



Application Case

Industrial Automation BU, Delta Electronics, Inc.

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| Case | Application of Delta's AC Servo System in Armature/Stator Winding Machine | | | | |
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| Applicable to | Delta ASDA-A2 series AC servo motors and drives | | | | |

Introduction

There are various kinds of winding products on the market, including the equipment, such as parallel winding machine, annular winding machine, armature/stator winding machine, textile winding machine, etc and the coil products, such as voice coil, transformer winding resistance, textile coil etc.

In order to reduce scrap wire materials and save the money, during the operation of the winding machines, ordered winding coils, accurate rotation, easy-to-use, large quantity and high quality these factors are needed. Besides, how to wind wires, spread wires, stop operation and change slots by pre-configured procedures automatically, and how to adjust the spreading width flexibly are also the key points for the applications of winding machines.

Function

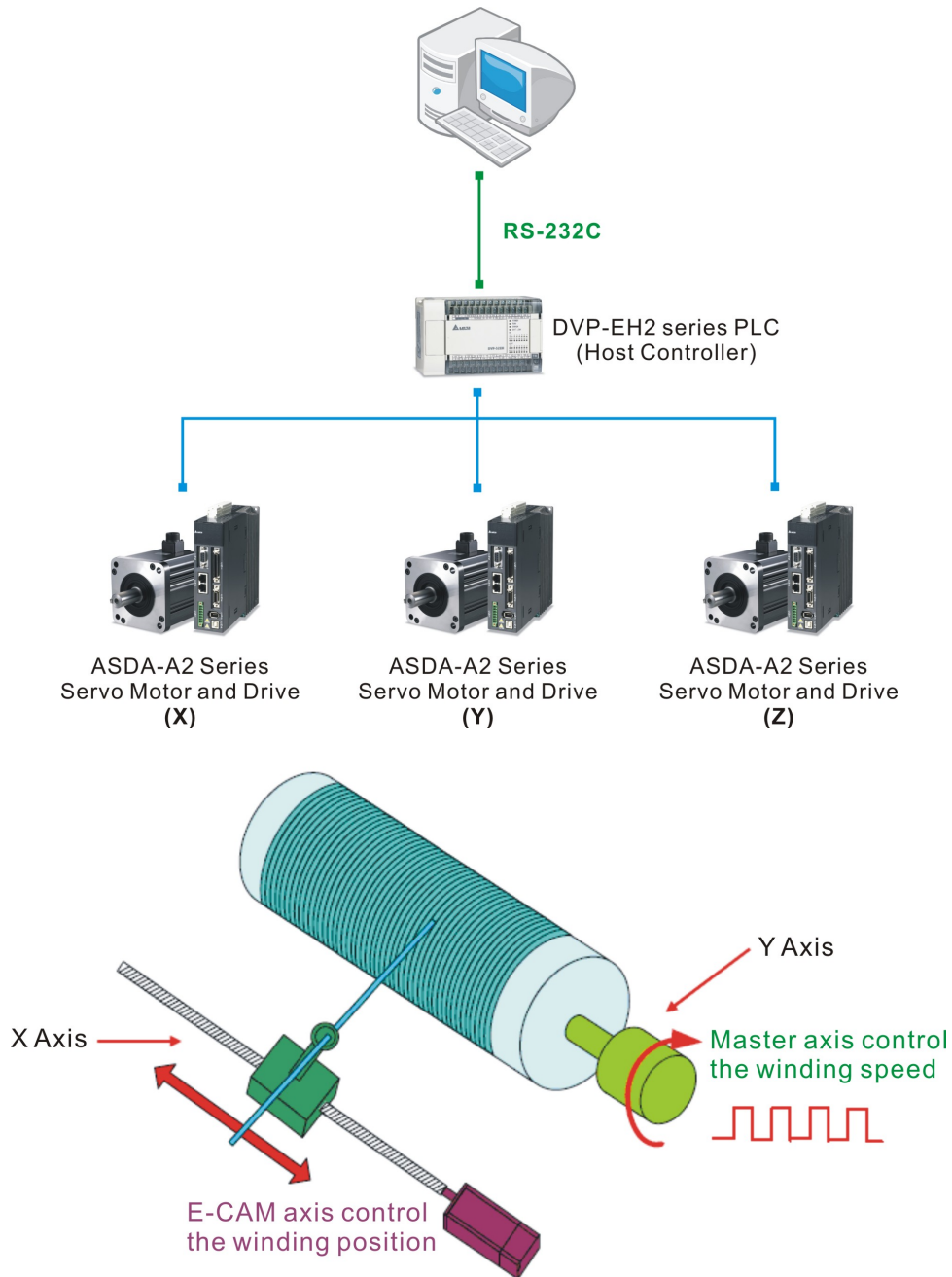
Generally, the mechanical design of armature/stator winding machine requires three-axis control system. Among the control system, the loading of X axis is smaller and therefore it can operate back and forth through 5mm ball screw which is driven by the servo system directly. In terms of the motion of Y axis, i.e. flying shear axis, it performs a 360 degrees rotation by connecting to a decelerator through the servo system. Regarding the motion of Z axis, because the loading of Z axis is heavy, it rotates 360 degrees by connecting to a decelerator with high deceleration ratio through the servo system. In the process of winding operation, X axis is used to control the winding position, Y axis is used to control the winding speed and Z axis is used to adjust the winding angle. These three axes should move synchronously.

During the operation of the winding machine, the mechanical load may change drastically due to the winding speed. Therefore, the motion control of the flying shear axis for winding application must depend on the high stability, good tracking performance and quick response capability for load changes. Connecting with a host (external) controller, such as PLC or programming controller, using multi-axis servo control system can totally satisfy the application requirements of the winding industries.

品質至上
信賴第一
追求卓越

QUALITY
RELIABILITY
EXCELLENT

System Structure



Application Analysis

The customer used simple PLC and stepping motor originally to control the winding equipment. However, the manufactured products are rarely qualified and unable to meet the requirements of the market. After the analysis of mechanical design and control technology, the customer decides to adopt one 4-axis host controller and three sets of Delta's ASDA-A2 series servo systems to satisfy the conditions listed below:

1. Precision Requirements:

- (1) Homing characteristics: spreading axis: 0.005mm; flying shear axis: +/-1 degree; feeding axis: +/-1 degree
- (2) Position precision: 0.002mm +/-1 degree. The customer requests the servo system should have read-time feedback detection ability to ensure the motion precision of mechanical system.

2. Features of Delta AC servo system:

- (1) Built-in multiple control modes, capable of connecting to various host controllers and suitable for wide variety of applications.
- (2) S-curve and P-curve smoothing function, capable of smoothing the input signal efficiently.
- (3) Robust control mode, capable of keeping excellent performance for wide range of load inertia change.
- (4) Powerful high-frequency resonance and low-frequency vibration suppress function, capable of improving the mechanical resonance and vibration effectively.
- (5) Excellent command tracking characteristic, capable of responding the changes of the commands quickly (almost without any delay).
- (6) Abundant and complete software functions, capable of providing fast and convenient servo tuning operation.

According to the result of the analysis, we can ensure that Delta's ASDA-A2 series AC servo system can completely satisfy the control requirements of this winding application. After the mathematical calculations of mechanical structure, load inertia and output torque, we recommended the customer to purchase one set of Delta's ASDA-A2 400W servo system and two sets of Delta's ASDA-A2 750W servo system.

More information on Delta's ASDA-A2 series AC servo motors and drives, visit our website at

http://www.delta.com.tw/product/em/motion/motion_servo/motion_servo_product.asp?pid=2&cid=1&itid=5