



## Maintenance Optimization of Goliath Crane in Supply Current Cable Trolley System

---

Purushottam Barve and Mohan Mendhe

EasyChair preprints are intended for rapid dissemination of research results and are integrated with the rest of EasyChair.

January 25, 2021

# “MAINTENANCE OPTIMIZATION OF GOLIATH CRANE IN SUPPLY CURRENT CABLE TROLLEY SYSTEM”

P.S.Barve<sub>1</sub> and M.K.Mendhe<sub>2</sub>

<sub>1,2</sub> Assistant professor Department of Mechanical Engineering Yeshwantrao Chavan College of Engineering, Nagpur .

[purubarve5@gmail.com](mailto:purubarve5@gmail.com), [mohankmendhe@gmail.com](mailto:mohankmendhe@gmail.com)

---

**Abstract:-** Gammon India limited is one of the leading tower companies with exposure in extra high voltage transmission line and distribution projects since 1984. They have in-house facility for design, testing and tower manufacturing capacity (110,000 TPA) and have supplied towers/structure over 6, 00,000 metric tons including 87,000 metric tons to different countries. They are ISO certified for design, testing, manufacturing and turnkey projects. The various types of cranes utilized in transmission Tower Company like goliath or gantry crane, electrical overhead travelling crane and hydra (JCB) to shift unprocessed materials, semi-process and end products from one station to another station. The goliath/gantry cranes are placed in unprocessed and processed yard and it is used to transfer unprocessed materials from raw yard to different machine in machine shop-1 and machine shp-2 also it transfer end products from steel yard to different automobile vehicles like box truck, recreational vehicle, camper etc. The high breakdown occurs in goliath/gantry cranes due to breakage of supply current trolley cable, so high maintenance and production cost is involved and after every two years supply current trolley cable is replaced by new one. In this paper an entire though is given as regards how to optimize breakdown and production loss by implementing bus-bar/ current collector system on gantry/goliath crane. The current collector or bus-bar system is employed to provide three phase current to different motors of gantry/goliath crane.

This paper presents evolving a maintenance optimization of gantry/goliath crane in supply current cable trolley system.

**Keywords:** Transmission Tower Company, goliath crane, cable trolley system, bus-bar system.

## 1. Introduction

Present Status of Operation: -

Following are the various sorts of crane utilized in transmission Tower Company to transfer materials from one station to a different station.

1. Goliath Crane.
2. EOT Crane (Electrical Overhead Travelling)
3. Mobile Crane (Hydra 12MT)

**1.1 Goliath Crane:** The goliath/gantry crane are used to shift raw materials from raw material yard to various machinery in production shop-1 and 2 such as CNC ,plate shearing, stamping, band saw, power press punching and universal punching and cutting machine etc. It is also wont to shift finish product from steel yard to different transport vehicles. In live system of gantry /goliath crane cable trolley system is employed to provide three phases current from main panel to Goliath crane motors. The ten sq.mm cable 4 core 60m length is mounted on cable trolley of goliath crane. If the goliath crane is major breakdown then high production loss occurs.

**1.2. EOT Crane:** The mounting of EOT crane in fabrication and galvanizing shop. It is utilized to shift unprocessed materials, semi-process materials and end products from one machine to a different machine.

**1.3. Mobile Crane:** it's utilized in raw yard and steel yard to shift finish goods, raw materials and semi-finish goods from one station to a different station.



