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Vibration Analysis of Emco Maximat V13 Lathes due to Variations in Machine Rotation and Feeding Depth On the Flat Lathe Process of ST 42 Steel

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Abstract

The purpose of this study is to analyze the vibration behavior of the EMCO Maximat V13 lathe due to variations in machine rotation and variations in cutting depth. This research is an experimental research. The research specimens amounted to 45 specimens. The data of this study was obtained from the measurement of vibration deviation using Vibscaner which was measured on the toll post of the lathe. From the data, it can be analyzed that the effect of increasing the rotation of the machine will cause an increase in the vibration of the lathe marked by an increase in the measured deviation on the Vibscaner, as well as the result of cutting, together both the increase in rotation and the increase in feeding together affect the increase in the vibration of the lathe measured on the Vibscaner. The test uses quantitative statistics. The results of the hypothesis test showed: (1) There is an effect of cutting speed on the vibration of the lathe, this can be seen from the significance value (sig) 0.000 < 0.05 and the calculation of 8.882 > 2.062 ttables. (2) There is an effect of cutting depth on the vibration of the lathe, this can be seen from the significance value (sig) of 0.000 < 0.05 and the tcount of 5.652> 2.063 ttables, and (3) There is an effect of cutting speed and cutting depth together on the vibration of the lathe, this can be seen from the significance value (sig) 0.000 < 0.05 and tcount 11.734 > 2.062 table.

KEY WORDS **:** *Machine Rotation, Feeding Depth and Lathe Vibration.*

NOMENCLATURE

Fe	Iron
Ra	Mechanical Vibration
HCl	Stell Lathe Iron

1.0 INTRODUCTION

A lathe is a machine tool that has a rotating main movement that functions to change the shape and size of the workpiece by cutting the workpiece with a cutting chisel, the position of the object in the direction of the axis of the lathe to perform cutting or feeding (Hadimi 2008).

The machining process on a lathe is that the relative motion between the tool and the workpiece will produce a variation of the chip that results in a change in force, so that the amplitude of vibration continues to increase rapidly. An enlarged amplitude will give rise to a sound that is squeaky that comes from a chisel that cuts the workpiece (Nur I. 2007).

This is an obstacle in the industry, especially in the manufacturing process because it must be able to produce products with good quality. In conditions like this, it is very necessary to select the right machinery parameters. The machining parameters that can affect the occurrence of vibration are the rotation of the machine and the depth of the cut. Machine rotation is the rotational speed that results in the cutting of the workpiece to produce metal incisions that can be in the form of powder or chips. Chips can be coils that form interconnected circles.

While the feeding depth is the average difference between the diameter of the workpiece before it is turned and the diameter of the workpiece after it is turned. The cutting depth can be adjusted by sliding the cross launcher through the rotary wheel (the scale on the rotor indicates the diameter price difference).

Vibrations that occur in production machines usually cause undesirable effects: such as noise, lack of precision in measurements or damage to the machine structure. Vibrations that occur due to excitation both from inside the engine rotation and outside the system, but the effect of vibration is very dependent on the frequency of the excitation and the elements of the vibration system itself.

Therefore, in this study, the variation in machine rotation and cutting depth in the lathe is varied into three variations to find out the extent of the influence of vibration on the turning process and to reduce the impact caused by the vibration that occurs such as roughness in the workpiece, noise and working time of the workpiece, as well as damage to the machine structure.

This study is to analyze the effect of machine rotation variations and feeding depth on the vibration of the lathe in the ST 42 steel flat lathe process. The benefits of this study can be analyzed from the effect of machine rotation and feeding depth on the vibrations caused in the turning and drilling process, so it is hoped that the selection of machine rotation and feeding depth is an important concern in a lathe process. So that it can be adjusted between the rotation of the machine, the depth.

1.1.Machining Process

The metal cutting process is a process used to change the shape of metal (machine components) by cutting. The cutting process using a cutting chisel mounted on a machine tool in technical terms is often referred to as the machining process. The machining process is the process of forming metal using a cutting tool commonly called a cutting chisel. Technically, the cutting process has been carried out by Wilkinson since 1775 that moment that to make the components of his steam engine James Wall.At that time the concept of rigor and determination begin applied considering componentrequires precisiontall. Appropriate with the development oftechnology Research on machining is constantly being developed. Research on machinery that has been up to datecontinueDone other:a. Research on the cutting process, b. Research on materials, c. Research on material chisel in order to can improve the working efficiency of the machine, d. Research aboutinfluence Machining Process result cut etc. Such efforts are made to improvemachineefficiencybusing certain machines(Subagio, 2008).

