

# Semi Automatic Slurry Filling Method

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**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.



**Figure 1.** Towline Conveyor

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- 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:

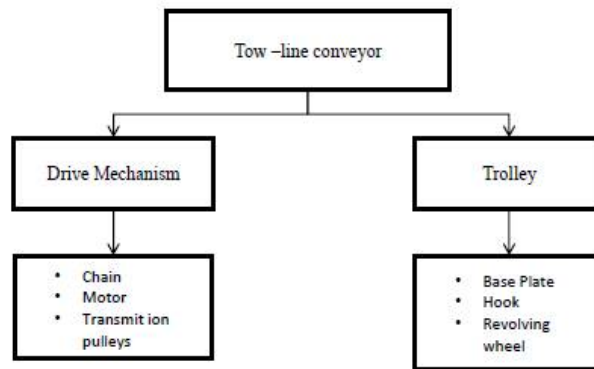


Figure 2. Basic Component of towline conveyor

## 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

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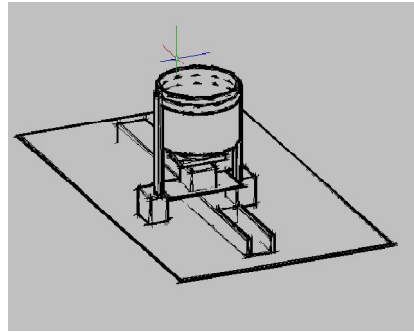


Figure 3. Basic Sketch

Time take for transporting now 15 min,

Time take to transport

$$\begin{aligned} \text{Time} = T &= S/v \\ &= 22/0.075 \\ &= 4.88 \text{ min} \end{aligned}$$

## 2.1 BASE PLATE DESIGN:

Length of bar = 730mm × 730mm

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  $R_a = R_b = 150 \text{ kg}$

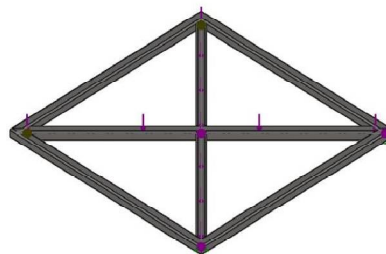


Figure 4. Basic plate

$$\begin{aligned} \text{Stress} = \sigma_b &= mg/A \\ &= 6.44430 \text{ Mpa} \end{aligned}$$

Ultimate strength of (M.S)  $S_{ut} = 841 \text{ Mpa}$

Stress = 280 Mpa

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$$\begin{aligned} \text{Length of bar required} &= 4(730) + 2(1032.37) \\ &= 4984.74 \text{ mm} \\ &= 4.984 \text{ m} \end{aligned}$$

$$\text{Weight} = \text{density} * \text{volume}$$

$$\begin{aligned} \text{Total Weight} &= \text{weight of bar} + \text{weight of diagonal bar} \\ &= 25.09 + 10.66 \\ &= 35.75 \text{ kg} \end{aligned}$$

Base Plate analysis in solid works

Total weight acting on base plate = 185 kg.

We take 200 kg for analysis.

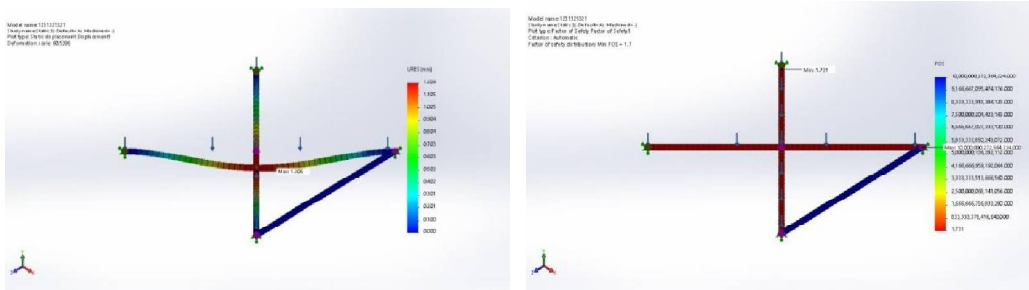


Figure 5. Base Plate Analysis

Name	Type	Min	Max
Displacement 1	URES: Resultant Displacement	0.000 mm	1.206 mm
1231321321-Static 2-Displacement-Displacement 1			

Table 1. Base plate Load Analysis

## 2.2 POWER CALCULATION FOR CHAIN LINK & MOTOR:

$$\begin{aligned} \text{Total weight of One Unit} &= w1+w2 \\ &= 385.66 \text{ kg} \end{aligned}$$

