Motion Control: Horizontal flow pack

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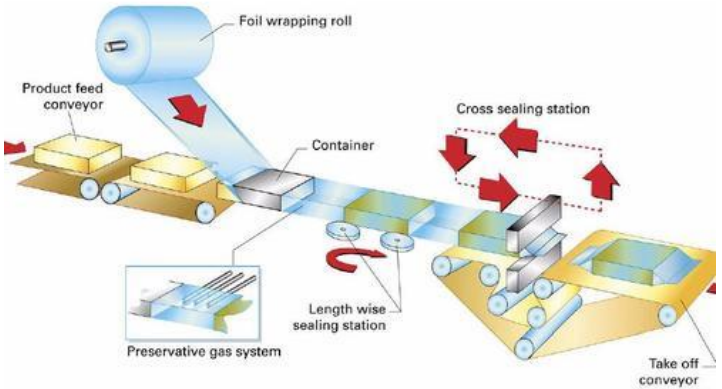
Case study:
Flow pack machine, 3 controlled axes

Analysis of typical machine

Request: This machine is an horizontal flow pack.
There are different sizes of products to be package with different technical solution

Solution: develop a control of 3 independent axis for:

- Cutting / welding unit axis (Rotative / Box Motion)
- Rotary group axis to drag film (wheels)
- Axis product load group (belt / pallet axis)
- Film reel change axis (optional)



Typical Box Motion machine

Information to collect

How many axis?: minimum of 3 or more

Are interpolated axis?: Yes, electronic cams

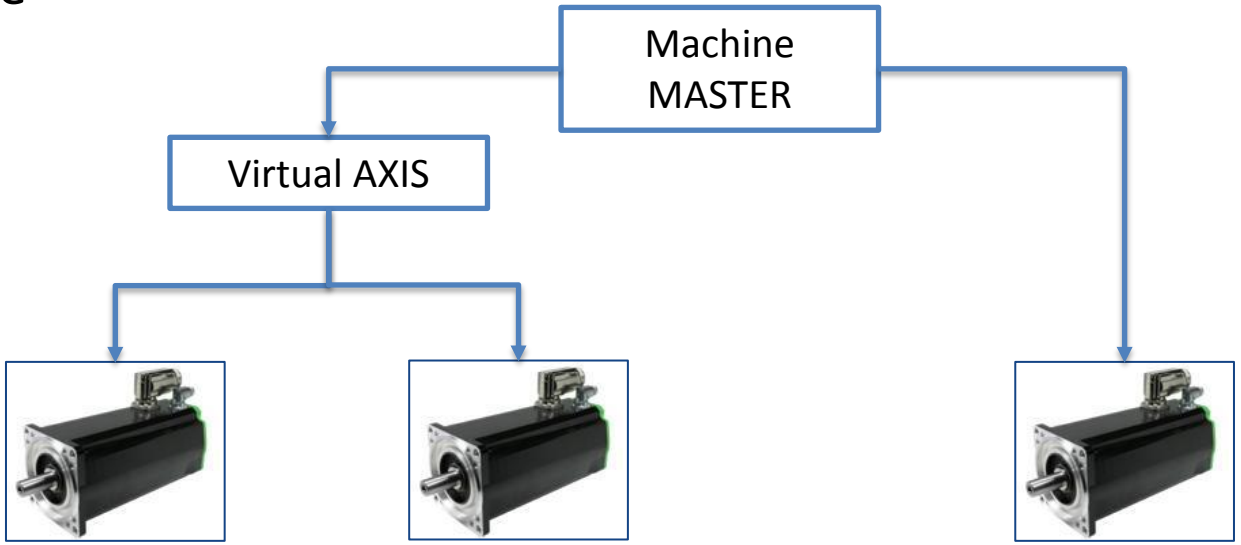
What are the speed of the machine axis?: Customer will provide us working speed, jog speed, homing speed etc..

