EXPERIMENTAL STUDY AND DESIGN OF FLAT BELT CONVEYER SYSTEM WITH DIFFERENT R.P.M.

Vishnu Datta Tiwari [1]✉, Prof. Gouraw Beohar [2]

[1] MTech Student (Machine Design), Shri Ram Institute of Technology, Jabalpur (M.P.), India
[2] Professor, Shri Ram Institute of Technology, Jabalpur (M.P.), India

ABSTRACT

In this work, we are studying during experiments with a flat belt conveyor system with different speeds such as 30, 60, 90, 120 and 150 R.P.M. In this study, it is also included that the observations of the different load capacities (Grams) at different outlet times (Hours). The design of the flat belt conveyor system is very important for the specific speed range of the material handling system from place to place, which depends on the effective length of the belt.

1. INTRODUCTION

The flat belt conveyor system is very useful for the material handling system because it has different speeds from the gear head D.C. motor, such as 30, 60, 90, 120 and 150 R.P.M. The transport system is also very important when two industrial units were built in different selective locations, so the material handling system is very necessary for the proper functioning of the plants.

2. LITERATURE REVIEW

Miroslav Bajda and Robert Krol, (2015) The means of transport commonly used in the Polish mining industry are belt conveyors, which have eliminated the cyclical transport previously used in most industries. The range of applications and differentiations resulting from the profile of the mining activity, requires the design and production of components of belt conveyors with the greatest care. Breaks or limitations in the mass flow carried, forced by individual elements of the belt conveyor, directly reduce the effectiveness of the entire technological system. Thus, already in the design phase of belt conveyors, optimization attempts are made, aimed primarily at reducing energy consumption.

Deepak Tarbada et.al, (2017) Handling involves moving materials from one location to another for the purpose of processing or storage. According to the American Material Handling society, 'Material Handling is an art and science of involving the movement, packaging and storage of subsystems in any form. Thus, the material handling function includes all types of vertical, horizontal movements or a combination of both and all types of fluid, semi-fluid and discrete and movement items required for packaging and storage. The material handling function is considered one of the most important activities of the production function in relation to the total time spent by the materials within the factory area.

3. RESEARCH METHODOLOGY

The resistance of the belt bearing on the pulleys results from the cyclic compression of the lower side cover plate by the transport pulleys. After leaving the roller, the belt returns to its original shape with the delay resulting from the loss of attenuation of the cover plate material. It causes the conversion of part of the kinetic energy of the belt bearing to thermal energy. Based on the analysis of research studies on the phenomena that occur on the belt during the operation of the conveyor, that is, dumping and friction in connection with the periodic deformation process of the belt.

4. PROPOSED METHODOLOGY

4.1 Reading the previous research paper
4.2 Finding the research gap in related papers
4.3 We are selected the experimental process
4.4 Data found from run of test rig
4.5 Found the optimum position during the operating of test rig.

5. EXPERIMENT PROCEDURES

The gear head motor, the power supply based on the step-down transformer, the cylindrical roller and the structure are used in the construction of the working model. In the flat belt system, it is very useful for the material handling system from place to place, because it has different types of motor speed, such as 30, 60, 90, 120 and 150 R.P.M. with different load capacity in grams at different working times such as 1 to 10 hours.

Table 1: Specification of components

Sr. No.	Components	Specification
1	Gear head Motor	12V.D.C., 10Kgf Torque
2	Power supply	12V.D.C., Transformer and Rectifier based with 5 Amp.
3	Roller	Cylindrical Type
4	Frame	Metallic Type

Table 2: Dimension of Angled metallic frame 25.4X 25.4 mm

Sl. No.	Name	Magnitude in mm
1	Length	760.24
2	Width	380.68
3	Height	520.87

Table 3: Dimension of Belt

Sl. No.	Name	Magnitude in mm
1	Effective Length	1002.34
2	Width	103.65
3	Thickness	1.02

Table 4: Dimension of Roller and Shaft

Sl. No.	Name	Magnitude in mm
1	Outer diameter of roller	75.33
2	Inner diameter of roller	5.88
3	Outer diameter of shaft	5.21

