

## PART TRANSFER SYSTEM

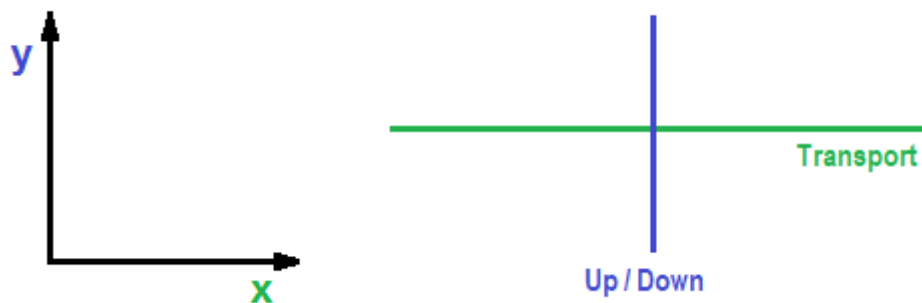
### TRANSFER

The purpose of transfer is to transfer parts from a station to another.

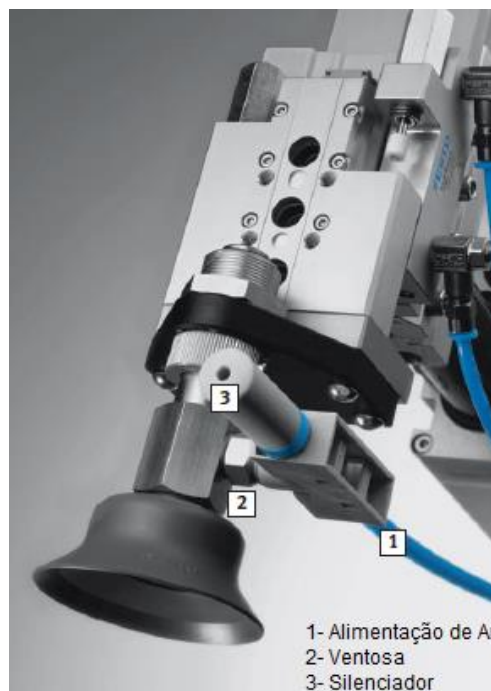
We can classify the transfer according to the quantity of axes; 2 and 3 axes.

The 2 axes (x and y) transfer has the following movements

- Transport movement (Forward and Return)
- Up and Down movements



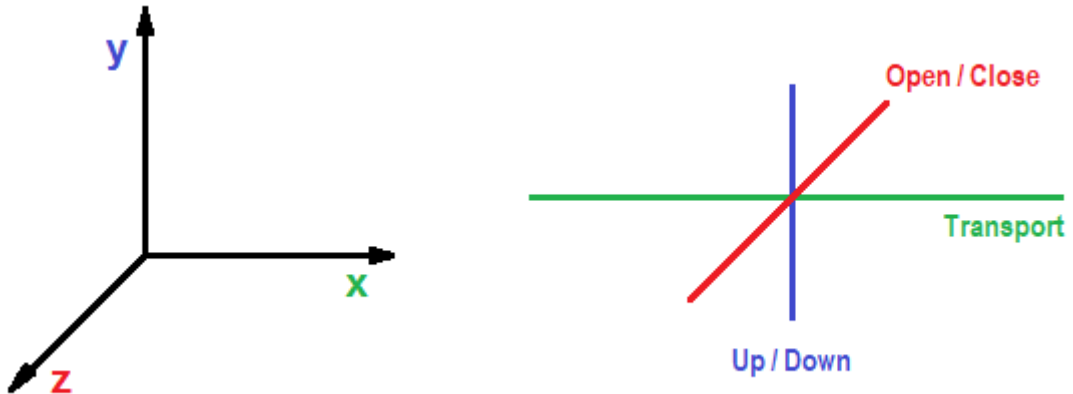
The 2 axes transfer is used for dies that there is free space among the stations in order to the transfer stay resting during part forming. On that situation, it is normal to use a vacuum system to get the part from the die.



