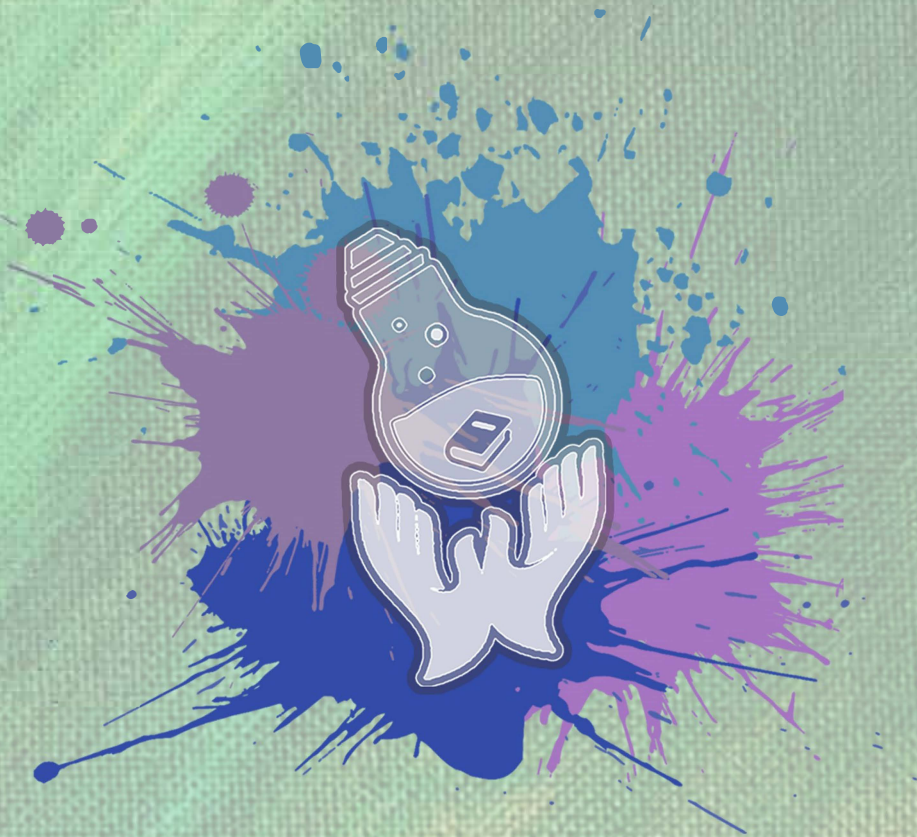




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SERI ISKANDAR CAMPUS

AUTOMATED MULTI-CONVEYOR STORAGE (AMCS)

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Abstract:

In today's fast moving, highly competitive industrial world, a manufacturing of Industrialize Building System (IBS) must be flexible, cost effective and efficient to survive. Increasing in demand for more productivity, high quality standard and better accuracy are mostly hard to achieve for mass production of precast component. In addition, current practice of material handling method and inventory control are mostly done manually and separately with more human interference. Therefore, the purpose of this study is focused on material handling management of precast component in IBS manufacturer. A detail desk study has been conducted which concentrates on the current method of material handling system, storage space utilization, inventory control management and other relevant research on various innovation approaches. Hence, Automated Multi-Conveyor Storage (AMCS) is proposed to reduce as much as possible the operator involve in construction work, cost expanses, time consuming, solving the current technical problems on material handling technology, eliminate manual and double handling works, give a high safety level of working environment as well as provide an easiest ways in material handling system. In line with this, the application AMCS is considerate the existence of current technology, working environment suitability and implementation of industry revolution 4.0 in construction.

Keywords:

Industrial Revolution; Industrialize Building System (IBS); Material Handling; Inventory Control; Automated Multi-Conveyor Storage (AMCS)

1.0 INTRODUCTION

This study is focused on transportation and storing system of the precast component in Industrialize Building System (IBS) manufacturer. Therefore, a detail desk study has been conducted relates to the current material handling technology and the organization system on handling materials in IBS manufacturer. Most of the problems occurs are on the current technology performance, poor inventory control system, lack of storage space and utilization. In line with this, a detail desk study has been conducted related to material handling methods, issues and problems arise.

