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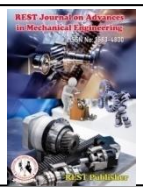

Machining Process Analysis for Machine Tool Selection Based on Form-Shaping Motions Using Statistical Analysis

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Abstract: Productivity, cost of equipment and Ability to provide satisfactory service and when selecting machine tools Important to consider are factors. Machine tool selection is one of many manufacturing companies It is an important decision-making process. Improperly selected Machinery as a whole of production system reduce efficiency. speed of production, Quality, cost and efficiency will be used Lathes, Drilling Machines, Shaping Machines, planning machines, drilling machines, milling machines. Machine tools are also known as "work machines". They are various machines and Manufacture of processing equipment Machines to do. They are fully mechanical play an important role in the development of the industry, Depends on the type of machine tool. So, they are the mother of machines are called Machine tool Frictional materials in technology, Casting manufacturing, transmission, electrical equipment, including system integration etc. Conversely, machine tools are consumers Electronics, Automobile Industry, Mechanical Manufacturing, Electrical Equipment, Railway locomotives, Shipbuilding Industry, Defense Industry, Aerospace Industry Includes. and others occupations. A machine is a and to use forces to perform action Power to control movement A physical system that uses This term usually refers to artificial devices Engines or motors Used for, etc. But like molecular machines Also applied to natural biological macromolecules.
Keyword: machine tools, Advanced Manufacturing System, analysis hierarchy procedure, SPSS

1. Introduction

A machine tool is metal or other hard materials manipulation or machining, generally cutting, boring, grinding, by shearing or other formative deformations. Machine tools cutting or Some types of tools like formatting are using All mechanical Tools also control the work area Some have ways and Guided movement of machine parts provide Thus, to the workplace A cutting tool is also called a toolpath The relative movement between absolute as offhand or freehand Without, at least to some extent controlled by machinery or is controlled. It is by a power A driven metal cutting machine, it is of cutting tool and work material for size and shape changing work necessary relation between Helps manage movement. Machine tool A precise definition of the word Varies between users, below has been discussed. All mechanical Tools and “people make things Although "helping machines", All factory machinery Not machine tools. Mechanical today the tools are usually nothing but human muscle Electrically, hydraulically, or via a line shaft Operated, they are in various ways Components of manufactured parts are used to create machine tool, of metal or other materials to design or manufacture fabricated parts Any constant used to design A power driven machine. machine is to make the job easier A thing created by people. It will multiply the effect of human effort It will multiply the effect of human effort An instrument or invention. The machine creates a mechanical advantage.

2. Machine Tool Selection

Machine tool selection is a Production of manufacturing company Strategic implications contributing to strategy contains In such a situation, Machine tool replacement and manufacturing strategy Links between Identifying and modeling is important. Such as for machine tools A strategic justification tool This study presents New Through the strategic justification tool, Evaluation of investment in machine tools, Model strategic considerations Can also be measured. however,Machine tool selection decision Full on strategic implications Study, to the best knowledge of the author Study, to the best knowledge of the author Not available in the literature. This The paper will justify individual machine tools is in kind, and it is mechanical Strategy of tool selection decision Focuses on impacts and mechan Strategy of tool selection decision Benefits are identified Creates a scalable model [1]. Advanced production methods of traditional models of justification Much has been written about defects. Application of fuzzy set theory, Unquantifiable in the decision model, Incomplete and partially known Allows adding information. In this paper, Evaluation of an Advanced Manufacturing System and ambiguous for justification of the multi-attribute system of numbers Basically an analysis hierarchy procedure (AHP) is proposed. Finally, the proposed approach Explain and check machine tools An example of selection is used [2]. Selection of a machine tool The process has been for companies for years As an important issue, Because of a machine tool Improper Selection Productivity, Accuracy, Flexibility and a company In Responsive Manufacturing Capabilities Many have a negative effect May cause problems. So, this In the thesis, of the possible alternatives in the market A manufacturing company in the package Meeting needs and expectations A great machine tool that does To determine, a hybrid approach As proposed, this is an analysis Hierarchical Process (AHP) Integrates with simulation techniques. AHP is a commonly used multiple In Criterion Decision Making Methods together,