Example: Vacuum System - FESTO

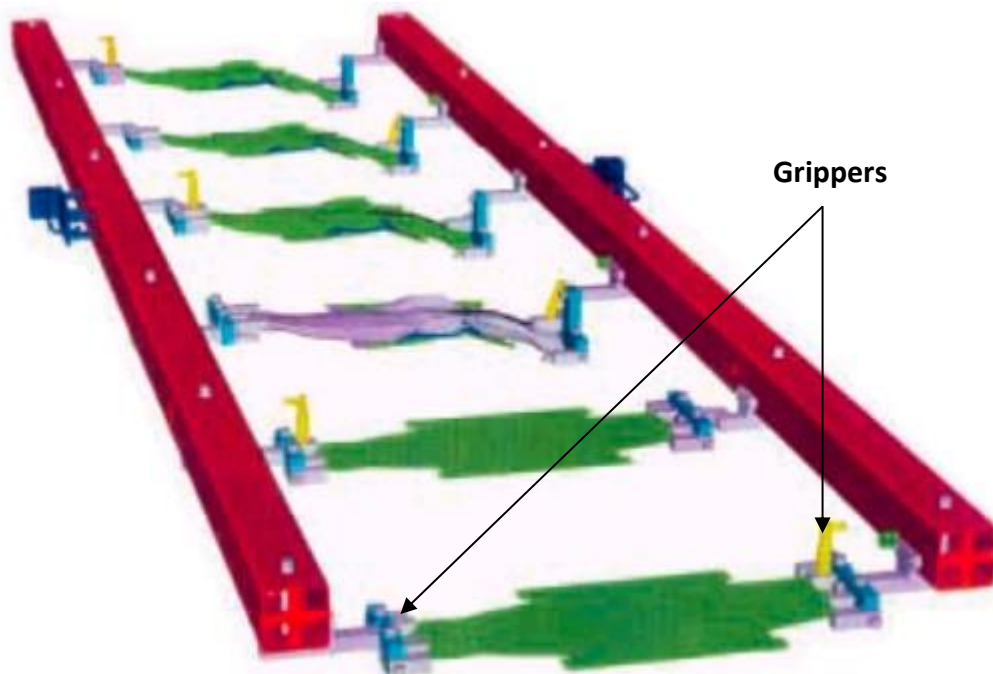
The 3 axes (x, y and z) transfer, has the following basic movements

- Transport movement (Forward and Return)
- Up and Down movements
- Open and Close movements



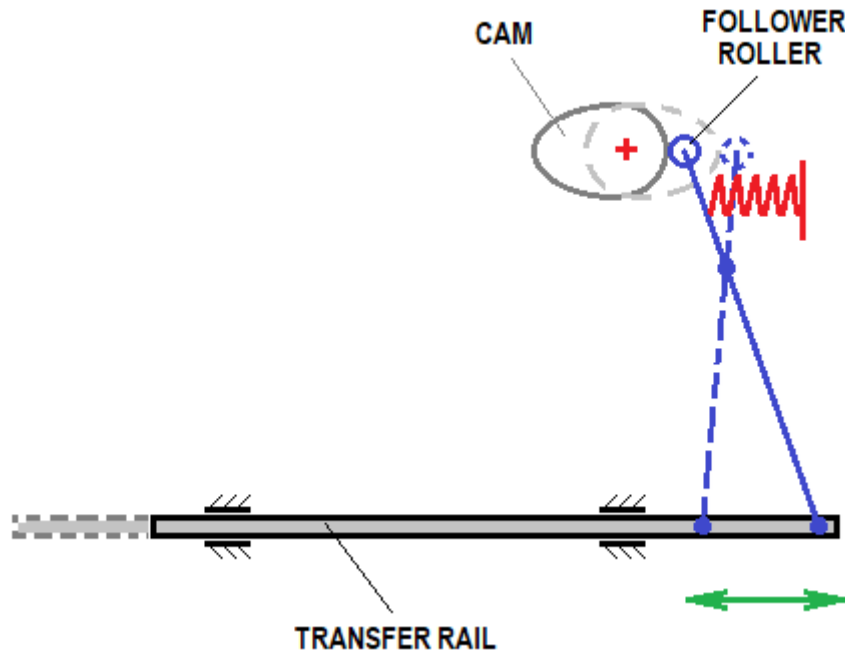
The 3 axes transfer is used for dies that there is no free space among the stations, the transfer stay resting out from the dies during part forming. On that situation, it is normal to use a gripper system to get the part from the die by using the open / close movement.

