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Study of Effective Process Parameter of Mild Steel in Turning Operation with chip formation

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***Abstract*- The manufacturing system the reliability of machining operations is an essential requirement of the industrial sector. But in the turning operation the chip of unbroken is the major barrier of the automatic system. The characteristic of chip breaker for mild steel with respect to depth of cut, cutting speed and feed were analyzed from the result of the experiment.. In particular, effective chip control is necessary for a CNC machine or automatic production system because any failure in chip control can cause the lowering in productivity, but taken discontinuous chip obtaining by using the grooved type chip breaker.**

***Keywords*- Chip breaker; CNC machine; MATLAB software, Obstruction type chip breaker, Tool maker microscope.**

I. INTRODUCTION

In the mild steel is the major role in industry, it is an important material which used more than 60 to 70 % as automobile parts in automobile factories. When the disposal of chips is an important factor of factory due to the continuous cutting operation which will be improves the safety of worker and saving the cost. The better cutting techniques the quality of cutting tools has been improved continuously. When the better control of long continuous chips which is the factor of performance of the work piece by the method of chip are being generated less time. Therefore the purpose of this analysis is to solve the problem of continuous chip and constructed the basis of improved factory automation by using chip breakers of the attached obstruction type, which represent to control the method of factory automation.

II. PROBLEM IDENTIFICATION

It has been noted that the handling and disposal problem the turning operation produced the continous chips. So that the strong material like a mild steel which is insert the carbide or cermic tool, so the metal removal rate is high with high velocity.

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For improve the mchinability, chip breaking is done proper way and reduced the cutting force also wear of the cutting tool. The purpose of the analysis is that to solve the problem of continuous chip by using the obstruction type chip breaker. So it is better control of the chip and reduced the chip thickess to best automation in the advanced technology system

III. METHODOLOGY

Step1: During this project the procedure will follow to calculate the result of response surface methodology by using the MATLAB software. So that the parameter like a chip thickness, chip diameter, chip length can be find out by using tool makers microscope. The next step is that the experiments will performed in a TIPL- 4 lathe machine. During the cutting operation chip length, chip thickness, chip diameter and the chip reduction coefficient can be carried out.

Step 2: In the turning operation, the experiments were carried out by using the tool high speed steel inserts in a TIPL-4 lathe machine. So that the grade of the high-speed steel as below Table I. The machining operation were performed with depth of cut of (t) 0.3, 0.4, 0.5 mm and feed (f) of 0.3, 0.35, 0.4 mm/rev with cutting speeds (Vc) 100, 135, 180 m/m in atmosphere condition. The material should be used for present work in mild steel; its diameter is 90 mm and 280 mm length.

Table I Mechanical properties of the mild steel

Sr.no	Mechanical properties	Values
1	Ultimate tensile strength (Mpa)	510
2	Yield strength (Mpa)	300
3	Elongation percentage (mm)	14
4	Rockwell Hardness	B64.30

Table II Experiment reading

Run No.	Depth Of Cut(mm)	Feed (mm/rev)	Speed (m/min)	Chip Thickness (mm)	Chip Diameter (mm)	Chip Length (mm)	Chip Reduction Coefficcient (ξ)
1	0.3	0.3	100	0.410	4.352	35.375	1.36

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2	0.3	0.35	135	0.434	5.967	28.545	1.44
3	0.3	0.4	180	0.462	4.120	24.786	1.54
4	0.3	0.3	100	0.360	3.758	75.865	1.2
5	0.3	0.35	135	0.476	4.576	86.896	1.58
6	0.3	0.4	180	0.403	5.231	78.945	1.34
7	0.3	0.3	100	0.494	4.123	95.245	1.64
8	0.3	0.35	135	0.451	4.821	79.805	1.50
9	0.3	0.4	180	0.384	4.984	78.056	1.28

Fig. 1 TIPL-4 Lathe machine (Gear Arrangement)

