Global Journals LaTeX JournalKaleidoscope™
Artificial Intelligence formulated this projection for compatibility purposes from the original article published at Global Journals. However, this technology is currently in beta. *Therefore, kindly ignore odd layouts, missed formulae, text, tables, or figures.*

Multi-Function Operating Machine: A Conceptual Model

Sharad Srivastava[1]

[1] Shri Ramswaroop Memorial Group of Professional College

Received: 14 December 2013 Accepted: 2 January 2014 Published: 15 January 2014

Abstract

This paper presents the concept of Multi-Function Operating 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 .In this machine we are actually giving drive to the main shaft to which scotch yoke mechanism is directly attached, scotch yoke mechanism is used for sawing operation. On the main shaft we have use bevel gear system for power transmission at two location. Through bevel gear we will give drive to drilling centre and grinding centre. The model facilitate us to get the operation performed at different working centre simultaneously as it is getting drive from single power source. Objective of this model are conservation of electricity (power supply), reduction in cost associated with power usage, increase in productivity, reduced floor space.

Index terms—

1 Introduction

ndustries 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, shaping, 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.

2 II.

3 Literature Review

Before starting our work we have undergone through many research papers which indicates that for a production based industries machine installation is a tricky task as many factor being associated with it such as power

consumption (electricity bill per machine), maintenance cost, no of units produced per machine i.e. capacity of machine, time consumption and many more?.

Some research papers which have led us to approach to the idea of a machine which may give solution to all these factors are as follows: a) 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. ume XIV Issue IV Version I 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 multipurpose 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.

4 III.

5 Proposed Methodology

In this project we will generally give the power supply to the shaft on which a bevel gear is mounted on it, and a second bevel gear at a right angle to it has been mounted on a drill shaft to which a drill bit is being attached. At one end of the shaft is connected to power supply, other end is being joined to a circular disc ,through this circular disc scotch yoke mechanism is being performed (rotator y motion is converted to reciprocating motion) . Also in between these two, a helical gear is mounted which transfer its motion to other helical gear which is mounted on a shaft consist of grinding wheel.

working centers, basically gear or cogwheel is a rotating machine part having cut teeth, or cogs, which mesh with another toothed part in order to transmit torque, in most cases with teeth on the one gear being of identical shape, and often also with that shape on the other gear. Two or more gears working in tandem are called a transmission and can produce a mechanical advantage through a gear ratio and thus may be considered a simple machine. Geared devices can change the speed, torque, and direction of a power source. The most common situation is for a gear to mesh with another gear; however, a gear can also mesh with a non-rotating toothed part, called a rack, thereby producing translation instead of rotation. The Scotch yoke is a mechanism for converting the linear motion of a slider into rotational motion or vice-versa. The piston or other reciprocating part is directly coupled to a sliding yoke with a slot that engages a pin on the rotating part. The shape of the motion of the piston is a pure sine wave over time given a constant rotational speed.

6 d) Power Transmission Through Gears

Bevel gears are gears where the axes of the two shafts intersect and the tooth-bearing faces of the gears themselves are conically shaped. Bevel gears are most often mounted on shafts that are 90 degrees apart, but can be designed to work at other angles as well. The pitch surface of a gear is the imaginary toothless surface that you would have by averaging out the peaks and valleys of the individual teeth. The pitch surface of an ordinary gear is the shape of a cylinder. The pitch angle of a gear is the angle between the face of the pitch surface and the axis.

7 IV.

8 Working of the Model

In the conceptual model of "Multi-Functional operating machine" we are giving supply to the main shaft (refer fig. 13), as we move along the axis of shaft we have mounted a pair of bevel gears, through the pinion shaft we are giving drive to drill shaft through beltpulley arrangement, we have installed the stepped pulley in the arrangement therefore we can made the speed variation. Now again as we move along the axis xiii. Frame is made of wood (neem). xiv. Operation can be performed are: sawing/cutting, drilling, grinding (we have used a prototype wheel (dia. 12 cm) in-place of grinding wheel).

V.

