| Case | Application: Delta's ASDA-A2 AC Servo Drives on PET Bottle Roll-feed Labeling Machines | | | | |
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| Applicable to | Delta's AC Servo Drives and Motors | | | | |
| Key words | Electronic Cam (E-Cam) | | | | |

## [Introduction]

Packaging and labeling are important to marketing for making products visually appealing and attracting the consumer's attention. Most consumers judge a product by its packaging and labeling before buying it. Attractive packaging and labeling can be crucial to get first time buyers to buy your products. Your first step in entering the market may falter if the packaging and labeling of your products are poor. Labeling equipment has become important in product manufacturing, especially in the food and beverage, daily necessities, and other consumer goods industries. The speed, precision and stability of the labeling equipment can directly affect production efficiency, which is why fully automatic control functions have become the market trend for advanced roll-feed labeling machines.

With competition between industries becoming increasingly critical and labor costs rising rapidly, the requirements for high labeling speed and automatic labeling machines are increasing. The efficiency and speed of traditional controllers are not good enough. There are many difficulties yet to be overcome. Traditional controllers cannot meet the high-speed and high-precision performance required for PET bottle roll-feed labeling machines. To satisfy the demand for speeds of at least 600 bottles per minute, the frequency response and labeling speed of the whole system must be enhanced and the speed of the conveyer and sealing and cutting must be synchronized to ensure processing positions are all at the same time. Users must be able to adjust the cutting speed freely and correct cutting errors to ensure that the labels are cut precisely and the products are labeled at the right place. A high-speed, high-response, high-accuracy servo system with excellent synchronization and flexibility are key factors for achieving positioning precision and increased productivity.

Different systems may have different designs and structures. For a more accurate labeling operation and enhanced efficiency, factors crucial to roll-feed labeling machines are: maintaining the same processing speed, eliminating motor noise, avoiding motor damage and reducing total expense.

This application case describes how Delta's AC servo drives and motors which provide electronic cam (E-Cam) functions can help our customers achieve high-speed and high-precision production for PET bottle roll-feed labeling machines.

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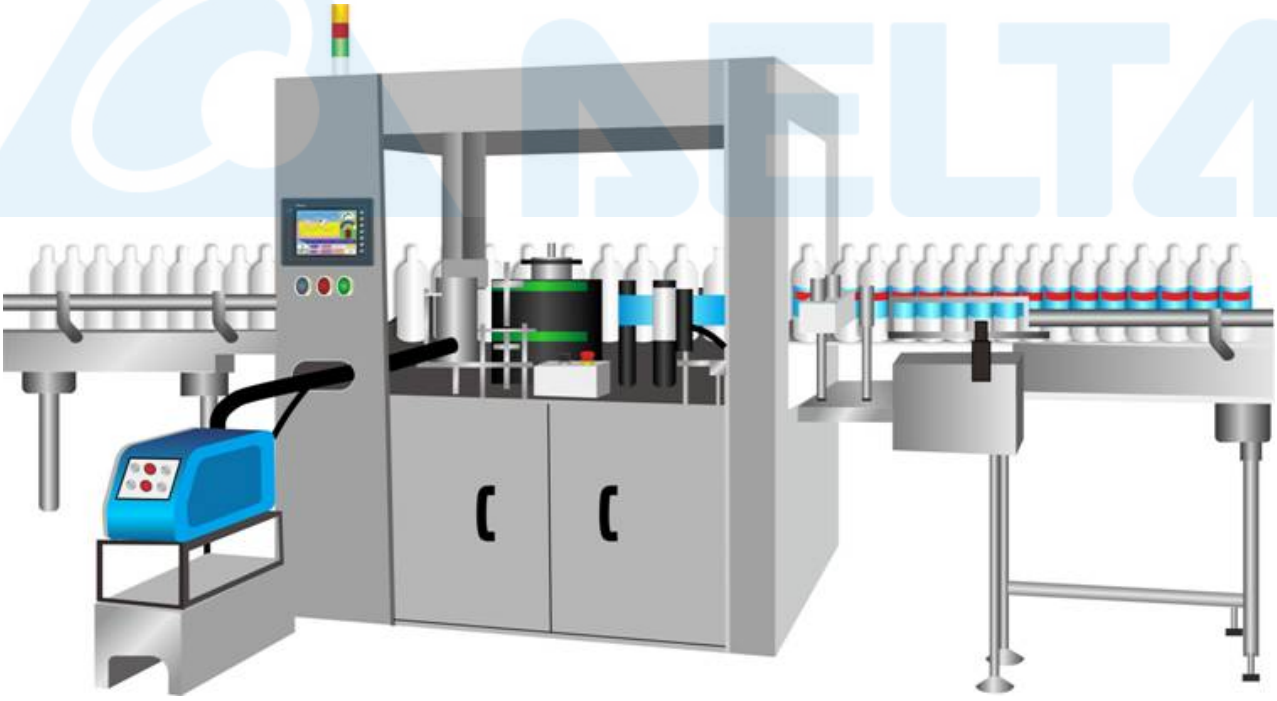
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## [Equipment Functions]

