Dosaxe

Automatic linear axis Brushless filler.

ErmaSmart #2

Description of the system

The **Dosaxe** system is an **automated system for filling** jars/vials of different sizes on the fly in a continuous production process. It is based on a real industrial machine used in the food, pharmaceutical or cosmetic industry.

This automated system can be used as a stand-alone system with e.g. jars/vials or within the **ErmaSmart** flexible production line (see page 3).

The main functions of the Dosaxe system are:

- ✓ **Convey** the jars/vials from the inlet to the outlet of the system (jars/vials can be conveyed either singly or in pairs in parallel, of different sizes).
- ✓ **Filling** pots/vials on the fly or at a standstill with the linear axis using the brushless motor

This **automated** system, designed in the spirit of **the Industry of the Future** (Industry 4.0), meets the main requirements for intelligence and the evolution of production methods:

- ✓ **Scalability & Flexibility** with the possibility to assign the system to different types of production
- ✓ **IoT & Communications** with the PLC and communicating drives
- ✓ **Efficient actuators** with brushless motor linear axis

This training system is mainly intended for **activities in the fields of operation, system control, industrial maintenance, electrical engineering, automation and mechanics**.

This product is accompanied by a technical and educational file in digital format.

Highlights

- Genuine **industrial system** with the latest **technologies (asynchronous & brushless motors, USS, Profinet, Ethernet communication)**
- **Several operating modes** including "on-the-fly" filling with **synchronisation of the brushless motorised linear axis** to the conveyor speed
- **Improvement activities**
- Includes TIA Portal programming software for programming the PLC and the dialogue terminal
- Possible extensions to the ErmaSmart flexible production line

Main References

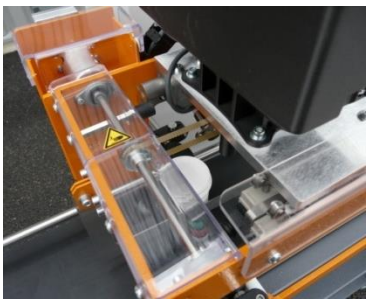
DX2KTP7000 : Dosaxe with linear axis with brushless motorization

CAP CIP - Bac PRO PLP / MELEC / MSPC
BTS CRSA / Electrical engineering / MS
IUT - Universities - Engineering schools

Main themes

Industrial Maintenance
Production Control
Multi-technology Systems Design
Electrical Engineering and Automation

Overview



In partnership with

SIEMENS

Filling system in situation

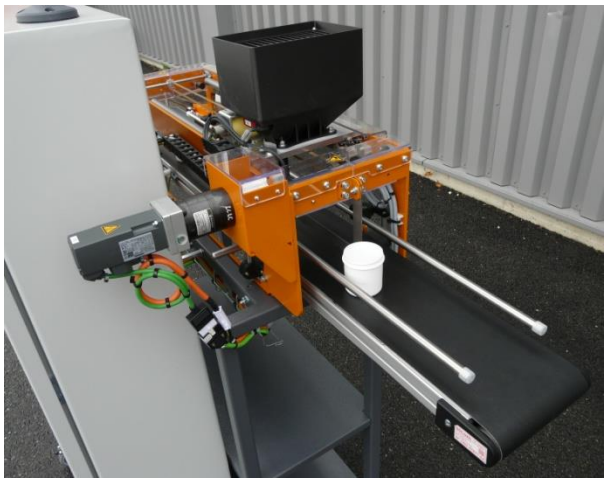
Themes "Industry 4.0" addressed

- Scalability & Flexibility
- Personalization
- Simplified programming
- Digital twin
- Mobile Robotics
- Collaborative Robotics
- Efficient Actuators
- CAPM & CMMS
- Digital instructions & MES
- Quality control "online".
- Vision & Smart Sensors
- IOT & Communications
- Big Data, AI & Predictive Maintenance
- Augmented reality
- Virtual reality
- Additive manufacturing for tooling...