Based on literature review, the total number of occupational fatal injuries slightly increased for both manufacturing and construction sectors from 2013 to 2016 related to material handling system and accidents with crane are extremely critical (Ayob, A Shaari, F M Zaki & A C Munaaim, 2018). The accident that are frequently occur due to this material handling system are overloading, hit by moving or swinging load, caught in between moving gantry crane and structure and falling load due to insecure rigging. The consequences of an accident can be serious and fatal at times. Adopting a right method and using the right equipment will greatly minimize potential accidents during lifting operations (Safety and Health Council, 2016). Other than that, most common failure happen in material handling is a problem of wind condition and the center of gravity issues that must be consider as a crucial part in lifting the component to guard its stability.

Meanwhile, for both storage system and inventory control are mostly poor in certain manufacturers management. High product demand and rapid product produced are unable the producer to manage the process effectively plus the activity of keeping, counting and transacting the data are manually conducted. It is impossible to conduct such works without any problems occurs throughout the production process at one time unless with more human effort needed. Poor management system of

storage and inventory control process can cause a trouble in tracking the item within the timeframe and may damages the component if not properly strategize the consequences of work done while storing. Current storage systems also are not properly utilized, and its locations are not optimized according to the factory layout. It can be concluded that the transporting, storing and inventory control management are mostly done separately and manually with more human interference.

Hence, the objectives of this study is focused on identify a problem and impact of the current practice material handling, determine the innovation approaches on current technology of material handling in meeting Industry Revolution (IR) 4.0 and propose a potential technology on robotic and automation of an auto transporting storage system and inventory control management with less human interference and fully automated handling system by combining both system for transport and store and inventory control management in one system of operation.

2.0 LITERATURE REVIEW

2.1 Innovation Approaches

Historically, the model for material handling has been set to prescribe weight limits only and get it done manually. Manual handling is defined as the application of human effort including lifting, putting down, pushing, pulling, carrying or moving for a purpose of transporting or supporting the load. However, the current standard is being prepared by advocate the role of risk assessment and emphasize that load is not necessarily the only factor to be considered. Hence, a critical review on a related research article on material handling and current method of storage system are review based on various innovation approaches of the conventional and modern technology.

2.2 Types of Robot Used in Construction Industry

Technology is transforming the construction and project management landscape towards a futuristic development with the ability of monitor deliveries, inventory and enhance the efficiency of the overall process. Industrial robots, logistics robots, building automation, autonomous drones, and 3D printing and other are types of robot that has been used in the construction process. The existence of robotics in construction help cope with mundane activities like lifting, shifting, loading unloading and other kind of repetitive jobs reducing depends on human intervention and external factors such as fatigue, interest, skills, work timing and human errors, (Verlprakash K., 2018).

2.3 Evolution of Conveyor System

Conveyor systems have been in use for over a century. Early used of conveyor introduced in transporting the goods in order to provide good management, better service, fast and efficient. This research covers the evolution of conveyor starting from 1795 until today which have transformed into a modern and automated in operation. Conveyor systems today are controlled by computers and automation is used for maximum performance and flexibility. Conveyors can move heavy loads with accuracy. Today's conveyor development technology allows designers to accommodate these curves relatively easily.

