MEL System®

Modular End-of-Line Solution

zenon
packaging automation

A Theodorou Group company

Contents

Company profile

A Greek packaging automation company with a successful record in the international market since its establishment 27 years ago.

Design, construction, integration, commissioning and support of **automated end-of-line packaging systems and complete lines**.

www.zenon-robotics.com

Company Strongpoints

- > 150 installations > 120 robots installed

- Preferred supplier of many Multinational companies

- Installations and technical support all over Europe & the Middle East

- Specialization areas: Food, Beverage, Pharma & Cosmetics, Chemicals, Paper

- Strategic partnerships with the top suppliers of packaging equipment

- 25 Specialized engineers

- Member of the THEODOROU Group of companies (www.theodorougroup.com)

End-of-line: definition

Individual packages → End-of-Line → Supply chain

The **end-of-line** is the part of the packaging operations in a manufacturing plant which starts after the individual product packaging machines and continues until the shipping units (carton, multipacks, pallets etc.) are delivered for direct shipping or to the warehouse.

End-of-line challenges

The end-of-line is considered as a separate entity in the packaging operation.

The challenges it faces are:

➢ It must be designed to add **minimum extra costs** to the packaging operations.

➢ The supply chain starts at the end-of-line. Hence the end-of-line must ensure a **proper start and smooth transition to the supply chain.**

End-of-line characteristics

Overall, the end-of-line must have the following characteristics:

➢ Efficient

➢ Flexible

➢ Economical

➢ Versatile

➢ Easy-to-use

The MEL System®

The MEL System® is a complete end-of-line automated system developed by Zenon. It features:

- Packaging machinery, industrial controls and IT combined in **one unique integrated system**

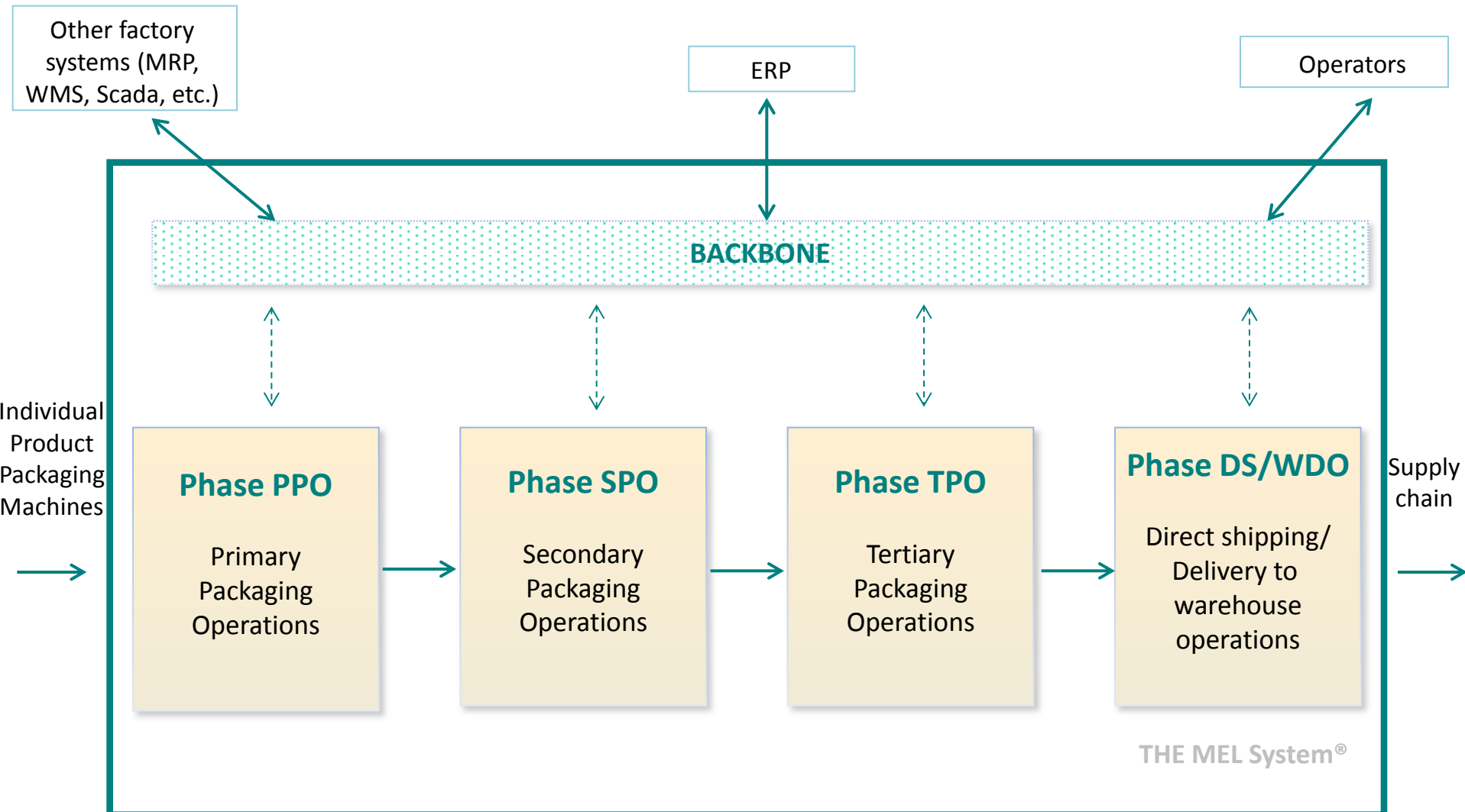- Innovative design with modular approach