General

The Dosaxe system consists mainly of :

- ✓ A welded frame with epoxy paint on 4 castors with brakes and trays for product storage
- ✓ An electrical cabinet with man-machine interface fixed to the chassis
- ✓ An operating part with two main functional chains, the conveyor and the filler mounted on a linear axis
- ✓ Protective enclosures only for the so-called "hazardous" areas in order to give priority to accessibility and visualization of the various components



Dosaxe operating part with Module for dosing granules into pots/flasks

Conveyor" functional sub-assembly

It consists mainly of :

- ✓ A frame in anodised aluminium structure
- ✓ A 9 m/min belt conveyor with adjustable outer edges and removable middle edge for different jar/vial sizes (conveying two jars in parallel, one jar...)
- ✓ A 230/400V 0.09 kW three-phase asynchronous geared motor controlled by a variable speed drive

Functional sub-assembly "Linear axis filler

It consists mainly of :

- ✓ A linear axis mounted on the welded frame
- ✓ A translational guide with cylindrical rail and associated bushes
- ✓ A toothed belt drive with pulleys
- ✓ A brushless geared motor with encoder and control / command provided by a drive
- ✓ Two limit switches and two mechanical stops
- ✓ An optical sensor for the presence of pots/vials or cans/pallets under the filling heads

Functional subassembly "Dosing of granules in pots/vials

It allows the **filling of the pots/flasks with granules.**

It consists mainly of :

- ✓ A raw material storage hopper with one or two filling nozzles
- ✓ An electromagnet for opening and closing the filling nozzles
- ✓ A low level detector for the raw material in the hopper

Electrical control / command cabinet

It is mainly made up of :

- ✓ A padlockable disconnect switch
- ✓ A set of electrical protections
- ✓ A safety relay, an emergency stop button and a system reset button
- ✓ A Siemens S7-1200 programmable logic controller
- ✓ A Siemens SIMATIC HMIMTP700 Unified (7 inch) colour touch screen Human Machine Interface
- ✓ A switch to ensure communication between the PLC, the HMI and the connected environments
- ✓ A variable speed drive for the conveyor
- ✓ An intelligent drive for the linear axis
- ✓ An area dedicated to the electrical wiring of new components as part of system improvements (new sensors, actuators, vision, traceability, etc.)

Maitre IO-Link

Programmable Logic Controller Industrial S7-1200

Human Machine Interface Siemens HMI MTP700 Unified

Dosaxe

Station 2 of the ErmaSmart flexible production line "Packaging

ErmaSmart Station 2 "Conditioning

In the context of **ErmaSmart "Packaging"**, the Dosaxe is used to dose granules into jars/vials.

Upstream of the Dosaxe is:

•Station 1: The 2D Unscrambling & Screwing Robot, 2D/3D jar/flask unscrambling and conveyor placement system (ref **UR03 or UR05 or ON10 and associated codes**)

Downstream of the Dosaxe are:
•Station 3: The **Collaborative Capping & Assembly Robot**, capping system, custom overcapping and control (ref **MI00 and associated codes**)
•Item 4: The **XYZ Cartesian Pick&Place** (ref **XY10 and associated codes**)
•Item 5: The **Dynamic Vertical Store** (ref **VL10 and associated codes**)
•Station 6: The **manual order picking, packing and palletising station with RFID tracking** (ref **PM91**).

