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Review Design Analysis and Optimization of Screw Conveyor for Asphalt Application: A Review

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ABSTRACT-
Screw conveyors are extensively used in a industry for transporting and materials along with distances. We are improving the capacity of screw conveyor by including the initial and actual design.(9TPH to 7.8TPH) They are very imperial transporting instrument for dry particulate solids, giving good output. design have tended to heavily on experiential performance data. In screw conveyor all over performance is dependent on the operating conditions the screw speed is in rotational, inclination of the screw conveyor; and the volumetric fill level of the bulk material. In that review paper we improve the capacity of screw conveyor by using computational fluid dynamics analysis (CFDA) also improve the tensional strength of screw shaft. We are reducing the overweight of conveyor from 52kg/set to 40-45 kg/set.The predictions of screw conveyor performance in terms of variations of particle speeds, energy dissipation, mass flow rate and power consumption, due to changes in the operating conditions. While the shape of the feed opening is not critical when dealing with free-flowing materials it has a very strong effect on performance when fibrous materials are being fed into the screw. The conveyor is powered by an electric motor by using a V belt connection.
Keywords- Screw conveyors; Vortex motion; Friction, screw blade.

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I. INTRODUCTION

The fixture is a special tool for holding a work piece in proper position during manufacturing operation.(Shrikant.V.Peshatwar 2013)[1] In industry screw conveyors are used extensively for conveying and elevating bulk materials over relatively short distances or long distance. It very effective instrument for conveying the bulky materials. (A.W Roberts)[6]. The use of reclaimed asphalt pavement in asphalt mixtures is considered as one of the best sustainable practices in the construction of transportation infrastructures. Extensive efforts have been made to design, produce, and evaluate RAP mixtures produced by the hot recycling technology in asphalt plants. (EAPA ,2018) [7] A screw conveyor consists of a circular or U-shaped tube which a helix rotates Agricultural materials may be granular, powder, fibrous, or a combination of these.(Ahmad S., J. R. Shapour, F. M.)[19]

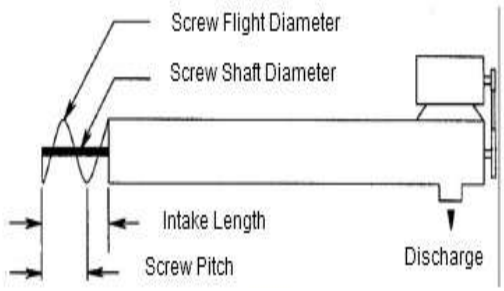

Fig:1 Schematic diagram of screw conveyor.[8]

It is used in many industrial application materials as like minerals, agriculture, pigments, asphalt, sand, cement, and food processing (M.I.Zhuravlev,2016) [8]

1. Asphalt :

Asphalt is defined as bitumen. It is made of a sticky, black, and highly viscous liquid or semi-solid form of petroleum. Asphalt source is found in natural deposits or may be a refined product. Asphalt is a primary application in road construction.70% asphalt are used to road construction. For create the asphalt concrete glue or binder mixed with aggregate particles are used.

Fig:2 Asphalt material.[9]

Asphalt properties are change with there temperature, which means that there is a specific range where viscosity permits adequate compaction by providing lubrication between particles during the compaction process. Low temperature prevents aggregate particles from moving, and the required density is not possible to achieve.[9]

II. LITERATURE REVIEW:

The screw augers performance at five levels of screw speeds, namely, 150, 200, 300, 450 and 600 rpm; and five levels of conveying angle of 0, 21.5, 39.25, 54.75, 69.5 and 84.75 degree. They reported that an increase in screw speed results in an increase in the conveyor required power. Increasing the angle of inclination caused the power to increase initially, but a decrease followed beyond a certain angle. They suggested that this trend could be due to the decline in the volumetric efficiency. They indicated that the conveying capacity decreases as the angle of inclination increases. They showed that there is a limiting value of speed beyond which the capacity does not increase. The limiting value of speed was independent of the angle of inclination. They suggested that there may be two factors responsible for this behavior(M. L. Gupta)[10] The capacity at 90° angle was about 30 % of the horizontal capacity. They suggested that this may be due to the restriction to grain flow into the intake of the conveyor at higher speeds and the fact that grain flows from a vertical orifice at one-third the rate from a comparable horizontal orifice. (A.W. Roberts(1999)[3]. Stevens tested The performance of several auger conveyors. He indicated that less than 50 % of the power was used in moving grain along the tube. Some of the extra power required must be consumed at the intake hopper, where considerable circulation of grain was observed. (G. N. Stevens) [11]

