

Case	Application of Delta's AC Servo Drive in Electric Discharge Machine				
Issued by	Solution Center	Date	November, 2009	Pages	3
Applicable to	ASDA-A2 series AC servo motors and drives				

Introduction

The concept of Electric Discharge Machining (EDM) is to use electrical energy to generate electrical discharges (sparks) and enable the workpiece to be melted rapidly. In other words, it is a kind of manufacturing process where the material is removed by generating high voltage sparks through a small gap filled with a dielectric fluid. A more detailed description is that in electric discharge machine, a difference of potential is applied between the two electrodes, one is called electrode (tool) and the other is called workpiece. To discharge a high voltage between electrode (tool) and work piece, the dielectric breaks and therefore the current flows between the two electrodes and makes a melt on the border of the surfaces of the electrode (tool) and work piece. This technique is used to form complicated shapes regardless of the hardness of the workpiece as long as the workpiece (materials) are conductive. Nevertheless, a necessary condition for achieving a good surface finish is the most important application challenges in the process of the electric discharge machining.

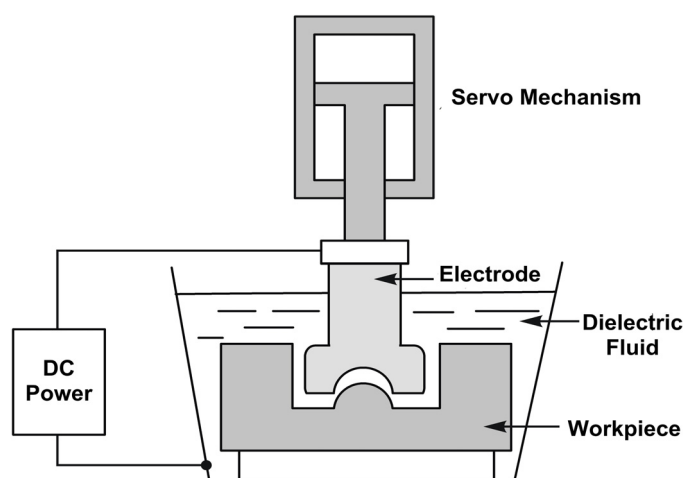
The customer in this application case is a well-known precision machinery manufacturer in Taichung, Taiwan, mainly manufacture CNC electric discharge machine and wire cutting machine.

Function

This machine is used to cut or form various kinds of metal materials. The electrode is utilized to process different shapes of workpiece, suitable for rapidly manufacture small quantity but various molds.

This manufacturer (Delta's customer) used general stepping motor to control each axis of the machine previously and could not meet their customer's needs. When the machine operates in high speed, the response performance of the motor is not good. When the machine operates in low speed, the processing operation is not smooth and cause the surface finish is not well so the product quality is uncertain and goes down.

System Structure



Solution

1. Processing requirements:
 - Max. speed is 2,000RPM
 - Applicable wire diameter is 0.1 ~ 0.2mm
 - Good surface finish is required
2. During the processing operation of the machine, it is essential to send the commands given by the host (external) controller to the servo drive quickly and accurately and drive the servo motor to move to the correct position and complete processing operation. In the meanwhile, it is also necessary to feedback the current status in real time in the process of manufacturing and accomplish the processing operation completely and rapidly. To satisfy these requirements, we recommended the customer to adopt Delta ASDA-A2 series servo motors and drives. ASDA-A2 series servo drives are provided with high-speed calculation and precise feedback control function incorporating dual CPU (DSP and CPLD) technology and intended to drive ECMA series servo motors to achieve precise positioning even at low speed. In addition, ECMA series servo motors are equipped with 20-bit resolution encoder which offers better position and speed control ability, and less noise during operation, especially at low speed so that the processing operation is more smooth with better performance. Besides, ASDA-A2 series servo drives features up to 1kHz frequency response characteristic which can enhance the tuning efficiency and enable the response of the position and speed command to be more real-time. Other additional functionality, such as auto-tuning function, auto resonance suppression function, low-pass filter for smoothing command and user-friendly software interface and high-speed PC monitoring function (similar to a digital oscilloscope), etc. all maximize the performance of ASDA-A2 series and improve ASDA-A2 series to be more advanced, more rapid, more precise and more stable so as to fulfill the requirements of high performance, high response, high precision and high reliability.

System Configuration

1. X-axis servo drive and motor: ASDA-A20421-B, ECMA-C10604ES
2. Y-axis servo drive and motor: ASDA-A20421-B, ECMA-C10604ES
3. Z-axis servo drive and motor: ASDA-A20721-B, ECMA-C10807ES

Features of ASDA-A2 series servo drive:

1. 20-bit resolution encoder is equipped with to offer better position and speed control ability, and less noise during operation, especially at low speed which is suitable for the applications of CNC electric discharge machine and wire cutting machine.
2. 8 digital inputs and 5 digital outputs are selectable and all can be user-defined via parameters.
3. Frequency response characteristic is up to 1kHz. The positioning is more stable and the response is more rapid.
4. 2 auto notch filters and 1 manual notch filter are provided to suppress the mechanical resonance more effectively.
5. High-speed PC monitoring function (similar to a digital oscilloscope, max. scan frequency is 16K) is available, capable of offering real-time and accurate information for the customer.
6. Built-in excellent motion control functions which include E-CAM, Capture, Compare and Pr mode, etc. greatly increase the ability of motion control and enhance the reliability of the system.



Application Case

Industrial Automation BU, Delta Electronics, Inc.

More information on Delta's ASDA-A2 series 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

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