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Multiple Operations of Machine Tool

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A B S T R A C T

Multi-Operational Mechanical Machines were originally developed primarily for production-based sectors. Industries are primarily designed for the low-cost production of valuable goods and services. The usage of technological innovation has made all tasks in today's society quicker and simpler, but it also necessitates significant financial investment. Every industry strives for high production while maintaining product standards and quality at low average costs. We have created a conceptual model of a device that can do multiple tasks simultaneously and with high effectiveness. This project's equipment is capable of drilling, sawing, cutting, and grinding operations all at the same time. Additionally, it lowers the expense of putting up four different machines for completing each duty reduces operator and work movement. Additionally, it will increase productivity and lower product costs.

***Keywords*:** Single slider mechanism, bevel gear, drilling, cutting, sawing, grinding, multi-operational, bearings.

1. Introduction

Since no machine currently exists that can drill, cut, saw, and grind simultaneously, one must create a mechanical device that can execute many operations. This machine uses a single slider mechanism, bevel gears, and a DC motor for operation. This particular model of the multi-operation mechanical device is suitable for residential use as well as small-scale companies dealing with light materials like wood, cardboard, etc. Daily living frequently calls for activities like drilling, grinding, and cutting. Industries are primarily designed for the low-cost production of valuable goods and services. This project involves creating a machine that can simultaneously perform the operations of drilling, sawing, grinding, and cutting at various work centres.It suggests that the maker need not pay for each individual task-performing equipment..

2. Literature Review

1.According to Arnold, Heinrich (2001), the machine tool industry has experienced increased innovation over the past 15 years as outdated models are routinely replaced by more modern ones. Additionally, the industry in these fields has been impacted by the incorporation of digital controls technology and computers into machine tools. The majority of businesses miscalculated the influence of this new technology. The study finds a link between the competitive climate, industry structure, and dramatic technological development. It shows several significant events and relationships that have hitherto gone overlooked.

2. According to Dr. ToshimichiMoriwaki (2006), the most recent developments in machine tool technologies are examined from the perspectives of high speed and high performance machine tools, combined multifunctional machine tools, high precision machine tools, and sophisticated and intelligent control technologies.

3. According to Frankfurt am Main, 10 January 2011 3. Modern machine tools need to be flexible and able to handle a wide range of materials. What lies ahead for makers and users of machine tools is discussed by two highly regarded specialists in machining and forming from Dortmund and Chemnitz. The declarations of independence are the multifunctional machines. The current fashion calls for multi-operational machining centres that can efficiently handle a wide range of products in small batch sizes. "You're less dependent on a single machine when it's multioperational,"

3.Methodology used:

The hacksaw is operated by a single slider mechanism in this project, and the power transmission between the various work centres is accomplished using a bevel gear arrangement. A dc motor is used to provide power to the shaft on which a bevel gear is attached. Three other bevel gears have been mounted—two at a right angle to the main shaft and one on the opposite side of the shaft. Power is sent to one end of the shaft by a motor, and this end is connected to a circular disc via this circular disc single slider mechanism, which is designed to operate a hacksaw. Cutting blades and grinding

wheels are provided on the other two shafts at a straight anglewhen the main shaft receives power, they begin to operate. Due to its bevel gear-enabled meshing, all of the machine's tools and main shaft begin to operate simultaneously. A drill bit is included in the shaft that is opposite the main shaft. A DC motor drives this machine. The mechanism of this device is based on a single slider and gears. This particular sort of mechanical equipment, which is multifunctional and capable of doing mechanical tasks like drilling, cutting, grinding, sawing of a wooden model or body and a thin metallic sheet. It is ideal for producing such things in batches that include all four of the aforementioned activities. Moving people, equipment, and materials takes a lot of time and effort, which drives up unit costs. Separate machines need to be installed for each function, which adds to the original investment, ongoing operating expenses, and space requirements. The most affordable solution to all of these issues is our device.

There are only two major principles on which our proposed machine generally works: 1. Single Slider mechanism

2.Power transmission through gears (Bevel gear)

5. ANALYSIS

Based on a temporal analysis: Manually Cutting = 2:30 (*4)

Filing: 1 minute, 30 seconds (*4)

Drill=20 seconds

2 minutes for base cutting

18 minutes and 30 seconds total

on a mechanical device with multiple functions Cut=1 minute and 10 seconds (*4)

40 second grinding (*4)

Drill=3 seconds

50 seconds for foundation cutting

Total time: 6 min. 33 sec.

Timemachine: 18 minutes and 30 seconds; 6 minutes and 33 seconds; 3:1

The time required to operate a mechanical machine is 3 times longer than the time required to operate it manually (270 90 machine).

All machines take up three times as much area as a mechanical machine with multiple functions.

Analysis on basis of space required

Required space for each machine Drilling device = 60 cm2

90 cm2 for a motorised hacksaw 60 cm2 for a grinding wheel

Cutting blade: 60 cm2; total space: 270 cm2;

mechanical device with multiple functions. space total = 90 cm2

The area all machines occupy area taken up by several

6. CONCLUSION

We are aware that the goal of every production-based industry is to reduce production costs and enhance output rate, which may be accomplished by using a mechanical machine with several operations. Due to its ability to perform multiple tasks at once, this machine uses less power and time. The installation of machinery in a sector of the economy requires a substantial investment. As a result, we have suggested a machine in this study that can execute operations like drilling, sawing, grinding, and cutting at various work centres concurrently, suggesting that an investment in separate machines to carry out the aforementioned activities is not necessary. Additionally, this machine requires far less floor space to set up than individual units do, indicating a relatively straightforward end product.

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