**Fig. 1 Goliath crane**

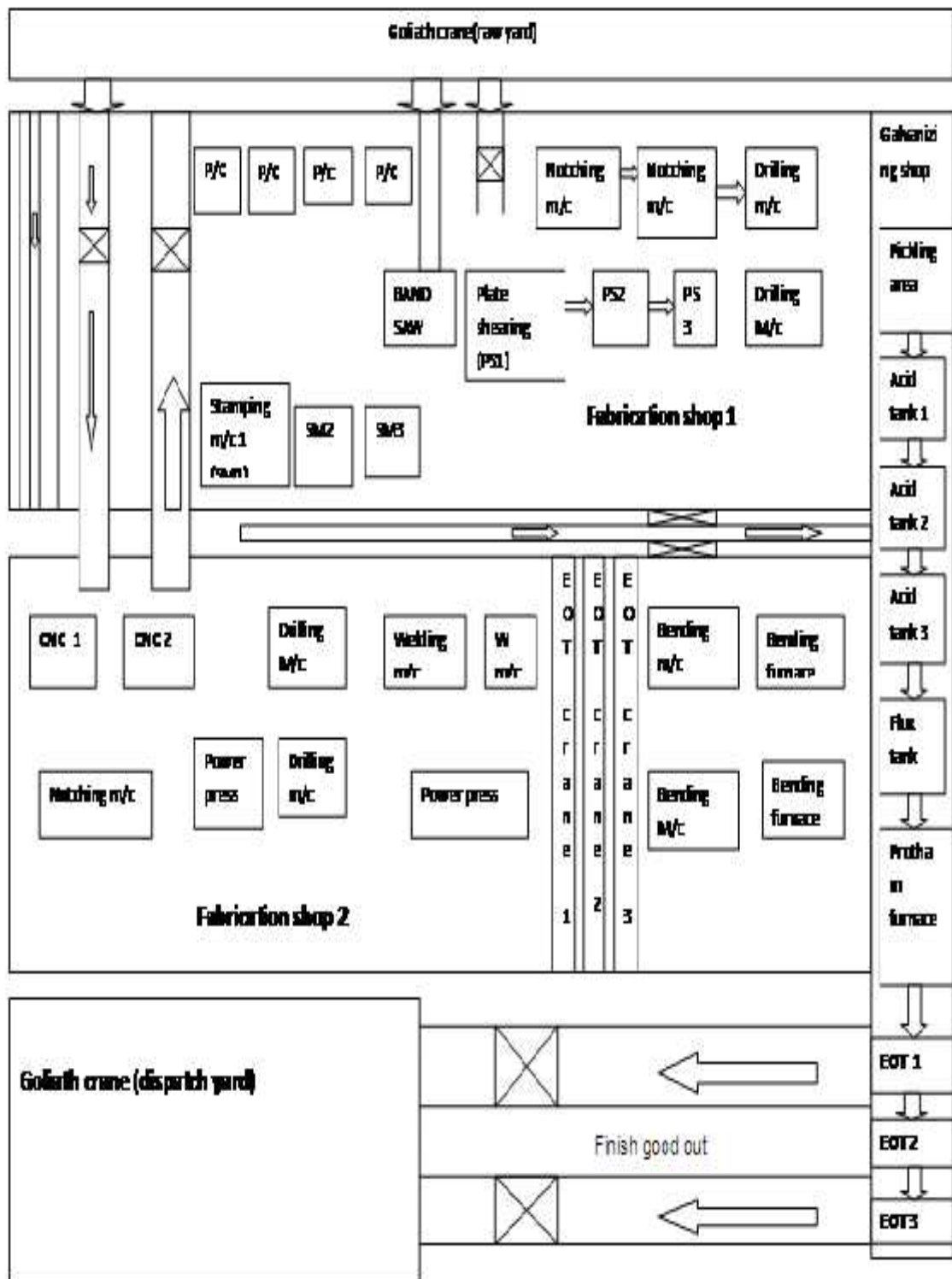


Fig.2 Plant layout

2. Plant Layout Details:-

**1. Raw yard section:-**

Goliath/gantry crane is employed for moving raw materials from raw yard to different machine in fabrication shops.

**2. Fabrication section:-**

Different machining operations are performed on raw materials and it's converted into semi-finish good.

