Spherical Object Conveyor

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Abstract— In industries, it is very necessary to move the components from one area to the other in a regular basis making it desirable to minimize the workers involved in it. In this work we have designed a conveyor which can be used in industries for the transmission of spherical objects. It is very necessary to send spherical and cylindrical material or objects from one place to another in an industry in a convenient manner and hence a need to find a way to transmit the materials and hence in this work we have made a conveyor model which is used for the material transformation from one end to another. The main objective of this project is to study and design the spherical object conveyor. With the help of slider crank mechanism.

Key words: Conveyor, Spherical Object Conveyor

I. INTRODUCTION

A conveyor for a relatively large number of fixed path mechanized equipment to move the material between a specific positions. (Dr Red) delivery system, because they are generally used to provide a number of advantages in many industries. Conveyor safely from one level to another, and when people work completed will be difficult and expensive to transport material. They can be installed almost anywhere and is more secure than using a forklift or other machinery to move materials. They can move a load of various shapes, sizes and weights. In addition, many have advanced security features to help prevent accidents. It can be used to run a variety of delivery systems, including hydraulic, mechanical and fully automated system, which is equipped to meet the needs of the individual options.

Delivery systems in many industries, including automotive, agriculture, computers, electronics, processing, aerospace, pharmaceutical, chemical, bottling and canning, finishing and packaging commonly used. Although a variety of materials can be transported, including some of the most common foods, such as beans and nuts, bottles, cans, car parts, scrap metal, pills and powders, wood and furniture, as well as cereals and animal feed. Many factors are in a conveyor system accurately selected important. We use the slider-crank mechanism for this item.

II. CONSTRUCTION

First, according to the design and manufacture of the frame requirements, as shown in Figure. Help after manufacturing and steel frame. After connecting the crank with the help of a given size of bolts under the framework. Once the crank is fixed to the frame we have a crankshaft connected to the bolt and bolt with the help of a crank. We fixed the crank shaft and the crank to the frame such that both can freely rotate relative to the frame mode. Because we want the same rotational speed of each crank, which is necessary. Then we link connected to the bolt with the help of the crank shaft. This connection can be seen in more detail in the assembly drawings. It should be noted that the length of the connecting rods should continue to increase from block 1-6. Then we fixed crank shaft and connecting rod block on the second hole provided at one end.

In order to avoid the slippage of the object in the sideways lastly weld the two sheets steel to the frame as shown in fig.

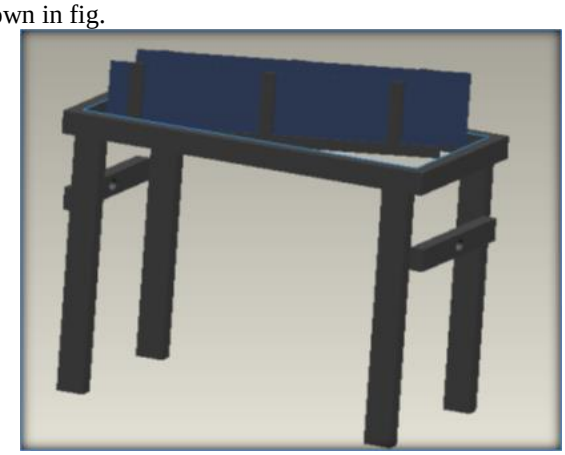

Fig. 1: Frame

III. DESIGN

A. *Crank shaft [5]*

Tensile strength- 700N/mm² (material-Steel)
Yield strength- 350 N/mm² (material-Steel)
T= (π/16) x d^3x ɽ
N = 30rpm
Firstly find out the torque apply on shaft
Consider the manual force applied on handle is 5kg
We know that,
F = m x g
=5×9.81
= 49.05N
The length of handle is 200
So,
T = F x r
= 49.05 x 200
= 11772 N-mm
= 11.772 N-m
Where,
F=force in N
T = torque in N-m
r=radius in mm
d= diameter in mm

B. *Power*

P = (2πNT)/60
P = (2×3.14×30×11.77)/60
P = 36.98 W
= 37 W
Now we know that
Shear stress ɽ = ultimate strength/ factor of safety.
We assumed,
FOS=4.
ɽ =700 /4
=175N/mm²

T = (π/16)x d^3 x ɽ
= (π/16)x d^3 x 175
d = 6.99 mm
=7 mm
So we select diameter is 12 mm which is safe
Where,
P=power in Watt
ɽ= Shear stress in N/mm²
FOS=Factor of Safety

C. Crank and Connecting rod design [5]

We have to lift object to 150 mm height through 375 mm distance as shown in fig.