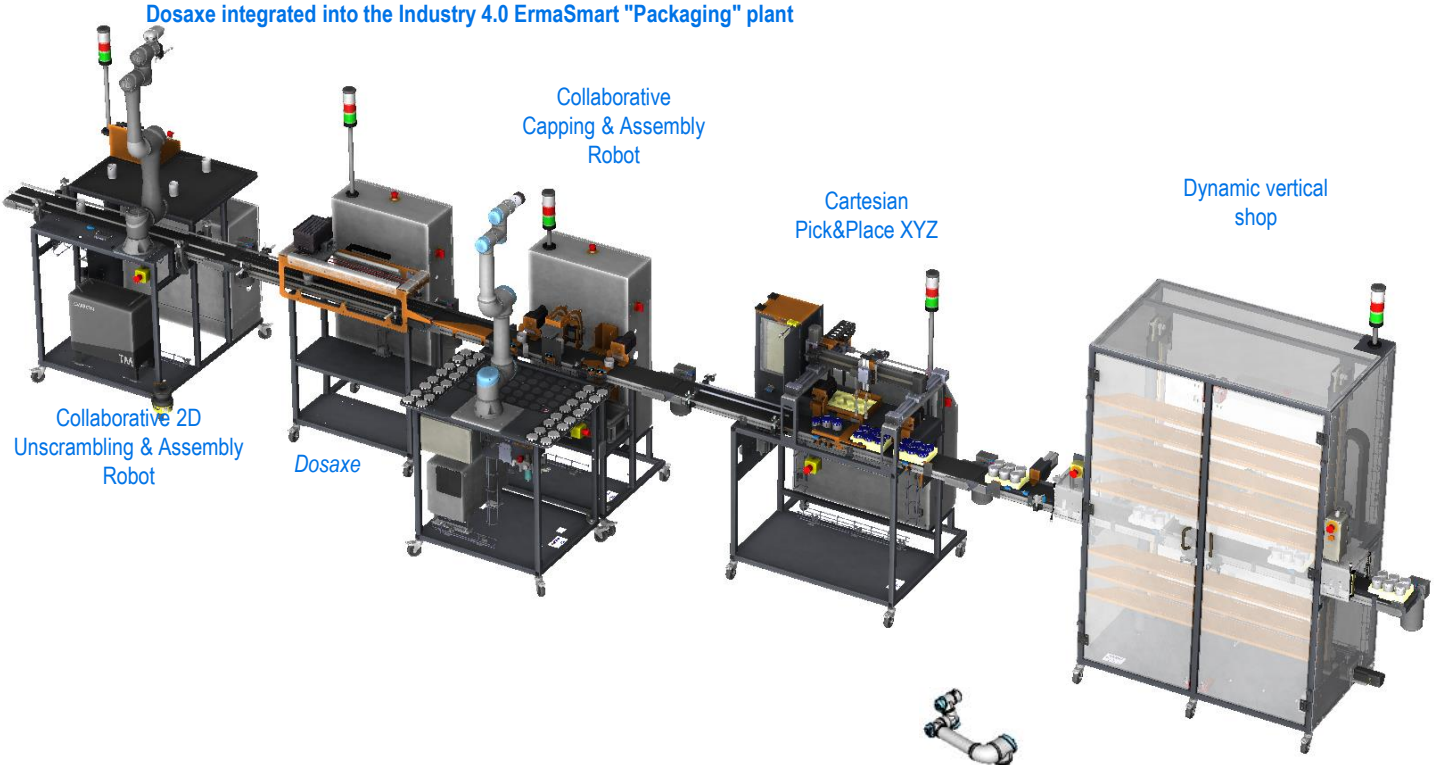
ErmaSmart Configuration "Conditioning

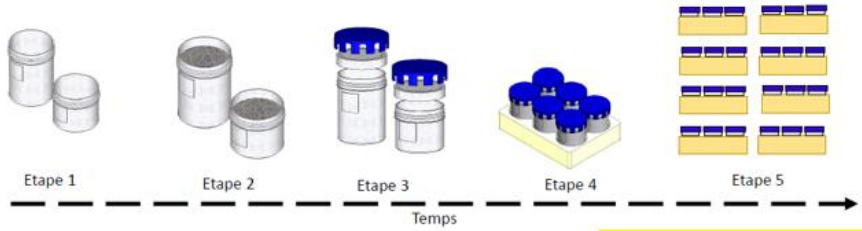
In the ErmaSmart "Packaging" configuration, the Dosaxe dispenses granules "on the fly" into pots/flasks.

Three jar/vial sizes are available for format changes.