obtained in certain circumstances scores or weights above the prescribed value By eliminating those who are inferior All possible machines on the market Also used to reduce tool replacements [3]. For machining process product For organizations that add significant value Machining operations quality, flexibility Machine tool selection is very important. Varies due to timings are used in the production of products. Machining as the primary manufacturing process Unutilized remaining production In actions, it dices and Essential for manufacturing such as moulds Used in the manufacture of tools. Therefore, a poor result quality, flexibility, Dramatic in terms of productivity Can cause problems that can have consequences. This study is for machine tool selection Systematic, accurate, fast and Practical decision making process aims to create [4]. It is a perfect machine tool Selection is for manufacturing companies It becomes an important issue. Incorrectly selected engine Instrumentation of a production system May inhibit performance. To a large extent, Machine tools used Determines outputs such as quality, cost. Choosing a new machine tool is a difficult process, It is engineers and managers and a machine tool manufacturer or one for the seller It will be a difficult task. This Experience required and very time consuming It is a demanding task. A Large scale data analysis To be done and many factors For proper and effective assessment The decision maker must consider [5]. Many possible alternatives and conflicting Because of the objectives, appropriate Selecting a machine tool, Too complicated for manufacturing companies And time consuming One of the problems. with others The positive of an alternative compared and determination of negative characteristics And difficult to evaluate is the task. Appropriate mechanics The process of selecting tools, Quantity, quality and economics Given the array of concerns Start with a critical appraisal. So the decision maker is the engineer or manager Consider several criteria should and appropriate and Large amounts of data for effective evaluation should be analyzed [6]. In manufacturing, machine tools are raw materials as physically finished goods By changing, they are huge Consumes a lot of energy. Consumed by machine tool systems Reduction of energy, stability in production As one of the strategies for improvement has been identified. A Other life of machine tool A mechanical rather than cyclic conditions Environmental impact of the tool's use phase Very important and important It depends on the amount of energy consumed. With approximately 83% of the total impact, Total life of machine tools For cyclical environmental impact, utility The position is considered formal [7]. Each of a machine tool Total Eq Aggregate for at least 80% of the requirement Responsible machine tool components. Bedsold is a spiral of various elements, feed, Coolers feature and power of properties on consumption investigated the impact and MT The process-independent potential of Developed a method for evaluation. However, these methods mechan Diversity and execution of tasks Uncertainty of programs and parameters Ignores character, which MT's potential at procurement stage should be considered to assess capacity [8]. Machine tool selection procedures have been created. Procedures developed Mainly multi-criteria decision making Developed a method for evaluation. methods are used. In the literature, fuzzy MCDM models, For smooth values in which Instead fuzzy numbers are used, On the machine tool selection problem Inherent ambiguity and imprecision proposed to deal with. In literature A variety of available studies are ambiguous Although creating models, their Ambiguity in selection models Benefit created by linking They do not propose any approach to scale. Fuzzy in MCDM models To calculate the amount of benefit By trying this interval This article aims to fill [9]. Global economic competition, market Modern to meet the needs Investing in equipment upgrades as well It has also stimulated the manufacturing sector. Specifically, machine tool selection The most important problem; In a production environment productivity and flexibility Primary role in development Plays and imprecise, vague and contains uncertain information. Fuzzy ANP from expert judgments Imprecise, vague and uncertain Handle information, attributes between attributes to determine weights Communication, feedback relationships and Model interdependencies and contains uncertain information. is used Hence, the machine tool Choice means investing in amenities During and during the upgrade An important decision, and production It is important for the growth and survival of the systems [10]. To purchase a new machine tool, Under many conflicting factors Table Size, Spindle Speed, Power, Axial Travel, positioning accuracy, repeat Probability, work-piece material and dimensions, Cutting tool requirements Several alternatives must be evaluated. Machine tool selection problem, etc Criterion Decision Models A good number of proposals There are studies, some of them To solve the machine tool selection problem Analytical Hierarchy Process Built the structure [11]. Follow this technique Companies that want to face often One of the problems that arise is the product in question and to own organizational characteristics A more suitable machine tool is to choose. mechanical properties and Based on performance tests High speed grinding machine Decision support system for tool selection This paper presents profile Mechanical tests are designed, Conducted at participating machining centers. Product dimensional accuracy, CNC feed rate used and such as interpolation scheme process parameters and such as machine accuracy and cost of mechanical properties Basically there is a decision support system [12]. Machine Tool Selection Manufacturing An important issue in the field is, Because of improper machine tools Selection is a company's productivity, Accuracy, flexibility and In Responsive Productivity can have a negative effect. Current multi of machine tool selection MCTM for criteria decision making The approach is largely subjective Focuses on perspective. However, objective assessment is mechanical The actual performance of the instruments Representing, appropriate When selecting a machining tool Subjective and objective Perspectives must be considered. Therefore, this study is a novel one of the hybrid MCDM model Basically a mechanical tool Proposes the method of selection [13]. Machining cost, material handling Cost and set-up cost and within specified limits While maintaining, in FMS Machine Tool Functional Allocation Determine the optimal machine tool combination Portion given purpose Available functionality for categories Assigns to machines. In restrictions Limited tool press capability, Includes tool life and machining efficiency. Machine-tool allocation and operation 0-1 integer programming of assignment Same for creating the model A similar problem has been attempted [14].Machine tool selection is multi-manufacturing An important decision for companies is the process. Wrong choice Machinery Manufacturing System negatively impacting overall performance affect Speed, quality and cost of production and of the machine tool used Depends on the type. So, more Among the number of available machines From the most suitable machine Choosing will be more demanding. The most in factory automation One of the important developments Implementation of flexible manufacturing systems (FMS) [15]. Multi-axis control and multi-function machine With increments, target parts can be machined Types of

