

DESIGN & FABRICATION OF HUMAN POWERED MULTI-PURPOSE MACHINE: A REVIEW

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ABSTRACT

This paper presents the concept of Human Powered Multi-Purpose Machine mainly carried out for production based industries. Industries are basically meant for Production of useful goods and services at low production cost, machinery cost and low inventory cost. Today in this world every task have been made quicker and fast due to technology advancement but this advancement also demands huge investments and expenditure, every industry desires to make high productivity rate maintaining the quality and standard of the product at low average cost. We have developed a conceptual model of a machine which would be capable of performing different operation simultaneously, and it should be economically efficient. This machine can be used in remote places where electricity is irregular or insufficient. It is designed as a portable one which can be used for cutting in various places. It can be used for operating on materials like thin metals, wood and p.v.c. The material can be cut without any external energy like fuel or current. Since machine uses no electric power and fuel, this is very cheap. Energy is the most vital aspect in the development of modern technological civilization. In the present work, a human powered multipurpose machine is developed which can perform three types of operations drilling, sawing and grinding. Power required for pedalling is well below the capacity of an average healthy human being. The system is also useful for the work out purpose because pedalling will act as a health exercise and also doing a useful work.

Keywords: Drilling, Grinding, Multipurpose, Sawing, Pedal Operated

I. INTRODUCTION

Industries are basically meant for Production of useful goods and services at low production cost, machinery cost and low inventory cost. Today in this world every task have been made quicker and fast due to technology advancement but this advancement also demands huge investments and expenditure, every industry desires to make high productivity rate maintaining the quality and standard of the product at low average cost In an industry a considerable portion of investment is being made for machinery installation. So in this paper we have a proposed a machine which can perform operations like drilling, sawing, grinding, some lathe operations at different working centers simultaneously which implies that industrialist have not to pay for machine performing above tasks individually for operating operation simultaneously.

Economics of manufacturing: According to some economists, manufacturing is a wealth-producing sector of an economy, whereas a service sector tends to be wealth-consuming. Emerging technologies have provided some new growth in advanced manufacturing employment opportunities in the Manufacturing Belt in the United States. Manufacturing provides important material support for national infrastructure and for national defense.

II. NEED OF DEVELOPMENT OF MACHINE

In the present scenario machines are electrically driven. Machine with electric motor are faster but that are costly as well as required electricity. The unit operating by means of electricity has limited applications in the rural area. In remote and interior places like in our Vidharbha where there is no facility of electricity as well as in urban areas, while in the duration of load shading or during electrical power-off timings, this type of human power operated unit will have very extensive utility. Therefore this human powered machine is having extensive utility in such areas. Also it reduces the machining equipment cost as three machines can be used simultaneously on same platform.

III. LITERATURE REVIEW

The surveys of the literature regarding the Pedal driven machines are listed:

Dharwa Chaitanya Kirtikumar [1] designed and developed a multipurpose machine which does not require electricity for several operations like cutting, grinding etc. This is a human powered machine runs on chain drives mainly with human efforts. But if you wanted to operate this machine by electric power this machine can also does that. It has some special attachment so use both human power as well as electric power. The design is ideal for use in the developing world because it doesn't require electricity and can be built using metal base, chain, pulley ,rubber belt, grinding wheel, saw, bearing, foot pedal (for operated by human) ,electric motor, chain socket.

S.G.Bahaley, Dr. A.U. Awate, S.V. Saharkar [2] designed and fabricated a pedal powered multipurpose machine. It is a human powered machine wich is developed for lifting the water to a height 10 meter and generates 14 Volt, 4 ampere of electricity in most effective way. Power required for pedaling is well below the capacity of an average healthy human being. The system is also useful for the work out purpose because pedaling will act as a health exercise and also doing a useful work.

Linxu, Weinan Bai, Jingyu Ru,Qiang Li [3] designed and developed an automatically reciprocating pedal powered electricity generator (ARPPEG) in conjunction with the management and control over harvesting the kinetic energy, electricity generation, electric storage and the output of electricity. According to the operation testing results, this system has been proved to effective in power generation. In view of the simple structure and low costs of this system without territory and time limits, the application of ARPPEG designed by them could open a new path to saving the energy and helping build a new energy society.

Heinrich Arnold1 November 2001: Rather long re-investment cycles of about 15 years have created the notion that innovation in the machine tool industry happens incrementally. But looking at its recent history, the integration of digital controls technology and computers into machine tools have hit the industry in three waves of technology shocks. Most companies underestimated the impact of this new technology. This article gives an overview of the history of the machine tool industry since numerical controls were invented and introduced and

analyzes the disruptive character of this new technology on the market. About 100 interviews were conducted with decision-makers and industry experts who witnessed the development of the industry over the last forty years. The study establishes a connection between radical technological change, industry structure, and competitive environment. It reveals a number of important occurrences and interrelations that have so far gone unnoticed.

Dr. Toshimichi Moriwaki (2006): Recent trends in the machine tool technologies are surveyed from the view points of high speed and high performance machine tools, combined multifunctional machine tools, ultra precision machine tools and advanced and intelligent control technologies.

Frankfurt-am Main, 10 January 2011. : The crisis is over, but selling machinery remains a tough business. Machine tools nowadays have to be veritable “jack of all trades”, able to handle all kinds of materials, to manage without any process materials as far as possible, and be capable of adapting to new job profiles with maximized flexibility. Two highly respected experts on machining and forming from Dortmund and Chemnitz report on what’s in store for machine tool manufacturers and users.

Multi-purpose machines are the declarations of independence. The trend towards the kind of multi-purpose machining centers that are able to cost efficiently handle a broad portfolio of products with small batch sizes accelerated significantly during the crisis. “With a multi-purpose machine, you’re less dependent on particular products and sectors”, explains Biermann

IV PROPOSED METHODOLOGY

In this project we are supplying power to shaft by means of bicycle pedals mechanism containing one big sprocket and one small sprocket which is fitted on shaft and chain on sprockets helps to rotating shaft, on which a pulleys are mounted on it by means of pedal chain sprocket arrangement. One pulley transmits power by v belt to the grinding wheel under it and also by link attachment the power is transmitted to the hacksaw frame (rotatory motion is converted to reciprocating motion). Also other pulley transmits power by v belt to the drilling attachment.

4.1 Working Principle

There are only two major principles on which our proposed machine generally works:

1. Scotch-Yoke mechanism: It converts rotary motion to reciprocating motion of hacksaw which is used for cutting operation i.e. sawing.
2. Power transmission through v belt and pulleys: It transmits power through the v belt and pulley to the drilling and grinding attachments.

V CONCLUSION

We can see that all the production based industries wanted low production cost and high work rate which is possible through the utilization of multi-function operating machine. It requires less power as well as less time, since this machine provides working at different center it really reduced the time consumption up to appreciable limit.

In an industry a considerable portion of investment is being made for machinery installation. So in this paper we have proposed a machine which can perform operations like drilling, cutting, grinding at different working centers simultaneously which implies that industrialist have not to pay for machine performing above tasks individually, since this machine will perform different operation simultaneously This machine can be used in remote places where electricity is irregular or insufficient. It can be used for light duty cutting and drilling operations of plywood. also the grinding operation can be used to sharp the tools edges as well as to remove extra materials Its working can be done in less floor space. Unskilled labour can also handle it efficiently because of this we can reduce the cost of production which is the most important factor in production industry.

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