Semi Automatic Slurry Filling Method

Y. Lethwala¹, J. Surti², V. Jagtap³
PG Student, VelTech University, Chennai, India¹
UG Student, GTU, Gujarat, India²
UG Student, GTU, Gujarat, India³

ABSTRACT: We have founded their old out dated method of manual slurry filling on Godrej safe for fire proofing the safe as a major defined problem. And we improvise that method by “SEMIAUTOMATIC SLURRY FILLING METHOD FOR FIRE PROOFING PROCESS”. The tow line conveyer is chosen as a transfer assembly for the transfer of heavy safe in the work area. The required component like base plate, chain, gear drive, hook and wheels designs of tow-line conveyer are calculated as the load transfer capacity and space availability on the shop floor. The prototype of the same will be manufacture in the following work schedule. This changes cause reduction in human work as well as production time.

KEYWORDS: Semi automatic slurry, Slurry filling method, Towline conveyer

I. INTRODUCTION

Nowadays as the new machines, new ideas, new method and other science & engineering application are widely used for high production rate in market. But still some areas of engineering application, where people and industries used the old out dated methods to perform their major work.

So we visit a medium scale industry PENTAFAB WORKS LTD. This is situated at BILLIMORA GIDC. Main product of industry is GODREJ Company’s locker safe. Godrej has 1500 types of model and 3 of them are manufacturing in PENTAFAB WORKS LTD.

We had taken reference of Mr. H. D. Patel who is working as senior supervisor. He has guided us very deeply and gave us brief knowledge about the working of the industry. We were taken a depth visit of the industry. And we have founded some major problems in the working area of the industry.

1.1 TOW-LINE CONVEYER:

Tow Conveyor is very much famous in the industry due to its flexible for various product combinations. This Conveyor is also known in different industries as one of the most economical as well as a logical resolution for multi-task performer and material handling operations.
Tow Conveyor characteristic inline passing on to move taking care and dynamic assembly, palletizing and also the packaging. Consolidated with the Automatic load and the unload offer, the Tow Conveyor are unparalleled. A portion of the Tow Conveyor feature incorporated the Cart transfer: prodding from the fundamental line of particular work cells and over to the primary line. In-the-floor tow Conveyor utilized to transport carts through manufacturing, warehousing, painting and assembling procedure. As it is normally set up flush with the floor, the procedure does not obstruct factory traffic needs or make safety concern connected with trip hazards.

1.2 BASIC COMPONENT OF TOWLINE CONVEYOR:

![Basic Component of towline conveyor](image)

II. CALCULATION AND DATA ANALYSIS FOR TOWLINE CONVEYOR

- **LIST OF COMPONENT TO DESIGN**
  - Base Plate
  - Chain Link
  - Motor

- **Data Analysis:**
  - Available data

Weight of safe = 150 kg
Weight of safe after slurry fill = 185 kg
Length between station = 24.83 m
Time take for transporting now 15 min,

Time take to transport
\[
T = \frac{S}{v} = \frac{22}{0.075} = 4.88 \text{ min}
\]

2.1 BASE PLATE DESIGN:

Length of bar = 730 mm × 730 mm
Cross section of square bar 30×30×2.5 mm
Load acting on base plate 200 kg
But we design at 300 kg
Length of diagonal = 1032.37 mm
Reaction force at diagonal Ra = Rb = 150 kg

\[
\text{Stress} = \sigma = \frac{mgA}{A} = 6.44430 \text{ Mpa}
\]

Ultimate strength of (M.S) Sut = 841 Mpa
Stress = 280 Mpa
Length of bar required = 4(730) + 2(1032.37)
= 4984.74 mm
= 4.984 m

Weight = density * volume

Total Weight = weight of bar + weight of diagonal bar
= 25.09 + 10.66
= 35.75 kg

Base Plate analysis in solid works
Total weight acting on base plate = 185 kg.

We take 200 kg for analysis.

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Displacement1</td>
<td>URES: Resultant</td>
<td>0.000 mm</td>
<td>1.206 mm</td>
</tr>
<tr>
<td></td>
<td>Displacement</td>
<td>Node: 1</td>
<td>Node: 137</td>
</tr>
</tbody>
</table>

Table 1. Base plate Load Analysis

2.2 POWER CALCULATION FOR CHAIN LINK & MOTOR:

Total weight of One Unit = w1+w2
= 385.66 kg

Total weight = 2w1+2w2
Weight in N = mg
= 3783.32 N

Factor of safety = Ns = Wb/w (Nf= 2)

Wb = 16535.74 N
Wb = 106 × P²

Pitch = P = 36 mm
Linear velocity = st
= 15300
= 0.05 m/s

Pitch Diameter of Sprocket

d = psin [180°]
= 287.23 mm = 0.28723 m

R.P.M = N = v × 60πd
= 3.32 RPM

Power = P = wb × v × 1.85 (service factor = Kd = 1.85)
= 223.45 watt
= 0.3 Hp. (assuming HP of motor approx.
= 0.5 Hp. as availability in market)

Number of chain link,
K = T + 2 × P
= 1,404

Length of chain,
L = kp
= 50.56 m

- Dimension & Analysis Of Chain Link,

  Height of link = 40 mm
  Cross section = 12 mm
  Width of chain link = 70 mm
  Center distance = 30 mm
  Pitch of the chain = 36 mm

Analysis of chain link:

  We do Analysis in CREO. We apply load 400 kg on each side.
2.3 ASSEMBLY OF TOW-LINE CONVEYOR:

III. CONCLUSION

- As we can see from the system the system is very helpful for the industry after this implementation work load plus work time will decreases. Eventually it will help to increase productivity.
- Before this system transportation takes about 15 min to transport one safe after installing this system it will take around 5 min.
This system also helps to reduced labor cost as well as wastage of slurry. After implanting this system the utilization of transporting units will be better.

REFERENCES


6. Recent Advances in the Design and Analysis of Material Handling Systems- B. S. Manda, U. S. Palekar [Department of Mechanical and Industrial Engineering, University of Illinois at Urbana-Champaign, 1308 W. Main St. #366 C&SRL, Urbana, IL 61801]