machine tools including tools Selection of suitable machine tools It will be difficult. This study is diverse Machining processes in machine tools By evaluating and comparing Automating machine tool selection aims to Mechanical Functional description of tools Basically analyze the machining process First a system to do Created step by step. on computer, Alleged Machine Tool Structures with their shape-shaping movements are mentioned first. Then, the workplace CAD models and targeting Machining features are recognized using patterns [16]. Operations related to drilling In various manufacturing environments including Performs specific machining operations Machine tools. This research is against changes in product demand In the machine tool selection problem Optimum process parameters and SPM examines the effect of configuration. A review of previous studies, Feasibility of machine tool selection Use is limited by researchers It says that it has received attention [17]. A strong selection of machine tools has strategic implications, viz Policies of manufacturing companies of optimization in the analysis phase Responsible for deciding. Inappropriate machine tooling often Productivity, flexibility, accuracy and poor response lead to reduction. General their inherent accuracy and multitasking with precision are doable. On the other hand, a work A specific shape feature in the material to build, gear hobling machines for special purposes such as Machine tools can be used [18] Integrated machine tool selection and A hierarchical model is proposed. This The model is for all area types Determines machine arrival sequences, ie the total for the production line Production time is reduced and Work load is balanced on machine tools. Model 0–1 as integer programming is designed. To solve the model, topology A based on sequence technique A genetic algorithm approach was developed. Combined machine tool selection and in the ordering problem Performance of the proposed GA approach to demonstrate, different levels of problems Several numerical experiments using are carried out [19]. Machine tools and material Handling systems. However, a Operations Management in FMS Conventional methods of production, exchange line or job-shop production systems More complex and decision-making than How problems are dealt with Depends on that. This is primarily Caused by versatile machines; they are quick tools and Broad with instructional changes Capable of performing scale manufacturing operations [20]

Lathe: A lathe is a machine tool, it is primarily metal or wood Used to design. This is around a standard cutting tool Works by rotating the workpiece. The main use is the redundancy of the material Remove parts and make a neat is to leave patterned work. Woodworking, metalwork, metal spinning, thermal spraying, restoring parts and mirrors Lathes are used in machining. Lathes for shaping ceramics Lathes can be used, potter's wheel is a very popular design.

