

## Application of ALPHA Frequency Converter in Laminating Machine

### 1. Description

Born in the 1950s, the laminating technology was first adopted by the U.S. Army. Laminating process in China began in the 1960s. At that time, we were inspired by the Japanese calendar cards and started testing on printing. After success, laminating has been widely used.

### 2. Technological Process

According to the raw material and equipment adopted, laminating of paper prints can be divided into three modes, i.e., laminating while coating, precoating laminating, and aqueous laminating.

Laminating while coating is the process that adhesives are firstly coated to the film and then the film is subjected to hot pressing. The adhesive used is solvent-based or of emulsion type. It can be prepared at any time when required.

The process of laminating while coating requires a lot of preparatory work. Firstly, measure and prepare solvent and solution. Secondly, increase the temperature of the drying tunnel of laminating machine. Thirdly, adjust the wind speed, temperature, and air volume of the drying tunnel as well as the pressure and temperature of the lamination roller. After all preparatory work is completed, perform laminating. After the completion of laminating, use alcohol to thoroughly clean the laminating machine.

#### Technological Process

Plastic film unwinding --- Traction --- Adhesive coating --- Drying tunnel drying --- Paper prints laminating --- Finished product rewinding



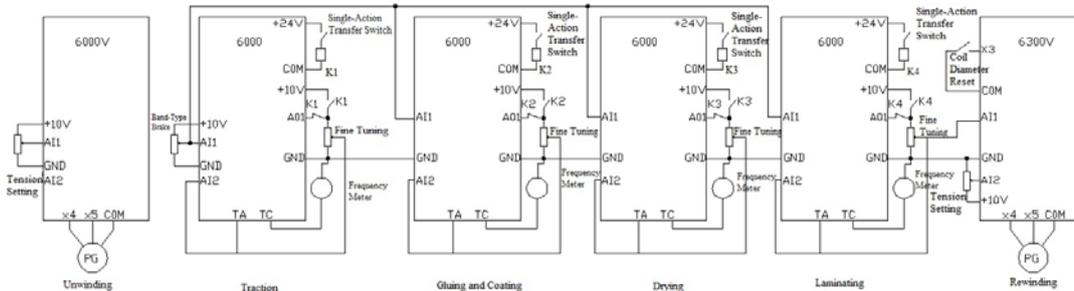
### 3. System Configuration

A 6000V high-performance vector tension frequency converter is used for unwinding while for rewinding, a 6300V product is adopted. For each of other links, a 6000 series frequency converter is used. The power of the motor used in each link is 1.5KW, 2.2KW, 3.7KW, 3.7KW, 3.7KW, and 2.2KW respectively.

It is required to use a potentiometer for main adjustment. An independent potentiometer is

used for fine tuning of other links. Also, switch control is converted by single-action and linkage. To prevent the frequency meter showing when the system does not run, TA and TC terminals are used for control.

System wiring diagram is as follows.



#### 4. Parameter Testing

6000V Frequency Converter for Unwinding		
P0.01	Control mode	1 (Closed-loop vector control)
P0.02	Frequency setting	50Hz
P0.07	Run command giving mode	1 (Terminal operation)
P0.18	Acceleration time	Set according to site requirements
P0.19	Deceleration time	Set according to site requirements
P3.04	X4 function	81 (Two-way speed measurement A)
P3.05	X5 function	82 (Two-way speed measurement B)
P8.10	Torque control mode	1
P8.11	Upper torque limit	1 (Tension is set via A11)
PA.00~PA.04 are set by referring to motor nameplate; then, they automatically learn how to set motor parameters		
Traction and Intermediate Links		
P0.01	Frequency setting 1	3 (Terminal AI2)
P0.04	Run command control mode	1 (Terminal operation)
P3.16	TA/TB/TC	1 (RUN)
P4.17	A01 function definition	9 (AI1=A01)
Main Parameters of 6300V Tension Frequency Converter		
P6.00	Tension control module selection	1 (Tension given)
P6.01	Winding mode	0 (Rewinding)
P6.02	Reduction ratio	3
P6.03	Tension giving source	2(AI2)
P6.05	Maximum tension	287.8N
P6.13	Coil diameter calculation mode	1 (according to line speed)
P6.14	Maximum coil diameter	300

P6.15	Scroll diameter	60
P6.17	Initial coil diameter 1	60
P6.21	Current value of coil diameter	Real-time coil diameter can be shown
P6.22	Number of pulses per revolution	600
P6.31	Line speed giving source	1 (AI1)
P6.32	Maximum line speed	50
P6.33	Minimum line speed for coil diameter calculation	3
P6.34	Actual value of line speed	Real-time line speed can be displayed
P6.55	Input source of given line speed	2 (AI2)
P2.44	Number of encoder pulses	600
P0.01	Control mode	1 (Closed-loop vector control)
P0.03	Frequency setting source	7 (line speed)
P0.07	Run command giving mode	1 (terminal control)
P1.00	Stop mode	1 (Free stop)
P3.04	X4 terminal function	81 (Bi-directional pulse A)
P3.05	X5 terminal function	82 (Bi-directional pulse B)
P3.03	X3 terminal function	54 (Reset coil diameter)
P3.01	X1 terminal function	1 (Forward run)
PA.02	Motor rated power	2.2kW
PA.03	Rated speed	1460
PA.04	Rated current	4.6
PA.00~PA.04 are set by referring to motor nameplate; then, they automatically learn motor parameter setting		

## 5. System Advantages

In this system, intermediate links are controlled via ALPHA6000 magnetic flux vector frequency converter, ensuring stable synchronous speed. Both coarse adjustment and fine tuning are adopted. For unwinding and rewinding, ALPHA6000V and ALPHA6300V high-performance current vector frequency converters are used respectively. Owing to stable tension, the finished products have high gloss.