ErmaFlex #7

# Clustering Cashing

*System for grouping jars and bottles in cartons*

**Bac PRO PLP - MSPC**
**BTS MS - IUT**
**Universities - Engineering schools**

## Clustering at a glance

- Highlights & Key Activities

  **Assembly, disassembly, reconditioning and adjustments of gripper heads**
  Position **control**
  **Change of format**: pots, bottles, cartons for pots and cartons for bottles

- Specific components

  2-axis transfer system consisting of a DC electric motor, a pneumatic cylinder and an incremental encoder
  Control cabinet with PLC, dialogue terminal and variable speed drive for control
  Two gripping heads with grippers and suction cups

This system is accompanied by a technical and educational file

IoT Sick Pack | IO-Link | TULIP

Trouble-shooting box

## References

- ✓ **RE50-RE51**: Basic grouping frame without gripper head and with control cabinet equipped with a Schneider M340 PLC and a Siemens TP177 colour touch panel
- ✓ **RE52**: Suction cup gripping head for pots (For RE50-RE51)
- ✓ **RE53**: Gripper head for vials (For RE50-RE51)
- ✓ **RE54:** RFID Tracking and Logistics Option for Regrouping Collection
- ✓ **UC13**: Supervision Option
- ✓ **UC90**: Option: Fault box for electrical cabinet, remotely configurable on a tablet (Not supplied)
- ✓ **IO00:** IO-Link package for electrical and pneumatic measurements
- ✓ **SK20**: Sick TDCE Smart IoT Gateway Kit & Smart Sensors for Ermaflex Clustering
- ✓ **UC51**: Option: Visual Instructions & Monitoring of Production Indicators on the Tulip open application environment and touch pad, for one machine
- ✓ **UC52**: Option Visual instructions on Tulip open application environment and touch pad, for one machine
- ✓ **AE30**: Schneider M340 PLC / Web Server with UnityPro license
- ✓ **MN13**: Programmable 3D digital mock-up Grouping:/Cashing

## Features

- ✓ L/ W/ H: 3000 x 2200 x 2250 mm
- ✓ Electrical energy: 400V three-phase + neutral
- ✓ Pneumatic energy: 7 bar
- ✓ Weight: 550kg

## Functional architecture

### Functional description

The grouping and packing module is designed to group different types of products and arrange them in cartons or trays.

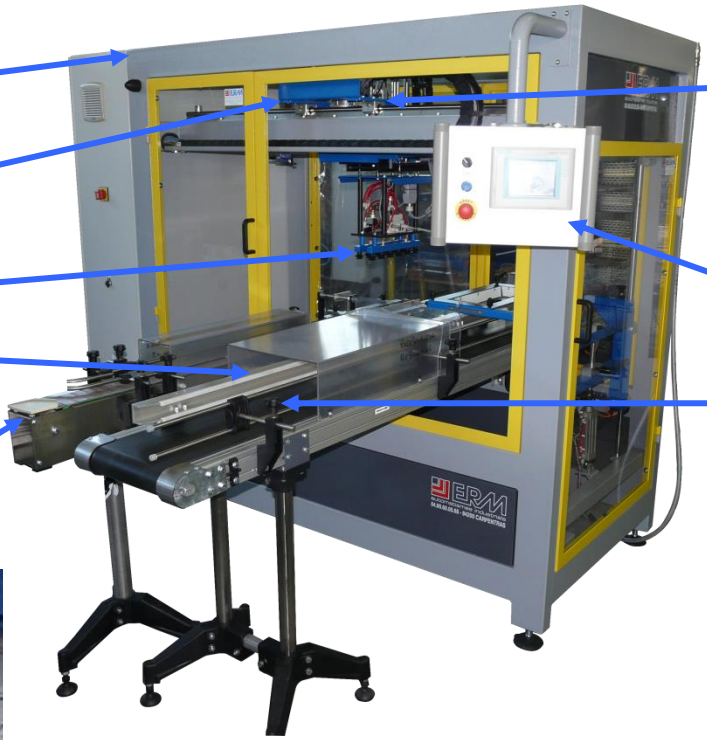
### Sub-assembly Product Conveyance

- ✓ It allows the transfer of products from the entrance of the system (packaging unit) to the grouping area.
- ✓ It is mainly made up of:
- ✓ A pallet chain conveyor
- ✓ A three-phase asynchronous electric motor to drive the vanes
- ✓ Two proximity sensors (fibre optics) to detect the presence of products on the conveyor and to create a buffer stock