9 Result

Our main aim is to represent our innovative concept, we have taken some useful data from our conceptual model and tried to evaluate the percentage deviation from the standard calculated values which is as follows:-Since pitch

radius of pinion is r p = 1.4 cm, pitch radius of gear r g = 2 cm. By the relation between pitch cone angle and velocity ratio we can find the velocity ratio as we have pitch cone angle for both gear and pinion as 55 deg. and 35 deg.tan ? p = ???????? ð ??”ð ??”ð ??”ð ??” ð ??”ð ??”ð ??”ð ??” + ????????

where ? is the angle between the shaft.

On putting ?= 90?and ? p = 35?we get Since the model is subjected to friction therefore there is a error of 6.51% and 2.15% during power transmission and transverse motion of sawing blade respectively.

For Drilling and Grinding operation we have used the identical bevel gears therefore both operation will have same velocity ratio.

10 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 multifunction operating machine which will 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, sawing, grinding at different working centers simultaneously which implies that industrialist have not to pay for machine performing above tasks individually for operating operation simultaneously. [1] [2]

Figure 1:

[1] Multi-Function Operating Machine: A Conceptual Model

[2] © 2014 Global Journals Inc. (US)

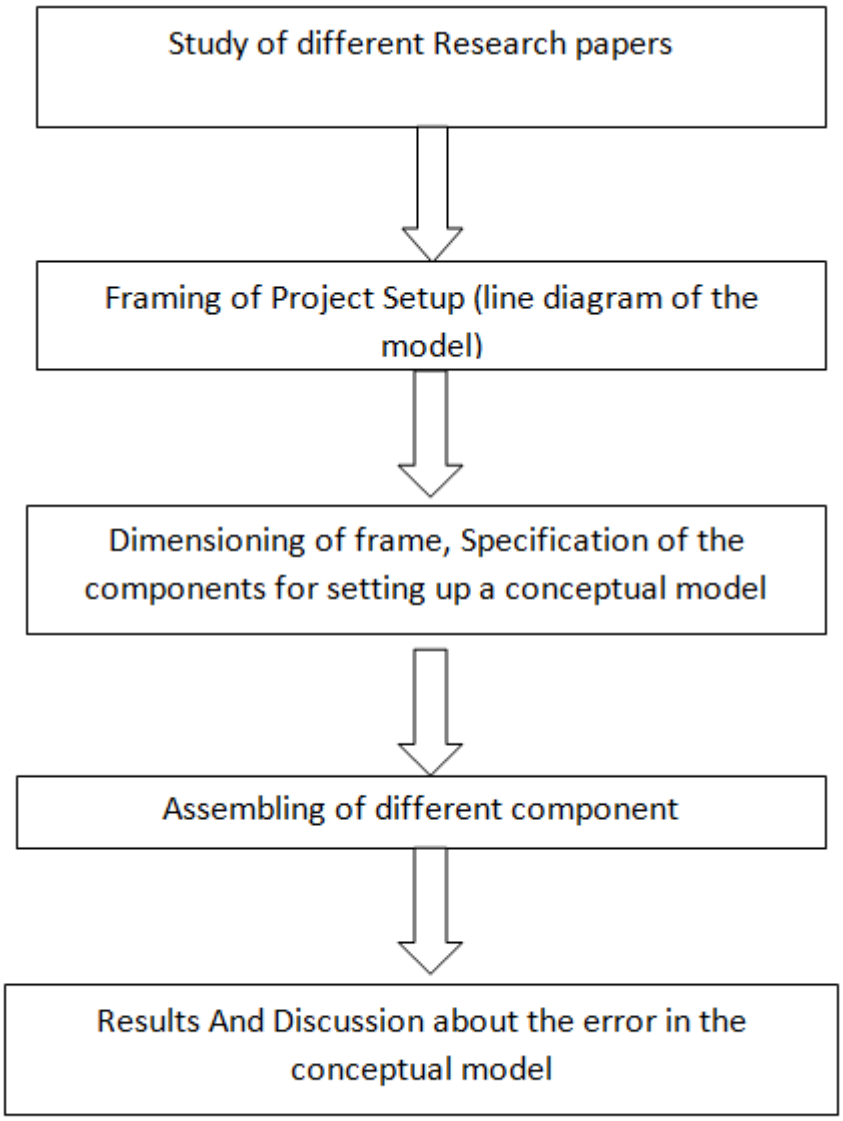

Study of different Research papers
Framing of Project Setup (line diagram of the model)
Dimensioning of frame, Specification of the components for setting up a conceptual model
Assembling of different component
Results And Discussion about the error in the conceptual model