Individual packages → **MEL System®** → **Supply chain**

Block Diagram

The MEL System® has 4 distinct equipment phases and 1 IT / Control backbone:

Other factory systems (MRP, WMS, Scada, etc.)

ERP

Operators

BACKBONE

Individual Product Packaging Machines

Phase PPO Primary Packaging Operations	**Phase SPO** Secondary Packaging Operations	**Phase TPO** Tertiary Packaging Operations	**Phase DS/WDO** Direct shipping/ Delivery to warehouse operations

Supply chain

THE MEL System®

The Innovation

➢ **Modular approach at the equipment, devices and machinery level**

  ➢ Contrary to the individual packaging of products which has a wide variety of different equipment and processes, <u>the end-of-line is much more uniform</u>. This allows the adoption of a modular approach at the equipment, devices and machinery level.

➢ **Integrated approach at the control and IT level**

  ➢ A unique control and IT system lies at the backbone of the MEL System®, enabling:

  - The integration and synchronization of the individual modules delivering efficiency and flexibility

  - The positioning of the MEL System® as the starting point of the supply chain

The modular approach

o The end-of-line operations are separated in 4 distinct phases.

o Each phase includes a number of individual modules, each serving a specific operation.

o The modules can operate both as autonomous units and as integral parts of the whole MEL System®.

o Each module consists of devices and components, either built and integrated by Zenon or sourced by external suppliers, Zenon's 'integration partners'.

o The MEL System® modules cover the requirements of the end-of-line operations. However it is highly unlikely that in a particular implementation, all modules of the MEL System® will be used.

The "MEL-ready" concept

All the modules of the MEL System® are "MEL-ready", i.e. they can operate autonomously but also as a part of the complete system.

The MEL-ready concept is important as it allows:

➢ **the gradual integration of the modules in a packaging line:** individual modules of the MEL System® can be purchased separately and can operate autonomously. These modules can be integrated and be incorporated in a whole MEL-system at a later stage.

➢ **the use of existing end-of-line systems in the MEL System®:** Zenon's engineers can certify if the customers' existing/legacy systems are "MEL-ready" and can be incorporated as modules of the MEL System®. The MEL System® has been designed so that existing end-of-line machinery can be easily incorporated with a few minor modifications into the MEL System®.