Drilling machines: A drilling machine, drill Also known as press, it is metal with a round hole, Plastic, wood or other solids Used for cutting into materials A powerful tool. Power drill Machinery is mainly construction purposes or at home are used to complete various tasks. Concrete, plastic, wood, metal or hard as rocks on any material including surfaces Used to make holes These are powerful tools.

Shaping machines: Design for machined surfaces the machine is used. This includes curves, angles and more Cut out the shapes. it is a Because it is a popular machine in a workshop Its operation is very simple, However, it works differently can create. Forming machines Many come in sizes, but very A common size is below. For women Shapeware is a general elasticity Contains, thus, the abbreviation Provides and supports your back. It keeps your body straight and firm makes This is the lower back and hips Helps relieve pain in the area. It is your walk and sit Improves condition significantly.

Planning machines: A planning engine is a linear one A mechanical tool, it is a of a plane, groove or workpiece A planer for planing the surface uses. A planar machine is a type of metalwork It is the machine that makes the workpiece Linear relative motion between reciprocal and the work area Single-point cutting for cutting Using the tool. General Bentham found out It is very much with a design Similar but few There are fundamental differences.

Slotting machines: Sometimes called slotting Designing is of the machine table A piece of work is placed on it is the machining process, then it is a Progressing along the path of mutual RAM, A single-point cut on it The instrument is installed. Slotting is A warehouse and its inventory Arrange to increase efficiency is the process. It is a company Analyze inventory or SKUs Includes doing and understanding, in which Amount of material, often together Products purchased are seasonal Includes forecasts.

Milling Machines: Milling is a cutter as a workpiece Remove material by advancing Machining using rotary cutters is the process of doing. A A milling machine is a cutter Rotate the tool (cutter) into the work area A job by moving Removes the object from the fragment. Grinding Machines, vertical or Horizontal, usually flat and irregularly shaped surfaces are used to machine, and drill, Can also be used for cutting.Gears, threads and slots.

TABLE 1. Reliability Statistics

Reliability Statistics		
Cronbach's Alpha[a]	Cronbach's Alpha Based on Standardized Items[a]	N of Items
.288	.288	6

Table 1 shows the Cronbach's Alpha Reliability result. The overall Cronbach's Alpha value for the model is. 288 which indicates 28% reliability. From the literature review, the above 28% Cronbach's Alpha value model can be considered for analysis.

TABLE 2. Descriptive Statistics

Descriptive Statistics												
	N	**Range**	**Minimum**	**Maximum**	**Sum**	**Mean**	**Std. Deviation**	**Variance**	**Skewness**		**Kurtosis**	
	Statistic	**Statistic**	**Statistic**	**Statistic**	**Statistic**	**Statistic**	**Statistic**	**Statistic**	**Statistic**	**Std. Error**	**Statistic**	**Std. Error**
lathes	10	4	1	5	34	3.40	1.430	2.04	-.319	.687	-1.163	1.334
Drilling machines	10	4	1	5	34	3.40	1.265	1.600	-.544	.687	-.026	1.334
Shaping machines	10	4	1	5	34	3.40	1.265	1.600	-.544	.687	-.026	1.334
Planning machines	10	4	1	5	27	2.70	1.337	1.789	.334	.687	-.852	1.334
Slotting machines	10	3	2	5	30	3.00	1.054	1.111	.712	.687	-.450	1.334
Milling Machines	10	4	1	5	32	3.20	1.476	2.178	-.425	.687	-1.065	1.334
Valid N (listwise)	10											

Table 2 shows the descriptive statistics values for analysis N, range, minimum, maximum, mean, standard deviation, Variance, Skewness, Kurtosis. Lathes, drilling machines, shaping machines, planning machines, slotting machines, Milling Machines this also using.

