

Development of Floor Tile Space Grouting Mechanism

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Abstract

This research project mainly focuses on the development of a floor tile space grouting machine. The traditional method has lots of drawbacks and challenges. The manual grouting process is labor-intensive and time-consuming, and it poses significant ergonomic risks to workers. Currently using grouting machines also has some limitations and disadvantages. It includes wastage of raw material because that machine applies the grout to the total tile surface area, and ineffective time consumption to cleaning the floor. Moreover, that machine needs a power resource to operate that machine. So, it limits the area that can operate at one time. The main purpose of this research project is to overcome those drawbacks and challenges. The machine's design features a screw extruder mechanism. The force required to extrude the grout mixture is determined by experimenting using a syringe and a digital spring balance. After finding the force required to apply grout, other design calculations were done. To assess the ergonomic risks of manual grouting, REBA (Rapid Entire Body Assessment) analysis is carried out and it has shown that manual grouting is a higher risk level than using the machine. When applying the grout for 1m in the manual method it takes 3 to 4 minutes. But using this machine it takes only 1.32 min. Therefore, it is concluded that the developed grouting mechanism is less ergonomic risky and is an efficient method of grouting the floor tiles. In terms of limitations, this machine can't apply the grout to the corner tile spaces which are very near to the walls. As well as this machine little bit heavy. In the future, this machine can be developed to automate using a line follower robot. It will help to reduce manpower usage and there can be a flexible nozzle to apply the grout to the corner spaces.

Keywords: *Extruder, Grouting Mechanism, Tile space*