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DEVELOPMENT OF PLANT ROTATING TUBES

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Abstract

The purpose of this study was to (a) determine the performance of the rotary tubular corn conveyor, (b) determine the efficiency of the agricultural rotary cropper. The methodology is to calculate and design a 0 degree vertical tubular corn seed conveyor, screw loading and unloading based on efficient design, and making screw conveyors. Efficient spinning process at the speed and timing specified for good handling and a quantity loading speed at 25 rpm can most likely carry 9.10 kg in 12 min. Rotation speed with good handling efficiency and loading and unloading amount is increasing. With a speed of 25 rpm, it can carry 16.1 kg in 12 min. The weight of the object affects the conveying of the vertical rotary pipe conveyor.

Keywords: Conveyor unit, Conveying pipe, Plant, Rotating, Swivel pipe.

1. Introduction

Agricultural innovations that can help save time and reduce production costs. Increasing agricultural productivity is important for the country's and world economic crops [1]. ASEAN countries have produced many types of agricultural products [2]. Thailand has sweet corn, baby corn, and sticky rice. Moreover, candle corn, but the important thing is sweet corn and baby corn. Glutinous corn. Moreover, candle corn is a local consumption, and in the future, the market is likely to develop rapidly. Increasing production efficiency is easy because it is a short crop production period. It only takes 45-50 days for young corn and 70-75 days for sweet corn and can be planted all year round. It is easy to care with high yield, low risk and use less chemicals. It is also a suitable crop for rural farmers. Especially in irrigated waters, the harvest for each variety of maize is not the same as the harvest age.

In general, maize in Thailand has a harvest period of 100-120 days, which should be harvested when the corn is ripe. A dry leaf sheath whose seeds should have a moisture content of no more than 30% at harvest. When harvesting corn in a pot, you can dye the corn and sell it immediately. Alternatively, if you want to store your maize for sale at a good price, keep busy, the harvest may be labour intensive, as an alternative, use a harvester. Like the most popular screw conveyors of the old conveyor systems using a spindle for conveying. The power transmission system comes to the shaft to drive the screw to carry the raw materials in that direction. The powerful motor is a carrying threaded shaft which is heavier than the conveying cylinder. The thread size is the pitch of the thread equal to the thread (measured from the ridge). Thus, it is possible to use in limited transportation; it can only be used horizontally and obliquely, by conveying horizontally and obliquely. It takes a lot of space to place the conveyor and pipe in the conveyor system. The spindle is large so that the conveyor screws can be inserted. There is a large gap between the threaded spline and other problems without much emphasis on the fit of the barrel and carrier thread [3].

With the milling spiral on the carrier intervene, another problem is the shaft less helical screw, heavy duty, and medium duty types. The blade is assembled with a screw rail, and the drive unit is located on the side of the walkway entrance. The screws can accept the top, and screw openings are standard entry doors [3]. Alternatively, there is an access point as part of the screw top rail as an option. Moreover, there is a side entrance from the screw rail. Also, it is available as an optional addition. It offers large storage capacity and control possibilities. In the absence of bearings, the axle and rail supports (troughs) are great entry points for inspecting and cleaning screws. The purpose of this study was to determine the performance of the rotary tubular corn conveyor, to determine the efficiency of the rotary cropper, and to efficiently design and build screw conveyors. However, this study has still some limitations**.**

2. Research Method

The main idea is to make calculations and designs for constructing a 90-degree vertical tubular corn grain conveyor. It is needed to count the loading and unloading screws. In the case of the material handling tilt angle, if the material handling tilt is too high, the material cannot move along the screw thread. Detailed systematic design of the material is shown in Fig. 1.

3. Results and Discussion

The results obtained from the study indicate that the screw blade has a pulp volume. The higher the amount of material in each pitch of the screw blade, this will result. The slope of the equation shows the relationship between the speed of material handling. The mass and rotational speed of the threaded blades are also large. In accordance with the theory, according to the reference document from the research results, the correlated variables are concluded [4]. Material handling unit thread horizontally consists of variables related to material, and the shape of the threaded leaf material set is density, material, thread speed, diameter, and thread blade.

Experimental results showed that grain mass has the characteristic equation for the determining factor which is different from that equation. In addition, the effect of the air gap intervening before the material grain material affects the density measurement of the material, and the mass volume of the seed material is also contained in each leaf thread. Since there are no complex pieces of equipment that can be used to transport liquid and viscous materials.

Liquids can be conveyed in either a horizontal, inclined, or vertical plane. It can make full coverage withstand pressure. To act as a load other weights to be smaller, it must take up less space in installation. However, the unloading screw has a drawback: relatively low delivery efficiency. Compared to other handling systems, if no motor speed control device is operating, loading and unloading should be stopped. This was quite a problem at the beginning.