3.0 METHODOLOGY

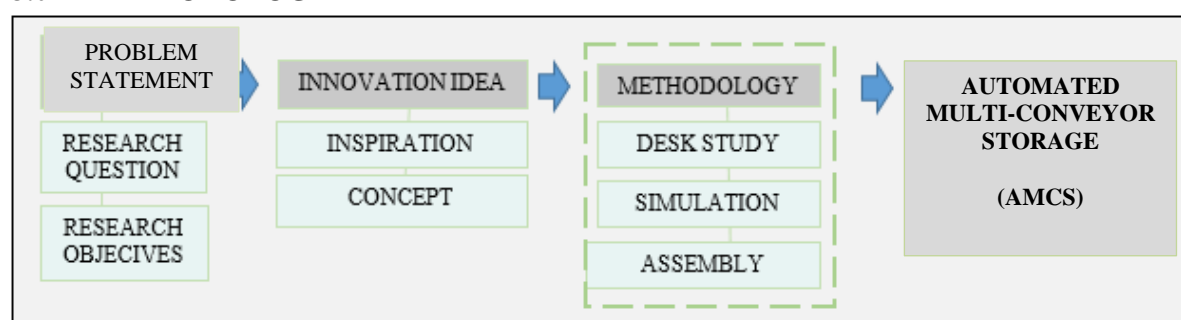


Figure 1: Methodology

There are several methods of proposed methodology in collection of the data research. First is conduct a detail desk study related to the problems and issues of material handling methods and manually inventory control management. Based on a review of relevant research, transporting and storing of component are requires more workers to operate and involve more safety issues as mentioned above. Meanwhile, for the inventory control management, the data of storing item are collected manually by the workers using a scanning device which need the workers to move all over the place to do a scanning. Hence, a second proposed methodology is a simulation of AMCS which combine a transport, storing and inventory control in one system are prepared to figure out a real live performance of the proposed AMCS in construction such as a movement of the component, component parts detail, materials and assembly process of a AMCS to tackle the mentioned problems. Third method will be an assembly prototype where the 3D imentional model of AMCS are being assemble parts by parts using an application of video from the Goggle SketchUp Software.

4.0 ANALYSIS AND FINDINGS

Automated Multi-Conveyor Storage (AMCS) are surely will beneficial the industry player especially Industrialize Building System (IBS) manufacturers. AMCS expected performance is to overcome the problems occurred in terms of technical, lack storage space and utilization and also poor in inventory control system in the IBS manufacturing practice. AMCS can assist the manufacturer management system by tracking the storage location profiles automatically recorded into the system and properly assign product to the best storage location safely without a gravity issues of a movable component as shown in Figure 2.

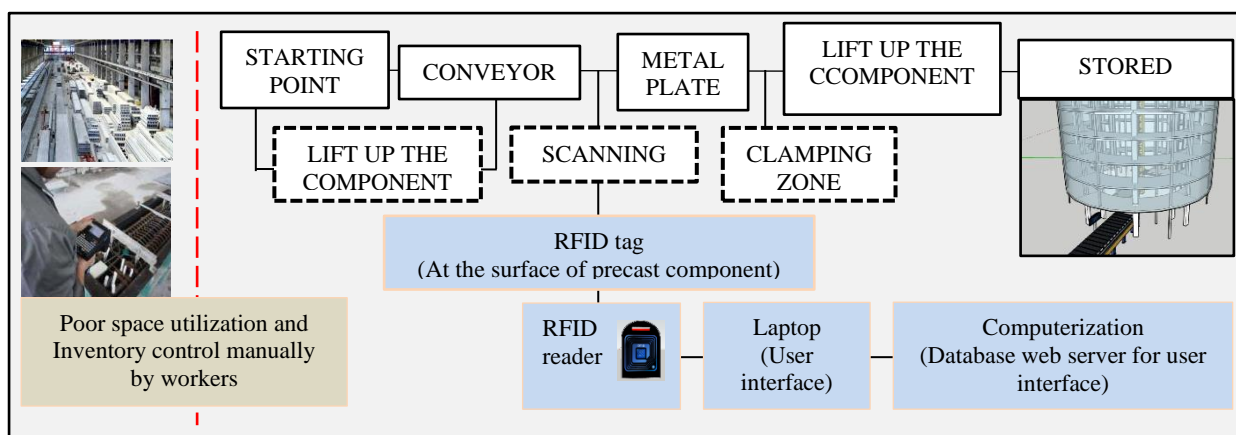


Figure 2: Current practice of IBS component management and Automated Multi-Conveyor Storage (AMCS)

5.0 CONCLUSION

The revolution gives an idea of mass production product at a very efficient and fastest way. The mechanization movement had a significant impact on how people worked. Automated Multi-Conveyor Storage (AMCS) will help industries to speed up their handling method of precast component with the higher and better-quality yield of end product. AMCS's vital feature capacity is specifically for moving a heavy load component such as precast slab and beam without damaging it with high accuracy and precision control.

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