ErmaFlex

Cartoning machine

System for packing different types of trays into cartons

Cartoning machine at a glance

- Highlights & Key Activities
  - ✓ Electrical wiring on removable board
  - ✓ Mechanical study on 3D Solidworks volume modeler
  - ✓ Assembly, disassembly, mechanical adjustments, re-conditioning and programming
  - ✓ Different types of pneumatic cylinders
  - ✓ Format change (cartons and trays)
  - ✓ Panelled components provided for diagnostic activities
- Specific components
  - ✓ Mechanical tray stacking system
  - ✓ Pneumatic pusher system for filling cartons
  - ✓ Control cabinet equipped with a Siemens-type PLC S7-1200, and a Siemens 7" colour graphic touch screen operator panel type KTP 700 (TIA Portal programming software and licence included)
- Features
  - ✓ L/ W/ H: 2350 x 1700 x 2350 mm
  - ✓ Electrical energy: 400V three-phase + neutral
  - ✓ Pneumatic energy: 7 bar
  - ✓ Mass: 600 kg

CAP CIP
Bac PRO PLP - MSPC - MELEC

Trouble-shooting box

IoT Sick Pack

TULIP

References

- ✓ **EB30 : Cartoning machine**
- ✓ **PA10: Blank removable deck**
- ✓ **UC13: Single Machine Supervision**
- ✓ **UC90: Option: Fault box for electrical cabinet, remotely configurable on a tablet (Not supplied)**
- ✓ **SK20: Sick TDCE Smart IoT Gateway Kit & Ermaflex Smart Sensors**
- ✓ **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**

Functional description

The Ermaflex automated system cartoner is designed to pack trays into cartons

Sub-assembly Product Conveyance

✓It allows the trays to be conveyed from the entrance of the system to the lift
✓It consists mainly of :
• A double belt conveyor associated with a geared motor controlled by a variable speed drive
• Guide rails and a photoelectric sensor

Elevation & stacking sub-assembly for trays

✓It allows the trays to be raised to prepare layers of trays
✓It consists mainly of :
•A lifting cylinder moving a plunger mounted on a ball bearing guide
•2 trays entry flaps

Pusher 1 sub-assembly (Pushing products to the cartoning area)

It consists mainly of a pneumatic cylinder moving a plunger

Pusher 2 sub-assembly (Packing products into cartons)

It consists mainly of a pneumatic cylinder moving a plunger

Sub-assembly manual tray with indexing

✓It allows full cartons to be taken out and/or empty cartons to be put in.
✓It consists mainly of :
- A turntable
- A safety sensor
- An indexing cylinder

Control cabinet

It contains :
- A safety relay and associated contactor
- A set of electrical protections
- A power supply to supply the low voltage circuits
- A drive to control the speed of the conveyor
- A Siemens S7-1200 programmable logic controller
- The remote motor terminal box for motor coupling activities (e.g. when wiring the motor starter)
- The cabinet is also equipped with a removable electrical board for wiring activities

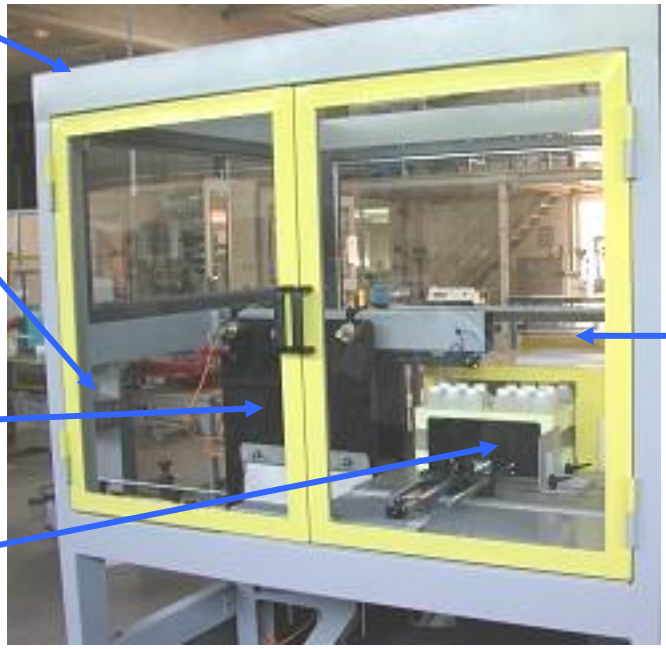
Pneumatic distribution

It consists of an air handling unit and 4 distributors

Operator console

It mainly contains a Siemens 7" colour touch panel type KTP 700, a potentiometer to adjust the conveyor speed and buttons for cycle start, emergency stop, etc

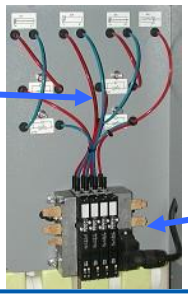
Functional architecture (continued)



Manual turntable for loading and unloading cartons.

Removable electrical board (can be wired by students)

Fixed electric board



Pneumatically extended connection on bulkheads for student connection activities

Fixed pneumatic connection plate

Educational activities

- ✓Functional analysis and study of electrical, pneumatic and mechanical technologies
- ✓Electrical wiring on removable plate and pneumatic wiring (pneumatic circuit on bulkheads)
- ✓Preventive maintenance, corrective maintenance and improvement maintenance
- ✓Mechanical activities: static and dynamic adjustments, size changes (2 tray sizes), mechanical intervention
- ✓Driving and production
- ✓Programming

Practical work proposed by ERM Automatismes

TP 1 Mechanical study of the manual rotary table
- ✓Static study of the indexer / manual turntable sub-assembly
- ✓Definition of the function and its relevance
- ✓Calculation of the force exerted on the indexing axis (tangent force, total tangent force and force on the indexer
- ✓Sizing of the indexing axis with calculation of stresses, elastic limit, safety coefficient.