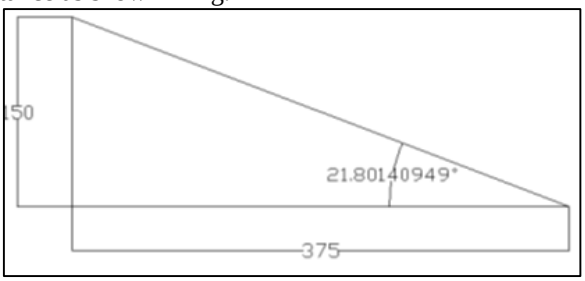

Fig. 2: Angle of lift

Angle of lift (α) = tan-1(150/375)
= 21.8014
No. of stages required (n) = 6 (assumed)
Total conveyor length (L) = $l\times(n/n-1)$
= 375 ×(6/ 6−1)
= 450mm
Length of block = Total length of conveyor / Length of each block
= L / b
= 450 / 6 = 75mm
Rise of each block =total height / (Number of blocks−1)
= h / (n−1)
= 150/(6−1)
s = 30
Crank radius = rise of each block
R = 30
Length of connecting rod
Connecting rod 1 x1 = 125 mm
Connecting rod 2 x2 = 30 + x1 = 155 mm
Connecting rod 3 x3 = 30 + x2 = 185 mm
Connecting rod 4 x4 = 30 + x3 = 215 mm
Connecting rod 5 x5 = 30 + x4 = 245mm
Connecting rod 6 x6 = 30 + x5 = 275 mm