### Sub-assembly Conveying of cartons

- ✓ It allows the transfer of cartons from the system entrance to the case packing area.
- ✓ It is mainly made up of:
  - A conveyor belt
  - A three-phase asynchronous electric motor to drive the belt
  - Two photoelectric cells to detect the presence of cartons respectively under the gripping head and at the exit or vision lock
  - A box indexing device associated with a cylinder
  - A box blocking device associated with a jack
  - A device for indexing the boxes at the exit lock associated with a cylinder

## Functional architecture (continued).





Gripper head for bottles


Suction cup head for pots

### Sub-assembly Product Handling

✓ It allows you to enter and breed products grouped in batches.
✓ It is mainly made up of:
• 2 interchangeable heads:
- Gripping head with suction cups (with vacuum generator and vaccuostat)
- Clamp head (2 springs + 2 cylinders and 1 ILS sensor)
• A lifting cylinder (200 mm stroke) for picking up products from the conveyor
• Three magnetic sensors (ILS) mounted on the lift cylinder

### Sub-assembly Product transfer

✓ It moves products grouped in batches from the grouping area to the loading area.
✓ It is mainly made up of:
• From a linear horizontal transfer
• A three-phase electric asynchronous gear motor
• An incremental encoder to control the position of the gripper head

### Sub-assembly Product guidance

✓ It ensures a good positioning of the latter during the loading operation.
✓ It is mainly made up of:
• A vertically mobile funnel guided in translation (modifiable according to the boxes and products)
• A funnel lifting cylinder (80mm stroke)
• Two magnetic limit switches (ILS) B14 and B15, mounted on the 3A1 cylinder

### Control cabinet

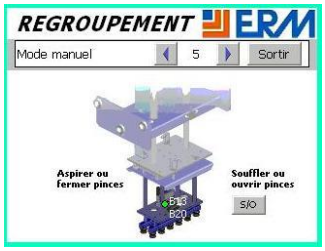
✓ It ensures a good positioning of the latter during the loading operation.
✓ It is mainly made up of:
• A vertically mobile funnel guided in translation (modifiable according to the boxes and products)
• A funnel lifting cylinder (80mm stroke)
• Two magnetic limit switches (ILS) B14 and B15, mounted on the 3A1 cylinder

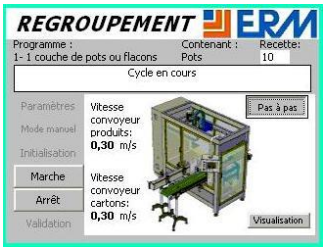
### Pneumatic distribution

✓ The system includes:
• 4 bistable 5/2 spool valves
• 3 monostable 5/2 valves
• 1 dispenser 5/3 closed centre
• A valve is mounted directly on the gripper head

### Control panel

✓ The system control panel is a Siemens TP177 colour touchscreen remote control panel, which contains all the dialogue components needed to operate the system.



## Pedagogical approach.

### Educational activities

- ✓ Functional analysis
- ✓ Study of technologies: electrical, pneumatic, and mechanical
- ✓ Programming
- ✓ Position control
- ✓ Change of format :
  - 2 gripping heads: with grippers for bottles, and with suction cups for jars
  - 2 types of cartons or trays (for pots or bottles)
- ✓ Assembly/disassembly and repackaging
- ✓ Settings
- ✓ Steering

