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Productivity Enhancement through Fixture Development and Micro motion Study

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ABSTRACT

Productivity gains are vital to the economy because they allow us to accomplish more with less. Capital and labor are both scarce resources, so maximizing their impact is always a core concern of modern business. Productivity enhancements come from technology advances, such as computers and the internet, supply chain and logistics improvements, and increased skill levels within the workforce. Enhancement in the productivity proves to be the most essential criteria in these competitive business strategies. Hence every organization has the prime focus on optimizing their resources with improvement in the productivity. In each of the optimizing term the main aim is to improve the production rate with minimum inputs and enable organizations to achieve their goals. Micro motion study of the workplace or operation results into better know how of the concern problem and provides bottlenecks. An increase in productivity means an increase in output that is proportionally greater than increase in input.

Keywords: Productivity, Micro motion study, resource optimization

I. INTRODUCTION

Fixture is required in various industries according to their application. Design of new fixture is a modified over the old fixture due to some drawback. The fixture setup for component is done manually therefore more cycle time is required for loading and unloading the material. So, there is need to develop system which can help in improving productivity, accuracy and reduction of time. Over the past century, manufacturing has made considerable progress. New machine tools, high-performance cutting tools, and modern manufacturing processes enable today's industries to make parts faster and better than ever before. The work holding methods have also advanced considerably, the basic principles of clamping and locating are still the same. Mass production methods demand a fast and easy method of positioning work for accurate operations on it. Jigs and fixtures are production tools used for accurately manufacture duplicate and interchangeable parts. Jigs and fixtures are specially designed so that large numbers of components can be machined or assembled identically, and to ensure interchange ability of components. The economical production of engineering components is greatly facilitated by the provision of jigs and fixtures. The use of a jig or fixture makes a fairly simple operation out of one which would otherwise require a lot of skill and time. Both jigs and fixtures position components accurately; and hold components rigid and prevent movement during working in order to impart greater productivity and part accuracy. Jigs and fixtures hold or grip a work piece in the predetermined manner of firmness and location, to perform on the work piece a manufacturing operation. A jig or fixture is designed and built to hold, support and locate every component (part) to ensure that each is drilled or machined within the specified limits. The correct

relationship and alignment between the tool and the work piece is maintained.

1.1 Purpose of Using Fixtures[2]

1. To eliminate marking, punching, positioning, alignments etc.
2. Easy, quick and consistently accurate locating, supporting and clamping the blank in alignment of the cutting tool
3. Guidance to the cutting tool like drill, reamer etc.
4. Increase in productivity and maintain product quality consistently
5. To reduce operator's labor and skill – requirement
6. To reduce measurement and its cost
7. Enhancing technological capacity of the machine tools
8. Reduction of overall machining cost and also increases in interchangeability.

1.2 Design Consideration for Fixtures

1. Jigs and fixtures are manually or partially power operated devices, to fulfill their basic purposes, jigs and fixtures are comprised of several elements
2. Base and body or frame with clamping features
3. Locating elements for proper positioning and orientation of the blank
4. Supporting surfaces and base
5. Clamping elements
6. Tool guiding frame and bushes (for jig)
7. Indexing plates or systems, if necessary
8. Auxiliary elements
9. Fastening parts

II. METHOD

While dealing with the daily varying requirement from the customers the main aim is to reduce the manufacturing lead time by implementing any optimization and analysis technique. Optimization in lead time may include automation of workstations with elimination of unnecessary workstations and operations, combining two or more operations.

In this business environment, the design of such manufacturing systems, which involves the design of products, processes and the plant layout before physical construction, becomes more and more important. Particularly, the design of an efficient assembly line has a considerable industrial importance.