Based on the opinion of these experts, it can be concluded that the machining process used in the production process requires high precision to get good results. Precision, precision and surface quality are the main priorities that become a reference in the machining process. A good workpiece surface result is one that is expected from every workmanship. Levels to precision and the surface roughness of the resulting workpiece should be in accordance with the requirements.

Factors that affect the surface quality of a workpiece in the machining process include the angle and sharpness of the cutting blade in the manufacturing process, variations in machine rotation, cutting speed, flashlight position, machine vibration, poor heat treatment and so on (Munadi, 1988). In addition to some of these factors, the depth of the cut affects the degree of roughness workpiece. Kalpakjian Serope and Schmid R, Steven (2002) said that the parameter that greatly determines the roughness of the surface is the cutting speed. Similarly, Rochim, (1993) that the results

Based on the opinions of the experts above, it can be concluded that one of the factors that affect the surface quality of a workpiece in the machining process is the rotation of the machine. Machine rotation is a factor that causes cutting due to friction with a stationary cutting tool.

A lathe is one of the machine tools that functions to work on workpieces that have a cylindrical shape or the diameter of the workpiece circle, both straight and multi-layered. In addition, lathes can also work holes in the cylinder (Subagio, 2008).Based on the expert opinion above, it can be concluded that the lathe is the oldest machine and is widely used to make work components. In daily life, there are a lot of components found in cylindrical shape, one of which is the shaft. With a lathe, this can be done easily.

The machining process on a lathe is the occurrence of relative motion between the tool and the workpiece will produce a variation of the chip resulting in a change in force, so that the amplitude of vibration continues to increase rapidly. The enlarged amplitude will give rise to a shrill sound coming from the tool pushing the workpiece. The increase in vibration amplitude that occurs is also caused by the energy used for cutting will be absorbed by the system. The system here is the machine tool system. If the energy absorbed is less than the available energy,

According to Mahani (2013), conventional lathes are one of the most widely used types of machines in machining workshops, both in the manufacturing industry, vocational education institutions and training or training institutions. The function of a standard lathe is in principle the same as that of other lathes, which is for: face turning/facing, straight/graded flat, tapered, groove, thread, shape, drilling, enlarging holes, cartering, cutting and others.

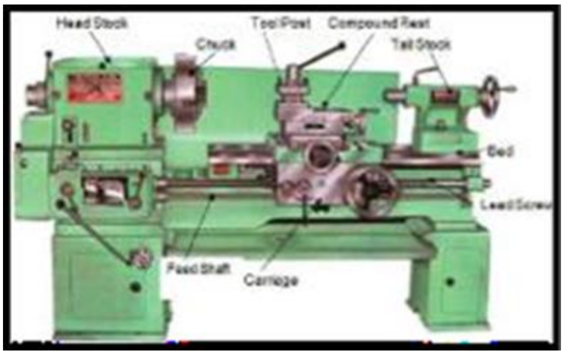

Figure 1. Conventional lathes.

Emco Maximat V13 Engine Specifications

- Lathe length: 1700 mm
- Lathe height : 1500 mm
- Lathe width : 500 mm
- Maximum length of workpiece : 1000 mm
- Maximum diameter of workpiece : 50 mm
- Minimum rotation of the lathe: 30 rpm
- Maximum rotation of the lathe: 2500 rpm

1.2 Productio Process on Lathes

According to Rahdiyanta (2010), the lathe process is a machining process to produce cylindrical machine parts that are worked using a lathe. The basic principle can be defined as the process of machining the outer surface of a cylindrical or flat lathe with a rotating workpiece, with a single-point cutting tool, with the movement of the tool parallel to the axis of the workpiece at a certain distance so

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METALOGRAM
-Mechanical and Energy Engineering-
December 15th 2025. Vol.02 No.01
December, 2025

as to remove the outer surface of the workpiec.