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IV. RESULTS AND DISCUSSIONS

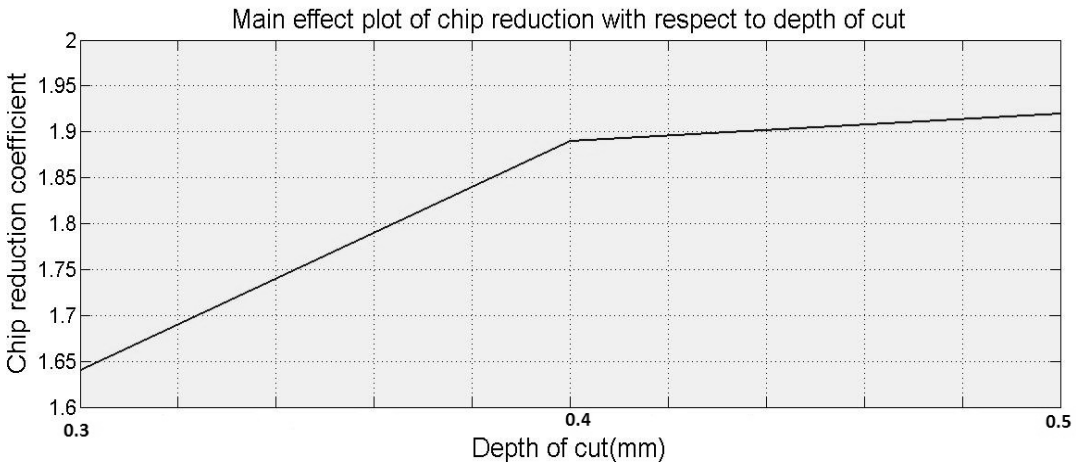

Fig. 2 Main effect plot for the Means of chip reduction coefficient with respect to depth of cut

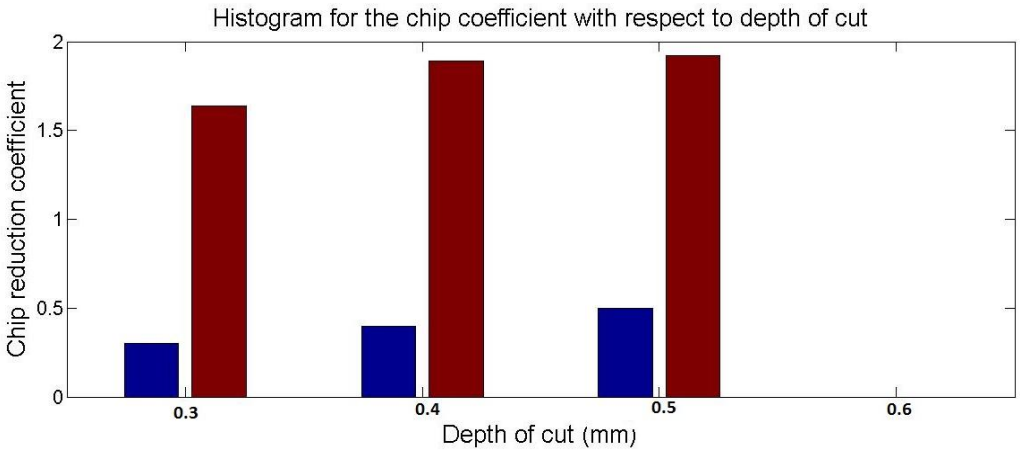

Fig. 3 Histogram for chip reduction coefficient with respect to depth of cut.

