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ANALYSIS OF CUTTING FORCES OF FLITCHED TOOL HOLDER USING ANSYS

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1.1. *Abstract: -* Introducing a novel Lathe single point tool holder named Flitched tool holder. This tool holder is manufactured by 3D printing method. It is nylon made and sandwiched between two mild steel plates. Investigating this novel tool holder, this research work focus on the cutting forces generated on the Flitched tool holder while machining Polytetrafluoroethylene (PTFE- Teflon). In experimental work, the TNMG Insert is used. Modelling of the Flitched tool holder is done by Catia v5. The model meshing is done with the help of ANSYS. The ANSYS analyzed model by FEA at different forces and measures the stresses and deformation generated in the Flitched tool holder. Forces were calculated by Analytically and Experimentally at input factors like F, DoC., CS Experimental results are analyzed, and optimum parameters are achieved by Taguchi and ANOVA. For this, L27 Orthogonal array of Taguchi method is used. In the Finite element analysis of the Flitched tool holder, Also, the maximum deformation that takes place at and under the tip of the Insert of the Flitched tool holder, which blunts the tool, is the cause of failure. It is investigated that, Flitched tool holder for TNMG Insert is sustained up to the max. Force 60N which, is generally induced while machining PTFE –Teflon with other steel tool. Hence concluded that, Polymer Flitched tool holder has the capability of machining PTFE –Teflon effectively.

Keywords: *Flitched tool holder, TNMG Insert, cutting forces, stresses, Taguchi, ANOVA, ANSYS.*

1. Introduction

The present time is of modern technology and it is changing day by day. New technology is beging used for modernization. Many industries should adopt this modern technology and assimilate this technology. This new modern technology has spared in manufacturing industries also. This technology should focus on crating qualitative and cost effective product along with increase in production rate. And for that, efforts should be made to implement innovative ideas in the manufacturing industry. In the manufacturing industry, it is need to see the interest of customer requirement, their satisfaction, product quality and performance. Along with these cost of the product is considered as an important factor. In the industry, the cost of the product In the machining process, cutting inserts and Tool Holders is played an important role, a lot of research has been done on the cutting Insert, and there are numerous different inserts available for different materials and different operations. But, if the tool insert and tool holder are compared, less innovative work has been done on the tool holder. In this paper, the research work is done on the Flitched tool holder. This flitch tool holder is manufactured by 3D Printing fused deposition method and this is made of Nylon material and Flitched between two steel plates. Fig. 1 shows the FFF 3D Printed Flitched Tool holder for TNMG Insert. It is the best option for a regular steel tool holder. The weight of a steel tool holder is 0.210 kg, and the weight of a Flitched Nylon tool holder is just 0.300 kg, which means a 30% weight loss achieved by the Flitched tool holder.

Fig. 1 FFF 3D Printed Flitched Tool holder for TNMG Insert

FFF/FDM - FDM 3D printing has a nozzle moves and squirts with melted plastic layer by layer to build a 3D object. You can find each layer as a flat slice, and after one layer is done, the nozzle lowers for the next. Once done, support materials are taken off. **[1]** In 2020**, J. H. K. Steven D. Kim AM et al.** stated that, Technologies such as FDM FFF, SLA, AND SLS all offer methods for rapid prototyping. FFF is more widely used for its ease of use and low cost. **[2] F. Calignano, M. Lorusso 2021** Due to this rapid rise in AM technologies, it is important to develop new and improved 3D printable high-performance materials. **[3]T. R. Mohammad Reza Khosravani** explained, Markforged developed the FDM process. SLA, DED processes were also used for the composite material 3D printing. FDM and FFF are widely used for the printing of Polymeric material. **[4] R.T. Mushtaq et al.** Stated that, FFF is the important 3d printing method. New methods are now developed in the FFF by which different various composite material can be printed even metalic materail also can be fused. Many researchers are lokking for the imporvement of the product quality. **[5]**I.M.Alarifi 2022 FFF and FDM nowdays mostaly used in Automobile, Aerospece, conductive structure, biological, biochemical, medical, and jewwlry product. It hs been used to build composite fiber structure and design product.

Nylon 6 – Nylon is the plastic category material. There are two common grade of Nylon, such as Nylon 6 and Nylon 66. These number dependents upon the Nitrogen Atoms. Nylon also called as Polyamide. Nylon material is mostly influenced by the different number of Methyl Groups. Nylon do not have large molecular chain structure. It is Crystalline material. It has 215°C melting temperature and it has nontoxic properties with better fatigue resistance. Nylon density is 1.14g/cm$^{3.}$ **[6] Y.Zhang et al.** stated that the Nylon 618 has good ability and effectively perform in the 3D printed parts. The results shows that the Gears which are made of Nylon 66, performed better at low to medium torquewas applied.