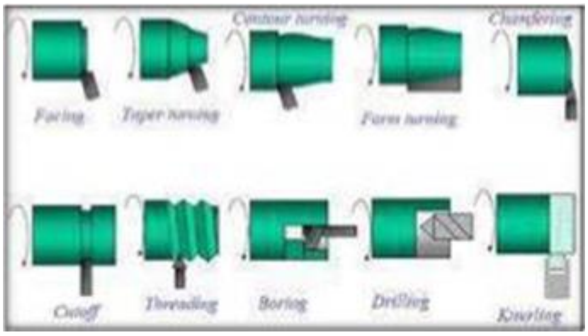


Figure 2. Types of Feeding Machine Lathe

Meanwhile, according to Rochim (1993), the speed of fury disposal can be selected so that the cutting time is in accordance with the desired. This is intended so that the productivity of machinery can be optimal. For this reason, it is necessary to understand the five basic elements of the machining process, namely: 1. Engine rotation (rpm), 2. Feeding speed: vf (mm/min) 3. Depth of cut: a (mm) 4. Cutting time : tc (min) 5. Rate of metal removal : Z (cm3/min) The five elements of the machining process above are calculated based on dimensions of the workpiece, the tool and the size of the machine used.

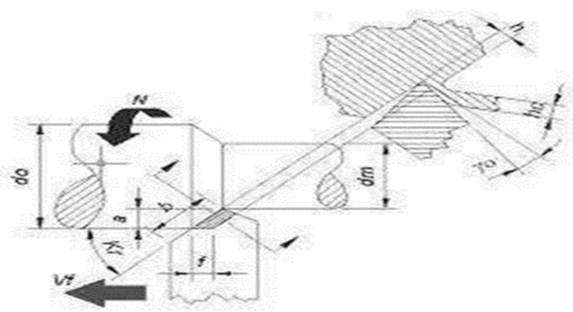


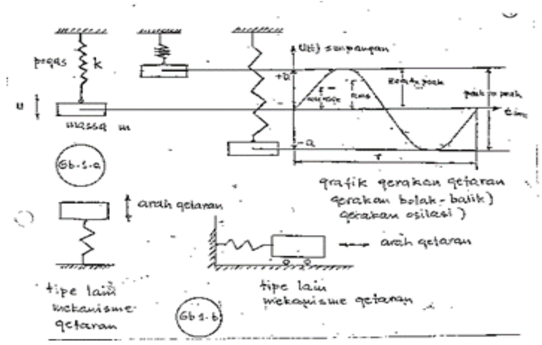
Figure 3. Types of Lathe Feeding

1.3 Vibration in Machine Tools

Machine tools are designed with a high one. This high rigidity is used to dampen the vibrations that arise during the operation of the machine tool. This high rigidity is usually followed by a large volume of machine tool designs. Machine tool vibration affects machine tooling, cutting conditions, workpiece vibration and chisel life.

The components in a vibration system consist of mass, spring, dampen, and excitation force. The first three components are the physical system. The energy is stored in the mass and springs and absorbed by the reducer in the form of heat. Energy enters the system through the application of an excitatory force imposed on the mass present in that system. The components in such a vibration system can be illustrated as follows.

Figure 4. Simple vibration system



All components in the image consist of mass, spring, reducer and excitation force. The first three components are the physical system. For example, it can be said that a vibration system consists of a mass, a spring, and a damper.

Mass, assumed to be a rigid object. The amount of kinetic energy depends on the mass and speed of the rigid object. From Newton's law, it is known that the product multiplication of mass and acceleration is the force acting on mass, and the direction of acceleration is in the direction of the force acting. $Fm = m\ddot{x}$ (2.6)

i. Spring, has elastic properties, while the mass of the spring is negligible. The force acting on the spring will cause a change in the length of the spring. If the spring increases in length then the force acting is the tensile force, while if the spring gets shorter then the force acting is the compressive force.

The reducer, the c reducer has no mass or elasticity, the damping force will arise if there is a relative velocity between the two ends of the damper.

Vibration analysis can be done with the help of mathematics, namely Newton's laws of motion, energy equations, frequency response methods, and superposition methods. Frequency is the opposite of a period, i.e. the number of vibrations per unit of time (HZ). In practice, there are 2 The types of vibrations are free vibration and forced vibration. Free vibration occurs if no external force is acting during the system vibrating and forced vibration occurs if there is an outside force acting during the system vibrating.