Table 5: Dimension of Inlet

Sl. No.	Name	Magnitude in mm
1	Outer diameter	68.85
2	Thickness	1.22

Table 6: Dimension of Outlet

Sl. No.	Name	Magnitude in mm
1	Outer diameter	115.35
2	Thickness	2.16
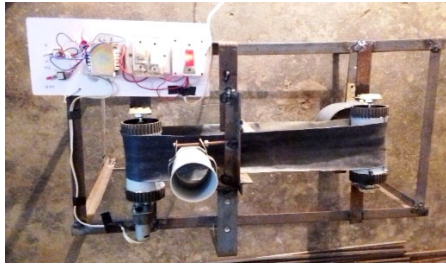
Figure 1: Experimental setup
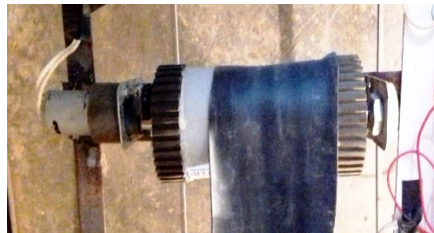
Figure 2: Inlet belt derive system

Figure 3: Outlet belt derive system

Figure 4: Control panel systems

Experimental Study and Design of Flat Belt Conveyer System with Different R.P.M.
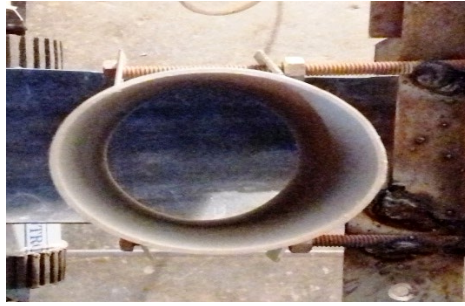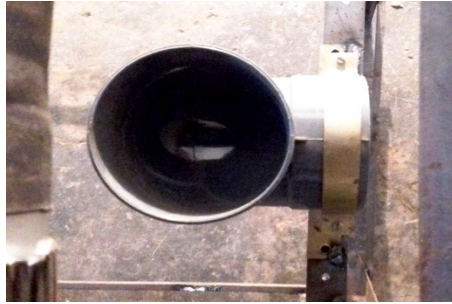

Figure 5: Inlet material feeding system

Figure 6: Outlet material delivery system

6. RESULTS AND DISCUSSION

Table 7: Gear head D.C. Motor with 30 R.P.M.

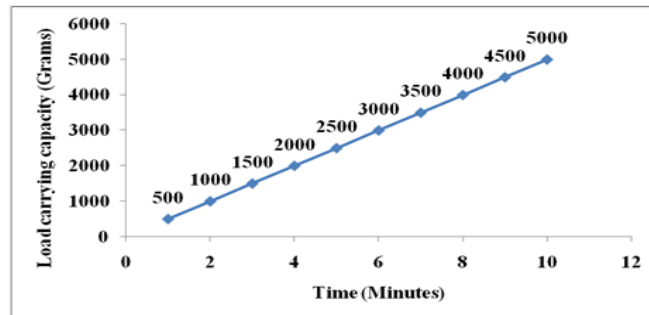| Observation No.	Time (Minutes)	Load carrying capacity (Grams)
1	1	500
2	2	1000
3	3	1500
4	4	2000
5	5	2500
6	6	3000
7	7	3500
8	8	4000
9	9	4500
10	10	5000

Figure 7: Gear head D.C. Motor with 30 R.P.M**.**

Table 8: Gear head D.C. Motor with 60 R.P.M.

Observation No.	Time (Minutes)	Load carrying capacity (Grams)
1	1	1000
2	2	1500

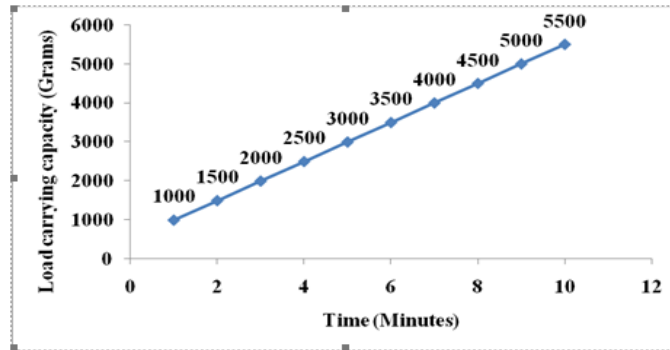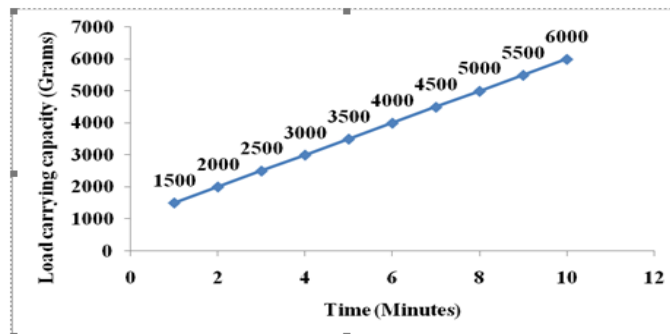|		
3	3	2000
4	4	2500
5	5	3000
6	6	3500
7	7	4000
8	8	4500
9	9	5000
10	10	5500

Figure 8: Gear head D.C. Motor with 60 R.P.M.

