"AUTOMATION IN TILES UNLOADING MECHANISM – A RESEARCH"

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Abstract

In the era of Ceramic Industries Manufacturing process is done through automatic machines but in Ceramic industries where use manually unloading of Tiles from Kiln. Productivity improvement is the need of current market. This project is based on automatic Tiles unloading Mechanism and to create Design of Mechanism and Simulation of this Mechanism and I will make significant efforts to make attempt to solve challenges in manual tiles unloading system. I will give the automation to Tiles unloading process and improve the work efficiency and also reduce the human effort. Aim of this Research is to Automation in Unloading of tiles from kiln and Reduce the human effort also reduce the production time with mass production of tiles unloading. So, create Assembly of mechanism and Create Simulation of mechanism in Design Software and to apply Automation in ceramic Tiles industries to unloading the tiles and reduce unloading times and increase mass production.

Keywords: *Unloading of Tiles, Manufacturing Process, Automation, Productivity and Ceramic.*

1. INTRODUCTION

✓ The ceramic tiles industry has almost complete automation in all process in recent years. Today's plants are capable of mass production of tiles with minimum human efforts. This project is based on Automation in plant to unloading of tiles with generating a new design of automatic unloading mechanism.
✓ To implement the automation and improve the work efficiency and also reduce the human effort. In the industries to use human efforts to unload the tiles and waste of time as well as to reduce the quality of the tiles.
✓ In this Research to design the automatic tiles unloading mechanism to reduce the time to unload of tiles and improve quality. To design a vacuum type tiles unloading mechanism and implement in industries.

2. LITERATURE REVIEW

➢ In first paper Belt conveyor & Bucket elevator are the media of transportation of material from one location to another in a commercial space. Belt conveyor has huge load carrying capacity, large covering area simplified design, easy maintenance and high reliability of operation. Belt Conveyor system is also used in material transport in foundry shop like supply and distribution of molding sand, molds and removal of waste [1]

➢ In second paper Low cost automation provides cost effective architectures and development approaches for transportation of components that properly integrate human skills and technical solutions. Most appropriate and judicious use of low cost material handling techniques become necessary to reduce the manufacturing cost, manufacturing cycle time, smooth material flow and remain competitive. It focuses on various issues typically faced by SMEs in handling parts during different stages of processing in a machine shop that houses a variety of machine tools [2]

➢ In Third Stress is a universal element at work and all human beings have to face stress in all walks of life. The consequences of stress are a deviation from the existing physical and psychological condition of human life [3]

➢ This paper The project develops an integrated digital workflow for robotic tile placement, a novel construction method that allows for off-site use of industrial robotics for on-site tile surfaces, and a feasibility study for implementing the approach in the context of the tile industry [4]

- This paper presents an interactive programming method for programming industrial robots in ceramic applications. The main purpose was to develop a simple but flexible programming system that empowers the user with product driven programming without compromising flexibility [5]

- In this paper, we discuss the competitive paradigm between globalization and local development in the ceramic tile industrial cluster, based on the Porter's theory in exploring the factors of the global competitiveness [6]

- In This Paper As an abstract model for tile based self-assembly, it has proven to be re- markedly powerful and expressive in terms of the structures which can self-assemble within it. As research has progressed in the a TAM, the self-assembling structures being studied have become progressively more complex [7]

- This Paper based on Automated Guided Vehicle or AGV is one of material handling equipment that has been used widely in most manufacturing industry today as it provides more flexibility to the system. The basic concept of the AGV incorporates battery-powered and driverless vehicles with programming capabilities for path selection and positioning [8]

- This paper deals with the visual inspection of ceramic's tiles surfaces for the purpose of detecting flaws using a wavelet approach. Surface defects in the ceramic tiles are viewed as in-homogeneities in regularity and orientation fields. To improve the homogeneity of batches received by final users and to detect manufacturing defaults, most production lines for ceramic tiles must integrate a visual control stage before the packing operation [9]

- This paper presents an overview of an autonomous robotic material handling system. The goal of the system is to extend the functionalities of traditional AGVs to operate in highly dynamic environments. Traditionally, the reliable functioning of AGVs relies on the availability of adequate infrastructure to support navigation. In the target environments of our system, such infrastructure is difficult to setup in an efficient way [10]

- In this Poor overview and control of workload in electronic case handling systems is a potential health risk factor which affects the users. Case handling systems must therefore be designed to give the users a better overview and maximum control over their workload [11]