Free vibration is a system that vibrates not because there is an excitation force (vibrating force), but because of the initial condition, i.e. in the form of an initial deviation x (0) or a velocity $\dot{x}$ (0). Free vibration in general is unmuffled free vibration and muffled free vibration. In reality, there is nothing that is not muffled by free vibrations.

In a rotating machine tool, there is generally always a forced vibration and the important factor is the magnitude/small amplitude of the forced vibration. The sources of forced vibration in machine tools come from: (a). Cutting forces that change preodis such as in machining using a fresh machine and a lathe. (b). Disruptive forces that come from the machine itself. For example:p the rotation of unbalanced engine elements, an unbalanced gear transmission system, etc. (Section, 2014).

JOURNAL OF METALOGRAM
METALOGRAM
-Mechanical and Energy Engineering-
December 15th 2025. Vol.02 No.01
December, 2025

1.4 Vibration Analyer

Gambar 5. Joystick Vibscanner (Oskar, 2010).

The way this product works is by sticking vibration sensor orThe magnetic base to the object/machine to be measured, then the magnetic base sends data via cable to the reader unit. Thus, the vibration meter shows the value of the strength of the vibration on the object or machine being measured, so that it can determine the adjustment action or whether it has entered the specified threshold.

By regularly controlling and analyzing vibrations, anything abnormal in the machine can be detected before major damage occurs. With the measurement of this vibration meter, industry players can also prevent their workers from getting high vibration hazards.

In general, all objects on this earth must be vibrating, objects around us can actually vibrate. Please note that vibrations can be measured precisely, as for how to measure these vibrations with a vibration meter.

The way it is done is to measure vibration with a Vibration Meter and then adjust it to the predetermined limit value. Usually with a threshold value that has been determined by the Decree of the Minister of Manpower.

1.5 Chisel

The tool is the part of the lathe that plays an important role in metal cutting, as the tool is the part that comes into direct contact with the workpiece being cut. There are several criteria that a chisel must have, including: it must be harder than the workpiece, resistant to mechanical properties, and resistant to wear. There are several types of chisel materials, including: carbon steel, HSS (High Speed Steel), nonferrous cast alloys, carbide, ceramics, CBN (Cub ic Boron Nitrides), and diamonds.

HSS type chisel is one of the chisels that has a fairly high hardness. This chisel is the most commonly found in lathes and even industrial workshops (Nugroho, 2010: 19).

2.0 RESEARCH METHODS

1.Research place

This research was carried out in the Laboratory of the Department of Mechanical Engineering Education, Faculty of Engineering, State University of Makassar. This research was carried out in November 2018.

2.Research Type , Tool , Materials and Research Procedures

a.Types of Research

This type of study is a quantitative research that is experimental to analyze the vibration behavior of lathes due to the influence of variations in machine rotation and variations in the cutting depth of ST 42 steel flat lathes.

B.Types of Research

The tools used in this study are as follows:

a. One unit of horizontal lathe type EMCO Maximat V13 made in Austria in 2002 and its equipment.
b. Vibscanner (vibration measuring device)
c. HSS chisel with 90° cutting angle
d. Feed drill bit 8 mm
e. Calipers
f. Modules, worksheets and stationery
g. Occupational health and safety standard tools

C.Material

The material used in this study is ST 42 steel which is cut with dimensions of 25 mm x 100 mm as many as 40 rods.

D.Researh Procedure

This research was carried out in several stages, namely

a.Specimen Material Preparation

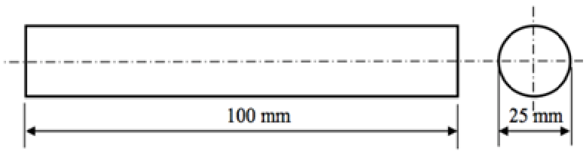


Figure 6. Specimen Material Dimensions

b Turning Process

1) Flat turning using a lathe.
2) Workpiece is steel ST42
3) The flat-lathered workpiece will be used with 3 kinds of machine rotation variations. Each with 5 experiments that will be carried out later on the variation type.
4) Each lathe workpiece will get 1 treatment to the Machine Rotation and cutting depth.
5) The cutting depth at the time of turning has 3 variations, namely 0.5 mm, 1,0 mm, 1,5 mm.
6) The feeding speed used during the turning process, namely on the lathe machine table, is 0.045 mm/min.
7) Each workpiece that is turned uses the same type of lathe.
8) Prepare documentation tools to be used as an attachment as evidence of the conduct of the research.