Figure 2:

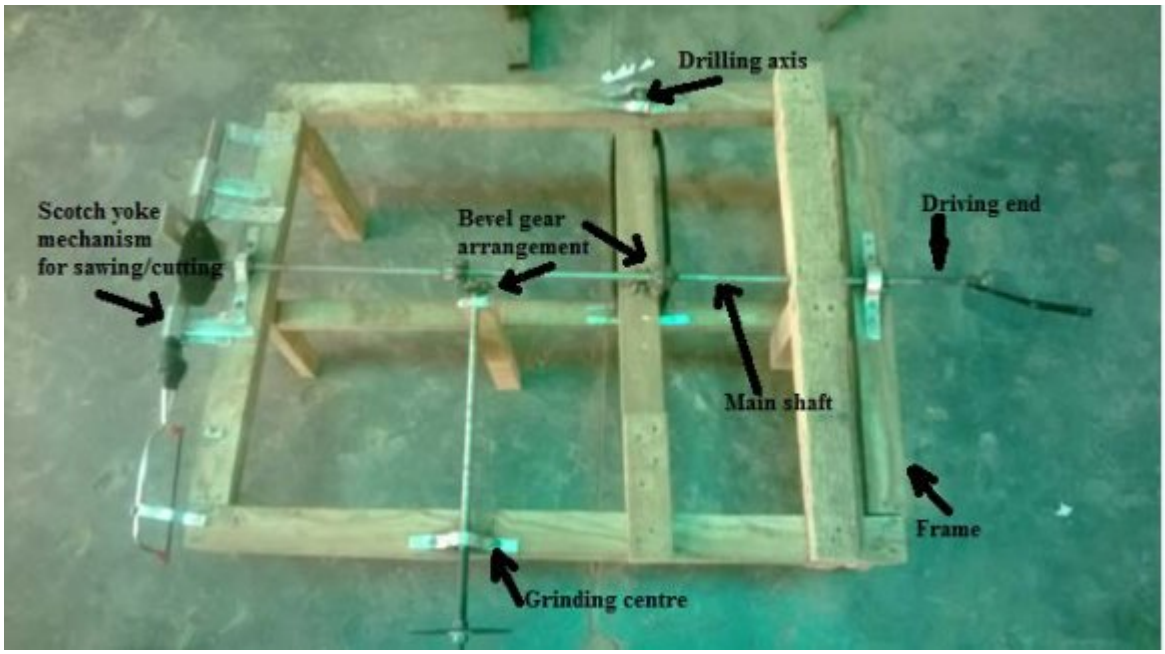


Figure 3:

