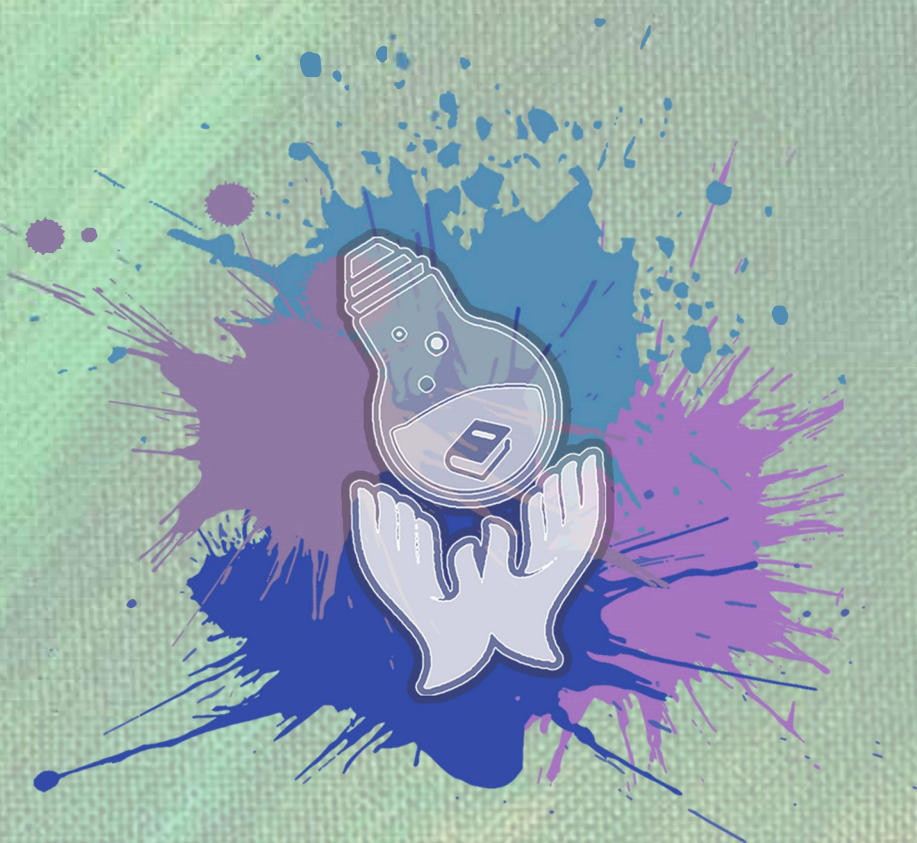




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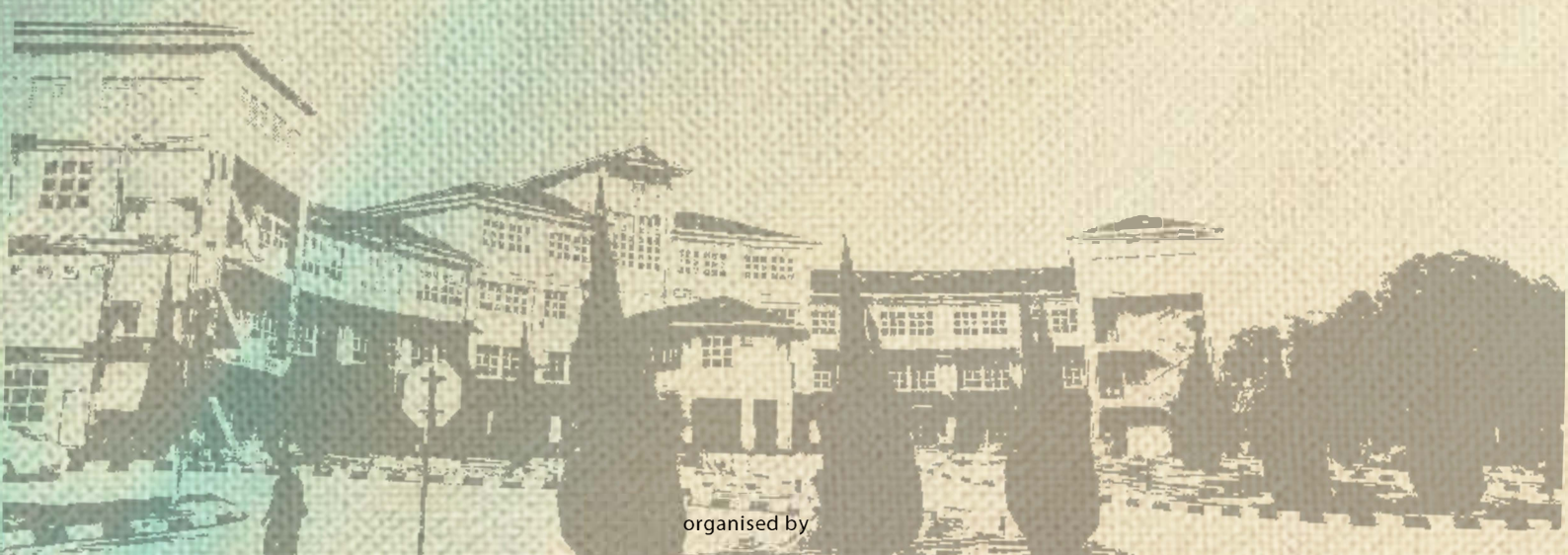
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## MAGNETIC LINEAR TOOL (MagTool)