Phase PPO

Primary packaging operations (PPO)

- ➤ Module PPO1: coding and marking
- ➤ Module PPO2: checkweighing
- ➤ Module PPO3: labelling
- ➤ Module PPO4: package quality inspection (with machine vision)
- ➤ Module PPO5: sorting

Integration partners

Phase SPO

Secondary packaging operations (SPO)

> ➤ Module SPO1: case forming

> ➤ Module SPO2: case packing

> ➤ Module SPO3: coding

> ➤ Module SPO4: checkweighing

> ➤ Module SPO5: labelling

> ➤ Module SPO6: package quality inspection (with machine vision)

> ➤ Module SPO7: sorting

Integration partners

Phase TPO

Tertiary packaging operations (TPO)

➢ Module TPO1: palletizing

➢ Module TPO2: pallet stretch wrapping

➢ Module TPO3: pallet labelling

Integration partners

Phase DS/DW

Direct shipping/Delivery to warehouse

At this phase the MEL System® delivers the shipping units either for direct shipping to the loading bays or to the warehouse.

The delivery can be automatic (through sorting systems) or using forklifts, or a combination of the above.

The Backbone

The Backbone of the MEL System® has been developed by Zenon's experienced software and control engineers.

It is a unique combination of PC, PLC and Scada based software, designed to deliver:

1. **Integration of the MEL System® modules in one efficient system**

2. **Synchronization of the modules:** In all packaging plants, although the individual operations might be efficient, when they operate as a system **the overall efficiency is much reduced**. The Backbone of the MEL System® provides a solution to this problem.

3. **Connectivity to the various other plant IT/control systems:** The MEL System® lies in the heart of the packaging operations. The seamless connectivity to the other IT systems (ERP, MRP, MES, WMS, other Scada etc) can secure a smooth end-of-line operation and the secure start of the supply chain.

The Backbone (cont'd)

4. Information intelligence: The Backbone incorporates a number of Manufacturing Execution System (MES) functions like:

- Raw materials usage

- Production and work flow monitoring

- Traceability data

- Quality control data

- Various actual production metrics, KPIs and statistics, OEE

- Maintenance data (predictive, preventive and emergency)

- Fault & Stoppages data recording (brake downs, changeovers etc)

All the above information is presented in a meaningful and interactive way to the system operators and management.

Areas of application

➢ The MEL System® can be used by any manufacturing plant involved in the packaging of food, beverages, pharma, cosmetics, metal parts, paper etc.

➢ The primary packaging of the products can be in the form of bottles, boxes, cans, jars, spray cans, sacks, bags, buckets etc.

➢ The secondary packaging can be in the form of cartons, trays, multipacks, other shrink film packs or a combination of the above.

➢ The shipping units can either be tertiary packages (pallets), secondary packages or a combination of them.

Benefits

To the production

- Increased productivity

- Overall safety improvement

- Cost reduction (good ROI reported from customers)

- Ease of use with minimum needs for operator interventions and maintenance

- Flexibility

- Quick product changeovers

- Error minimization

- Meaningful production data presentation

- Ease of implementation

- Optimal resources utilization (space, manpower, existing equipment and IT)

- Expandability

Benefits (cont'd)

To the supply chain

- A sure start of the supply chain, both at the physical (shipping units) and the data flow levels

- Can cope with both direct warehousing and direct shipping or any combination of those

- Can quickly adapt to unexpected changes in demand/incoming orders

- Excellent ROI

Implementation

Our customers consider us not only simple system integrators but also trusted business and manufacturing consultants and partners.

We strive to deliver to our customers real value by combining technology innovations into realistic implementations.

In every project, we strictly follow the below steps :