JOURNAL OF METALOGRAM
METALOGRAM
-Mechanical and Energy Engineering-
December 15th 2025. Vol.02 No.01
December, 2025

E.Research Variables

This study consists of 3 variables, namely (i) Machine rotation which is declared as a free variable and given a symbol (X1), (ii) cutting depth which is declared as a variable (X2), (iii) the vibration value of the lathe which is given a symbile (Y1), Schematically the influence between the two variables in this study can be seen in the figure below.

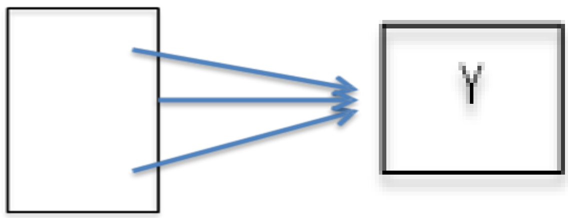


Figure 7. Specimen Material Dimensions

F.Data Collection Techniques

The data collection technique was carried out by direct measurement with Vibscaner on the tool post of the lathe.

G.Data Analysis Techniques

Before hypothesis testing is carried out, the data of the research results must be welcomed to test the analysis requirements, namely:

1.Test Analysis Requirements

a. Normality Test

The normality test is used to find out whether the data obtained is normally distributed or not. For the data normality test, we use the SPSS program with the kolmogrov-smirnov normality test. Basis for decision-making in the kolmogroc-smirnov normality test:

b. Homogeneity Test

The homogeneity test is intended to prove the similarity of variance of the sample groups. If it turns out that there is no difference in variance between the sample groups (the variance is the same), it means that the sample group is homogeneous. The homogeneity test uses the SPSS program.

c. Linearity Test

The linearity test is carried out to find out whether two variables have a significant linear relationship or not. The data linearity test was carried out using the SPSS program.

2. Uji Hypothesis

regression analysis aim to find out whether the independent variable (X) has a significant effect on the variable (Y). The T test is carried out using the SPSS program.

3.0 RESULTS AND DISCUSSION

3.1Research Results

In this study, the lathe used is the EMCO MAXIMAT V13 lathe with a variation of engine rotation of 260 rpm, 440 rpm, and 540 rpm, the cutting depth starts from 0.5 mm, 1.0 mm, and 1.5 mm to determine the size of the measured deviation on the vibscanner that describes the vibration of the lathe.

Before conducting research, first measure the flatness and condition of the machine and prepare the cleaned sample then place the vibration measuring device on the tool post. Furthermore, initial data was taken on the lathe without feeding the workpiece and data at the time the workpiece feeding took place. From the research conducted, the following research data were obtained.

Lap Engine (rpm)	Peng Measure an to	Cutting Depth (mm)		
		0,5	1,0	1,5
260	X1	0,18	0,18	0,20
	X2	0,17	0,18	0,21
	X3	0,18	0,19	0,19
	X4	0,17	0,19	0,20
	X5	0,18	0,19	0,21
Average		0,176	0,186	0,202
440	X1	0,17	0,19	0,20
	X2	0,19	0,19	0,21
	X3	0,18	0,21	0,21
	X4	0,19	0,20	0,22
	X5	0,19	0,21	0,21
Rata-rata		0,184	0,20	0,21
540	X1	0,21	0,22	0,23
	X2	0,22	0,21	0,23
	X3	0,21	0,23	0,24
	X4	0,22	0,22	0,23
	X5	0,22	0,21	0.24
Average		0,216	0,218	0,234

Table 1. Machine Rotation to Feeding Depth of Specimen Material.

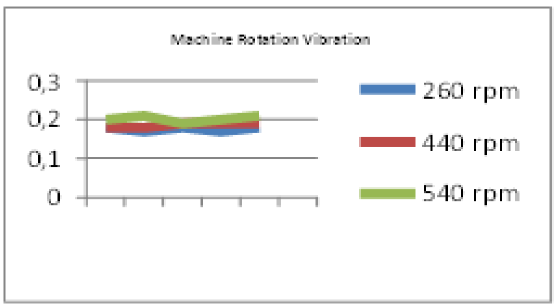


Figure 7. Vibration of Machine Rotation

1. Test Analysis Requirements

a. Normality Test

The results of the normality test analysis for machine rotation data against lathe vibration can be seen in the following table.