**3. Galvanizing section:-**

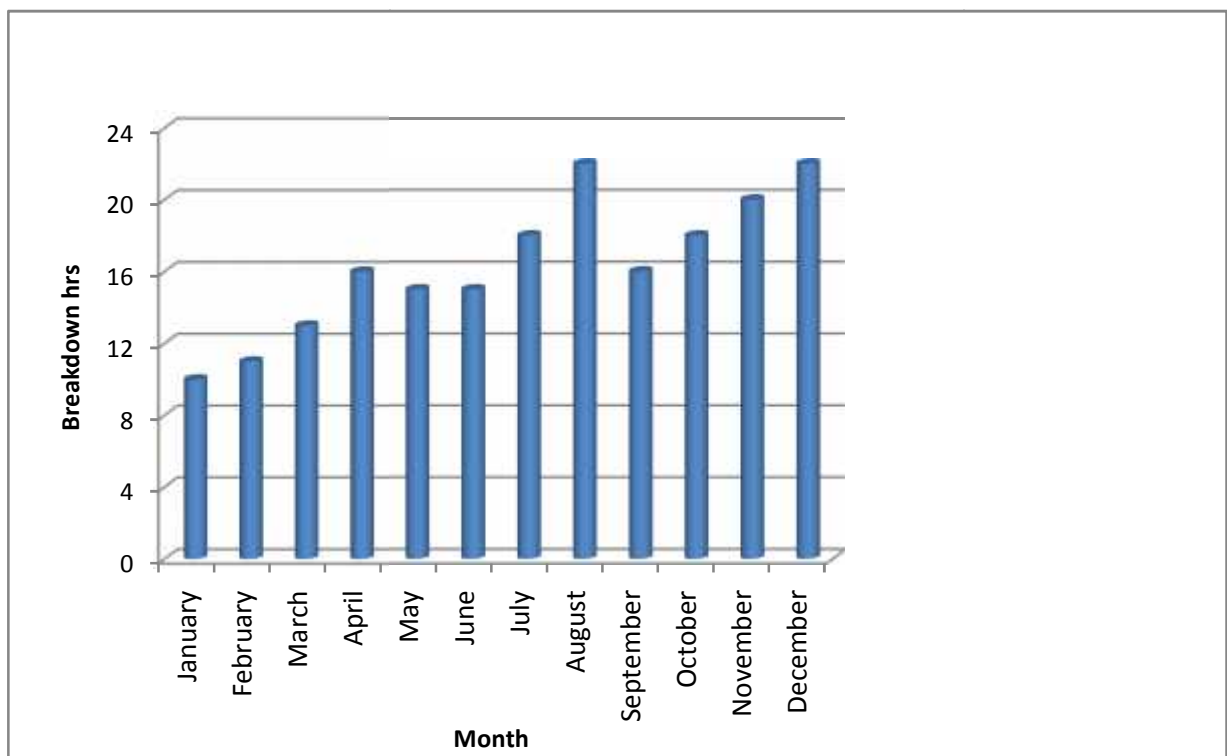
The semi-finish good are converted to end products by galvanizing furnace. (Protherm furnace)

**4. Dispatch section: (steel yard):-**

Goliath crane are wont to shift finished product from steel yard to various transportation of vehicles.

**3. Flaws in current system:-**

Due to number of revolution (clockwise or anticlockwise) goliath crane cable trolley system, cable is stretch and crane break down occurs. Every two years, cable was replaced