1

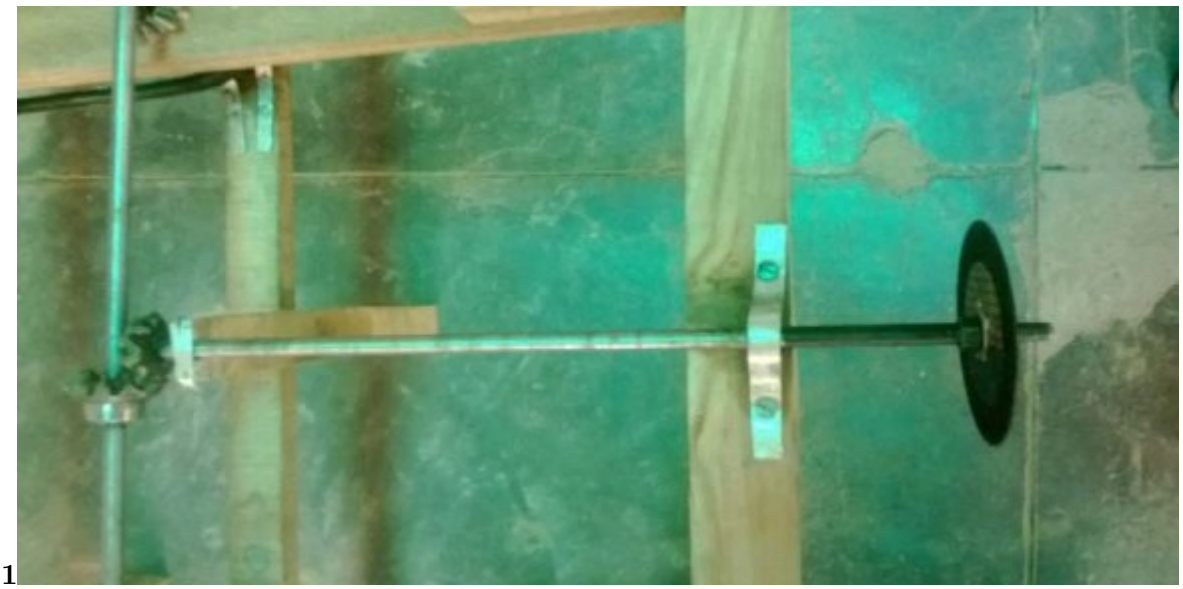


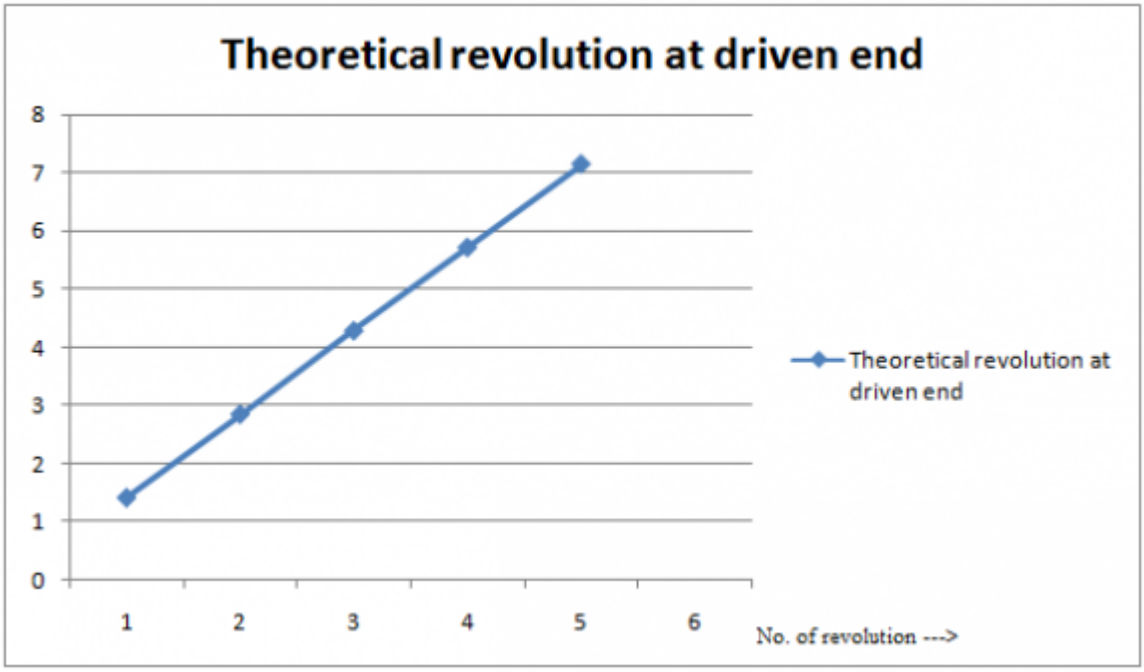
Figure 4: Figure 1 :

2

Figure 5: Figure 2 :