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### **Abstract:**

Simpler and faster construction are now a must-trend within the development of construction field. The reason for this is that the faster a project completes without quality defects, the greater the firm become at the world's eye. This paper presents the innovation project proposal for Magnetic Linear Tool (MagTool). A study has been conducted to identify the problem and issue related to the measurement tools in precast panel and surveying work. The objectives of this study are to evaluate the current tools available in the market and to propose suitable measurement tools that is user friendly in the industrial needs. A quantitative method, a questionnaire survey will be provided and distribute to selected range of individual and industry personnel who are related to the construction field especially for those involve in the measurement and surveying work. Another qualitative method by using interview to related personnel in the measurement and surveying work. The interview is mainly focus towards experiences workers who have been working for several years. Some of the literature studies are from the researched article and journals, relevant researches. Based on the data, there are many problems regarding the arising of building inspection and installation in measurement and surveying works. Expected outcome will benefit the construction and industrial sectors.

### **Keywords:**

Measurement tools; Construction work; Inspection work; surveying work; Industrial needs

### **1.0 INTRODUCTION**

The use of IBS in Malaysia started in 1963. This term is in reference of the requirement of the IBS construction industry Master Plan, 'Road Map' 2003-2010 and IBS 'Road Map' 2011-2015 with achievement is still in progress and which is still an initial stage. However, although it has been four decades since the introduction of IBS in Malaysia, the application and adoption of this method in the local construction industry, particularly in the private sector, is still relatively low compared to the developed countries. This was despite the perennial problems besetting traditional construction methods which include (i) time delay, (ii) cost overrun, and (iii) waste generation (Research, 2014). As modern production, techniques dictate working to tighter and tighter accuracy limits, and as economic forces limiting production costs become more severe, so the requirement for instruments to be both accurate and cheap becomes ever harder to satisfy. This latter problem is at the focal point of the research and development efforts of all instrument manufacturers (Morris, 2001). Unfortunately, the crucial part that measurement plays in all of these systems tends to get overlooked, and measurement is therefore rarely given the importance that it deserves. For example, much effort goes into designing sophisticated automatic control systems, but little regard is given to the accuracy and quality of the raw measurement data that such systems use as their inputs (Morris, 2001).

Bad management can endanger both the success and completion of a project as well as the safety of the workers. When there is uncertainty, variability in objectives there is an increase in risk. The result is an increase in safety and material incidents, injuries, and losses. If construction management is poor, so will be the outcome. Conventional tools are contributing some of the dangers in manual method and they are only continuing to increase, especially working at height. This shows advancements in the market mean that modern cordless tools are expected to be much safer and able to last much longer than they used to as well. Cordless power tools are hardly a new invention and just finally beginning to become better than the corded alternatives. Current tool need something more user friendly. At the same

time, small human errors are in principle not distinguishable from other components of measurement uncertainty.

The objective of the innovation project is (a) to identify the problem and issue related to the measurement tools in precast panel; (b) to evaluate the current tools available in the market; (c) to propose suitable measurement tools that is user friendly.

## **2.0 LITERATURE REVIEW**

In 1960, the very first laser was constructed and the next 15 years following its invention saw its uses becoming more and more varied. According to Ian Johnson, the ISO Standard 16331-1 ensures that a person purchasing a laser measure that holds this certification can expect the product to perform as advertised and, of course, to deliver the very highest levels of accuracy. Before this standard was introduced and adhered to customers frequently found it difficult to compare the various laser measures and manufacturers on the market. Imprecise measurements can be a huge problem (Johnson, 2016).