but cost of cable (10sq-mm 4 core) is rupees one lakh. When new cable is fitted then breaks down of crane is optimize for next six months. After six months breakdown is increased in every month and high production loss occurs.



**Fig 3.shows monthly breakdown in goliath crane (2010 years)**

**4. Effect on production rate:**

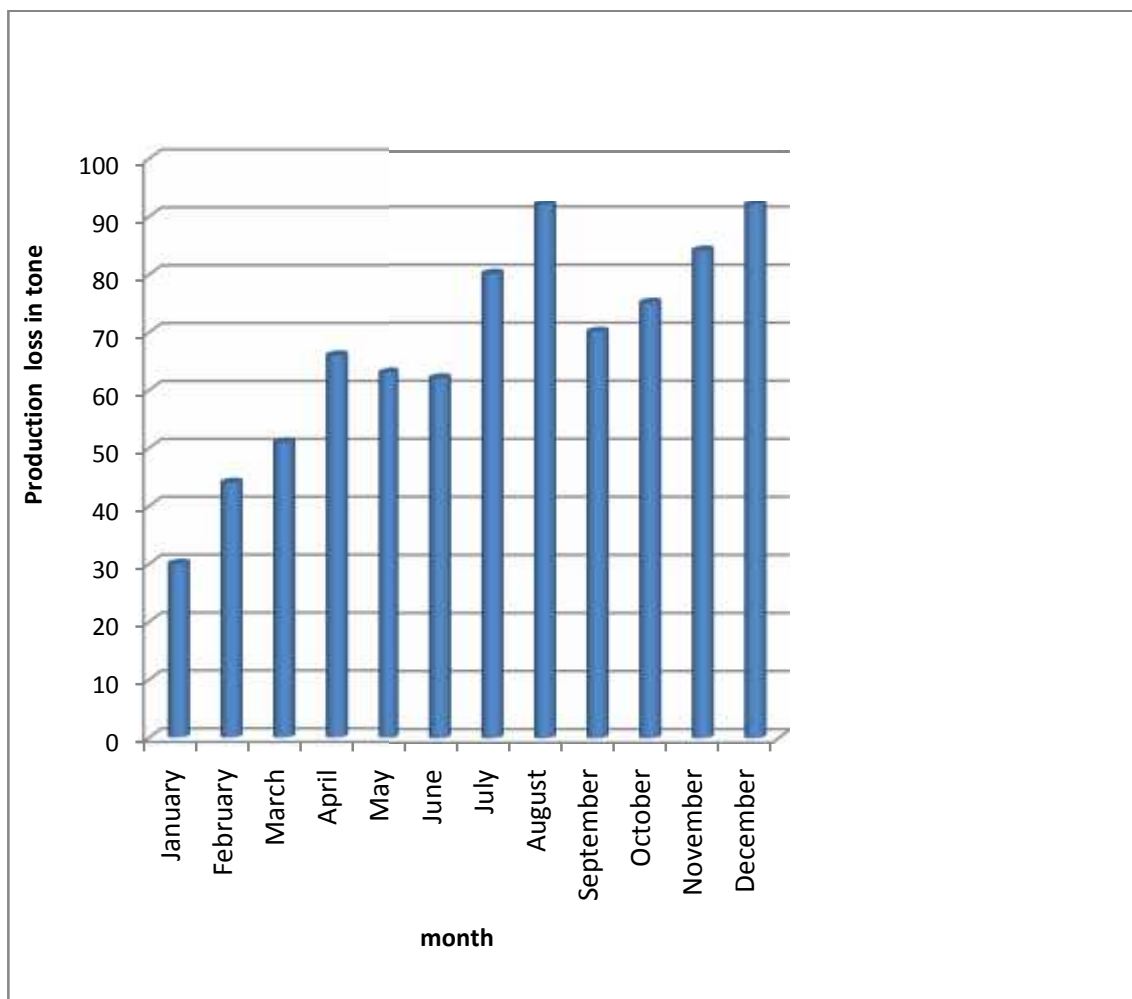
Suppose an example of gammon India transmission tower manufacturing company, plant capacity – 100MT in 24 hours and net working hours is 22hr.