The correct path of unloading is in a horizontal plane until the slope does not exceed 20°; if there is a need for conveying on multiple slopes then a special design is required. From the concept of developing an agricultural conveyor system to reduce the breakdown of the traditional conveyor system, this is an innovation that will affect future conveyor systems, Reduce material friction has problems when conveying material residue on the rail after running machine. Fragmentation is due to material abrasion during transportation, high wear on the blade, as well as loading and unloading must be stopped.

Figure 1 depicts a structural design with a three-dimensional program designed in this study. Helix size, pitch, and tilt angle are important parameters for handling efficiency. It is important for predicting the optimum condition based on data theory in computation and design. We continued to manufacture screw conveyors with a loading length of 2 m, having pitch with 5-inch screw blade and 1-inch shaft. Figure 2 is a structural design with a three-dimensional program designed by researchers as a stage of developing the tools being developed.

From this study, the barrel and screw feeder design are interrelated, assuming that when controlling the mass flow in the inundated feeder from an adequately designed screw feeder, the hard material will have a stress-like action and appropriate limits. Material flows into the openings and perforated areas in the screw blades. It is ready to construct pipes supported by the frame using 2-m angle steel and the rotating pipe inside the flood feeder of the adequately designed screw feeder. Hard materials will have a pressure-like motion and have appropriate boundaries as the material flows through the openings (Exposed Sound) and perforated areas in the screw blades. The hoper design that facilitates the development process is shown in Fig. 3, which depicts a 2-inch screw blade connected to a 1-inch shaft.

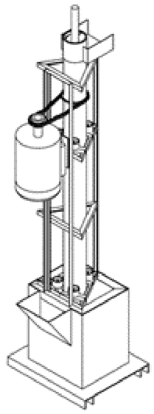

Fig. 1. Structural design with a three-dimensional program.

Fig. 2. The 5-inch screw blade is connected to the 1 inch shaft.

Fig. 3. The 2-inch screw blades connected to the 1-inch shaft.

The experimental set of corn kernels with 90-degree rotating pipes is divided into 90°. Vertical rotation performance of tubular corn kernels requires a motor to operate. The motor is 1.5 HP and 220 V with a maximum speed of 1450 rpm. The size of the motor is determined by its performance. The drive is chosen as the drive for the 40 sprocket to be smaller than the drive used to rotate the tube for low rpm. Inside the conveying pipe consists of a spiral blade that is tilted 30° inside the pipe and carries the bottom of the pipe, fixed with a 6 mm nut to the pitchfork, packed with a pitch of 30° to the conveying pipe. This pipe is placed in the tank (sizes of 42 × 36 × 50 mm), having a protruding hole for the second cycle. The result is conveying efficiency that is more or less dependent on the conveyor speed. The experiments used are 15, 25, and 35 rpm rotations, calculated from the 1450 rpm motor standard speed. This data is to get the right standards and tested performance at different speeds. If the speed is too slow, transports may be blocked. In other words, if the size of the bale I conveying material is wasted, the shaft rotation speed (rpm) decreases, and the bearing capacity decreases at a height of 2 m. Cycles are too fast and haul is reduced. This is due to the high speed use of the sweeper blade to sweep back and sweep instead of getting the right standards and performance tested at different speeds. If the speed is too slow, as a result transport cannot be carried out. Stages in the green bean transport test as shown in Fig. 4. The cycle is used too fast, the transport is reduced due to the high speed use of the sweeper knife to sweep back and sweep instead. This is in line with the system in the milling process [5].

Fig. 4. Mung bean transport test.

Table 1 shows that the loading efficiency of corn kernels at the specified speed and time found that the speed with good loading efficiency and the tendency of a large loading capacity is 25 rpm. The timer at 3 min is 2.10 kg, 6 min has 3.90 kg, 9 min has 5.80 kg, and 12 min can carry 9.10 kg. Determination of the efficiency of rice grain can transport at 15, 25, and 35 rpm.

Table 2 is the efficiency of rice seed transport at the specified speed and time. The rotating speed with OK loading and unloading efficiency increases. The speed is at 24 rpm. Starting from 3 min, it is going to 4.10 kg, 6 min to 10.40 kg, 9 min to 15.00 kg, and in 12 min to carry 17.30 kg.

Table 1. Maize delivery efficiency.

Time (min)	**Speed (rpm)**		
	15	**25**	**35**
3	2.30 (kg)	4.10 (kg)	2.40 (kg)
6	4.80 (kg)	10.40 (kg)	5.50 (kg)
9	6.10 (kg)	15.00 (kg)	6.70 (kg)
12	8.10 (kg)	17.30 (kg)	10.00 (kg)

Table 2. Efficiency of rice transportation.

