

## Application of V&T (<http://www.EcoDriveCN.com>) vector control variable speed drives for engraving machines

### Site conditions

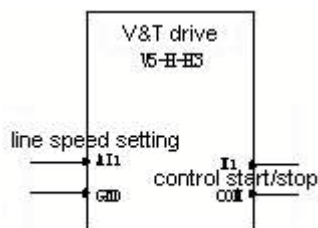
The machinery: CNC engraving machine

V&T EcoDriveCN vector control variable speed drives: V5-H-4T3.7G/5.5L-H3

(Please kindly notice that this is a special example. There power supply is 380V at the customer' spot, no 200V power supply there. But the motor is 200V. So we choose EcoDriveCN V5-H-4T vector control variable speed drive (VSD, VFD, AC drive). The input voltage of 4T series drive is 380V-480V. For normal situation, for 200V motor, we will choose 200V VSD if the power supply is 200V too.)

Motor nameplate: 200V, 133Hz, 2000r/min, 5.6A

### Wiring diagram of our drive on this engraving machine



### System solution

Adopt vector control 1 to control engraving machine. The line speed is given by AI1 analog terminal. The start/stop is controlled by digital terminal X1. Correctly set the motor parameters of variable speed drive, controlled by multi-steps V/F curve. Thus the engraving machine can get stronger torque.

Through the motor nameplate, we can calculate the base running frequency of motor, and the group of P9 motor parameters:

The base running frequency of motor  $f$ :  $133/200=X/380$ . So  $X = 252.7\text{Hz}$ . We set  $f = 250\text{Hz}$ .

Motor poles:  $n = 60*f/n = 60*133/2000 = 3.99$ . So the number of pole pairs of motor is 4. So this is 8 pole motor.  $P9.01 = 8$ .

Rated speed of motor:  $r1 = 60*250/4 = 3750\text{r/min}$ . Because there's error for the real rated speed, generally smaller, the real rated speed can be set,  $r2 = 3700\text{r/min}$ . That is,  $P9.02 = 3700\text{ r/min}$ .

Rated power of motor: Because the rated current is 5.6A, we can calculate that the rated power is 2.2Kw. So  $P9.03 = 2.2\text{ kw}$ .

Rated current of motor:  $P9.04 = 5.6\text{A}$

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Current of motor with no load:  $I = 5.6A * 40\% = 2.24A$ . So we set P9.05 = 2.5A.

### Function code setting

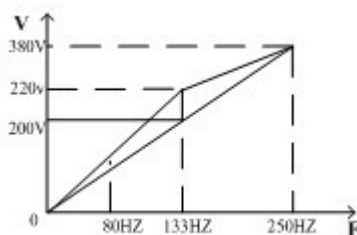
The original function code parameters are: P0.03=0, P0.04=1, P0.06=1, P0.08=5, P0.09=5, P0.11=400, P0.13=400, P0.14=5, P0.15=400HZ, P5.00=2, P9.01=4, P9.02=1500 r/min, P9.03=3.7 kW, P9.04=7.7A, P9.05=4.0A

According to this setting, the torque of grinding castings is not strong. We notice the running parameters of V&T EcoDriveCN variable speed drive: running frequency is 106.8Hz, the output current is varied in the range of 0.9A ~ 1.1A.

The correct function parameters are: P0.03=0, P0.04=1, P0.06=1, P0.08=5, P0.09=5, P0.11=400, P0.13=400, P0.14=5, P0.15=250HZ, P5.00=2, P9.01=8, P9.02=3700 r/min, P9.03=2.2 kW, P9.04=5.6A, P9.05=2.5A. According to this correct setting, the torque of grinding castings is obviously increased. Now the running parameters of V&T variable speed drive: running frequency is 80Hz, the output current is varied from 1.6A to 1.8A.

If set a V/F multi-step curve point, can increase the torque of variable speed drive better: P4.00=1, P4.05=133HZ, P4.06=58%, P4.07=250HZ, P4.08=100%. Now the running parameters of V&T variable speed drive: running frequency is 80Hz, the output current is varied from 1.8A to 2.0A. The torque of grinding castings is increased obviously.

### The V/F curve boost diagram:



### Attention

From the above example of different parameters setting of variable speed drive, it's important for input the correct parameters for the drive according to motor nameplate. This makes the torque of motor larger, thus meeting the demands of the customers better.

The parameters setting of V/F curve is better if the according voltage of the frequency is increased 10%. For example, 133Hz is for 200V. Then increase the voltage to 200V, this will be better. After the adjustment of V/F curve, the standard of setting to increase the torque of the Manufacturer of vector control frequency inverter (AC drive, VSD, VFD), servo... for precision control, speed adjustment, position control, angle control, length control



machine, note the torque of grinding castings of engraving machine.

During the adjustment, note the output current and running frequency of variable speed drive, and observe the surface of grinding castings. This is the factors to evaluate if the parameters setting can meet the requirement.

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V&T Technologies Co., Ltd. (<http://www.EcoDriveCN.com> ) has rich experiences in the field of machine tool. AC inverter drive speed controllers from V&T are widely applied in the machine tool industry in the world, including cold forging presses, lathe, drilling machine, CNC drilling machine, boring machine, cable making tool, chamfer machine, CNC boring machine, engraving machine, grinding machine, milling machine, shearing machine, die casting machine, drawing machine, high-speed drilling machine, multi-spindle drilling machine, electric discharge machine, laser engraving machine, etching machines, gear cutting machines, lapping machines, milling machines, planing machines and so on.

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