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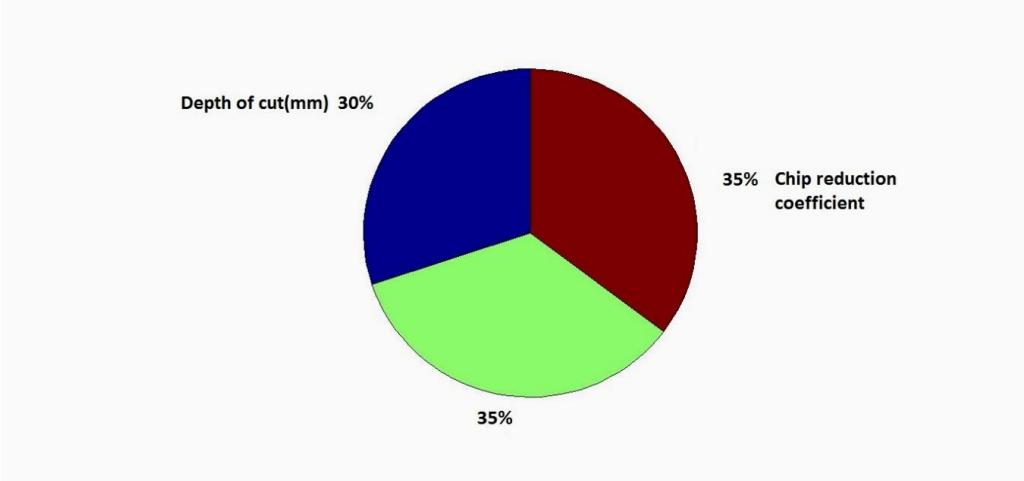

Fig. 4 Pie chart of chip reduction coefficient with respect to Depth of cut

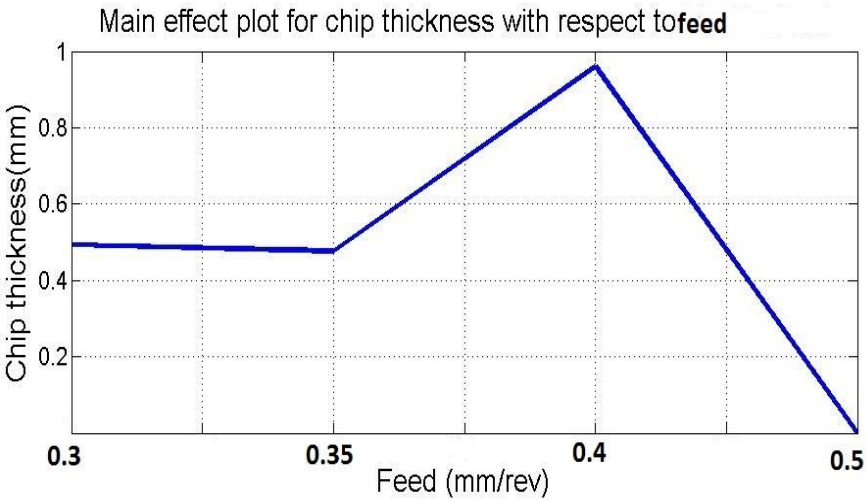

Fig. 5 Main effect plot for chip thickness with respect to feed

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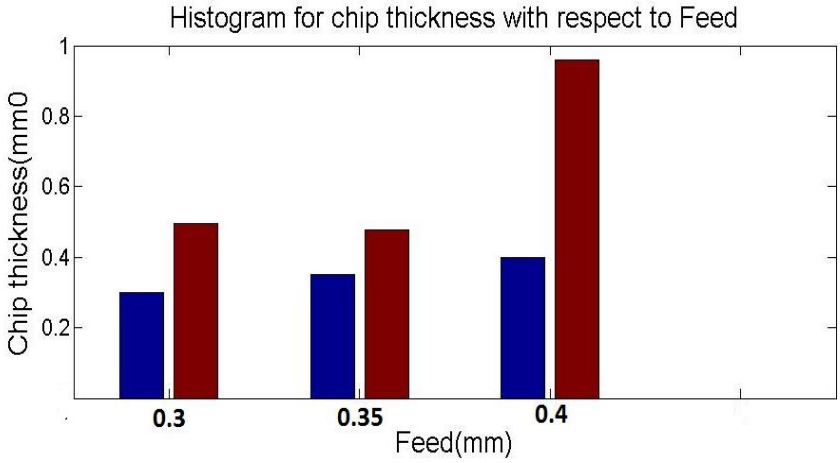