If necessary, beside of 3 axes, the system can have a turning movement of the axes.



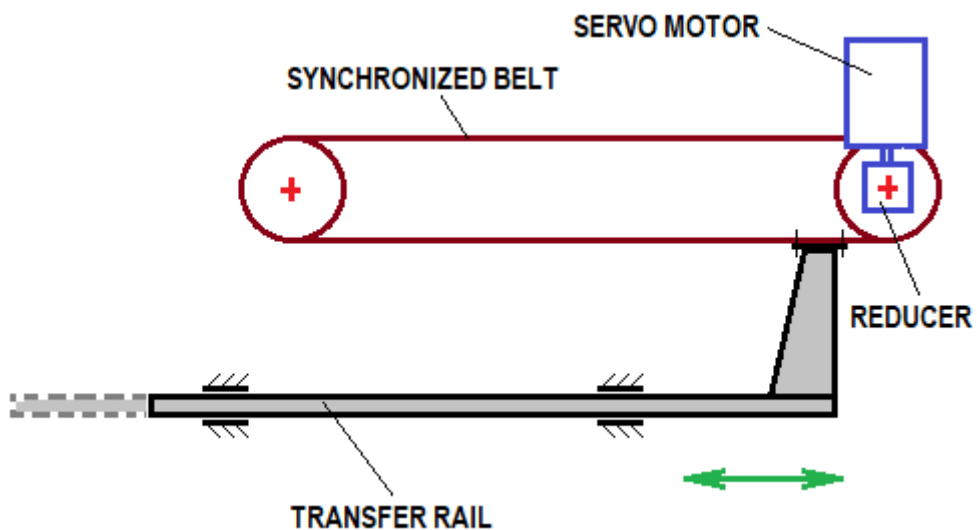
Concern the drive system, there is the Mechanical Transfer and the Electronic Transfer.

The Mechanical Transfer is driven by cams. The adjustments of a Mechanical Transfer are limited.



Due to the complexity and high cost for manufacturing a Mechanical Transfer, nowadays that kind of transfer is out of use.

The Electronic Transfer is driven by electric motors (servo motors). It is versatile and easier for adjusting the movements.



**CRITICAL POINTS TO HAVE A GOOD PERFORMANCE**

- ✓ Control of mass and acceleration

$$F = m \cdot a$$

F = Force  
m = mass  
a = acceleration

In order to have the smaller possible force, it is necessary to reduce the mass on movement and the acceleration of the system.

**CONTROL OF THE MASS**

In case of the mass, it is necessary to use light materials. For example; aluminium and its alloys, carbon fiber, etc..

**CONTROL OF THE ACCELERATION**

In case of the acceleration, it is important to have the minimum possible distance among stations. As smaller is the distance faster will be the part transfer. Other point to be considered is the control of acceleration, it is necessary to have a soft acceleration (ramp of acceleration and deceleration).

- ✓ Control of the system vibration

To avoid vibration on the system it is important to have a rigid frame and no mechanical clearances.

To have a rigid frame, but a light frame, it is essential the geometry of the design, also the use of light materials; aluminium and its alloys, carbon fiber, etc..

For eliminating the mechanical clearances it is necessary do not use standard machine elements.

- ✓ Minimizing the gravity force effects

In case of the up and down movements which suffer the gravity force effects, it is important to use a weight counterbalance.

- ✓ Safety

As the transfer system is automatic it is necessary to enclose the complete system.



**Natal Pasqualetti Neto**  
Mechanical Engineer  
Pos-graduated on  
Industrial Automation

Date: April, 2020