One-Sample Kolmogorov-Smirnov Test

		Unstandardized Residual
N		27
Normal Parameters^a	Mean	.0000000
	Std. Deviation	.00841414
Most Extreme Differences	Absolute	.132
	Positive	.084
	Negative	-.132
Kolmogorov-Smirnov Z		.685
Asymp. Sig. (2-tailed)		.735

a. Test distribution is Normal.

Table 2. Normality Testing for Machine Rotation data against lathe vibration

Based on the SPSS output above, the significance value of Asiymp.Sig (2-tailed) is known to be 0.735 > 0.05. Therefore, in accordance with the basis for decision-making in the kolmogrov-smirnov normality test above, it can be concluded that the engine rotation data on the vibration of the lathe is normally distributed. Thus, the assumption or normality requirement in the regression model has been met.

2. Homogeneity test

The results of the homogeneity test analysis for machine rotation data against lathe vibration can be seen in the following table.

Test of Homogeneity of Variances

Kedalaman Potong Terhadap Getaranbubut

Levene Statistic	df1	df2	Sig.
.664	2	24	.524

Table 3. Cutting Depth against Lathe Vibration

Based on the SPSS output above, it is known that the significance value is 0.524 > 0.05. Therefore, in accordance with the basis of decision-making in the homogeneity test above, it can be concluded that the machine rotation data on the vibration of the lathe is homogeneous. Thus, the assumptions or homogeneity requirements in the regression model have been met.

The results of the homogeneity test analysis for the cutting depth data against the lathe vibration can be seen in the table next:

Based on the SPSS output, it is known that the significance value is 0.661 > 0.05. Therefore, in accordance with the basis for decision-making in the homogeneity test above, it can be concluded that the cutting depth data on the vibration of the lathe is homogeneous. Thus the assumption or homogeneity requirement in the regression model has been fulfilled.

Test of Homogeneity of Variances

Kedalaman Potong Terhadap Getaran bubut

Levene Statistic	df1	df2	Sig.
.421	2	24	.661

Table 4. Cutting Depth against Lathe Vibration

1. Linearity Test

After testing the normality and similarity of variance, to test the hypothesis first to test the linearity to find out whether there is an influence between the two variables, a linear equation using SPSS is used.

Results of the linearity test of machine rotation data on lathe vibration: Based on the results of the calculation, the linear test of Fcal was obtained of 4.429. With a significance level of 0.046 < 0.05. Then the calculation was consulted with Ftabel at a significant level of 5% with the degree of guidance freedom = (k -2) = 3-1 = 2 and the denominator DK = (n-k) = 45-3 = 42, so that Ftabel was obtained as 3.40. It turns out that Fcal > Ftable, so it can be concluded that the data is stated to be non-linear because.Calculate > Ftable (4.429 > 3.40).

ANOVA Table

			Sum of Squares	df	Mean Square	F	Sig.
Getaranbubut * Kecepatan Potong	Between Groups	(Combined)	.007	2	.003	22.258	.000
		Linearity	.006	1	.006	40.086	.000
		Deviation from Linearity	.001	1	.001	4.429	.046
	Within Groups		.004	24	.000		
	Total		.010	26			

Results of the linearity test of the cutting depth data against the vibration of the lathe.

ANOVA Table

			Sum of Squares	df	Mean Square	F	Sig.
Getaranbubut * Kedalamanpotong	Between Groups	(Combined)	.002	2	.001	3.730	.039
		Linearity	.002	1	.002	7.454	.012
		Deviation from Linearity	.000	1	.000	.006	.941
	Within Groups		.008	24	.000		
	Total		.010	26			

Based on the results of the calculation in the table above, the linearity test of Fcal was obtained of 0.006. With a significance level of 0.941 > 0.05. Then the Fcalculation was consulted with the Ftable at a significant level of 5% with the degree of freedom of pronunciation = (k - 1) = 3-1 = 2 and the denominator DK = (n-k) = 45-3 = 32, so that the Ftable was obtained as 3.40. It turns out that Fcal < Ftable, so it can be concluded that the data is stated linear because Fcal < Ftable (0.006 < 3.40).