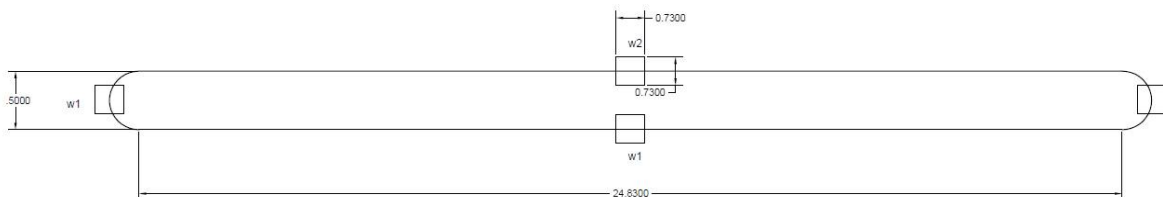


Figure 6. Layout

$$\text{Total weight} = 2w1+2w2$$

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$$= 842.8 \text{ kg}$$

$$\begin{aligned} \text{Weight in N} &= mg \\ &= 3783.32 \text{ N} \end{aligned}$$

$$\text{Factor of safety} = N_{fr} = W_b/w \quad (N_{fr} = 2)$$

$$\begin{aligned} W_b &= 16535.74 \text{ N} \\ W_b &= 106 \times P_2 \end{aligned}$$

$$\begin{aligned} \text{Pitch} &= P = 36 \text{ mm} \\ \text{Linear velocity} &= st \\ &= 15300 \\ &= 0.05 \text{ m/s} \end{aligned}$$

Pitch Diameter of Sprocket

$$\begin{aligned} d &= p \sin [180T] \\ &= 287.23 \text{ mm} = 0.28723 \text{ m} \end{aligned}$$

$$\begin{aligned} \text{R.P.M} = N &= v \times 60 \pi d \\ &= \mathbf{3.32 \text{ RPM}} \end{aligned}$$

$$\begin{aligned} \text{Power} = P &= wb \times V \times 1.85 \quad (\text{service factor} = K_d = 1.85) \\ &= 223.45 \text{ watt} \\ &= \mathbf{0.3 \text{ Hp.}} \quad (\text{assuming HP of motor approx.}) \\ &= 0.5 \text{ Hp. as availability in market} \end{aligned}$$

Number of chain link,

$$\begin{aligned} K &= T + 2xp \\ &= 1,404 \end{aligned}$$

Length of chain,

$$\begin{aligned} L &= kp \\ &= \mathbf{50.56 \text{ m}} \end{aligned}$$

- Dimension & Analysis Of Chain Link,

$$\begin{aligned} \text{Height of link} &= 40 \text{ mm} \\ \text{Cross section} &= 12 \text{ mm} \\ \text{Width of chain link} &= 70 \text{ mm} \\ \text{Center distance} &= 30 \text{ mm} \\ \text{Pitch of the chain} &= 36 \text{ mm} \end{aligned}$$

**Analysis of chain link:**

We do Analysis in CREO. We apply load 400 kg on each side.

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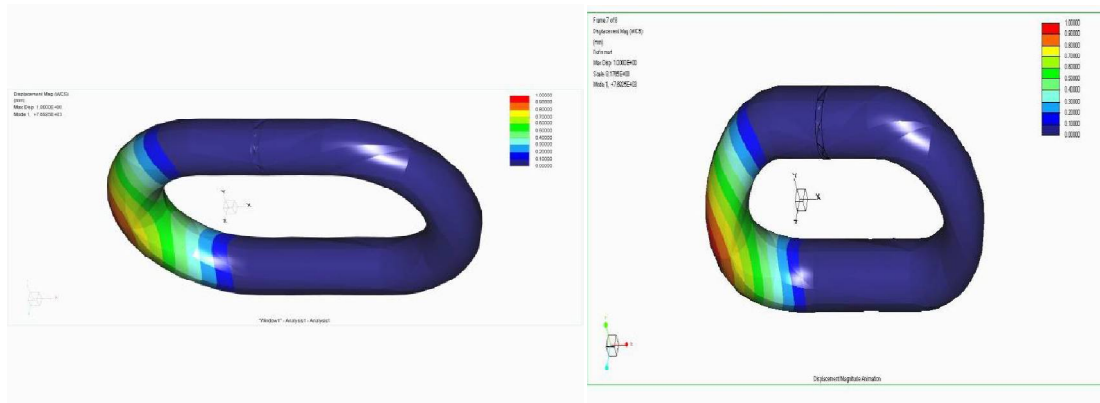


Figure 7. Stress Analysis of Chain Link

## 2.3 ASSEMBLY OF TOW-LINE CONVEYOR:

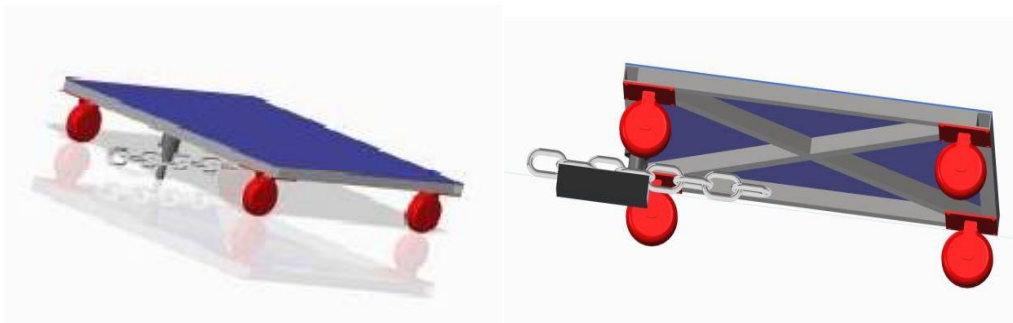


Figure 8. Sub assembly conveyor



Figure 9. Experimental setup

## 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 decrease. 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.

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- 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.

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