

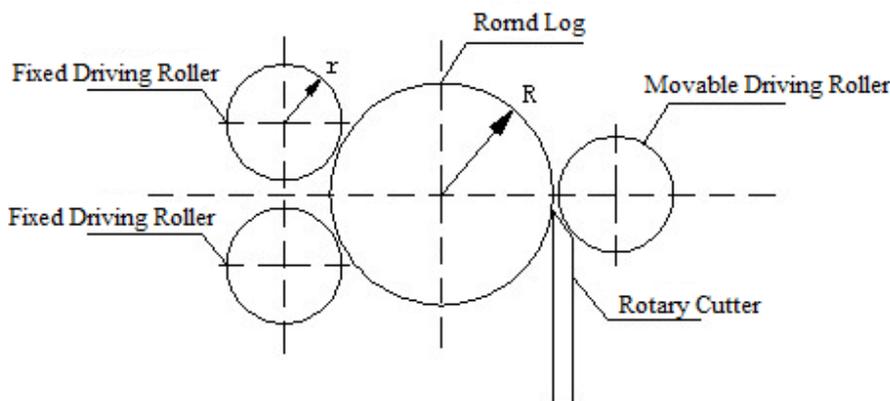
ALPHA6500 Frequency Converter for Rotary Cutter

The ever-worsening scarcity of forest resources has forced many woodworking equipment manufacturers and wood processing factory owners to find ways for effective use of wooden materials. The multiply wood manufacturer, for example, uses traditional rotary cutters with shaft support block to perform cuts on the wooden plate. This way of cutting enables more dimensional accuracy, but it does reach a limit when the round wood diameter exceeds 200mm due to the presence of the shaft support block. Another drawback to this cutting method is that the resulting plate has a low rigidity, which results from the small diameter of the wood. During the cutting of small-diameter wood, large amount of wood core would go to waste. This increases the plate production cost. Those are the reasons why most wood processing factories speedily moves to rotary cutters without shaft support block, which enable the reuse of wood core.



Working Principle

Pictured below is the structure of a rotary cutter without shaft support block.



As is shown in the above picture, the round wood is sandwiched between 2 fixed rollers and 1 drive roller. A rotary cutter is used to cut the wood as the wood rotates. The central bearing support of the drive roller moves together with the rotary cutter. They don't change position relative to each other. In this way, the cutter peels one layer of circular plate off the wood. The plate thickness is controlled via adjusting the gap between the drive roller and rotary cutter as well as the cutting speed of the rotary cutter.

Generally speaking, the gap between the driver roller and rotary cutter is a given and adjustment of plate thickness is mainly possible via the control of the moving speed of the rotary cutter by the rotary motor.

Suppose the rotary speed of the drive roller is constant. As the wood becomes thinner, its angular speed keeps varying. This means the cutting speed of the cutter should be changed after every full rotation of the roller. Therefore the moving speed of the cutter is always changing.

Differences between ALPHA6500 Frequency Converter and Traditional Speed Controller

Traditional control system for the coreless rotary cutter adopts the 2T series electromagnetic speed regulator for speed adjustment. It requires users to operate the rotary knob or cam to change the input voltage, which in turn adjusts the motor speed. The major disadvantage of this control mode is the large amount of thickness deviation of up to 1mm.

Hence, it becomes crucial to design an accurate speed control system for precise control of plate thickness. Our basic thoughts on solving this them is to build an accurate mathematic model in the first place, and then design an advanced speed control system to replace the original one.

Advantages of ALPHA6500 Frequency Converter for Use in Rotary Cutter

Based on the working principle of the rotary cutter, we have independently designed this 6500 model for use in various rotary cutters currently available on the market. Customers

form Shandong, Hebei, Guangxi and Jiangxi have proved the high efficiency of our frequency converter which meets their automation requirements of the rotary cutters.

ALPHA control system for rotary cutter is made up of vector control type frequency converter plus an electronic ruler or rotary encoder. Our converter is made with HITACHI motor chip, enabling super fast and ultra accurate calculation. Below are the main parameters of this converter.