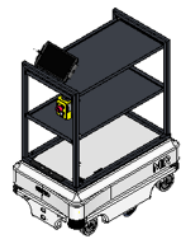
This configuration requires the code:
•DX20 : Dosaxe with linear axis with brushless motorization

Dosaxe integrated into the Industry 4.0 ErmaSmart "Packaging" plant





AGV MiR100 avec bras collaboratif UR eSeries



AGV MiR100

Educational activities

Le système Dosaxe permet de **réaliser notamment les activités pédagogiques** suivantes :

✓ **Electrotechnique**
- **Découverte et prise en main du système (**analyse fonctionnelle et étude des technologies de système)
- **Contrôle des grandeurs électriques du système** (réseau, alimentation de la puissance, des variateurs, de l'automate programmable, de l'interface homme machine et du circuit de commande).
- **Mise en service et validation du fonctionnement** du système (des différents modes de production)
- **Réglage et paramétrage** des composants de l'installation (axe linéaire brushless et son variateur intelligent, motoréducteur triphasé asynchrone et son variateur de fréquence)
- **Câblage** de nouveaux capteurs et actionneurs (amélioration et/ou remplacement d'un composant électrique de l'installation)
- **Modification des programmes** de l'automate et de l'interface Homme Machine (logiciels Tia Portal et WinnCC fourni avec licence 1 an).
- **Diagnostic d'un ou des dysfonctionnements**
- **Exploitation des outils numériques et communication**

✓ **Automatismes**
- **Analyse fonctionnelle** et **structurelle** du système
- **Modification des programmes des cycles de production** (logiciel Tia Portal livré avec le système)
- Programmation des périphériques complémentaires associés (vision, traçabilité,…)
- **Programmation** de **l'interface homme machine** (logiciel TIA Portal livré avec le système)

✓ **Pilotage de production**
- *Pilotage de la production* avec convoyeur en marche et synchronisation de l'axe linéaire, ou convoyeur à l'arrêt
- **Changement de format** de production
- Mise en place d'une **traçabilité de production**
- **Développement de procédures d'assistance des opérateurs**
- **Optimisation de la production avec les outils numériques 4.0**

✓ **Maintenance industrielle**
- **Maintenance préventive** (convoyeur, axe linéaire,…)
- **Maintenance corrective** (diagnostic de panne à l'aide du logiciel TIA PORTAL basic livré avec la cellule, fabrication rapide en impression 3D d'outils et pièces…)
- **Maintenance améliorative** (ajout de capteurs sur le convoyeur, contrôle avec vision, traçabilité…)

✓ **Mécanique**
- Etude d'un poste avec axes linéaires, ergonomie, dimensionnement axes et actionneurs…
- Conception de pièces imprimées en 3D

Software tools

The Dosaxe is supplied with the Siemens TIA Portal suite required for the implementation of the system and the PLC, control panel and drive programs.

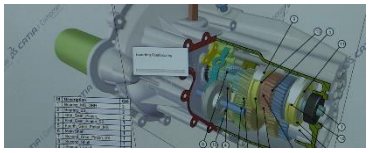
References

DX20 : Dosaxe with linear axis with brushless motorization
UC90 : Option: Fault box for electrical box, remotely configurable on a tablet (Not supplied)
UC51 : Option: Visual instructions & Monitoring of production indicators on the Tulip open application environment and touchscreen tablet, for one machine (with a 3-year subscription to Tulip Pro, €1170 excl. tax per year beyond that)
UC52 : Option: Visual instructions on the Tulip open application environment and touchscreen tablet, for one machine (with a 3-year subscription to Tulip Standard, €570 excl. tax per year beyond that)
UC41: Siemens Remote Desk Option on iPad (Included)

Option: Visual instructions & Monitoring of production indicators on the Tulip open application environment and touchscreen tablet, for one machine (with a 3-year subscription to Tulip Pro, €1170 excl. tax per year beyond that) (Ref: UC51)

Diota" Augmented Reality Scenario available

DIOTA AUGMENTING INDUSTRIES



From the CAD/PLM tool (Solidworks Composer) to the industrial maintenance RA scenario job card
DF10: Industrial augmented reality solution DIOTA Tablet