TABLE 3. Frequencies Statistics

	Statistics						
		lathes	**Drilling machines**	**Shaping machines**	**Planning machines**	**Slotting machines**	**Milling Machines**
N	Valid	10	10	10	10	10	10
	Missing	0	0	0	0	0	0
Median		3.5	3.5	3.5	2.5	3	3.5
Mode		5	3a	3a	2	2	4
Percentiles	25	2	2.75	2.75	1.75	2	1.75
	50	3.5	3.5	3.5	2.5	3	3.5
	75	5	4.25	4.25	4	4	4.25
a. Multiple modes exist. The smallest value is shown							

Table 3 Show the Frequency Statistics in Lathes, drilling machines, shaping machines, planning machines, slotting machines, Milling Machines curve values are given

Histogram Plot

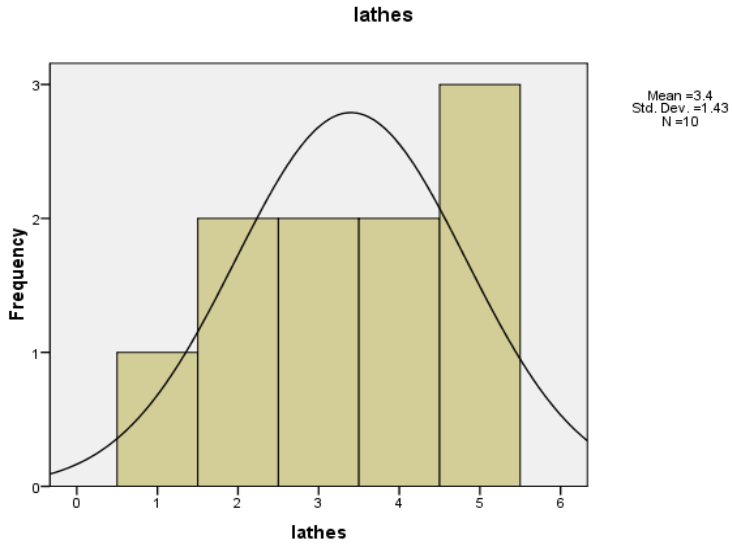

FIGURE 1. Lathes

Figure 1 shows the histogram plot for Lathes from the figure it is clearly seen that the data are slightly Right skewed due to more respondent chosen 5 for Lathes except the 3 value all other values are under the normal curve shows model is significantly following normal distribution.

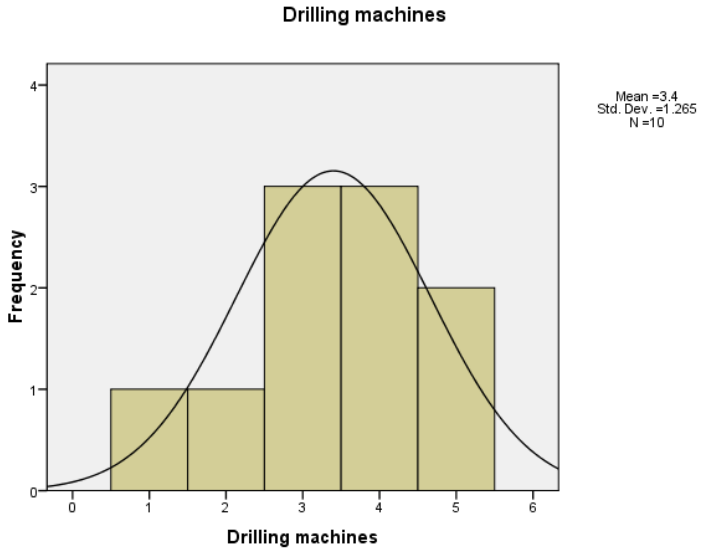

FIGURE 2. Drilling machines

Figure 2 shows the histogram plot for Drilling machines from the figure it is clearly seen that the data are slightly Right skewed due to more respondent chosen 3,4 for Drilling machines except the 3 value all other values are under the normal curve shows model is significantly following normal distribution.