### **2.1 Various Innovation Approaches in Robot**

Owing to rapid technological advancements in robotics and automation, the manufacturing sector has witnessed an increased adoption of robotics engineering and technology into its production processes. Industrial robots are being used to perform tasks with high precision and repeatability resulting in products of higher quality. The ability of industrial robots to work continuously without taking a break is helping manufacturers in increasing output. Moreover, robots can work in dangerous and harmful environments, thus improving the working conditions and safety of the production plant. Therefore, the several advantages of industrial robots are encouraging manufacturers to integrate different types of industrial robots in its production line to increase plant efficiency and profitability (Technavio, 2018).

## **3.0 METHODOLOGY**

The method uses to achieve the objective of this innovation idea is divided into two categories: (i) qualitative method, and (ii) quantitative method. A qualitative method of critical review is used in order to identify the problems face by the end users of several of measurement tools available in the market. By using the Internet, several researches on how the existing tools work. Based from all the information gather, list out the potential benefit and shortcoming of the tools.

As for quantitative method, a questionnaire survey will be provided and distribute to selected range of individual and industry personnel who are related to the construction field especially for those involve in the measurement and surveying work. The data of questionnaire will be evaluated as the result for the competencies of the innovation idea. It will also act as bonus to the innovation idea, as the result of the survey is to be able to identify the quality and disadvantages of the innovation idea in the industry.

Another qualitative method by using interview to related personnel in the measurement and surveying work. The interview is mainly focus towards experiences workers who have been working for several years. The data from the interview will be extract and use as a reference. By using a semi-structural interview as a reference on how the measurement tools benefit and disadvantages that will give advantage in long term.

## **4.0 ANALYSIS AND FINDINGS**

A robot that is multitasking when delivering the measurement work. Robot with semi-automation function that only require one operator to handle it. The most suitable robot to apply on the Magnetic Linear Tool (MagTool) is the Mobile robot. As the tool must able to be move from a certain point distance toward another point distance. Based on this, the mobile robot suit MagTool as it is a good option for rotation and balancing robot. The typical method of protecting an operator from getting pinched or hit is an external system that creates a fence around the robots. This hard guard protects both the operator and the product by not allowing anyone to tamper with the robot when it is in use. As far as maintenance goes, there is no standard across the board for the robotic types. Maintenance periods mostly depend on the environments in which the robots are operating and their duty cycle.

This innovation idea is inspired by a military tank, a camera and a seesaw. The concept took the mobility of the military tank in detecting the distance, the zooming effect of the camera and the balancing concept of the seesaw. It is designed to measure the distance and balancing the precast panel and easing the surveying work. It is a tool (i) to measure distance horizontal and vertically, (ii) to ensure the balancing during measurement and surveying work.

Table 1: Current measurement tools approach

Current tools	Spirit Level	Digital Measuring Tape	Laser Distance Meter	Magnetic Linear Tool
Manufacturer	INGCO TOOLS			
Country	China	China	China	Malaysia
System Type	-Bubbles Level	-Roll Mode -Cord Mode -Sonic Mode	-Laser	-Rotation Bearing -Laser -Arduino -Automated Remote Controller
Motion of Robot	Vertical and Horizontal	Vertical and Horizontal	Vertical and Horizontal	Vertical and Horizontal
Speed/Measuring Capacity		1/100th of an inch	0.05 meter – 100 meters	0.05 meter – 200 meters
Dimension/Weight	80 cm	13.3 x 1.6 x 3.3 inches / 170grams	4.4 x 1.97 x 0.99 inches / 250grams	11.8 x 11.8 x 11.8 inches Full Height:Up to 3 meters

Based from Table 1, current tool by using spirit level, it is a struggle for some of first timer to centralize the bubbles inside the spirit level. Even harder to centralize the bubbles if the subject is measure in height. Using the motion detector sensor, this innovation idea, it is expected to be use as a substitute for the bubbles. It is equipment with technology to control the mobile tool by using a remote control. One person automates it.

## 5.0 CONCLUSION

The construction industry's growth is also evolving and needs due attention, to drive the development and advancement of the country. The contribution of Magnetic Linear Tool (MagTool) to construction industry is expected to reduce the process of the work by one person automated the tool. MagTool is equips with balancing alarm, laser distance sensor, PIC computer interface and IR sensor in one tool and is automated by one person. Hence, the main problem of accuracy error during installation and inspection on site is expected to reduce. The management able to work within the schedule with lesser error on installation and inspection at a very efficient and fastest way. Using conventional method, the worker is much exposed to danger. Thus, a few different tools need to be use in completing one work. MagTool is expected to be much easier to handle and carried. The installation method is expected to be much simple. Hence, by using MagTool the work done quicker, cheaper and with more detail that is precise.

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