

The Large-Scale Sugarcane Stripper with Automatic Feeding

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Abstract: This study mainly introduce the large-scale sugarcane stripper with automatic feeding, which including the automatic feeding module, cleaning leaves module, collecting module and control module. The machine is an important part of the segmental type sugarcane harvester, using to solve the highest labor intensity problem of cleaning leaves. Collecting the hilly areas sugarcane and cleaning their leaves, can greatly improve the labor productivity and changing the current mode of sugarcane harvest.

Key words: Automatic feeder, large-scale stripper, module

INTRODUCTION

Sugarcane is one of the important economical crops in the south area of China. Harvesting sugarcane is a very painstaking, time-consuming and high strength job. Cleaning sugarcane leaves is one of an important process of sugarcane harvesting and the amount of study accounting for about 60% (Yu-peng, 2010). At the present time there is not mature sugarcane harvester appearing in the market that adapt to the areas of south China.

In order to solve those problems, many scholars have provided lots of solutions to settle this problem. Regrettably, Small-scale sugarcane (Zhang *et al.*, 2010) harvester remain have a problem of labor intensive, while large combined harvester are limited by the factor of field. Yang *et al.* (2007) make the research and development of machine of disposing of sugarcane leaves which is hollow shaft claw style. Lin *et al.* (2005) analyse the experimentation of improving soil by burying and burning cane-leaf in field. Mou (2011) study the leaf-stripping effect of sugarcane feeding way for centrifugal leaf-stripping machine. Wang *et al.* (2010) have a research of the dynamics simulation of one-blade cutting sugarcane process.

Now, our study put emphasis on the process of sugarcane leaf carding. And found that the present harvest process of sugarcane has some shortages as follows:

- The efficiency of the small-scale sugarcane is low and the labor-intensity is high.
- Large combined harvester can adapt to South Hills areas of china.
- Depend for the components of shelling leaves.
- The problem of sugarcane leaves recycling has not been settled.

So, we study the process of carding sugarcane leaves and changing the current module of sugarcane harvest.

And we should concentrate on settle the problem of low-efficiency, poor suitability, high labor-intensity and so on. Thus, let the farmers free from that real heavy manual study.

In this study, we mainly introduces the large-scale sugarcane stripper with automatic feeding, which changing the current sugarcane harvest mode and using the mature technology of mechanical engineering and automation intelligent control technology. The machine is an advanced sugarcane leaf cleaner and this kind of stripper has been applied in a sugar-refinery in *Liuzhou* of china and the result is satisfied. Moreover, collecting the hilly areas sugarcane and cleaning their leaves, can greatly improve the labor productivity and changing the current mode of sugarcane harvest.

THE LARGE-SCALE SUGARCANE STRIPPER WITH AUTOMATIC FEEDING

The goal of the large-scale sugarcane stripper with automatic feeding is to change the harvest method that cleaning leaves in the fields which using now. People can put this machine in a relative fixed place and use it to clean the sugarcane which is collected from the field. Thus, it can greatly improve the labor productivity of sugarcane harvest and be good to use the sugarcane leaves realize recycling economy. Based on the mature technology of mechanical engineering and automation intelligent control and independent innovation, we designed this machine through the research of sugarcane harvest process and the innovation of product. The large-scale sugarcane stripper with automatic feeding mainly include the automatic feeding module, cleaning leaves module, collecting module and control module. All the part can be used together or can only use the cleaning leaves part. Figure 1 shows that the basic part of the large-scale sugarcane stripper with automatic feeding.

The sugarcanes are sent to the equipment of cleaning leaves after the automatic feeding part carding. While the

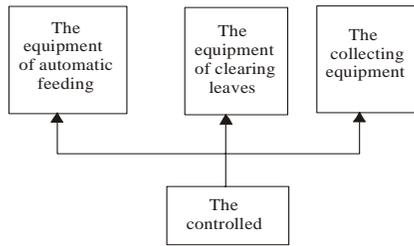


Fig. 1: The large-scale sugarcane stripper with automatic feeding schematic diagram

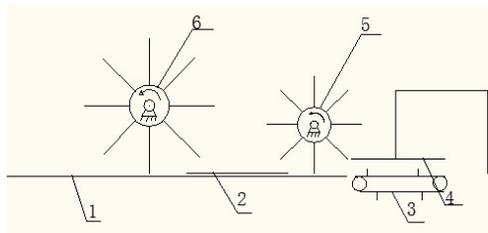


Fig. 2: The schematic diagram of the automatic feeding module, 1: Working platform; 2: Conveyer; 3: Transfer belt; 4: Barrier plate; 5: Carding wheel; 6: Carding wheel

collecting equipment collect the sugarcane and the leaves which comes from the equipment of cleaning leaves. The automatic feeding equipment, cleaning leaves equipment and collecting equipment are connected closely, controller just get the three parts studies s together.