Table 9: Gear head D.C. Motor with 90 R.P.M.

Observation No.	Time (Minutes)	Load carrying capacity (Grams)
1	1	1500
2	2	2000
3	3	2500
4	4	3000
5	5	3500
6	6	4000
7	7	4500
8	8	5000
9	9	5500
10	10	6000

Figure 9: Gear head D.C. Motor with 90 R.P.M.

Table 10: Gear head D.C. Motor with 120 R.P.M.

Observation No.	Time (Minutes)	Load carrying capacity (Grams)
1	1	2000
2	2	2500
3	3	3000

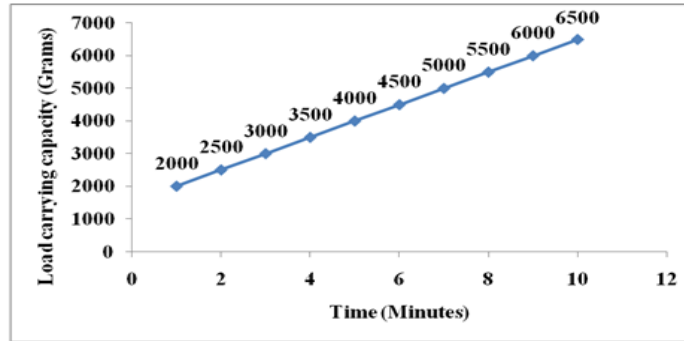| 4 | 4 | 3500 |
5	5	4000
6	6	4500
7	7	5000
8	8	5500
9	9	6000
10	10	6500

Figure 10: Gear head D.C. Motor with 120 R.P.M.

Table 11: Gear head D.C. Motor with 120 R.P.M.

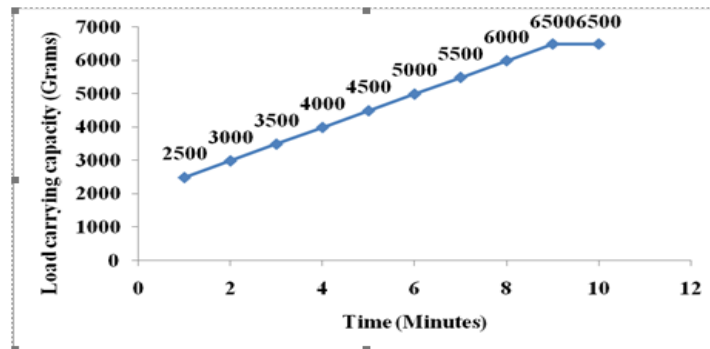| Observation No.	Time (Minutes)	Load carrying capacity (Grams)
1	1	2500
2	2	3000
3	3	3500
4	4	4000
5	5	4500
6	6	5000
7	7	5500
8	8	6000
9	9	6500
10	10	6500

Figure 11: Gear head D.C. Motor with 120 R.P.M.

7. CONCLUSION AND FUTURE SCOPE

7.1. CONCLUSION

In this study, we found that different load capacity in grams from 500 to 6500 grams at different working hours in Hours with different R.P.M. such as 30, 60, 90, 120 and 150 R.P.M. using 12 V. D.C. motor, which has 10 KgF. It is

verified that the material handling process of 6,500 grams has stability in the time of 9 to 10 minutes of adequate operation of the drive system during the rotation of the Gear of the DC motor has 120 RPM, which is shown in Table 11. Concludes maximum material capacity is 6,500 grams with constant DC motor speed of 120 RPM.

7.2. FUTURE SCOPES

1) To study about material handling using chain drive system.
2) To study and analysis about material handling using gear drive system with heavy load.

SOURCES OF FUNDING

CONFLICT OF INTEREST

The author have declared that no competing interests exist.

ACKNOWLEDGMENT

REFERENCES

[1] S. M. Jadhav research paper on "Redesigning & Optimization of Conveyor Pulley", Volume IV, Issue XII, December 2015.
[2] Pravin A. Mane research paper on "Design, Manufacture and Analysis of Belt Conveyor System used for Cooling of Mould" Vol. 2, Issue 3, May-Jun 2012, pp.2162-2167.
[3] Kasi Visweswarao research paper on "Design and selecting the proper conveyor belt" Ananth et al., International Journal of Advanced Engineering Technology.
[4] Molnár, Vieroslav, et al. "Analysis of asymmetrical effect of tension forces in conveyor belt on the idler roll contact forces in the idler housing." Measurement52 (2014): 22-32.