A PET bottle roll-feed labeling machine features high-speed, high-precision and high-efficiency operation. It employs a rotary cutting mechanism as the master axis of the system for cutting labels. The labels feeding mechanism is the slave axis of the system for controlling the cutting length. The speed of the master cutting axis determines the overall processing productivity. The master cutting axis and the slave feeding axis are synchronized to ensure positioning is correct and precise for every cut. Rotating the cutting speed of the shaft and the fixed-length feeding axis must be synchronized. A problem that occurs in the general system when master and slave axes change speed instantly, is that the system is not able to compensate speed offsets immediately and it may result in positioning and cutting errors.

Delta's ASDA-A2 servo system provides the special "Phase Alignment" function to solve the problems of positioning and cutting errors. The system delivers mark sensor signals to the ASDA-A2 servo drives. Users can finish the compensation and correct position tracking errors easily through parameter settings on servo drives to achieve the best accuracy. With the aid of the ASDA-A2 servo drives, the system can instantly change speed and ensure that position tracking errors are within a safe range during a high-speed processing operation and satisfy customer needs.

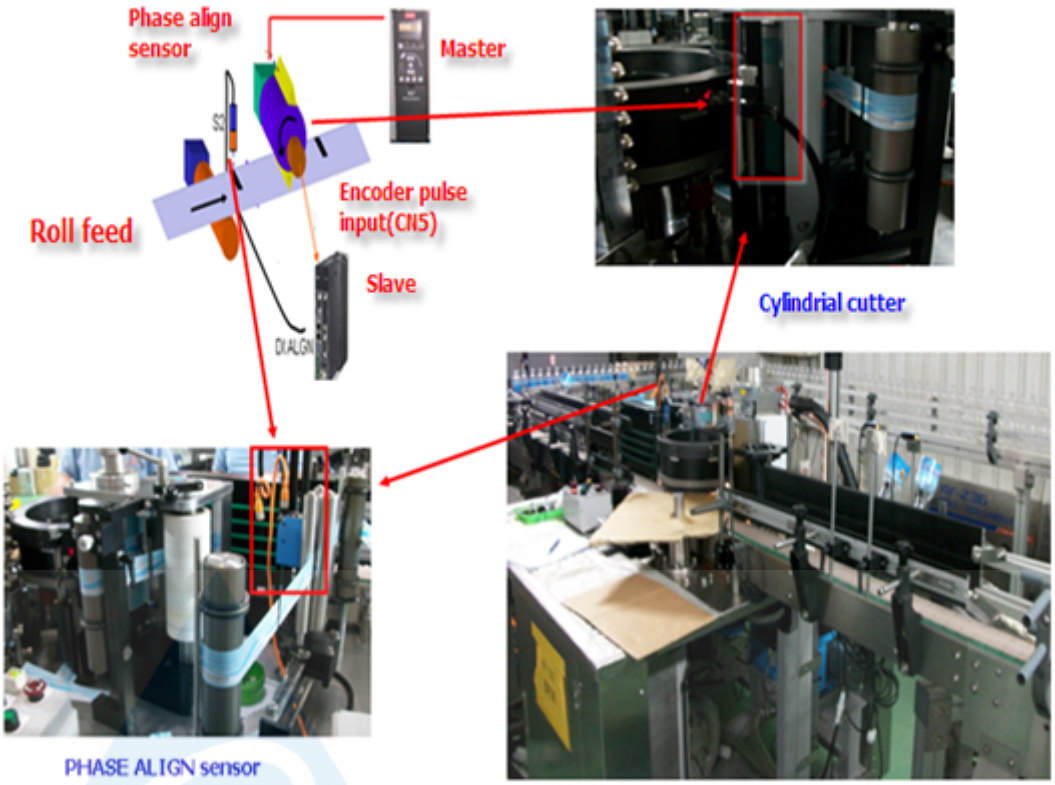
## [Equipment]