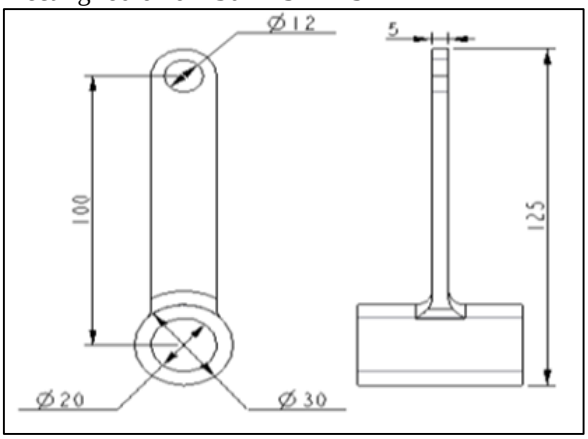

Fig. 3: Drawing of connecting link 1

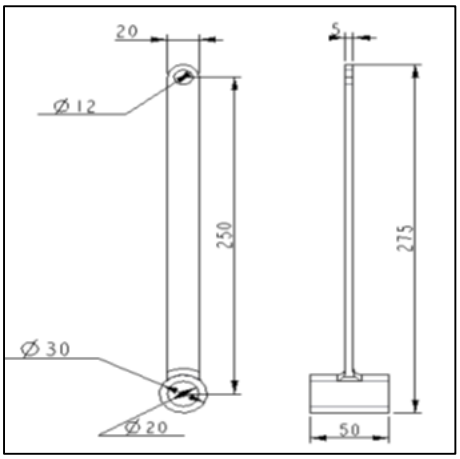

Fig. 4: 2D drawing of connecting link 6

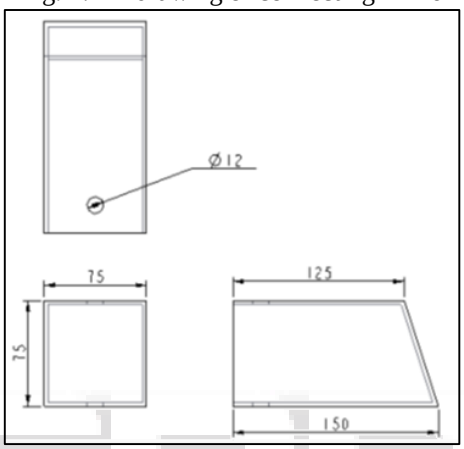

Fig. 5: 2D drawing of Block

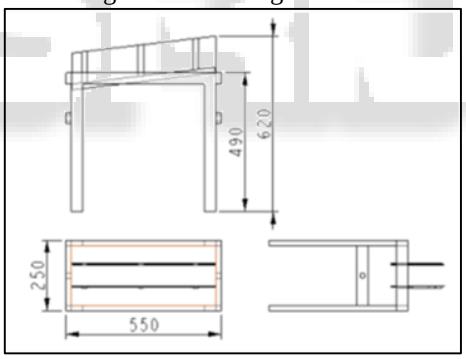

Fig. 6: 2D drawing of frame

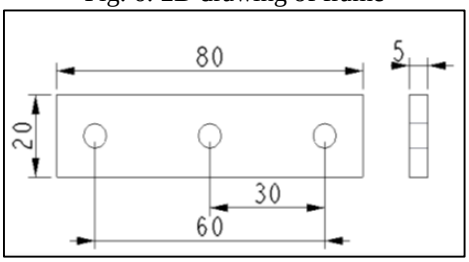

Fig. 7: 2D drawing of crank

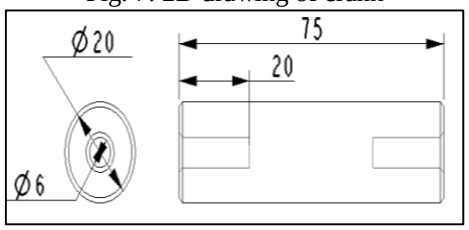

Fig. 8: 2D drawing of Crank Pin

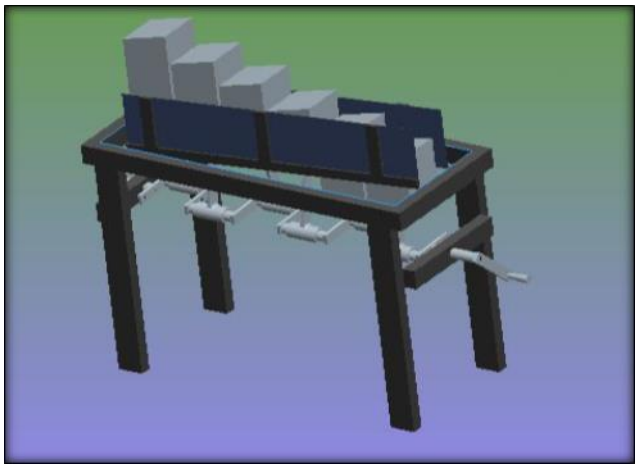

Fig. 9: Assembly drawing

IV. WORKING

When all the blocks in the BDC crankshaft is at the lowest position. When the crank clockwise rotation of the first two blocks of each other together with the objects shown in Figure 2, a block from the first to the second slide in such a manner.

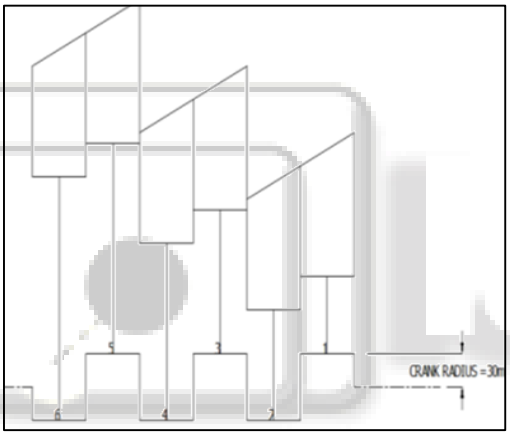

Fig. 10: Assembly of Crankshaft, Connecting rod and Block

In the top of the taper block is given exactly the opposite, through which the object has been lifted, because whenever two blocks meet each other, subject to the subsequent block having a downward slide angle. When the second block further rotation of the crank in the third block matching objects from the second to the third slide way. But the difference is, wherein the second and third blocks meet the high ratio point, wherein the first and second blocks meet the high altitude. Because the length of each block is connected to the connecting rod in order to prevent an increase in the height of the block 6 of the gain.

In the same way an object is transferred from the third to the fourth block, the fourth to the fifth and final from the fifth to sixth with each 30 mm high gain.

V. ADVANTAGES

- It is a continuous process.
- Simple design.
- This is the mode of operation.
- Requires less labor.
- Spherical object by providing a final position with a certain angle from the first position.

VI. DISADVANTAGES

- The initial cost is high.
- Wooden material required a good surface finish.
- Maximum usable in mass production industry.
- Only spherical object is transmitted.

VII. APPLICATIONS

- Usable for mass production industry.
- Usable for medicine industry.
- Usable for ball industry.

VIII. CONCLUSION

Although the design and manufacture of spherical object conveying full realization of the basic goal has been fully convey the spherical object. The basic function of the conveyor spherical object is to reduce the cycle time.

IX. FUTURE SCOPE

We have built a prototype of a spherical object conveyor. The material can be transferred to the desired height using the hand crank. But it also can be atomized using an electric motor.

REFERENCES

[1] Imran.S. Khan, prof. Ravindra Gandhe."Study and Analysis of roller conveyor in material handling"International Journal of Emerging Technology and Advanced Engineering (Volume 5, Issue 5, May 2015)
[2] David R. Loker. "Conveyor Control System Project", Pennsylvania State University, Erie. American Society For Engineering Education.2011.
[3] Ghazi Abu Taher, YousufHowlader, Md. Asheke Rabbi, Fahim Ahmed Touqir
[4] Mayur M. Wable, Vijay K. Kurkute. "Design And Analysis Of Screw Conveyor At Inlet Of Ash/Dust Conditioner"
[5] V.B. Bhandari, Design of Machine Elements, R.S. Khurmi, Strength of Materials, S. Chand & Company Ltd. New Delhi.
[6] R.S. Khurmi, Design of Machine Elements, S. Chand & Company Ltd. New Delhi.
[7] V.D. Kodgire, Material Science and Metallurgy, Everest Publishing House.