The motor axis are sized?: No, it is necessary to collect motion profile and physical information

Fieldbus?: yes for example CANOpen

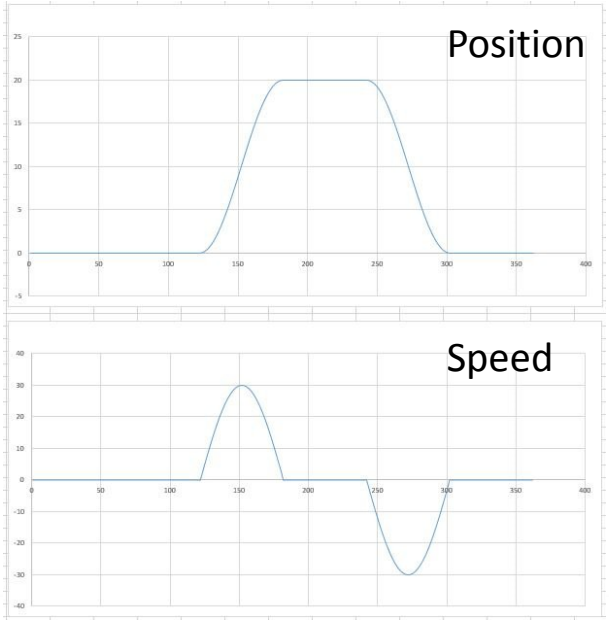
Definition of motors and architecture structure

Why: You must know it to offer the right motor /drive and the right architecture



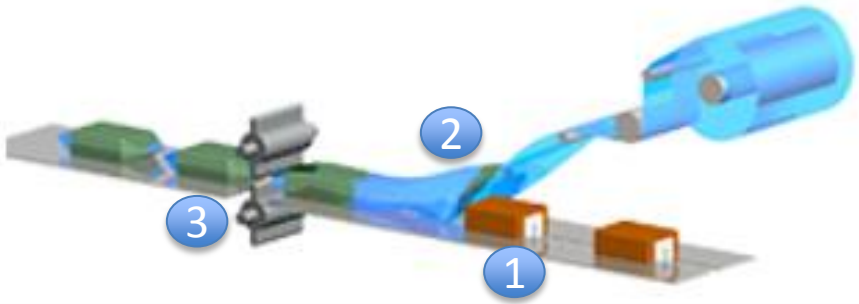
Electronic CAM

Each group is connected with an electronic CAM, a system that generates periodic profiles with mathematical connection made by phase, velocity and acceleration of a motor and another one



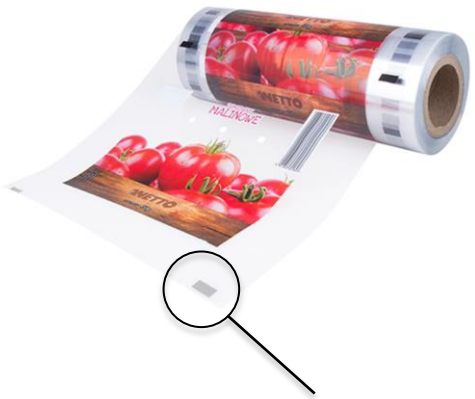
Machine Process Step

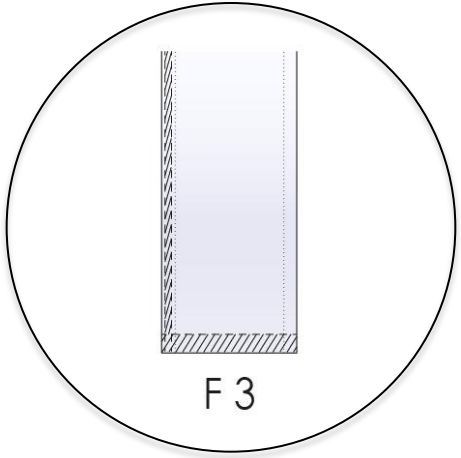
1- package is pushed by the pallets on the conveyor, over the film (first axis)
2- The plastic film is moved into a cylinder by means of two metal wings, which is then welded by welding routes (second controlled axis).
3- After this we have the plastic film tube; the product is inside the tube, so the package must now be closed (third controlled axis). The plastic film is melted at the beginning of the pack (the same concept as on-the-fly cutting)and on the end with rotation of the blades, by means of rotary or translating technology.



