Mechanical Module Capper

Module of the mechanical part of the cam capper

ErmaFlex #4s

The Mechanical Capper at a Glance

Highlights & Key Activities

- ✓ **Assembly, disassembly, adjustments and mechanical validation**
  - Cam synchronization
  - Adjusting the range of motion of the plug socket
  - Centering of the plugs
  - Adjustment of screwing head height and chain tension
  - Setting the games...
- ✓ **Kinematic study** and drawing of diagrams
- Analysis of technological solutions
- Analysis and **calculation of cams**
- Mechanical study on SolidWorks 3D volume modeler
- ✓ **Instrumented system with** rulers and protractors for kinematic studies

Specific components

- ✓ Robust welded frame
- ✓ 2-cam synchronised system with cam rollers and shafts

Features

- ✓ L/ W/ H: 840 x 760 x 2000mm
- ✓ Weight: 200kg
- ✓ This system is accompanied by a technical and educational file

Bac Pro MSPC
BTS MS - IUT
Universities - Engineering schools

Reference

*MB10: **Mechanical Module Capper***

Functional description

- ✓ The Mechanical Capper Module is derived from the Capper which is integrated into the ERMAFLEX production line which manufactures, packages and palletises cosmetic products.
- ✓ This capping station ensures the distribution of the caps (or lids), their positioning and screwing onto the bottles (or jars).

The proposed module includes 2 functional sub-assemblies of the Ermaflex line capper:

- Plugging and removal sub-assembly
- Screwing head sub-assembly

- ✓ The cam assembly allows for a reciprocating circular movement of the Plug Pick-up and Removal sub-assembly synchronized with a reciprocating rectilinear movement of the Screwing Head sub-assembly

Multi-technical mechanical assembly

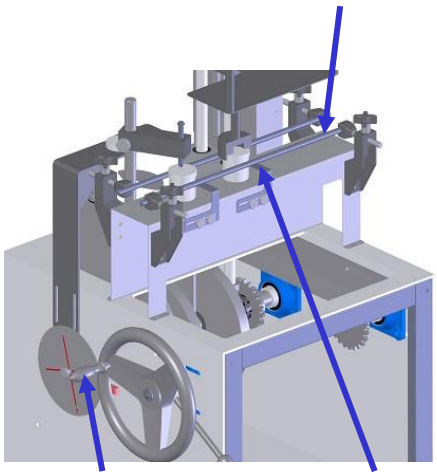
- ✓ The mechanical module of the cam capper contains
  - A system of 2 synchronised cams with cam rollers and shafts
  - 5 clamping rings of different diameters
  - 2 sprockets and associated chain
  - 2 tables and ball bearings and its 2 axes
  - 2 compression springs
  - 1 tension spring
  - 4 bearings applied
  - 4 bearings
  - Ball joints
  - 2 spur gears

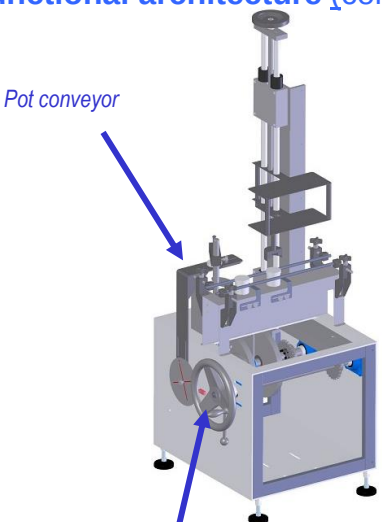
Refill parts supplied with the equipment

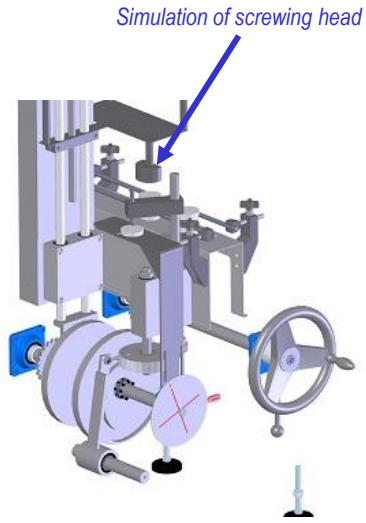
- ✓ Y bearing bracket
- ✓ Male rod ends
- ✓ Channel
- ✓ Cam roller with pin
- ✓ Rigid ball bearing
- ✓ Single step quick fastener

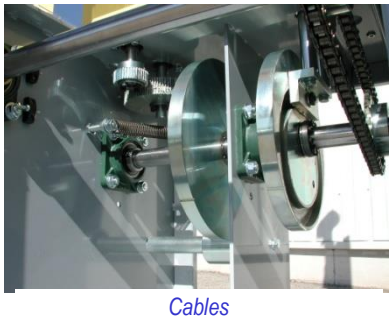
Capper module from the cam capper (Ref BO50)

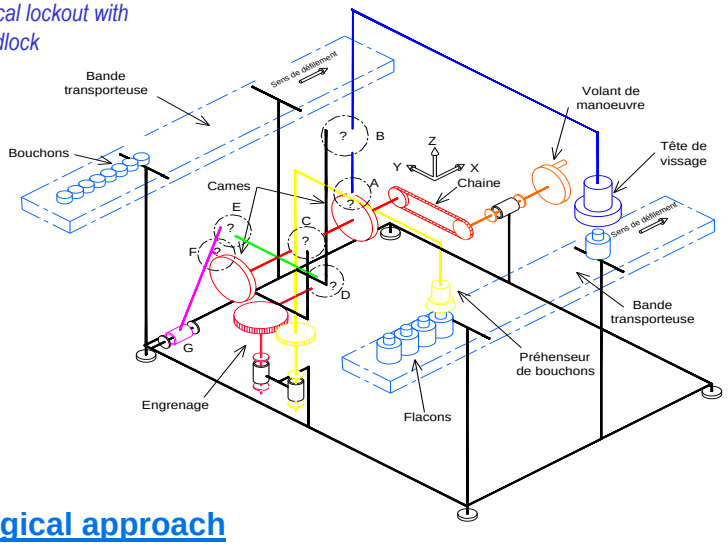
Functional architecture (continued)








