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# Automation in Conventional Drilling Machine to Multi-spindle Drilling SPM

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**Abstract.** The current scenario for small scale industries is the production of use box component work piece of 14mm and 10 mm square rod, that takes two workers to operate the conventional pillar drilling machine (Model- SKP 20mm capacity) to drill three holes of various diameters at various center distance. The time required to complete process for one work piece is about 2-3 minutes. The production target of 14mm square rod is 6000 pieces and 10mm square rod is 10000 pieces in 26 days. The aim of this paper is to automate the entire process with minimum human intervention and thereby increasing production rate and minimizing the process time. The entire theoretical design calculation, manufacturing, and experimental work carried out in industries as it demands to reduce the process time and increase the production rate. Therefore, the conventional pillar drilling machine setup is to be automated. Now to fulfil the above purpose, the modification in conventional machine need to be done and is to incorporate a separate motor for both z-axis and x- axis travel and that are controlled by using a microcontroller, new designed multi spindle head, and helical gears. Production rate measured for different feed rate for drilling operation on multispindle and measured reduction cycle time to fulfil the process requirements. Jig plate provision is made to improve the accuracy and reduce the workpiece rejection rate. Finally, power consumption calculation is made in which the automated multi-spindle reduced 78.85% than conventional drilling machine.

**Keywords:** Multispindle, Drilling Machine, Microcontroller, Production Rate, Jig Plate, Automation.

## 1 Introduction

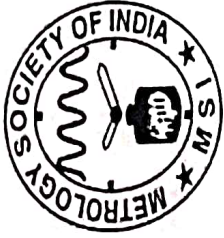
Manufacturing industries have evolved a lot throughout the years in terms of technology. Large-scale industries have already started using automation for production. Nevertheless, large-scale industries rely on smaller industries to produce components that are to be used in their assemblies. However, small-scale, and mini-scale industries still prefer conventional machining operations. This leads to low production rate and long working hours. To maximize productivity and obtain accuracy these industries need to opt for the automated process. Gears are the most important components for power transmission at high speeds. If not selected properly can cause problems such as vibrations, heating due to friction and high frequency noise intolerable to human ears and jamming of gears. For this, the factors affecting



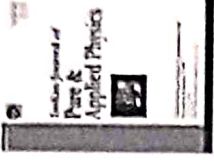
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### Abstract

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