Time (min)	**Speed (rpm)**		
	15	**25**	**35**
3	1.30 (kg)	3.10 (kg)	2.00 (kg)
6	5.10 (kg)	6.50 (kg)	4.40 (kg)
9	6.80 (kg)	10.40 (kg)	7.70 (kg)
12	11.40 (kg)	16.10 (kg)	10.20 (kg)

Table 3 determines the efficiency of rice grain transport at speeds of 15, 25, and 35 rpm. The speed is at 24 rpm, starting from the 3rd min it can be 3.10 kg, 6 min can be 6.05 kg, 9 min can be 10.4 kg, and in 12 min it can carry 16.10 kg. The results of the experiment were to determine the flux efficiency in 1 min intervals. The result of the experiment is to find the flow of each material in 1 min at different rotational speeds to see that the flow of each material has different efficiencies for the transport of corn kernels in 1 min, a speed of 25 rpm. The flow of corn kernels has a fast flow with the blade sweeping the grain. No corn kernels were damaged due to the transportation process. Compressed corn kernels are transported at the same 25 rpm, but it has different volumes. Figure 5 shows how the final result of the product testing, in which the corn kernels have been removed.

Table 3. Determine the efficiency of transporting mung beans.

Time (min)	Speed (rpm)		
	15	25	35
3	0.50 (kg)	2.10 (kg)	1.40 (kg)
6	1.20 (kg)	3.90 (kg)	3.50 (kg)
9	2.00 (kg)	5.80 (kg)	4.70 (kg)
12	9.10 (kg)	9.10 (kg)	5.00 (kg)

Fig. 5. Condition of the removed corn kernels.

The vertical rotary tubular corn conveyor is a 2 m long conveying tube, and the stationary shaft uses two horsepower motors, an inverter and a 1:20 reduction gearbox. The transmission moves the pipe to turn to carry the corn. There is a corn hopper measuring 42 × 36 × 50 mm with a protruding hole to hold the corn kernels. The principle of operation is that the inverter system controls the rotation of the motor to move the conveying tubes to rotate. The conveyor pipe rotates attached to the pitchfork at an inclination of 30 degrees to the pipe. The conveyor pipe rotates the conveyor pipe and is attached to the pitchfork at a distance of 30 degrees to the pipe. To test the performance of the vertical rotary pipe corn conveyor. The test time is divided into four periods: 3, 6, 9, and 12 min. It has a fast flow rate wherein the sweeper can sweep the corn continuously [4].

The efficiency of handling corn kernels at the specified speed and time is efficient rotation speed, good handling, and the possible loading quantity of speed at 25 rpm, can carry 9.1 kg in 12 min. It tested two other crops, rice and mung beans. Transport efficiency at the same rotation speed and time found that rice transport was better at 25 rpm, average transport was 17.3 kg in 12 min and was followed by green beans with the appropriate transport. Rotation speed with good handling efficiency and loading and unloading amount is increasing. With a speed of 25 rpm, it can carry 16.1 kg in 12 min. It can be concluded that the weight of the object affects the conveying of the vertical rotary pipe conveyor, if it has a light and slippery surface.

The damage to the crop is to build a vertical tubular corn conveyor 90 degrees, the speed of transporting the corn kernels at a height of 2 meters; The stationary shaft uses a two-horsepower motor, an inverter and a 1:20 reduction gear to transmit power to drive the pipes. For rotating to transporting corn, there is a 42×36×50 mm corn bin with protruding holes to support the corn kernels loading cycle. Corn kernels can be transported at a speed of 25 rpm, but due to the heavy surface and viscosity the 30-degree screw blade conveying is not good enough for a 90-degree vertical pipe conveyor which requires a pitching push to carry the rice and mung beans. This 90-degree vertical rotary tube conveyor is compatible with 30-degree tilt screw blade. This is also meeting the standard for the mechanical properties of materials [6].

For the preparation of corn kernels with a 90-degree pipe, the following results are obtained: From the corn grain conveyor working system with a 90-degree vertical pipe rotation to make the pipe rotate, a motor is needed to move it. The motor to be used is two horsepower (220 V) with a maximum speed of 1450 rpm. The drive chosen was a 40-tooth sprocket drive, so the organizer saw that the 90-degree vertical pipe carrying corn was practical. It can transport corn kernels with a height of 2 m at a speed of 25 rpm and is useful for transporting small and light seeds such as rice, green beans, to compare efficiency. Light material handling has slippery surface which can carry better [7]. Other than that, less residual waste in pipes that can be developed or used in the small agricultural industry, due to their compact size and low budget [8, 9]. It is consistent testing reported in this study, was conducted to determine the effect of these parameters which are believed to significantly affect the throughput capacity of the horizontal screw conveyor and power requirements when handling rice grains [10, 11].

4. Conclusion

This study focuses on experiments for the work of the rotary tubular corn conveyor and the efficiency of the agricultural rotary cropper. Calculation and design were used in designing 0 degree vertical tubular corn grain conveyor, screw loading and unloading based on efficient design, and making conveyor screws; there was a limit. The study resulted from the calculation and design of 90 vertical rotary tubular corn grain conveyors, the machine was tested using the efficiency calculation formula. Efficient and efficient turning speed at specified speed and time for good handling, and speed loading quantity. Rotation speed with good handling efficiency and loading and unloading amount is increasing.

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