

Deign of Belt Conveyor for Finishing House Pulper

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Abstract— The main objectives of our project “Design of Belt Conveyor for Finishing House Pulper” is to reduce the human effects and labour cost. Tamil Nadu Newsprint and Papers Limited is one of the most leading paper production company India. The target of this company is to produce 900 tons of paper per day. This target is quite difficult to achieve every day because of some delays in some processes. Among those processes, the process of repulping the damaged papers is an important one. The delay in this process is due to the manual paper feeding into the finishing house pulper. So, we have planned to reduce the human effects and processing time by designing a belt conveyor for feeding the damaged papers into the pulper.

Key words: Belt Conveyor, Finishing House Pulper

I. INTRODUCTION

The Tamil Nadu Newsprint and Papers Limited (TNPL) was established by the Government of Tamil Nadu to produce newsprint and writing paper using bagasse, a sugarcane residue. The Government of Tamil Nadu listed the paper mill in April 1979 as one of the most environmentally complaint paper mills in the world under the provisions of the Companies Act of 1956. The factory is situated at Kagithapuram 11.0488°N 77.997°E in the Karur District of Tamil Nadu. The registered office of the company is located in Guindy, Chennai.

II. GROWTH OF CONVEYOR SYSTEM

As far growth is concerned the material handling and conveyor system makers are getting utmost exposure in the industries like automotive, pharmaceutical, packaging and different production plants. The portable conveyors are likewise growing fat in the construction sector and by the year 2014 the purchase rate for conveyor systems in North America, Europe and Asia is likely to grow even further. The increasing construction of malls and airports around world shows positive scope and growth for manufacturers of conveyor belts. As far growth is concerned the material handling and conveyor system makers are getting utmost exposure in the industries like automotive, pharmaceutical, packaging and different production plants. The portable conveyors are likewise growing fat in the construction sector and by the year 2014 the purchase rate for conveyor systems in North America, Europe and Asia is likely to grow even further. The increasing construction of malls and airports around world shows positive scope and growth for manufacturers of conveyor belts.

III. BELT CONVEYOR SYSTEMS

Conveyors are durable and reliable components used in automated distribution and warehousing. In combination with computer controlled pallet handling equipment this allow for more efficient retail, wholesale, and manufacturing

distribution. It is considered a labor saving system that allows large volumes to move rapidly through a process, allowing companies to ship or receive higher volumes with smaller storage space and with less labour expense.

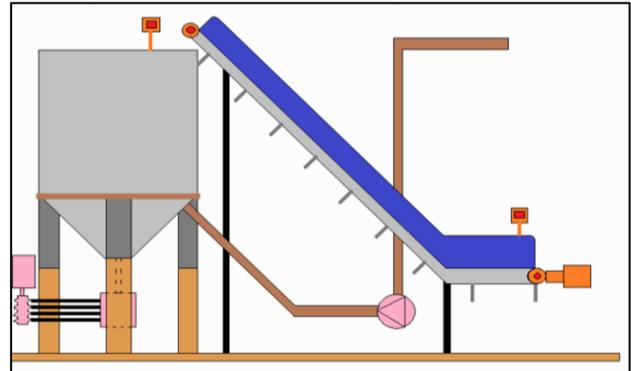


Fig. 1:

Belt conveyors are the most commonly used powered conveyors because they are the most versatile and the least expensive. Product is conveyed directly on the belt so both regular and irregular shaped objects, large or small, light and heavy, can be transported successfully. These conveyors should use only the highest quality premium belting products, which reduces belt stretch and results in less maintenance for tension adjustments.

IV. SENSORS

A. Proximity Sensor

- Proximity sensor is a sensor, which is able to detect the nearby object without any direct contact.
- The object which is to be sensed is often considered as the target.
- Proximity sensors are also used in mobile phones, machine vibration monitoring etc.



Fig. 2:

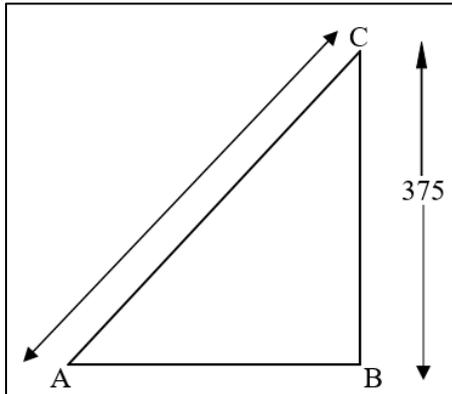
V. CALCULATIONS

A. Height Calculations

Load =1.5 tones
 Height of the pulper
 = 375 cm=3.75m Width of the belt
 =1000mm =1 m

B. Centre Distance (C)

From the Data book, the maximum angle of efficiency for slat belt conveyor is $\theta=30^\circ$ Let us assume, $\theta=27^\circ$ for good efficiency.



From the triangle ABC,

$$\sin \theta = \frac{BC}{AC}$$

Here, $\theta=27^\circ$, $BC=375\text{cm}=3.75\text{m}$

$$\sin 27^\circ = \frac{3.75}{AC}$$

$$AC = \frac{3.75}{\sin 27^\circ}$$

$$AC = 8.26\text{m}$$

Thus, the centre distance between the pulleys are $AC = 8.26\text{m}$.

C. Drive Selection

Let us assume the power of the motor drive used as $P=20\text{kW}$ and thus the speed of the motor will be $N=1440\text{rpm}$.

We know that,

$$P = \frac{2\pi NT}{60}$$

$$20 \times 10^3 = \frac{2 \times \pi \times 1440 \times T}{60}$$

$$T = \frac{20 \times 10^3 \times 60}{2 \times \pi \times 1440}$$

$$T = 132.629 \text{ N-m}$$

Thus, the torque produced by the selected drive will be

$$T = 132629 \text{ N-mm.}$$

We know that,

$$1 \text{ kW} = 1.34 \text{ hp}$$

$$20 \text{ kW} = 20 \times 1.34$$

$$= 26.8 \text{ hp}$$

Therefore, the drive should be 26.8 hp belt dimensions.

VI. ADVANTAGES

- Less maintenance
- It reduce labour cost
- Time consumption is less
- Power consumption is less
- The conveyor can have changes in elevation
- Belts can be loaded virtually any place along the belt The belt can have "trippers" to unload the belt almost any place
- Weigh belt sections can be added for continuous product weighting
- Including belt can have cleats added to the belt to stop product roll back

CONCLUSION

- [1] Our project "Design of Belt Conveyor for Finishing House Pulper" is very helpful for carrying the paper to the pulper machine. Today conveyor systems are widely used for load transmitting process.
- [2] Thus our project reduces and saving the time, labour cost and manpower. Thus conveyor helps to transfer the load in inclined direction to move material for long distances. Our project design of belt conveyor for finishing house pulper was analyzed and tested by the plant engineering of TNPL and it will be implemented in the upcoming years.