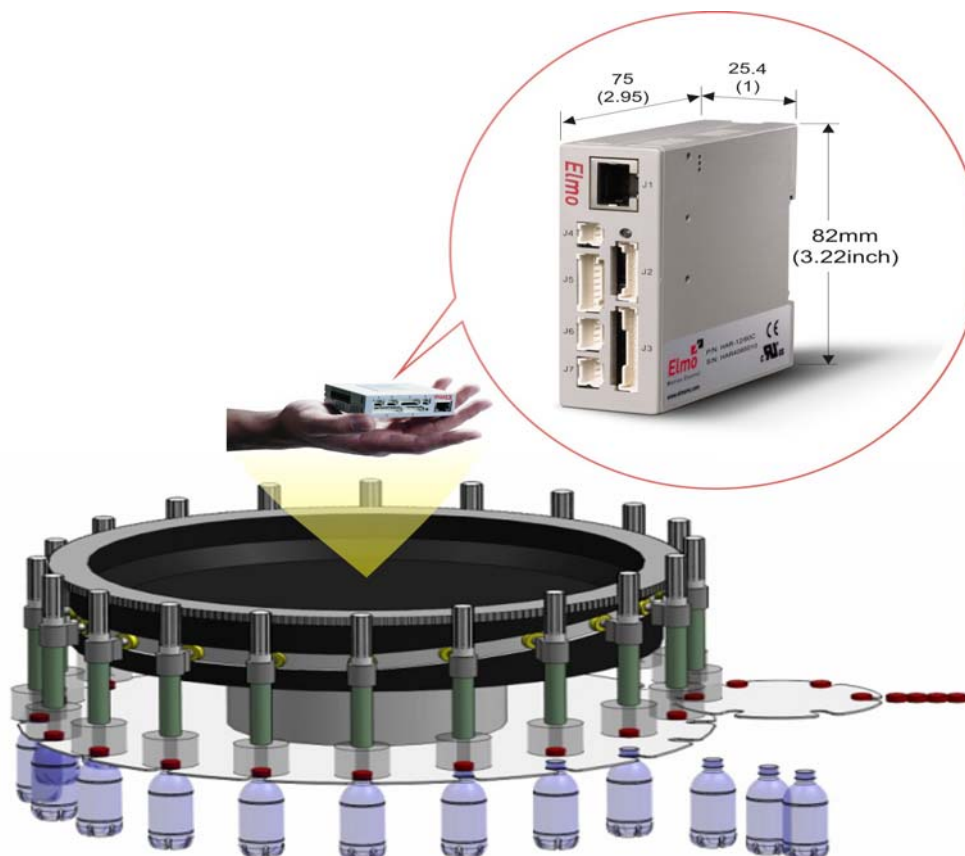


# Case Studies & Application Solution: The Best solution in the market for: **Labeling/Capping Industrial Machine**

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- \* Machine Description
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Product Name- **Harmonica**



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### Machine Description:

Rotary carousels are commonly used in labeling and capping machines.

The rotary motion that is applied to the bottle holder platter or capping chuck regulates the tightening torque that is applied by a magnetic clutch.

However, mechanical cam systems have a number of shortcomings which include:

1. Reduced efficiency. This is due to the mechanical couplings that require complex and costly installation procedures and constant maintenance.
2. Noisy operation.
3. Inadequate or no format flexibility.
4. Limited scalability of the machine, both during the design stage of the installation and for machines already in service.

Recent technological advances have led to the replacement of the mechanical cam with an electronic cam. As a result, each platter or chuck is driven by an onboard electric motor. The motor is coupled to the relative utility via belts, pulleys or gear trains to achieve the required reduction ratio, and it communicates with a separate machine control system that manages operation of all the axes. The data traffic that is generated requires the use of a fast communication bus.

The use of an electronic cam offers advantages in terms of format flexibility, as the format is managed electronically, and allows modifications to the machine operating cycle both during the design stage and for machines already in service. However, this system still has some of the disadvantages listed above: reduced efficiency due to the use of mechanical couplings, and noisy operation.

### The Challenge:

It is usually the rotation of the carousel itself that imparts, via a mechanical cam, rotary motion to the bottle holder platter or capping chuck which, in turn, regulate the tightening torque applied with a magnetic clutch. The main shortcomings of a mechanical cam system include reduced efficiency, due to the mechanical couplings which require complex and costly installation procedures and constant maintenance, noisy operation, inadequate or no format flexibility and limited scalability of the machine.

- Replace the mechanical solution with an electrical solution while keeping the mechanical and electrical systems as simple as possible by increasing the throughput
- Top level performance
- Reduce complexity
- Double the throughput
- Ability to work in an extreme environment

The Solution:

1. Advanced ECAM programming:
  - An ECAM table operating in each drive
  - Flexibility at point 0 of the slave axis
  - Slave point 0 is received by the camera through the central controller
  - All of the axes are slaves of the main axis in the carousel, when every axis begins moving at a different point on the master
2. Master Encoder Via CanOpen network:
  - The Encoder sits in the static part of the machine and provides the location information of the carousel's central axis using CANopen communication. This application provides information about the location of the carousel to the axes without additional general wiring.
3. Distributed processing power:
  - Using ECAM programs on the drives enables the update rate to be increased from 4 ms/point to 2 ms/point while reducing the network baud-rate from 15 MHz to 500 KHz.  
this enables the machine speed to be increased, while increasing the network robustness.
  - The machine is assembled with two labelling systems, with the central controller identifying a label picture placed on the bottle after the first label. The management of the ECAM motion compared with the first and second labelling systems is performed in every drive that is commanded by the central controller.
4. Compact physical solution:
  - A small drive able to withstand shocks becomes an integral part in an engine.
5. Implementation flexibility on existing mechanics:
  - Working in ECAM mode allows the bottle's movement profile to be changed by altering parameters without making a mechanical change. For example, changing the bottle turning speed based on the bottle's radius.
6. Flexibility of feedback:
  - The possibility of a working with the resolver in a compact drive enables the engine to be placed in the bottle axis without a timing belt. At this stage the engine gets a shock when the bottle is pressed. Other drives are unable to withstand these compact and resolver conditions.

Components Selected

Description: 57 Harmonicas working in ECAM mode are used in labeling and capping machine.

Why Elmo:

- ◆ Advanced motion and servo control
- ◆ Distributed networking
- ◆ Advanced programming
- ◆ High density
- ◆ High reliability
- ◆ Rigidness
- ◆ High efficiency
- ◆ Complexity reduction

## CARROUSEL APPLICATION OUTLINE