Cables



Pedagogical approach

Educational Activities

- ✓ Study of the transformation of movements
- ✓ Assembly, disassembly, adjustments and mechanical validation
  - Cam synchronization
  - Adjusting the range of motion of the plug socket
  - Centering of the plugs
  - Height adjustment of the screwdriver head
  - Chain tension adjustment
  - Play adjustment...
- ✓ Kinematic study and drawing of diagrams
- ✓ Analysis of technological solutions
- ✓ Analysis and calculation of cams
- ✓ Mechanical study on 3D Solidworks volume modeler

Examples of design-oriented practical work offered

➢ **TP1: Structural study of the machine (Part 1)**
Discovering the kinematics
Kinematic modelling
Research of the global hyper-statism of the machine
Technological consequences of hyper-statism, critical analysis of the chosen constructional arrangements

➢ **TP2: Structural study of the machine (part 2)**
Research into the hyper-statism of certain bonds
Technological consequences of the hyper-staticity of the connections, critical analysis of the chosen constructional arrangements

➢ **TP3: Study of the cam transmission (Part 1)**
Recording of the output movements for both movements (Rotation and translation)
Finding the speed of acceleration and momentum for both movements
Validation of the cam profiles with regard to the results obtained

➢ **TP4: Study of the cam transmission (part 2)**
Researching the analytical relationship between arm rotation and cam rotation
From a given optimised arm rotation law, draw the cam profile
Plotting the profile of a cam corresponding to a given lift curve

✓ **TP5: Study of the cam transmission (3rd part)**
Creation of the 3D model of a cam corresponding to a given profile
Research of dynamic effects due to the movement created by the cam (Motion)
Validation of the components chosen with regard to the forces to be absorbed

Pedagogical approach (continued)

Examples of maintenance-oriented practical work offered by ERM Automatismes

- **TP1: Mechanical intervention: Adjustment of the cam timing**

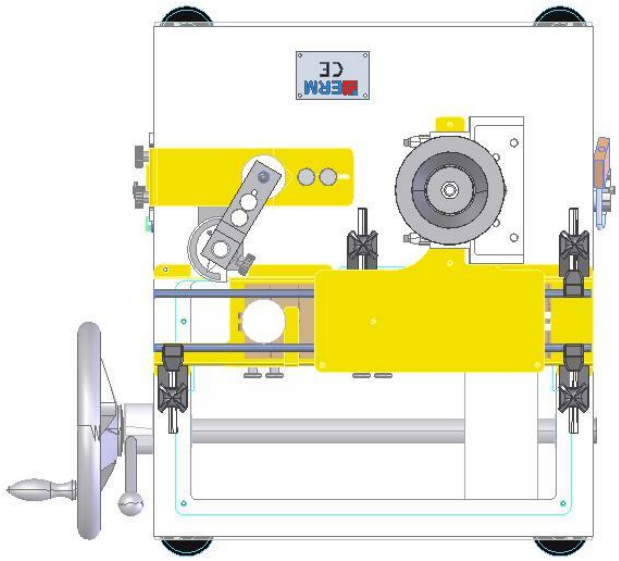
Functional analysis
Tooling preparation
Adjustment operations (Cam loosening, Alignment pin installation, Cam tightening)
Functional check

- **TP2: Mechanical intervention: Chain maintenance**

Functional analysis
Tooling preparation
Adjustment operations (lubrication, alignment, chain tension)
Functional check

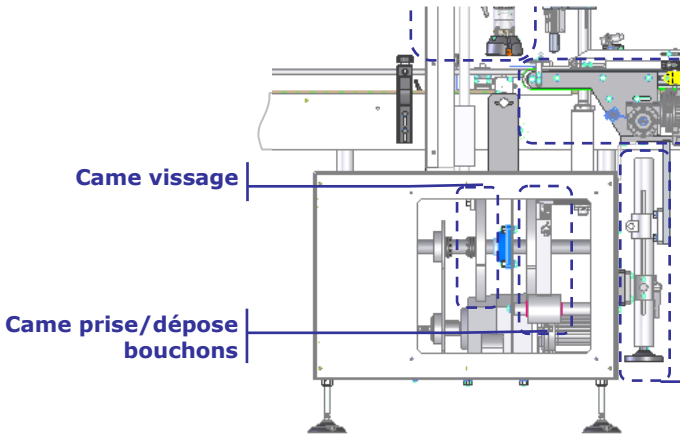
- **Practical training 3: Mechanical intervention: Replacement of cam rollers**

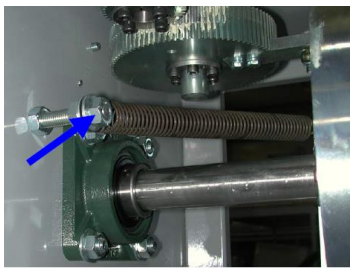
Preparing for the removal of the rollers
Preparation of the necessary tools
Removal and replacement operations (Cam follower removal and assembly "Picking up and removing plugs", Cam follower removal "Screwing on
Functional check



Didactic procedures for mechanical intervention

Cam timing adjustment procedure
Cam "Zero" setting procedure
Procedures for intervention on the line
Procedure for adjusting the backlash on the gears of the plug removal system
Procedure for setting the amplitude and initial position of the circular movement of the pick and place system
Procedure for changing a cam roller





Cam roller removal