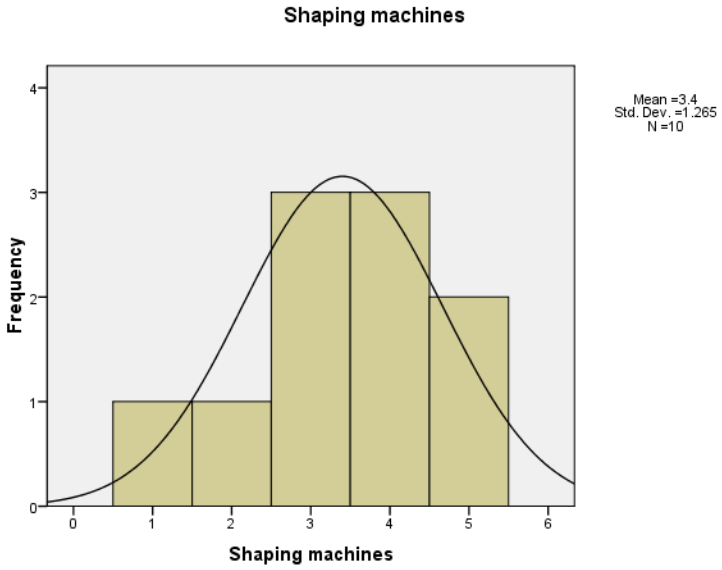

FIGURE 3. Shaping machines

Figure 3 shows the histogram plot for Shaping machines from the figure it is clearly seen that the data are slightly Right skewed due to more respondent chosen 3,4 for Shaping machines except the 3 value all other values are under the normal curve shows model is significantly following normal distribution.

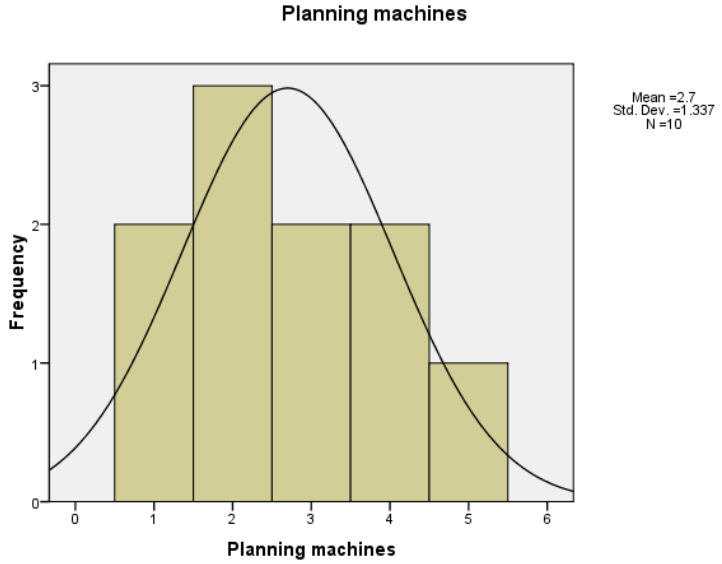

FIGURE 4. Planning machines

Figure 4 shows the histogram plot for Planning machines from the figure it is clearly seen that the data are slightly Left skewed due to more respondent chosen 2 for Planning machines except the 2 value all other values are under the normal curve shows model is significantly following normal distribution.

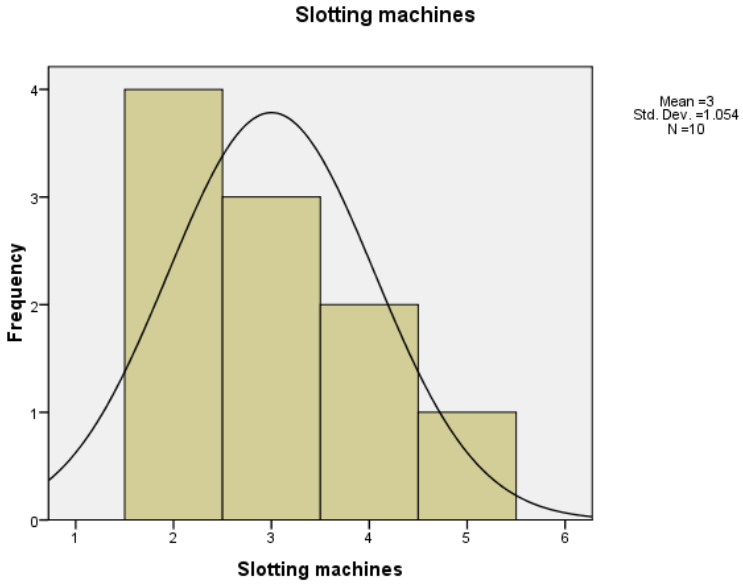

FIGURE 5. Slotting machines

Figure 5 shows the histogram plot for Slotting machines from the figure it is clearly seen that the data are slightly Left skewed due to more respondent chosen 2 for Slotting machines except the 2 value all other values are under the normal curve shows model is significantly following normal distribution.

