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"Design and Manufacturing of Drilling and Tapping head for Street Light Lamp Casing"

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Abstract - *The growth of Indian manufacturing sector depends largely on its productivity & quality. Productivity can be improved by reducing the total machining time, combining the operations etc. In case of mass production where variety of jobs is less and quantity to be produced is huge, it is very essential to produce the job at a faster rate. This is not possible if we carry out the production by using general purpose machines. The best way to improve the productivity along with quality is by use of special purpose machine. SPMs or Special Purpose Machines offer tremendous scope for high volume production at low investment and at low cost of production when compared to VMC machines. SPM, Special Purpose Machines is a high productivity machine, with specially designed tooling and fixture, dedicated for mass producing the same component day in and day out. This paper show the way of development of SPM for drilling and boring operation. The concept of SPM is that the plate having different size and thickness are drill on drilling spindle first and then tapped on tapping spindle latter, with the use of guide ways. Both the operation performs on same machine having two separate spindles.*

Key Words: Special Purpose Machine, Automation, Drilling and Tapping Operations, Drill Head, Tapping Head

1. INTRODUCTION

Now a day's automation is highly essential trend in the manufacturing industries.SPM, transfer lines, FMS, Robots are the techniques through which automation can beachieved easily. SPMs are mainly designed for special jobs. In mass production industries, SPMs plays an important role because it yields highest productivity & accuracy. Generally, large scale industries are not manufacturing SPM by themselves. They are not interested in manufacturing such machines & expend the money & time in it. So these large scale industries are always trying to search such vendors who can manufacture such SPMs.

1.1. Importance Of Drilling :-

Drilling is a cutting process that uses a drill bit to cut a hole of circular cross-section in solid materials. The drill bit is usually a rotary cutting tool, often multi-point. The bit is pressed against the work-piece and rotated at rates from hundreds to thousands of revolutions per minute. This forces the cutting edge against the work-piece, cutting off chips (swarf) from the hole as it is drilled.

1.2. Importance of Tapping :-

Tapping also Called as(tapstyle), touch-style, and two-handed tapping, is a guitar playing technique where a string is fretted and set into vibration as part of a single motion of being tapped onto the fretboard, with either hand, as opposed to the standard technique of fretting with one hand and picking with the other. Tapping is the primary technique intended for some instruments such as the Chapman Stick, and is the alternative method for the Warr Guitar and others.

1.3 Literatures Review

1. "Review On Special Purpose Machine for Driling and Tapping"

Mukesh Mane SRTTC VIT Kamshet, Pune

In this paper give the information about the Drilling and Tapping operations. In recent past year more stress was given to design and development of existing machines. In this regard attempts had been made to develop a machine that can perform drilling and tapping operations simultaneously on the same machine. There were so many machines had been developed as portable drilling, hand tapping and automation tapping machine.

2. "Design, Fabrication and Analysis of Special Purpose Machine for Drilling and Riveting Operation"

Prof. Manish Kale, Prof. D. A. Mahajan, Prof.S. Y. Gajjal

In this paper gives the detail information of design, fabrication and analysis of special purpose machine and compare the cycle time with conventional method. This machine is containing automation by using pneumatic

system. Modeling is done using CAD software and analysis by FEA tool. The design is analysed for induced stress on work piece due to various load condition.

1.4 RESEARCH FINDING AND ISSUES:-

1. The Street Lamp Casing is currently machined on the lathe which requires approximately 3 minutes processing time which includes time required for loading/unloading, clamping –decamping and actual machining)
2. Semiskilled operator required.
3. Dimensional accuracy is not achieved as per requirement. Clamping & Declamping is complicated.

1.5PROBLEM DEFINATION

Fig.No1.Conventional Drilling Machine

Current the **Suvarna alloy, kagal** is using vertical drilling and tapping machine which produce Street lamp casing component per month is 3700 street lamp casings.

Working shift of day is 8 hrs (i.e.480mins), but the Production hours in working shift of the day considering recess period is 7hr 20 min (i.e.440 min). So driiling and tapping operation consume 3 min per street lamp casing .The tapping and drilling machine within single shift is 146 components per day. And Production of street lamp casing per month (considering 25 working days) is 146 x 25 = 3700 components.

After designing machining head ,Same product will consume 1 min for same operation .By taking above considerations Production in one day shift will be I component in 1 min i.e. 440 street lamp casing per day. Therefore Production in one month will be 440 components street lamp casings per month (25 days).