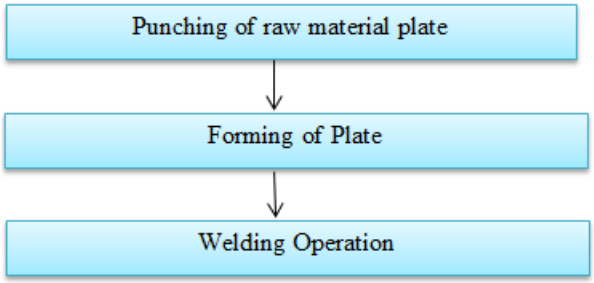

Figure 1

The components requires above sequence of operation for is complete manufacturing. The micro motion study gives exact idea about the bottlenecks and number of elements in the activity.

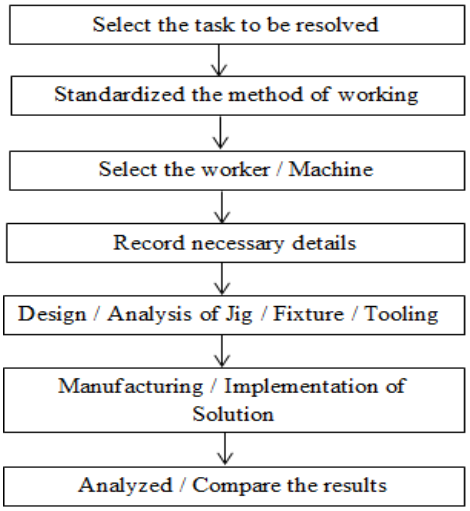

Figure 2. Steps in Methodology

Table 1. Time Study for Existing Method

Sr. No.	Motion Sequence	Time Required (Seconds)
1	Loading of Sheet Metal	5
2	Punching operation	10
3	Transport to next	10

	station	
4	U Forming operation	6
5	O Forming operation	8
6	Transport to welding station	15
7	Fixing of Workpiece	20
8	Welding operation	15
	Total	**89 Sec (1 min. 29 Sec)**

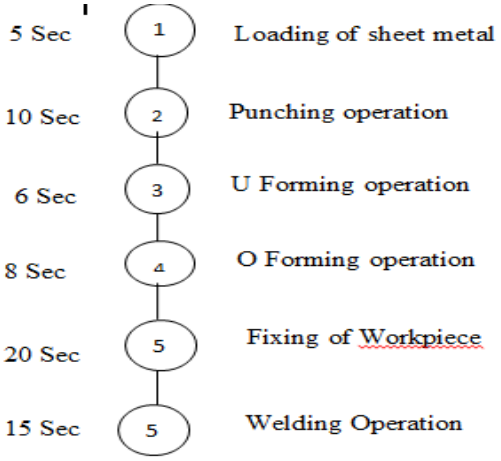

Figure 3. Outline Process chart for Existing Method

Table 2. Time Study for New Method

Sr. No.	Motion Sequence	Time Required (Seconds)
1	Loading of Sheet Metal	5
2	Punching operation	10
3	Transport to next station	10
4	U Forming operation	6
5	O Forming operation	8
6	Transport to welding station	15
7	Welding operation	10
	Total	**74 Sec (1 min. 14 Sec)**

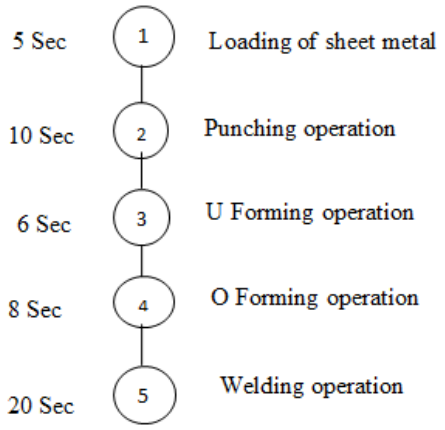

Figure 4. Outline Process chart for New Method

III. RESULTS

Above outline process charts and table indicates that the manufacturing lead time required for the earlier method is greater than the new method.

The total time saved due to fixture manufacturing and its implementation is 15 sec/part.
Total 500 parts are manufactured per shift.
Hence total time saved = 500 X 15 = 7500 sec / shift
i.e. 2 hrs approximately per shift can be saved using this fixture.

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