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## [System Configuration]




## [Application Analysis]

Delta's ASDA-A2 AC servo drives provide an innovative electronic cam (E-Cam) function which is able to replace mechanical cams and offer high precision control between multi-axis operations. The connection and efficiency between different working axes are excellent and mechanical cams can be eliminated. There are no durability and cost problems. The E-Cam is controlled and adjusted using parameter settings. A high-speed and high-precision position control can be achieved easily and executed quickly. Using Delta's ASDA-A2 AC servo drives on roll-feed labeling machines can complete various high speed and high precision positioning operations.

The features of Delta's ASDA-A2 AC servo drives:

1. The labeling speed and precision are both enhanced. A speed output of 600 bottles per minute is possible. Repeat cutting precision is within +-0.1mm.
2. The previous productivity rate was 300~400 pieces per minute. After using the "Phase Alignment" function of the ASDA-A2 servo drives, productivity is greatly increased and the system is more stable.
3. Delta's high resolution AC servo motors provide smooth operations. There are no overheating and overloading problems. No additional acceleration and deceleration are required. Noise can be

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reduced and maintenance costs can be greatly decreased.

4. Motion control is achieved by the ASDA-A2 servo drives. Complicated programming procedures are not required. No high-end host controller is required in the system itself. Wiring and its expense are both saved.
5. Using an E-Cam instead of a mechanical cam and the mechanical structure of material and cutting position is no longer needed. The mechanical structure can be simplified. Tuning and maintenance is easier, and it saves cost and reduces noise.
6. Multiple groups of E-Cam curves for rotary knife and flying shear are created easily. When production conditions (cutting length) are changed, all settings can be changed as well via HMI. No need to use PC Software.

Delta Industrial Automation Solution:

ASD-A2-2023-B 1 unit, Rotary Cutting Axis

ASD-A2-1521-B 1 unit, Feeding Axis

## [Conclusion]

Featuring not only a built-in electronic cam (E-CAM) function, the ASDA-A2 series AC servo system also features 32-bit high-speed DSP (Digital Signal Processor) technology, and a Capture and Compare function for high-speed pulses and high-speed motion control performance. Using the ASDA-A2 series AC servo system can meet all the demanding requirements of roll-feed labeling machines. In addition, the user-friendly and easy to operate ASDA-Soft servo configuration software is also an efficient tool for users to work out the system smoothly and it is simple to operate so that the tuning and testing time can be drastically reduced.

The functions of a flying shear E-CAM, high-speed and real-time capture synchronous correction, and others are the required functions for advanced and high-level roll-feed labeling machines in the field of packaging and labeling. In the near future, the system which provides all of the above functions and is able to increase and double or triple the efficiency of production will become the mainstream for motion control. The successful application of Delta's ASDA-A2 series servo drives in high-speed roll-feed labeling machine is a good demonstration that Delta can provide complete industrial automation products and total solutions for the high-speed packaging and labeling industries.

For more information on Delta's industrial automation products, visit our website at:
www.delta.com.tw/ia

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