Now the production rate is Approx. 4000 per month (i.e.3 min/8 hour of shift = 4000 component) .but the order of Street lamp casing has increased by 7000 components, so we are going to **Design and Manufacturing of Drilling and Tapping head for Street light lamp casing.**

1.6 OBJECTIVE:-

1. To increase the rate of production
2. To minimize the production time
3. To increase dimensional accuracy
4. To minimize human error.
5. To avoid frequent production delays

1.7 ADVANTAGES:-

1. Less time required for the operation.
2. Increase in production rate.
3. Less inspection.

2. MACHINE SETUP AND METHODOLOGY

Fig.No.2 Machine Setup

1) As shown in the Fig this project begins by studying the requirements and the existing method of drilling and tapping operation on street lamp casing. This study will include overview of the current manual drilling and tapping process and formulation of initial design proposal for the proposed new method of welding the component
2) The next step to follow will be to carry out extensive literature review to find out about the drilling and tapping processes, automation in drilling and tapping processes and recent developments in drilling and tapping applications. This task is accomplished through accessing the internet, reference books, research papers, technical magazines and others related source of information.
3) After gathering and collecting all relevant information and knowledge about the drilling and tapping processes and automation, the proposal for design of a drilling and tapping head will be prepared for the approval of the sponsoring industry. It will include proposed schematic layout of design of a drilling and tapping head considering all the requirements of the street lamp casing component and the drilling and tapping process.

4) The schematic layout of design of a drilling and tapping head will be followed by detailed design of various assemblies and sub assemblies required for manufacturing and fabricating the design of a drilling and tapping head. The next step after the design is finalized will be to manufacture the components and fabricate the different sub assemblies considering their manufacturing suitability and requirements such as operations and machines required, processes and heat treatment to be carried out and the inspection of the parts.
5) The next step will be to assemble the subassemblies and join the sub assemblies on a single platform to assemble the complete drilling and taping head. Trials will be conducted to verify the performance and functioning of the drilling and taping head.
6) The specimens of drilled and tapped components will be tested quality control department.
7) Finally the total cost will be estimated, that is incurred on designing, fabricating and testing of drilling and taping head. The economic justification will be verified in the end.

COMPONENT SPECIFICATION

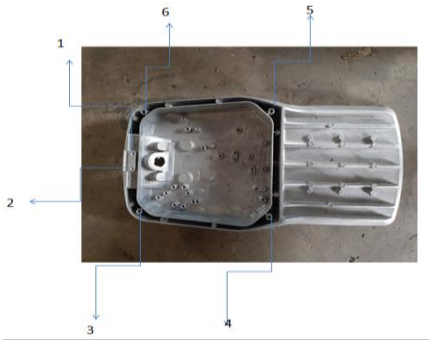

Fig.No.3 Component

Table -1 Specifications

Parameter	Specification
Name of Component	Street lamp casing
Component No.	BOG-CUN
Component weight	1.3 kg.
Material	Aluminum
Diameter of drill	3.3. mm
Depth of drill	10 mm
No of holes	6
Tap Size	M4 X 0.7 mm

3. RESULT AND DISCUSSION

From Economical Analysis following conclusion are derived:

1. Time required for drilling And Tapping operation is reduced by 3 min./Street Lamp Casing component to 1 min/ Street Lamp Casing component with ultimately result in increase production rate. And improvement in productivity.
2. After designing the drilling and Tapping head production rate increases and Maintenance of the conventional machines which are used to Specially for Drilling and Tapping Operations and tools Life get reduce.
3. Enhancement improved product quality and delay in production avoided which problem faced on conventional drilling and tapping get troubleshooter in existing design drilling and tapping head.
4. Increase in Turnover, Increase in profit of industry.
5. Cycle time will get shortered.

Table No .2 COMPONENTS REQUIREMENT

No.	Name	No	Name
1	Sliding Bed	7	Jig Plate
2	Gear Train (Spur Gear)	8	Clamping and De-Clamping Device
3	Bearing	9	Washers.
4	Spindle	10	Check Nut.
5	Driving Shaft	11	Motor
6	Driving Pulleys	12	Motor Mounting Plate

4. CONCLUSION

From above result and discussion it is conclude that, by using conventional methods in machining process we cannot increase production rate and productivity.but we are using this techniques for Drilling and Tapping Operation we get Good quality of product, increase our production rate.

5. REFERENCES

[1] V B Bhandari, Design Of Machine Element, Tata McGraw Hill Publishing Company, 3rd edition, reprint 2010, pp 55-75,107-110,219-269,272-325,330-393,564-599,646-690.
[2] Machine Tool Design Handbook, Central Machine Tool Institute,1st edition ,reprint 2006,
[3] Manish Kale, Prof. D. A. Mahajan,Prof. (Dr.) S. Y. Gajjal",Design, Fabrication and Analysis of Special Purpose Machine for Drilling and Riveting Operation" ,Volume II, Issue VI, June 2015