Phasing Machine

The machine’s phasing depends on the information generated by a photoprint available on the plastic film and an optical sensor so that the pre-printed film is centered for the package. This “mark” is used for this fast process (depend of the speed of machine). The whole machine is phased since it is read this mark.

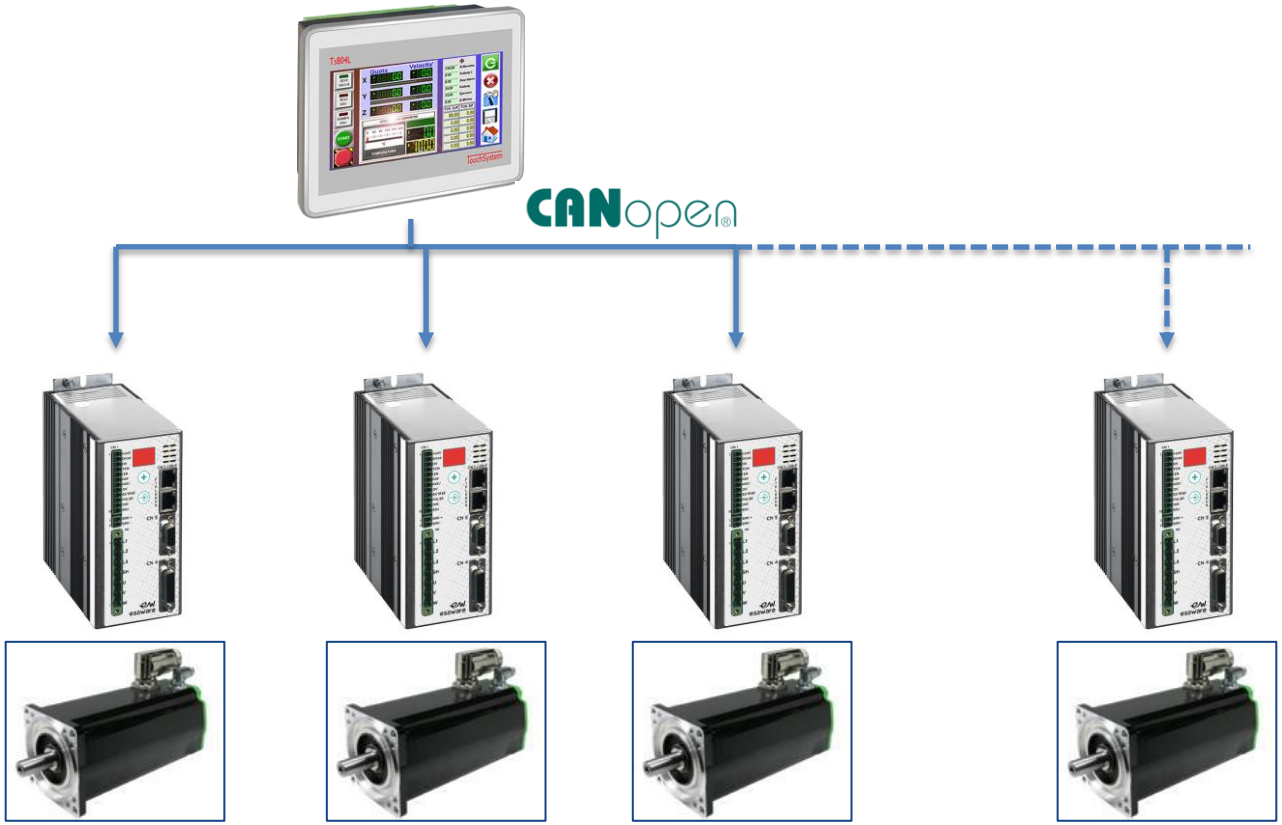




No product No bag

No product no Bag is a functionality to avoid the empty package. In case a product jumps, the pallet would generate an empty package. To avoid this problem, the machine does not stop the master axis but stops the other 2 axes (welding and wheels) in order to provide always the right package.

Real Time PAC Architecture



Thank you for your attention!