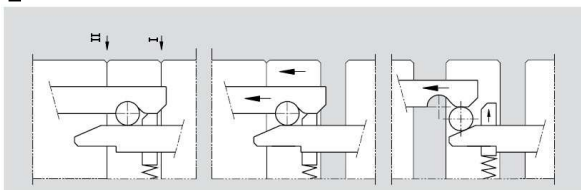


Spring lock system



46

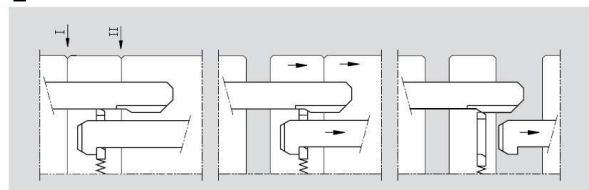
Latch locking unit



Z170/1
Mat.: 1.2764



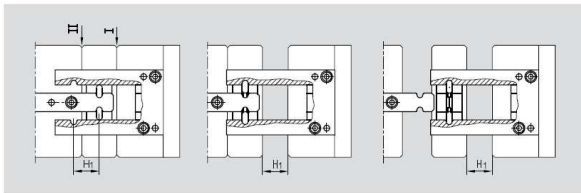
Latch locking unit



Z171/1
Mat.: 1.2764

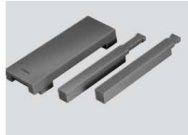


Latch locking unit



Z174/...

Mat.: 1.2764



Examples

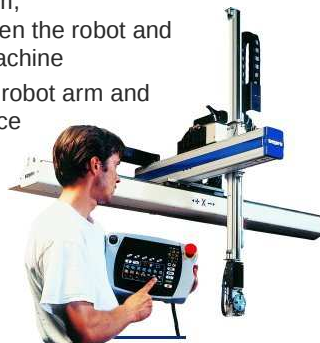


Strack animation films

50

Robotic demoulding

- Install the robot system, communication between the robot and the injection mould machine
- Enough space for the robot arm and appropriate part surface
- Robot gripper



Industrial robot

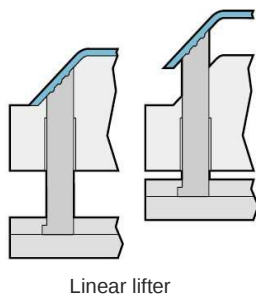
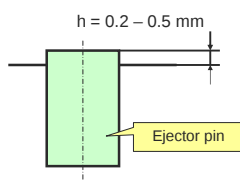


- Mechanical fitting
- Connect the controllers
- Robot programming

52

Grip the part

- Put up from the cavity
 - Ensure the part position
- Linear lifter
 - Put up and hold

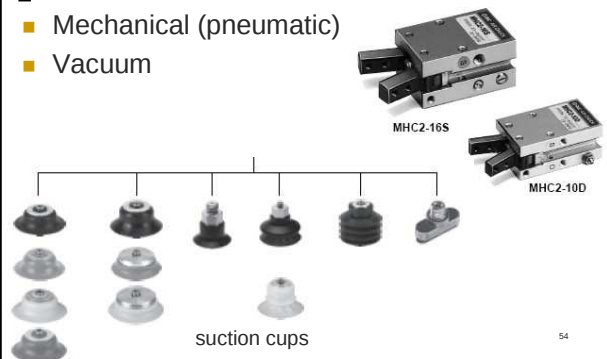


Linear lifter

53

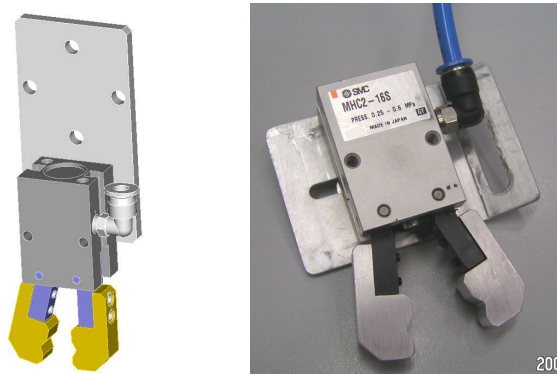
Robot gripper

- Mechanical (pneumatic)
- Vacuum

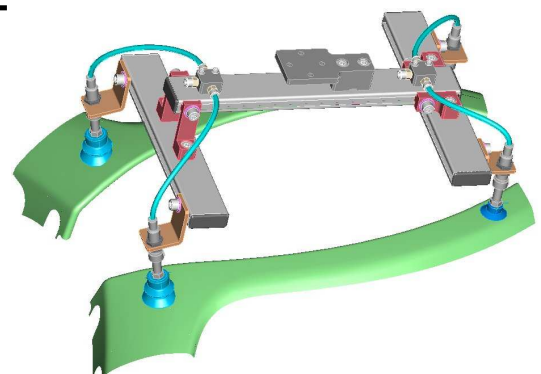


54

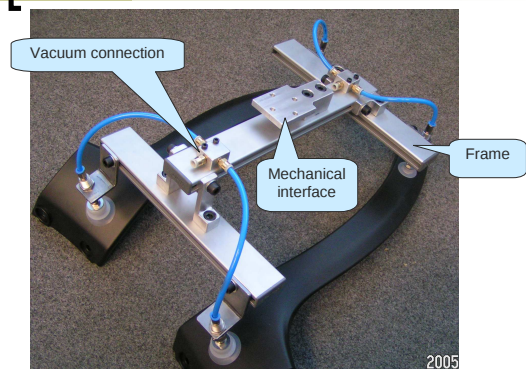
Mechanical gripper



Vacuum gripper



Vacuum gripper



Vacuum gripper