**Production per hour = Plant capacity / Net working hours**

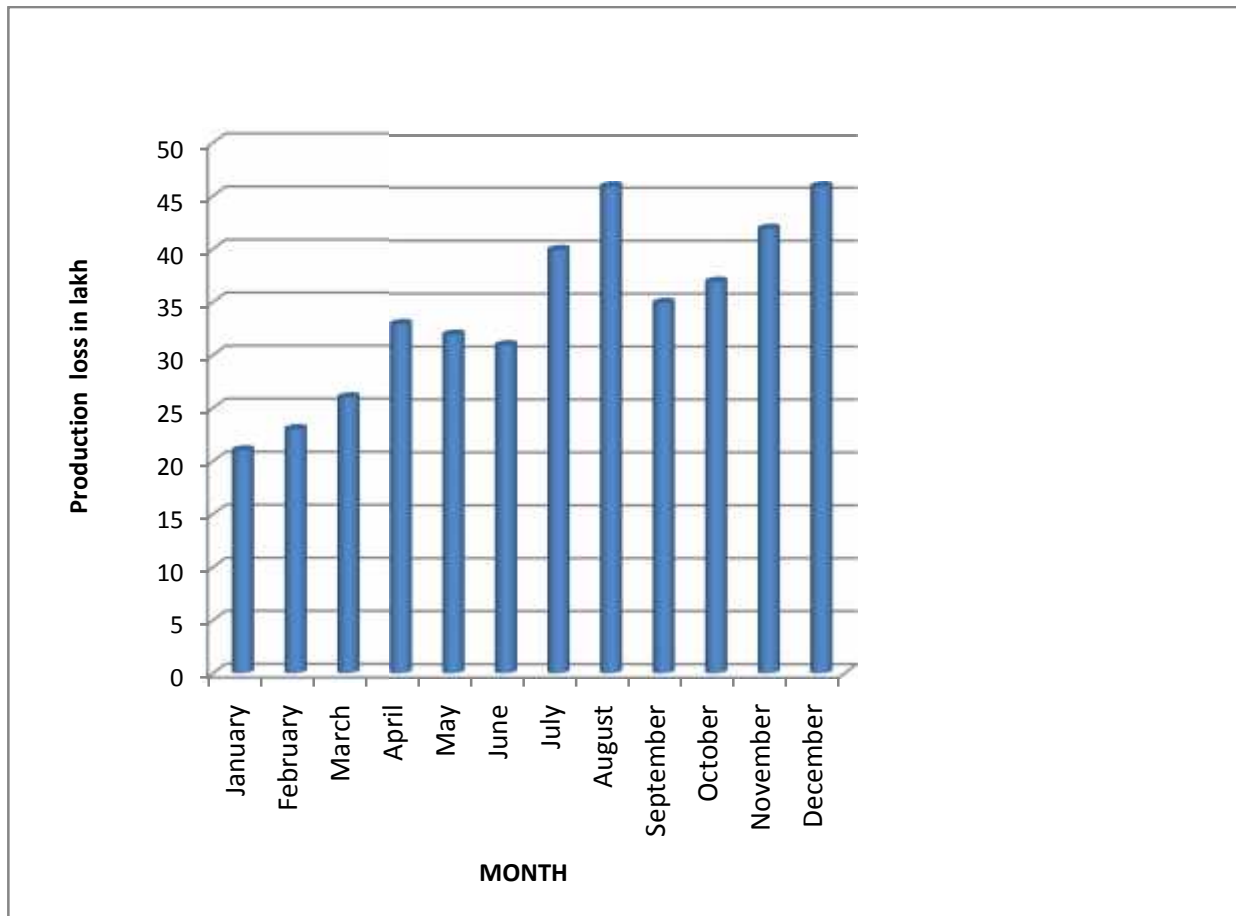
$$= 100/22$$

$$= 4.55 \text{ tone /hour}$$

The above example shows that if goliath crane breakdown in 01hr from 3 shifts then 4.55 tone production loss in one day. Fig-1.3 shows if goliath crane is major breakdown then production loss is also high, it is calculated by 2010 year breakdown of goliath crane.



**Fig.4 shows production loss in tone (2010 year)**



**Fig.5 production loss in lakh (2010)**

It is assumed that production cost is 50,000 rupees for one tone production. Fig 3, 4 and 5 is calculated by goliath crane breakdown in year 2010.

**5. Clue to design task:**

By implementing of existing system new supply current bus-bar system are going to be applied on goliath crane, the breakdown is optimize and improvement in production system. The current collector is employed to provide three phase current supply to different motors of goliath/gantry crane rather than cable trolley supply current.

**6. Formulation and Identification of proposed work :-**

Analysis of machine break down and shut down list for span of about 1 year has revealed that most of the failure, which has occurred, is due to failure of Goliath crane wheel and damages of cable 10mmsq. Hence, it has been decided to focus attention on how to optimize the maintenance aspect of Goliath Crane system.



7. **The pay – back analysis:**

This method means the pay – off period is calculated .In its simplest version, Basic investment (B) is put against average annual yield (Y) , i.e., the difference between cash inflow and outflow. The pay off period (T) thus is that the time it takes for B to be paid off.

$$T \text{ (years)} = B \text{ (SEK)} / Y \text{ (SEK)} \text{ ----- ( I )}$$

**Example:-**

It is propose that a tower manufacturing industry is thinking of adjusting existing supply current cable trolley system for goliath crane because it's found that prime breakdown and production loss .A study of delays show that company wants to optimize breakdown and improvement in production by implementing supply current bus-bar system in goliath crane:- .

**Basic investment (B) SEK**

Purchase price after discount	2, 00,000
Training (01 operator @ SEK 5000)	5,000
Installation	30,000
Miscellaneous	1, 00,000

-----  
**Total B = Rs 3,35,000**

**Cash Inflow ( I)**

1cable trolley operator @ SEK	48,000
10sq-mm cable 4 core	100,000
Maintenance and repair including cost Of down time	2, 50,000

-----  
**Total Rs 3, 98,000**

**Cash outflow (O), SEK / Year Operating costs**

(1) Fixed: One operator @ SEK	Rs70, 000
Insurance	10,000
(2) Variable: Replacement of parts	40,000
Maintenance & repairs including cost of downtime	50,000
Miscellaneous	20,000

-----  
**Total Rs 1, 90,000**

-----

## **8. Results:-**

The pay of period (T) is calculated consistent with  $T=B / Y$ . The yield (Y) equals the annual cash inflow less the live flow (I - O).

$$T=33.5/39.8-19$$

$$=1.61 \quad 2 \text{ Years.}$$

It indicates that the Investment is profitable after 2 years.

## **9. Conclusion:**

High breakdown in existing goliath crane involved low production rate by implementing bus-bar system in goliath crane shows optimize breakdown and high production rate. It also indicates that the investment of new system is profitable after 2 years which is proved through pay-back analysis.

## **10. References:-**

- (1) Lindquist, R.G.T. (1985) Handbook of material handling. Chic ester ELLIS Harwood Ltd.p.31-40.
- (2) EOT Crane company manual of ATSL.
- (3) Sharma S.C. (2004) material management and material handling khanna publishers Delhi.
- (4) Deshpande V.S. & Modak J.P. & Reliability engineering and system safety80 (2003)
- (5) Industrial maintenance management by Sushil Kumar Srivastava.
- (6) Maintenance engineering by Er. Sushil Kumar Shrivastava.