2. Hypothesis Test T Test

1) The results of the linear regression test multiplied the effect of machine rotation, cutting depth on the vibration of the lathe

2) The T test in multiple regression analysis aims to find out whether the independent variable (X) has a significant effect on the variable (Y).
Results and decision making in the first t-test:
Based on the results of the table. T test regression analysis obtained a calculated t-value of 8.882 > 2.063 t table and significance value (GIS).
0.000 < 0.05. So it can be concluded that H0 is rejected and H1 is accepted, which means that the engine rotation (X1) has a significant effect on the vibration of the lathe (Y).

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	.123	.008		16.138	.000
	Kecepatanpotong	.002	.000	.765	8.882	.000
	Kedalamanpotong	.023	.004	.487	5.652	.000

a. Dependent Variable: Getaranbubut

Results and decision-making in the second t-test: Based on the results of the t-test regression analysis, a calculated t-value of 5.652 >2.063 t table and significance value (sig) of 0.000 < 0.05. So it can be concluded that H0 is rejected and H1 is accepted, which means that the cutting depth (X2) has a significant effect on the vibration of the lathe (Y).The formula for the lathe vibration regression equation in the analysis in this study is as follows:Y = 0.123 + 0.002 + 0.023

3.1DISCUSSION

The effect of machine rotation, and cutting depth on lathe vibration Based on the results of this study, it is shown that the engine son, and the cutting depth have a significant influence on the vibration of the lathe. We see based on the table of the results of the study, the amount of lathe vibration before feeding with variations in engine rotation shows an increase due to a difference in RPM, thus affecting the results when measuring using the vibscanner tool. In the turning process with a varied size of machine son and a cutting depth of 0.5 mm to the vibration of the lathe shown in the graph image at the time of the first and second experiments, we assume that it is due to the time of data collection the installation of the tool on the tool post is not appropriate so thaT affect the result of the vibration that comes out, at the time of the experiment to the three graphs showPresenceThe increase compared to the previous experiment was due to an increase in the engine son, at the time of the fourth experiment, and five graphs showed a significant increase due to the improved engine son, as well as an increase in the cutting depth from 0.5 mm to 1.5 mm there was a significant increase in the vibration deviation value of the lathe. As stated by Section, 2014. In a rotating machine tool, there is generally always a forced vibration and the important factor is the magnitude/small amplitude of the forced vibration. The sources of forced vibration in machine tools come from: (a). Cutting forces that change preodis such as in machining using a fresh machine and a lathe.
(b). Disruptive forces that come from the machine itself. For example:p the rotation of unbalanced engine elements, unbalanced gear transmission system and others.

Based on analyst data obtained. The t-test regression analysis for engine rotation obtained a t count of 8.882 > 2.063 t table and a significance value (sig) of 0.000 < 0.05. And for the cutting depth, the t-value was obtained > 5.652 2.063 t table and the significance value (sig) was 0.000 < 0.05.So it can be concluded that the engine rotation and the cutting depth have a significant effect on the vibration of the lathe. This is in line with the research conducted by Neno T Y (2012) conducting research on the vibration of the tool in the lathe process due to variations in the length of the tool (tool overhang), feeding motion and machine rotation concluding that the length of the chisel, the rotation of the machine and the feeding motion affect the occurrence of the vibration of the chisel.

D.CONCLUSIONS AND SUGGESTIONS

D.1.CONCLUSION

From the results of the analysis, it can be concluded that if the process of flat turning is carried out by increasing the engine rotation price and accompanied by an increase in feeding, the results of the study show that there is an increase in the vibration of the Emco Maximat V13 lathe, this is in line with the theory of mechanical vibration where forced vibration in the machine is generally caused by the presence of unbalanced mass that rotates or goes back and forth.

D.2.SUGGESTIOS

The suggestion from the results of this study is that every lathe operator should pay attention to the selection or suitability between the rotation of the machine and the depth of the cut with the material of the workpiece in order to obtain good turning results and a fast working process with good turning results and not cause the lathe to work very hard so that its service life becomes low. High vibrations will cause the engine to become imprecise, and eventually damaged.

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