Torque response time: 20ms

Control Accuracy in Stable State: $\leq 3\%$

Speed Reduction Rate: 1:200

Speed Accuracy in Stable State: $\pm 0.2\%$

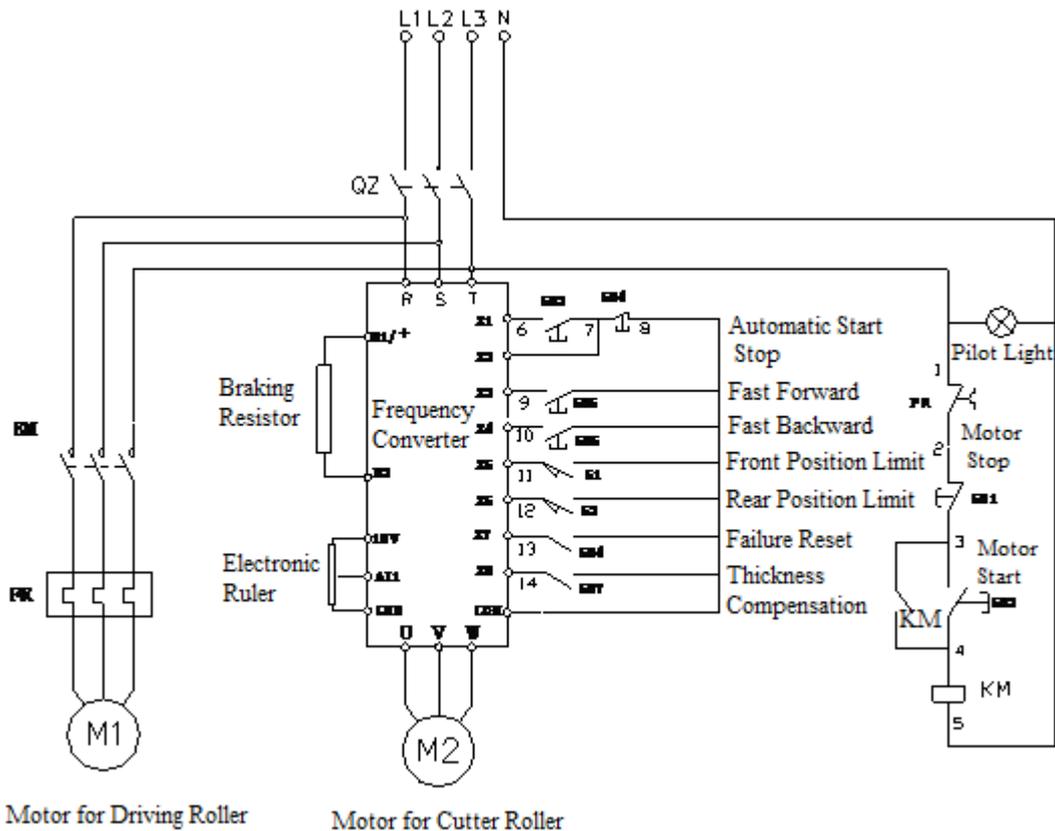
The converter is able to deliver 1.8 times of rated output torque at a frequency of 0.5Hz.

1. Large start-up torque ensures the motor delivers strong, uniform cutting force at a low speed. Stable start-up and restart after stop at high speed can be ensured.
2. Real-time high speed position calculation is possible via the encoder, which enables 0.01mm improvement in measurement accuracy. This ensures the cutting thickness can meet customer specifications with a thickness tolerance falling between ± 0.1 mm. Well-lubricated mechanical parts allow for connection accuracy of ± 0.05 mm.
3. Excellent braking performance allows the cutter to stop immediately under emergency conditions.
4. The use of rotary encoder in measurement of roller speed avoids cutting error arising from unstable voltage supply. The encoder allows the cutter to work properly in a wide range of voltages. It ensures a stable torque output even when the voltage varies from time to time. With this encoder, the cutter can function normally as long as the input voltage is above 60% of the rated voltage. Such a cutter is especially suitable for use in rural areas where there is unstable electricity supply.
5. A wide range of cutting speeds is available. Fast, efficient cutting allows the cutter to be used in situations where there is high feed speed.
6. Buyers can choose a single encoder, double encoders or an electronic ruler for use with our converter.
7. Multiple working modes ensure operation safety and high automation of the cutting process.
8. Built-in switches control the power supply system for greater stability and

anti-interference ability.

Working Principle and Wiring of ALPHA6500 Rotary Cutter Control System

The wiring for ALPHA6500 rotary cutter is rather simple and straightforward without any external controller. All the functions are realized via the built-in frequency converter. The whole system is quite economical. Picture below shows the wiring of the control system.



Summary

ALPHA rotary cutter control system simplifies the mechanical construction, eliminates the cutting error due to mechanical wear, improves the cutting accuracy, and minimizes the use of wood materials.