### TP1: Changing the format of the Regrouping unit Cashing

- ✓ Timeline of the TP:
  - Learn about the format change, prepare your tools and your workstation
  - Making the automated mechanical system safe
  - Replace sub-assemblies Gripper and Funnel Guide
  - Adjust the Product Conveyor, Funnel Guide and Case Conveyor sub-assemblies.
  - Carry out tests and final adjustments

### TP2: Designing a diagnostic process (Failure of the "Gripper down" acquisition chain)

- ✓ Timeline of the TP:
  - Identify the failure
  - Locate the fault
  - Formulating hypotheses
  - Analyse and rank assumptions by probability of occurrence and ease of verification
  - Carry out checks, tests and trials
  - Diagnose

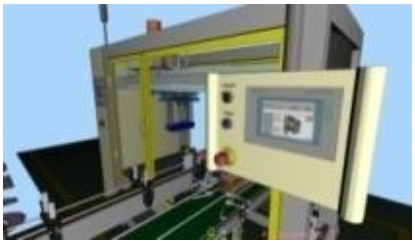
### TP3: Designing a diagnostic process (Safety loop failure)

- ✓ Timeline of the TP:
  - Identify the failure
  - Locate the fault
  - Formulating hypotheses
  - Analyse and rank assumptions by probability of occurrence and ease of verification
  - Carry out checks, tests and trials
  - Diagnose

*Clamping unit integrated in the Ermaflex line*

## RELATED & COMPLEMENTARY PRODUCTS

### PLC & Touch Panel + Digital Twin in VU Pro



Programming in Schneider and Siemens environments and then simulation in the digital twin

# ASSOCIATED & SUPPLEMENTARY PRODUCTS (continued)

## Industrial IoT for Ermaflex Packaging Bundle

The Sick TDCE Smart IoT Gateway & Smart Sensors for Ermaflex Collation Kit (Ref: SK20) contains:

- Sick Smart IoT Gateway TDC-E200EU
- SIG100 module for implementing logic gates and timers
- Cabinet temperature sensor
- Engine temperature sensor
- Vibration sensor on the head or on the carriage
- Photoelectric sensors
- Electrical measurement sensor
- Pneumatic measurement sensor

SICK
Sensor Intelligence.

## Sick TDCE Smart IoT Gateway Kits & Smart Sensors

SICK
Sensor Intelligence.

www.erm.li/sk10

## Smart IoT Sick TDCE & Smart Sensors Case (SK00)

The Smart IoT Sick TDCE & Smart Sensor Gateway Toolkit contains several industrial smart sensor application cases.

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Sensor Intelligence.

www.erm.li/sk00

## IO-Link package for electrical and pneumatic measurements (IO00)

Study and implementation of an energy measurement system, communicating and IOT compatible

www.erm.li/io00

## Ethernet IO-Link Master Kit, Supervision & IO-Link Sensors (IO01)

Design and implementation of IO-Link master and IOT compatible sensors

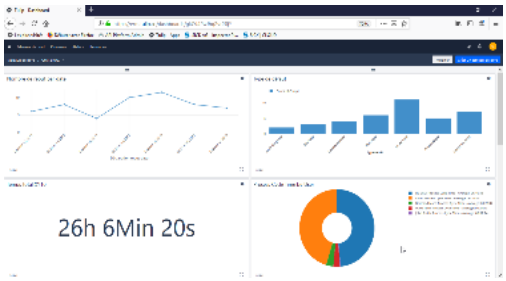
www.erm.li/io10

## Visual instructions & Monitoring of production indicators (UC51-UC52)

Tulip is a web-based environment for creating applications on tablets and touch screens designed to digitalise workstations

- ✓ Visual 0-paper intervention procedures
- ✓ Supervision of machines by OPC-UA to retrieve production data
- ✓ Declarations of production stoppages and defects
- ✓ Suggestions for continuous improvement by operators
- ✓ 0-paper control thanks to connected tools (Scale...)
- ✓ Dashboards for monitoring production indicators (OEE, output, etc.)
- ✓ Easy to modify applications and create new ones (100% graphical)
- ✓ Implementation of lean manufacturing concepts (Andon, 5S...)

TULIP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