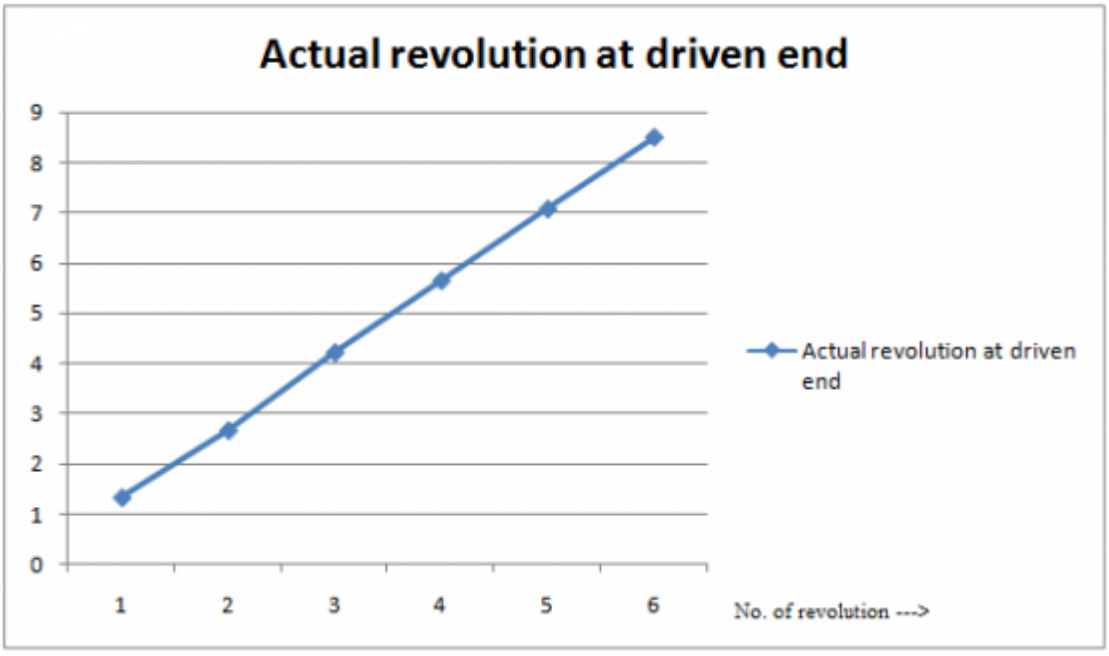
4

Figure 6: Figure 4 :



20

Figure 7: Figure 20 :

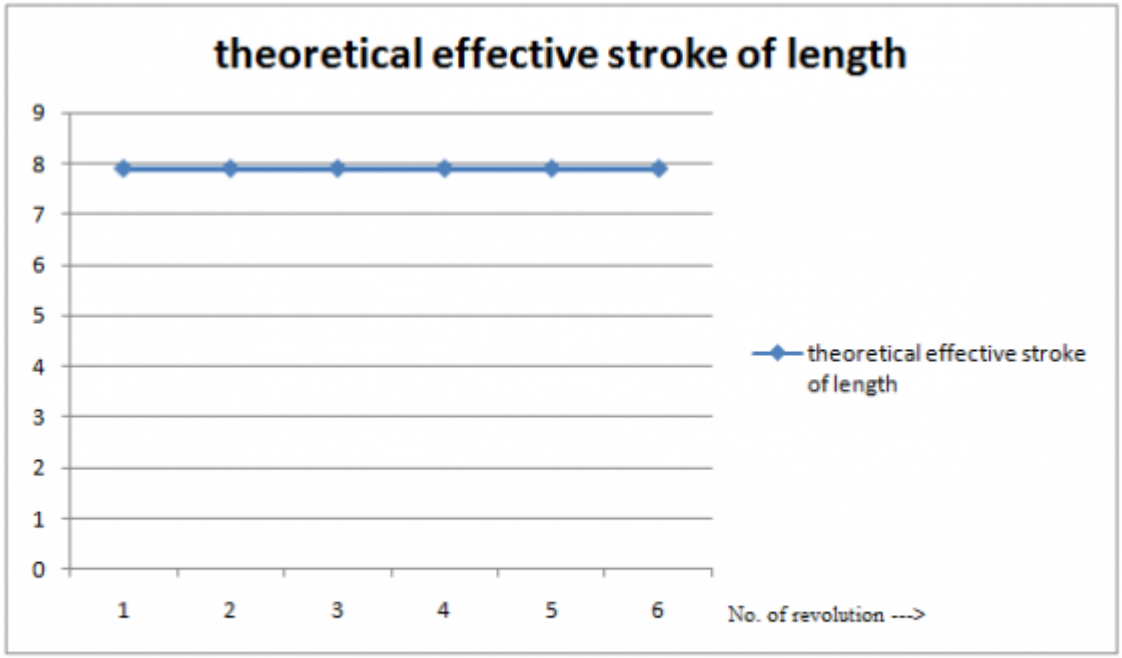


21

Figure 8: Figure 21 :