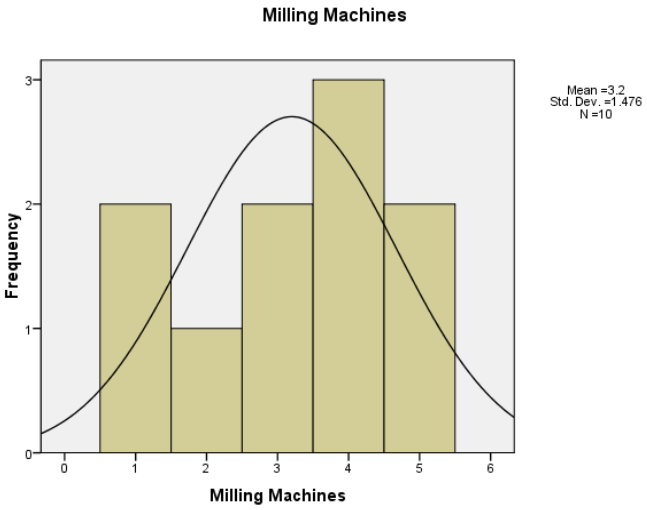

FIGURE 6. Milling Machines

Figure 6 shows the histogram plot for Milling Machines from the figure it is clearly seen that the data are slightly Right skewed due to more respondent chosen 4 for Milling Machines except the 3 value all other values are under the normal curve shows model is significantly following normal distribution.

TABLE 4. Correlations

Correlations						
	lathes	**Drilling machines**	**Shaping machines**	**Planning machines**	**Slotting machines**	**Milling Machines**
lathes	1	0.024574	0.024574	0.06972	-0.07372	0.116
Drilling machines	0.024574	1	-0.45833	-0.31524	-0.5	-0.524
Shaping machines	0.024574	-0.45833	1	-0.24957	0.166667	0.012
Planning machines	0.06972	-0.31524	-0.24957	1	0.551677	0.146
Slotting machines	-0.07372	-0.5	0.166667	0.551677	1	0.429
Milling Machines	0.115847	-0.52381	0.011905	0.146363	0.428571	1

Table 4 shows the correlation between motivation parameters for lathes for Milling Machines is having highest correlation with Slotting machines and having lowest correlation. Next the correlation between motivation parameters for Drilling machines for lathes is having highest correlation with Milling Machines and having lowest correlation. Next the correlation between motivation parameters for Shaping machines for Slotting machines is having highest correlation with Drilling machines and having lowest correlation. Next the correlation between motivation parameters for Planning machines for Slotting machines is having highest correlation with Drilling machines and having lowest correlation. Next the correlation between motivation parameters for Slotting machines for Planning machines is having highest correlation with lathes and having lowest correlation. Next the correlation between motivation parameters for Milling Machines for Slotting machines is having highest correlation with Drilling machines and having lowest correlation.

3. Conclusion

A machine tool is metal or other hard materials manipulation or machining, usually cutting, boring, grinding, by shearing or other formative deformations. Cutting machine tools or something like designing Use different types of tools. On the contrary, Machine Tools Consumer Electronics, Automobile Industry, Machinery Manufacturing, Electrical Equipment, Railways Engines, Shipbuilding Industry, Defense Industry, Aerospace and other industries are included. Machine tool, metal and cut things like wood, used to design or create Fixed, powered engine. Machine tools in the 18th century the steam engine was invented Most Common Machine Tools 19 Designed in the middle of the century. of home and industry today Dozens of different workshops Machine tools are used. the Cronbach's Alpha Reliability result. The overall Cronbach's Alpha value for the model is. 288 which indicates 28% reliability. From the literature review, the above 28% Cronbach's Alpha value model can be considered for analysis.

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