Fig 6 Histogram for chip thickness with respect to feed

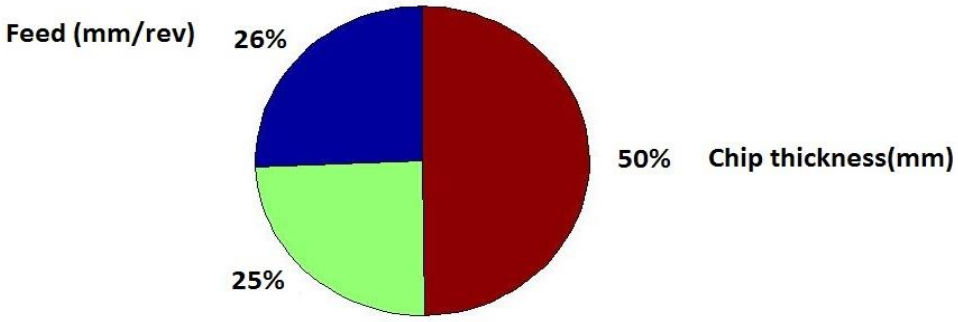

Fig 7 Pie chart for the chip thickness with respect to feed

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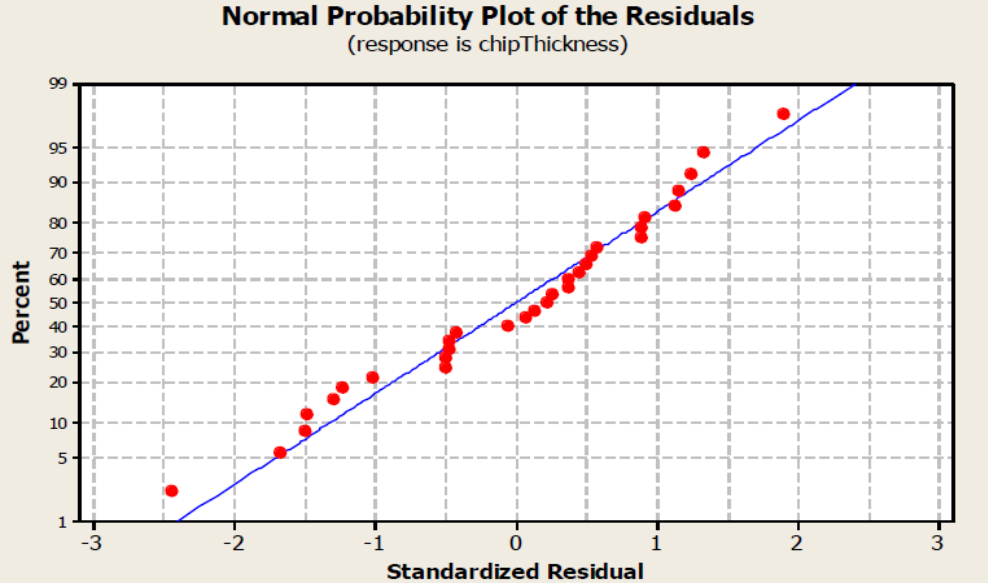

Fig 8 Normal probability plot of residual for the chip thickness

V. CONCLUSION

The effect of cutting speed, feed, depth of cut and chip breaker height and width on the chip breakability was studied.

- It was found that chips of greater thickness are produced at low feed and depth of cut and it gradually decreases as feed and depth of cut increases.
- Cutting speed and depth of cut are the most significant factors affecting the chip breakability and even their higher order terms play a significant role. The graphs obtained from histogram of residuals show a normal distribution. The graph of normal probability plot vs residuals shows that most of the points are near the line implying the residual is normal.
- Thus, it was concluded that speed and depth of cut are most important factors in better control of chip.

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