

# Design And Fabrication of Rolling System For Flat Bar Rolling



## Engineering

**KEYWORDS :** coaming, lightning holes, manhole, rolling

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### ABSTRACT

Flat bars are commonly used for various purposes in manufacturing industry. This system is designed as an alternative arrangement for coaming of flat bars. Coaming is widely used term in shipbuilding. It is derived from aerospace where coaming is used to ensure the air tight condition of doors; similarly in ships it prevents the entry of water. Manholes and lightning holes are the specific areas where the coamed flat bars are used. Even though coaming can be done on folding machines and pressing machines, this small system serves the purpose at a smaller scale with better surface finish. The system designed has an alternate option of manual operation in case of power cut shutdown. Hence in the absence of power cut down or power shortage flat bars can be easily coamed on this system.

### INTRODUCTION

Coaming is generally a vertical extension given to plane surfaces, such as in manholes and lightning holes in ships and airplanes. This vertical extension acts as a barrier against the water in ships and air in airplanes. The term was taken from aviation domain to refer to a vertical rim around the cockpit. Coamed manholes and lightning holes are important regulations of many shipping industries to prevent the ingress of water into the passenger accommodation spaces. This work is primarily focused on the system developed for coaming of flat bars. This project was intended towards the reduction of time consumed for coaming on conventional folding machines and pressing machines.



Fig.1 Typical Coaming

### 2.1 DESIGN

Since a rolling system has to be developed so basically it should have rollers. Flat bars will be fed in the rollers to get rolled and produce the necessary coamed part. In order to design such a system, basically it should have three rollers. We go for three rollers because a necessary curvature has to be given to the flat bar. Based on the idea of three rollers, a rolling system was designed using CAD utility CATIA V5. The fig. 1 shows the designed model of the system.

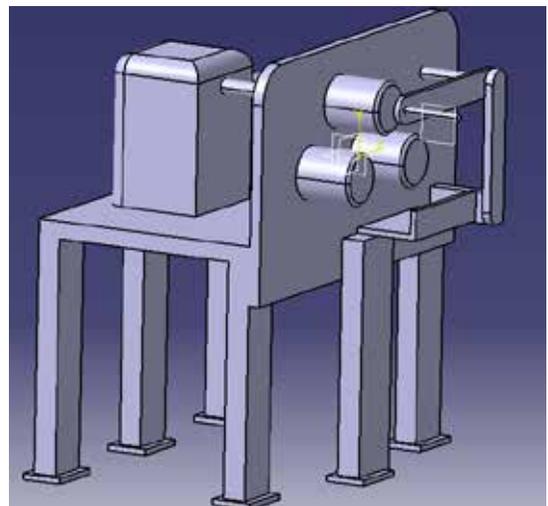


Figure2: CAD model

### 3. COMPONENTS OF THE SYSTEM

#### 3.1 ROLLERS

As it is a rolling system so three rollers of diameter 90 mm are being deployed. Rollers are made of mild steel. Rollers are supported at the end on bearings since it has to rotate smoothly without interruption.

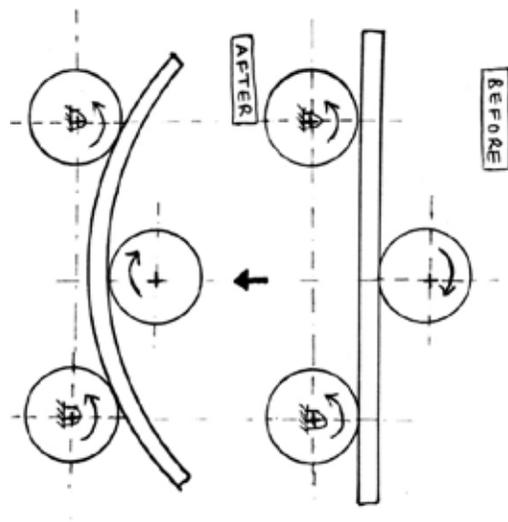


Fig.3 Rolling Design Ideology

**3.2 MOTOR**

A motor is used to power the upper roller so that when intensive production is required it can cope up with it. The motor has a rating of 0.5 hp with speed of 1395 rpm. It is coupled to a gearbox.

**3.3 GEARBOX**

A gearbox is used to be coupled with the motor selected. We know that the motor provides the speed but for rolling we need high torque rather than speed. Hence this speed reducer gearbox is deployed which increases the torque by reducing the speed. The gearbox has a speed ratio of 40:1.

**3.4 BEARINGS**

Bearings are important component of the system as the rollers have to be supported at the ends for smooth operation. Three bearings for the three rollers are used of designation number 308 (Indian Standard).

The other details of the bearings are as given below.

Bore	:	40 mm
Outer Diameter	:	90 mm
Width	:	23 mm
Static Load Rating (C <sub>0</sub> )	:	32(Dynamic)
	:	22 (Static)

**3.5 HYDRAULICJACK**

A hydraulic jack is used to apply pressure on the bar which is connected to movable roller. This in turn pushes the roller on the flat bar to provide the necessary radius. The pressure to be applied depends on the requirement of the radius of the coaming.

**4. WORKING**

After assembly of all the components of the system successfully the working of the system was tested. A flat bar whose length is equal to the circumference of the coamed bar is inserted between the rollers as depicted in fig. 3 and then in order to provide the necessary curvature to the flat bar, the upper roller is pushed downwards by applying pressure using the hydraulic jack. The operation can be performed without motor for thin plates and for thicker plates it can be taken into usage.

**5. ADVANTAGES AND LIMITATIONS**

It can be effectively used as an alternative for folding machine, which results in reduction of power consumption and better productivity. The lead time to position the bar into the machine and the overall time for the production of the coamed plates is significantly reduced. It can also be effectively used by small scale production companies which can produce these components with lesser financial input in terms of power and manpower.

As it can be used for coaming with reduction in time but it can also lead to reduction in production capacity, as on folding machine we can put number of flat bars for coaming at a time and all of them will have the same dimensions and the accuracy will be higher.

**5. CONCLUSION**

This system is made for the possibility of coaming on smaller machines so that the overall time on folding machines is reduced, since the positioning, alignment etc. activities on it not only consumes more time, more manpower but also the power consumption of such bigger machines is high, which is significantly reduced if this system is taken into usage.

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