➢ In depth analysis of customer requirements

➢ Existing infrastructure (mechanical, electrical, IT) analysis

➢ Detailed proposal

➢ Implementation and commissioning

➢ After-sales support contracts
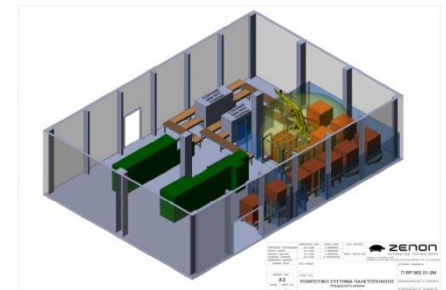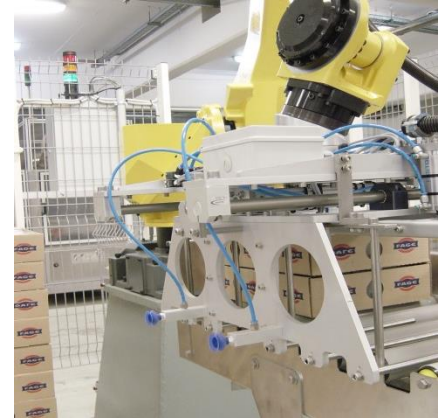
However our role continues after the implementation of each project and we remain close to our customers to cover their evolving needs.

Installations

The MEL System® has been implemented at the following companies:

Case studies

ATHENIAN BREWERY (HEINEKEN)

• Depalletizing of full crates

•Palletizing of empty crates

• Decrating of full crates

• 1st level packaging of bottles into shrinked multipacks

• Coding of multipacks (expiry date, Lot number)

• 2nd level packaging of multipacks into shrinked bundles

• Labeling of bundles (expiry date, description, barcode)

• Palletizing of bundles

• Stretch wrapping of bundle pallets

• Supervision and control system
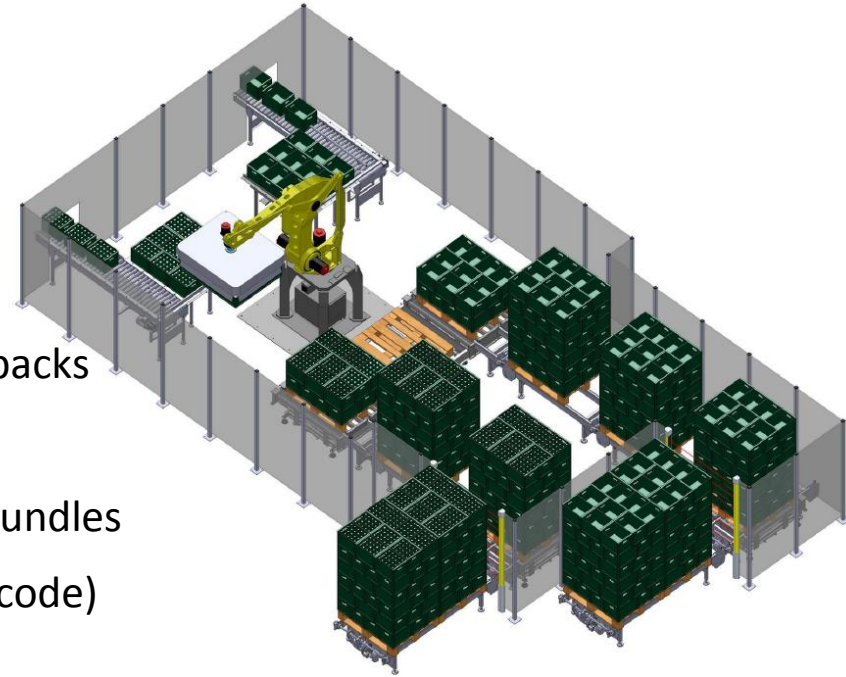
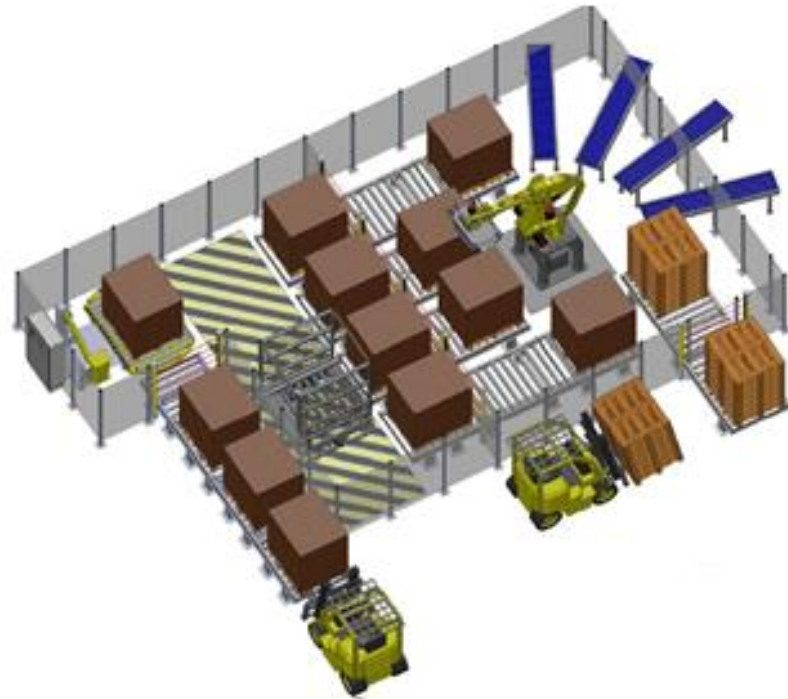**Click here to see: Video Case Study**

