

Design and Analysis of Slot Chain Conveyor

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ABSTRACT: A conveyor system is a common piece of material handling equipment that moves materials from one location to another. Conveyors are especially useful in applications involving the transportation of heavy or bulky materials. Conveyor systems allow Quick and efficient transportation for a wide variety of materials, which make them very popular in the material Handling and packaging industries. Bagasse is the fibrous matter that remains after sugarcane are crushed to extract their Juice. It is currently used as a bio-fuel and in the manufacture of pulp and building materials.

1. INTRODUCTION

Modern civilization requires handling of bulk materials in huge quantity. Our present civilization aims at producing innumerable items .For utility and comfort of human race. All these items are produced from raw material from our unique planet with appropriate /Modification. To cite some examples, we need huge quantity of cement, which is made from mine materials. We need steel to make simple kitchen. Knife to steamers, which requires movement of huge quantity of iron ore at national as well as global levels. Every man needs electric Power at his disposal, which demands generation of electric power on mega scale. Hence requirement for movement of huge quantity of coal, from mine to thermal power station. The above examples need installation of special bulk material handling system at source of raw materials, and also at process (consumption) unit. The raw materials being mined has to be temporarily stored in gigantic piles, to be retrieved on need and to be loaded in to railway – wagons / trucks. When such material arrived at cement /steel /power plant, some are to be unloaded stored, retrieved and finally to be consumed for making end product. Again, if the end product is a new bulk material, it will be further Handling for storage, reclamation and onward transport the bulk material handling system consists of numerous equipment's which work in co-ordinated pre planned manner to achieve Functional need. The slot conveyors are very preeminent and important equipment in such system, to ensure flow of material through various parts of the system.

II. THE SLOT CONVEYOR

Conveyor system is a mechanical system used in moving materials from one place to another and finds application in most processing and manufacturing industries such as: chemical, mechanical, automotive, mineral, pharmaceutical, electronics etc. There are various Types of conveyor systems available such as gravity roller conveyor, belt conveyor, slot conveyor, bucket conveyor, flexible conveyor, belt driven live roller conveyor, chain conveyor etc. The choice however depends on the volume to be transported, speed of Transportation, size and weight of materials to be transported, height or distance of transportation, nature of material, method of Production employed. Material handling equipment ranges from those that are operated manually to semi- automatic systems and to the Ones with high degree of automation. The degree of automation however depends on handling requirements material handling involves movement of material in a manufacturing section. It includes loading, moving and unloading of materials

From one stage of manufacturing process to another .A slot conveyor has the open links of chain drag material along the bottom of hard faced MS (mild steel) or SS (stainless steel) trough. The trough is fixed and slots are movable. The slots are the mechanical components that fixed between two strands of chain which drags the material from feeding end to the discharge end. These slots are available in different widths and lengths as per the site Requirements.

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A small gap is made purposely between slots and trough. The slot conveyors are designed for horizontal and inclined Transport of sawdust, chips, bagasse and other bulk goods. Slot conveyors are the traditional and most common means for distributing Bagasse to boilers.

2.1. Input parameters required for development of slot conveyor

While designing a slot conveyor only four

input parameters will be given by customer which are as follows-

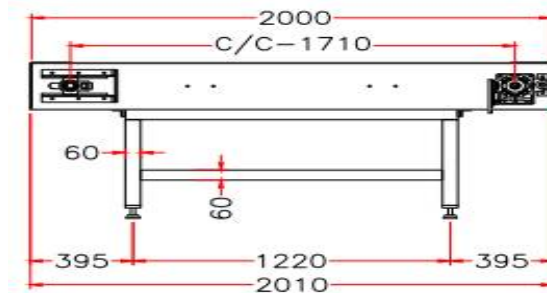
Guaranteed capacity = 33mtph Conveyor Length = 2.01 m Conveyor lift = 1.95 m

Material to be handled = Bagasse

(Density= 150Kg/m³)

Conveyor inclination = 310

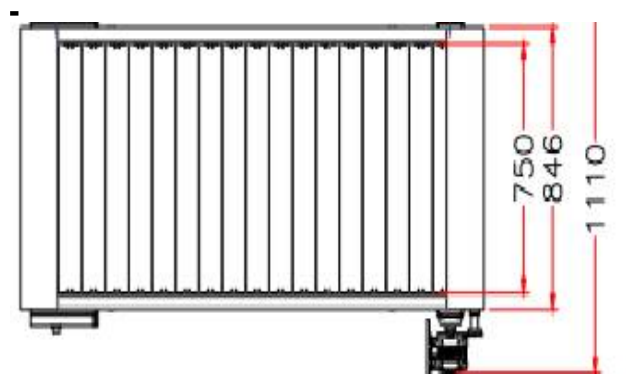
III. DESIGN OF SLOT CONVEYOR



In slot conveyor number of components are used like slot, trough, chain, chain resting part, roller pin, Sprocket, drive shaft, tail shaft, Gear box, motor, etc. We have to design some of these components while using these components in system.

3.1. Slot Design

The two main requirements in the design of the conveyor are the ability to convey all the bagasse from the final mill and sufficient We must fix Speed of conveyor, the width of flights, The spacing of flights and having from previous experience we fixed the



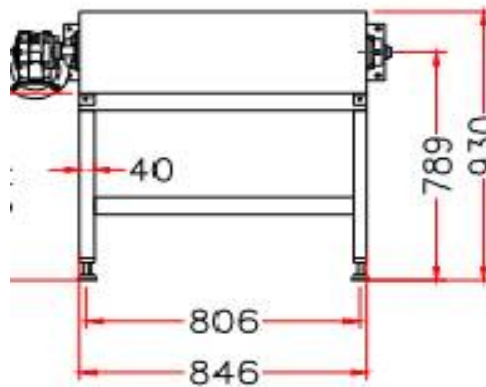
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Individual fire openings; also their limit of elevation appears to be between 300 and 350 .These limitations can, no doubt, be quite Easily overcome



Material properties

Material Properties	Value	Unit
Density	1180	Kg/m ³
Young's modulus	1999.5	Mpa
Poisson's ratio	0.39	
Bulk modulus	3.0295×10^9	Pa
Shear stress	7.0924×10^8	Pa
Tensile yield strength	527	Mpa
Compressive yield strength	527	mpa
Tensile ultimate strength	604	Mpa
Compressive ultimate strength	<u>0</u>	<u>Mpa</u>

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IV. CONCLUSION

We wish to state that in our opinion the above method of conveying and storing the bagasse is by no means the ideal one ; the storage Shed and the slot conveyor used overseas is considered far superior. Belt conveyors and slot conveyors as used in some mills appear to Be an effortless means of conveying bagasse but there are limitations to these as regards a satisfactory method of feeding to the

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