TP 2 Corrective maintenance of the air tank
- ✓Troubleshooting
- ✓Fault finding (reading the electrical diagram with the PLC input, the faulty sensor, reading the pneumatic diagram, role and function of the sensor, setting value)
- ✓Troubleshooting (cause, procedure, elimination of other faults)

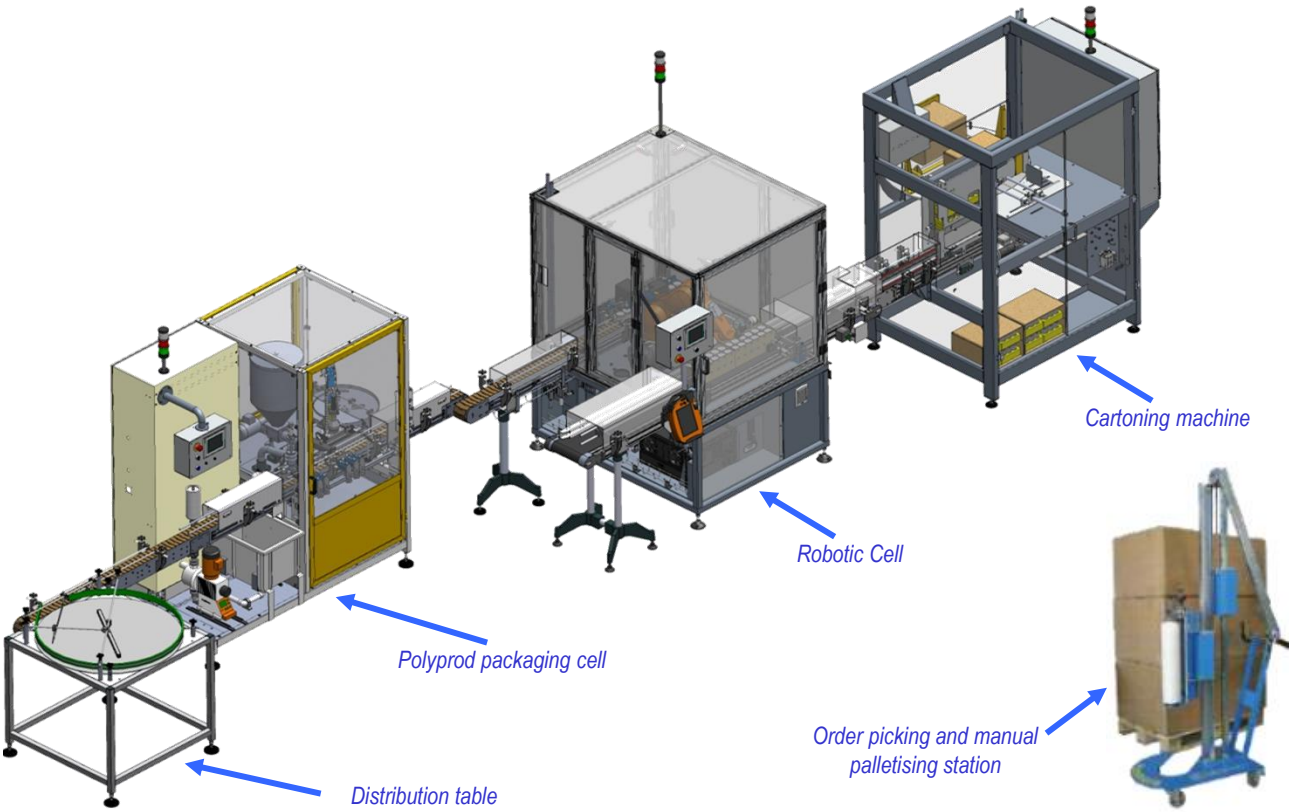
TP 3 Machine setting
- ✓Setting the scene
- ✓Troubleshooting
- ✓Identification of the faulty material(s)
- ✓Adjustment of the first component on the lifting cylinder
- ✓Adjustment of the second component on the plunger 1
- ✓Adjustment of the third component on push rod 2
- ✓Commissioning and qualification after the intervention.

TP 4 Uses of electrical and pneumatic energy
- ✓Study of the pneumatic lift sub-assembly
- ✓Creation of a pneumatic connection diagram
- ✓Making a pneumatic connection and adjusting a component

TP 5 Electrical diagnosis
- ✓Identify the faulty function
- ✓Identify and list the components related to the failure of the function
- ✓Carrying out the troubleshooting

TP 6 Electrical troubleshooting
- ✓Analyse the operation of a safety relay and a variable speed drive
- ✓Validate the operation of the safety relay
- ✓Validate the operation of the variable speed drive

Cartoning machine integrated in the Ermaflex R line



RELATED & COMPLEMENTARY PRODUCTS

Industrial IoT Ermaflex

The Sick TDCE Smart IoT Gateway & Ermaflex Smart Sensors 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

Smart IoT Sick TDCE & Smart Sensors Case (SK00)

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

www.erm.li/sk00

IO-Link electrical and pneumatic measurement package (IO00)

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

www.erm.li/io00

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

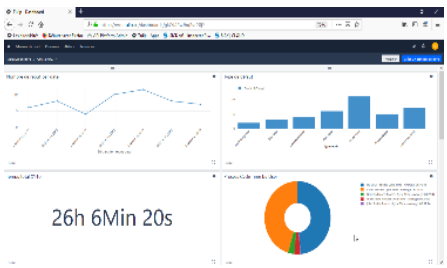
Design and implementation of IO-Link master and IOT compatible sensors

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...)



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