- The ceramic tile industry has evolved greatly in the recent years to the almost complete automation of the production line. After a decade of improvements in the manufacture, today's plants are capable of mass produce tiles with little human intervention. However, the planning and scheduling of the orders has not changed much and scheduling the client's orders in the shop remains as a manually solved problem [12]

- In this paper use AGV to Tiles Horizontal Loading and Unloading using AGVs and use IPSI concepts [13]

- The ceramic tiles manufacturing process has now been completely automated with the exception of the final stage of production concerned with visual inspection. This paper is concerned with the problem of automatic inspection of ceramic tiles using computer vision. It must be noted that the detection of defects in textured surfaces is an important area of automatic industrial inspection that has been largely overlooked by the recent wave of research in machine vision applications [14]

- In this paper ceramic system consists also of a track based vehicle and process tooling for automated cladding of ceramic tiles [15]

- In this paper Installing a Robot in an Automated Investment Casting Shelling Production Line to unloading of Tiles in Ceramics Industries [16]

3. DESIGN & METHODOLOGY

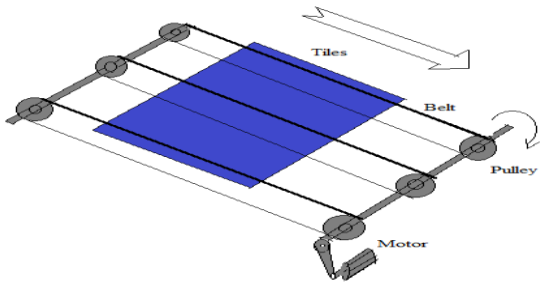

Figure 1: Belt and Pulley

➢ Belt and pulley are used for move the tiles from Kiln outlet to unloading mechanism. There are 6 pulleys and 3 belts used for moving tiles. Total number of 3 or 4 tiles move at a time.

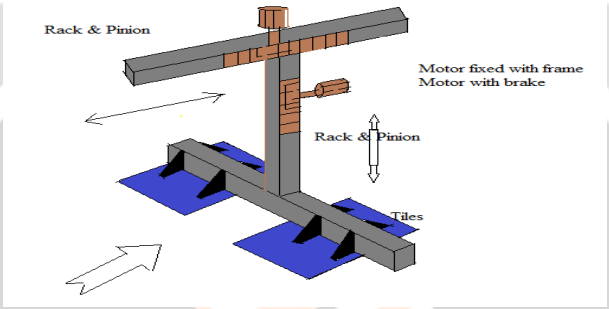

Figure 2: Frame

➢ When tiles move from belt and stop the belt at that time frame will move and pickup the tiles from belt and put in the bucket. Bucket may be wooden or plastic. Sensors are used for controlling the speed and sensors put in down of the frame to sense the bucket and belt to pickup and put the tiles.

➢ There are use Rack and Pinion mechanism to move the frame from belt to bucket. One rack & pinion is used for moving the frame from tiles pickup in belt to upward and downward motions of frame to put tiles in bucket. Other rack & pinion is used for horizontal motions of the tiles from belt to bucket.

4. VACUUM PRESSURE CALCULATION

Given; Tiles weight (m) = 7.32kg
No. of Suction Cup (n) = 4
Friction Coefficient (μ) = 0.5
Factor of Safety (S) = 2
Suction Cup Diameter (D) = 0.095m
Vacuum Pressure (P_u) = ?

$$D = 1.12\sqrt{\frac{m \times s}{Pu \times n \times \mu}}$$

$$0.095 = 1.12\sqrt{\frac{7.32 \times 2}{Pu \times 4 \times 0.5}}$$

$$0.095 = 1.12\sqrt{\frac{7.32}{Pu}}$$

$$\frac{0.095}{1.12} = \sqrt{\frac{7.32}{Pu}}$$

$$(0.084)^2 = \frac{7.32}{Pu}$$

$$Pu = \frac{7.32}{0.007}$$

Vacuum Pressure P_u = -0.1025 bar
= -0.1045 kgf/cm²

5. EXPERIMENTAL WORK

In this research to Automation in tiles unloading is done by using gripper type unloading mechanism and detail drawing and assembly of this mechanism is show in previous chapter. Now in this chapter validate this mechanism by using vacuum type gripper.

Figure 3: Vacuum gripper to grip tiles

6. CONCLUSION

This project is based on Automation in plant to unloading of tiles with generating a new design of automatic unloading mechanism. This Design used to unloading of Tiles from Kiln in Ceramic industries and In this project to design the automatic tiles unloading mechanism to reduce the time to unload of tiles and improve quality. To design a vacuum type tiles unloading mechanism and implement in industries and also to apply this approach in to industries.

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