Case studies

SYNGENTA SA

- 2 pick & place systems for bottle caps
- 3 cartesian bottle casers
- Robotic palletizer for cases
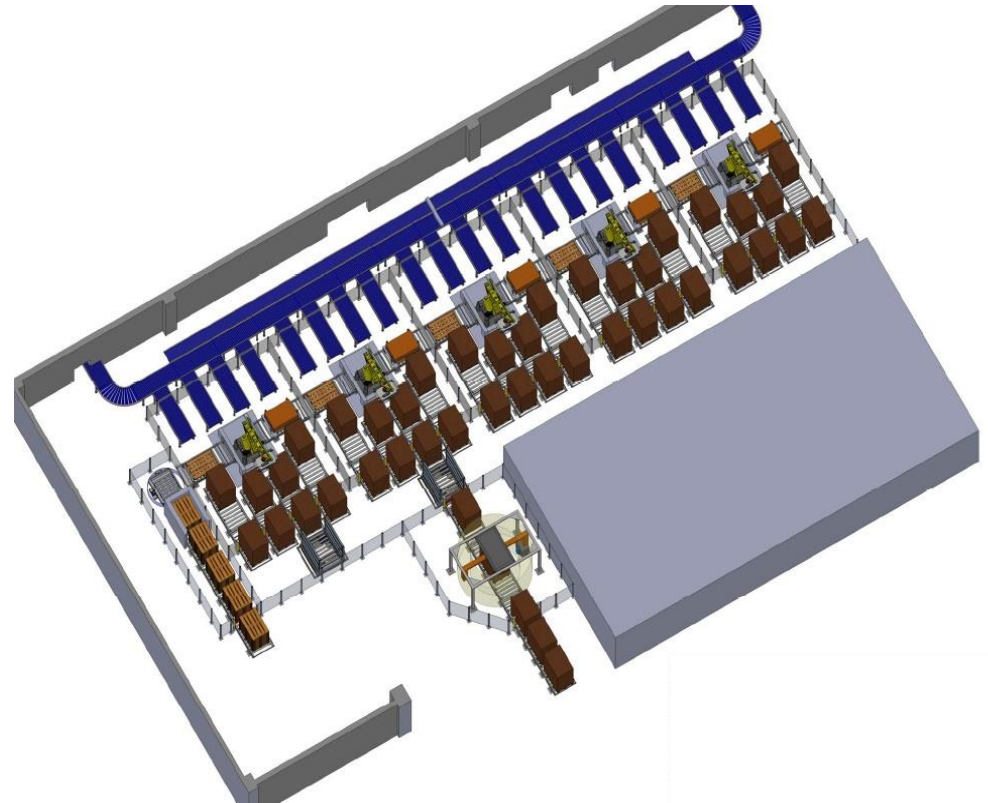- Pallet transfer
- Stretch wrapping
- Lines & tanks SCADA system

Click here to see: Video Case Study

Case studies

PEPSICO

• Fully automated conveyance and sorting for cases (20 SKUs)

• 5 robotic palletizers for cases

• Pallet transfer

• Stretch wrapping

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