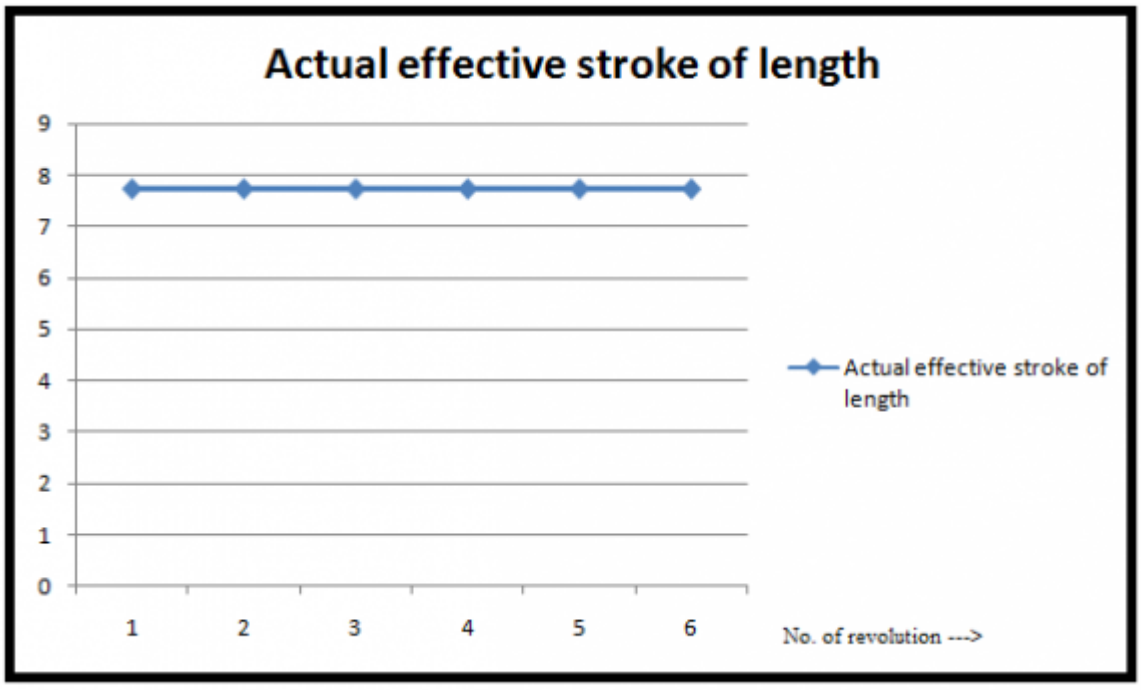
22 No. of revolution

Figure 9: Figure 22 :



23

Figure 10: Figure 23 :



24

Figure 11: Figure 24 :

25 No. of revolution --->

Figure 12: Figure 25 :

1

S no.	No. of revolution given to main shaft	Theoretical revolution at driven end	Actual revolution at driven end
	difference in between theoretical power transmission and actual power transmission		
1	1	1.428	1.335
2	2	2.856	2.67
3	3	4.284	4.22
4	4	5.712	5.65
5	5	7.14	7.075
6	6	8.568	8.503

Figure 13: Table 1 :

2

S no.	No. of revolution given to main shaft	Theoretical effective stroke length at driven end	Actual effective stroke length at driven end
1	1	7.9	7.73
2	2	7.9	7.73
3	3	7.9	7.73
4	4	7.9	7.73
5	5	7.9	7.73
6	6	7.9	7.73

Figure 14: Table 2 :

[Arnold1 (2001)] *The recent history of the machine tool industry and the effects of technological change*, Heinrich Arnold1 . November 2001. University of Munich, Institute for Innovation Research and Technology Management

[Dr and Moriwaki] *Trends in Recent Machine*, Toshimichi Dr , Moriwaki .