Main performance index:

- The power of main motor: 30 kw
- The power of auxiliary motor 1: 10 kw
- The power of auxiliary motor 2: 5 kw
- study efficiency: 20 ton per h y

THE AUTOMATIC FEEDING MODULE

The automatic feeding module use the mode of double-stage carding for the reason that the sugarcane were put together and placed out of order are a disadvantage for automatic feeding. Figure 2 shows the automatic feeding equipment how to work.

In short, carding wheel 5, 6 included some pieces for carding and did fixed-axis rotation that driven by the transmission mechanism. The conveyer 2 do reciprocating motion to transfer the sugarcane. Sugarcane at the working platform 1, transferred to conveyer 2 after the carding wheel 6 carding. Next, the sugarcane to the limits of carding wheel 5 and carded. Then, the ordered sugarcane under the barrier plate transferred to the right region. The transfer belt 3 connected this unit with the cleaning leaves unit.

The cleaning leaves module: The cleaning leaves module mainly consist of the speed limiting wheel, the

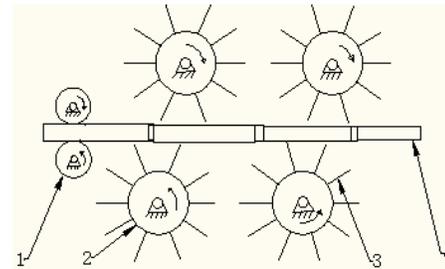


Fig. 3: The schematic diagram of the cleaning leaves module, 1: The speed limiting wheel; 2: The stripper wheel; 3: The stripper bar; 4: Sugarcane

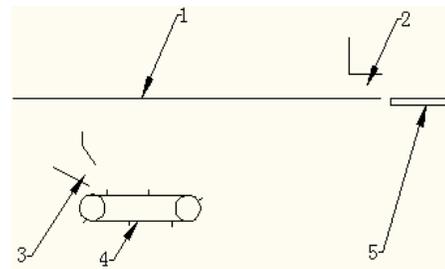


Fig. 4: The schematic diagram of the collecting module, 1: The region of cleaning leaves; 2: The exit of sugarcane; 3: The exit of sugarcane leaf; 4: Transfer belt; 5: Transfer belt of longitudinal movement

leaf cleaning wheel and transmission mechanism. Figure 3 shows the cleaning leaves module consists and how this module to clean sugarcane leaf.

The speeding limiting wheel and the stripper wheel did fixed-axis rotation that driven by the transmission mechanism. The stripper wheel is two cylinder-shaped roller which did relative rotation and the ex-circle of the roller have many stripper bar. The sugarcane leaves are cleaning up after the stripper high speed of rotation. To improve the efficiency of cleaning sugarcane leaves, the large-scale sugarcane stripper with automatic feeding contain multiple-stripper wheel unit.

The collecting module: This module mainly includes two parts: Collecting sugarcane leaves and collecting sugarcane. The sugarcane and leaves are collected by transfer belt. Figure 4 shows the sketch of the collecting module.

In simple terms, after cleaning leaves, the sugarcanes are collected by transfer belt 5 of longitudinal movement. While the sugarcane leaves are collected by transfer belt 4.

The control module: According the application of modern control theory, the controller coordinates the automatic feeding module, the cleaning leaves module and the collecting module working together. The controller mainly control the feeding speed of automatic feeding unit, the rotation rate of the stripper wheel and the

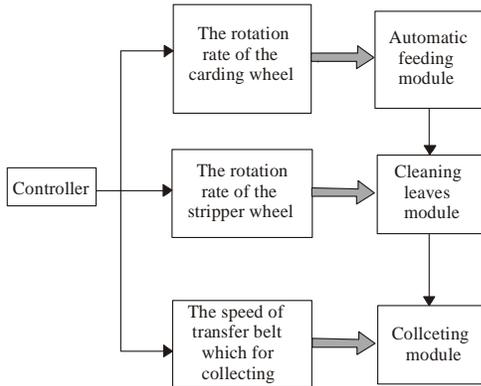


Fig. 5: The control chart of control module

speed of collecting unit. And Fig. 5 shows the control module control chart. a complex information system. From top-down, some soft computing.

CONCLUSION

In this study, we introduces the large-scale sugarcane stripper with automatic feeding, which changing the current sugarcane harvest mode and using the mature technology of mechanical engineering and automation intelligent control technology. The large-scale sugarcane stripper with automatic feeding is a barn-new deployment in the field of sugarcane stripper and the application of this machine at an advance level in the field of sugarcane harvest. Especially the application of the automatic module can greatly reduce labor intensity. The equipment can content to different user's needs for that main module can combined flexible. In the aspect of machine quality and performance, the equipment also reached the international advanced level. Moreover, collecting the

hilly areas sugarcane and cleaning their leaves, can greatly improve the labor productivity and changing the current mode of sugarcane harvest.

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