III. DESIGN OF SCREW CONVEYOR:

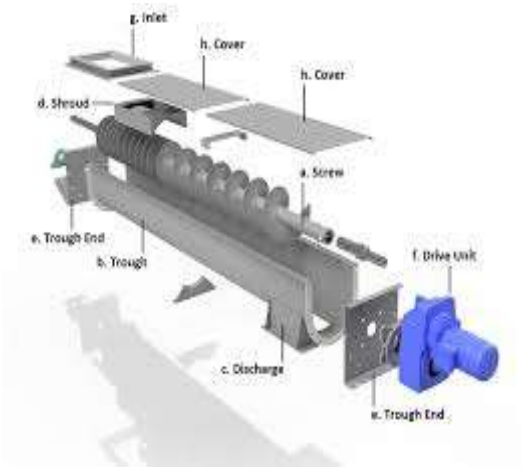

Fig:3 Design of screw conveyor

3.1 Bulk Material Characteristics**:**

Irregular,stringy,andinterlocking materials thatmatorcling along need special thought.
Materials are may be those who pack harassed. If the material will pack harassed, it's affected on conveyor screw and seriously damages the conveyor. All materials with these characteristics should be rigorously studied thoroug hly with relevancy their actions in an exceedingly screw conveyor. expertise with screw conveyors shows that the free flowing material needs less power unit to move it. The converse is also true. as a result of flow ability isn't simply reduced to numerical terms, in some instances twin expertise has been the guide in codifying the flow ability of the materials. (Bhandari V B)(1994)[20]

3.2.Selection of Conveyor Size and Speed:

In order to determine the size and speed of a screw conveyor, it is necessary that to first establish the code number of material. It will be seen from what follows that this code number controls the cross sectional loading that should be used. The usual screw conveying operation is controlled with help of volumetric feeders and the material are uniformly fed into the conveyor housing and discharged from it.

3.3.Conveyor Speed:

For the calculation of conveyor speeds wherever thespecial sortsof screws ar used, l ike cut flights ,short pitch screws, cut and ribbon flightsand rolled flights, identical needed capability would beused, supported factors.Theequivalent cap ability isfoundbymultiplying thespecified capability by one or additional of the capability factors that are concerned. Ac ustomary pitch screw conveyor is transport thirty six,000 lbs material per hour per cube like feet during a half-hour a kind of

cross sectional loading. an extra demand is that the conveyor is to combine the fabric in transit by means that of a cut flighty with one 45° reverse pitch-mixing paddle per pitch, for a commixture time of forty seconds minimum. (E. Ebrahim. 2014,1993)[19]

3.4.Lump Size Limitations:

The size of a conveyor is depends on the capacity required in it and also the size and proportion of lumps in the material to be handled. The sizes of a lump is the maximum dimension. it has a closer definition of the lump size would be the diameter of a ring which the lump would pass, However, if a lump has one dimension much longer than its transverse cross-section, in that the long dimension or length would determine the lump size. (Gupta S C ,2003)[21]

3.5.Bearing Recommendation:

Selection of bearing material for an intermediate hanger is based on experience together with a consideration of the characteristics of the material to be conveyed normally; the bearing selection will be made from one of the following four bearing types bearing. Lubricated babbitted bearings are very frequently used, but have a maximum operating temperature of 130°f. lubricated bronze bearings may be operated temperature up to 225°f. in addition to these self lubricated bearings, ball bearings, hard iron bearings are used. (Bhandari V B ,1994)[20]

Fig.4. Ball bearing

IV. CONCLUSION/DISCUSSION:

The design of screw conveyors requires a detailed consideration of the geometry of the screw and the properties of the bulk material. Whereas in the performance of screw conveyors has been based on actual design and rated design using similarly to predict the performance of screws, the by considering the screw diameter ,helix angle, pitch, Computational Fluid Dynamics(CFD) The leading idea was to improve the mixing quality and homogeneity of the mixture before entering the principal mixer, by welding the additional helical strips The blending procedure relies upon the geometry of the screw helix and the length of the particle's path. By structural static analysis we can improving the tensional strength of screw shaft by considering the design and material. And reducing the conveyor overweight which are (52kg/set) to 40-45kg/set by considering the saddle support it is designed by calculating the shape, size, moc. By inserting additional elements, particle transport time remains relatively consistent, however, the particle velocity is significantly augmented, and the probability of mixing is also enhanced, with regard to distance travelled is much
longer.

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