[7] T.R.Mohammad 2021 investigated that, for the complex geometric structure elements can be frbaricated with 3D printing techanology, worked on the Fiber-reinforced composite materail and expected more techaniques and application in the future regarding the Fiber-reinforced compostite 3D printing. **[8] I. M. Alarifi 2022** stated that Mechanical Properties of the composite parts are mostly depends upon the loading and orientation in Nylon material. Glass fiber has max. modulus and flextural strength at fiber raster orientation.

Table no. 1. Properties of Tool holder material Nylon and Experiment material Teflon

Property	Unit	Tool Holder material Nylon	Experiment material Teflon
Density	g/cm3	1.13	2.2
Tensile Strength	MPa	83	34
Modulus of elasticity	GPa	4	0.5
Melting Temperature	°C	220	327
Shore Hardness	D	85	55
Coefficient of Friction	-	1.4	0.10

1.2. Cutting forces - cutting forces determining is very crucial task during the machining process. The quality of machining and surface finish, tool life is depending upon the forces induced while the machining process. Tool wear and power consumption are significant factors in machining **[9] J. P. Davim and F. Mata –** the feed rate increased as the result of which cutting forces are also increased [**10] C. Fetecau and F. Stan** stated cutting forces mostly influenced by the feed rate near about 95% then the combination of feed rate and doc. **[11] M. Suhail, A. Deepak et al** observed that, the specific pressure and specific consumption, cutting temperature, tool wear, are depend upon the F, DoC. and NR 57.81%, 35.02% and 4.29% respectively. **[12] Sharma S. et al.** observation recorded that DoC. and F directly proportional to forces. The cutting forces and feed forces are increased by increasing the Depth of cut. But **[13] M. R. Dijmarescu** stated that, there are different forces occurs during the machining process such Orthogonal, Tangential Axial cutting forces and radial forces. Less influenced with cutting speed observed. Turning is not orthogonal cutting process. This is shown in fig no. 2

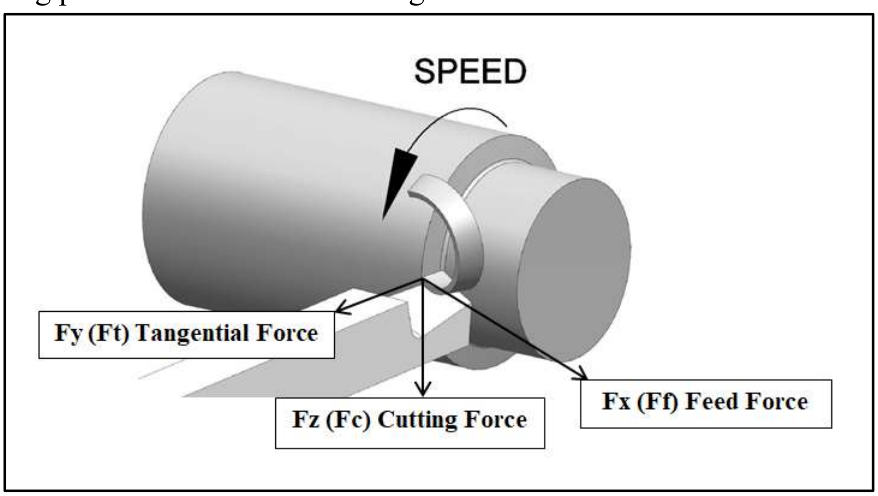

Figure No. 2. Illustrates forces during a turning operation

[14] According to A. Shrivastava et al. (2021), the depth of the cut emerges as the most impactful factor, constituting 83.99% for feed force. Following closely is the feed rate at 8.58%, while speed holds the least significant at 3.68%, and error marginally higher at 3.76%. In terms of cutting force, the depth of cut remains pivotal, contributing 61.22%, trailed by the feed rate at 19.01%. Speed retains minimal influence at 3.10%, while error accounts for approximately 16.66% [15] S.

Elhami, 2022 it is indicating that, cutting force diminishes with heightened CS attributed to material softening due to increased speed levels, resulting in reduced shear strength within the shear zone.

1.3. Analysis- [16] M. C. Cakir and Y. Isik delved into infinite element modeling of a cutting tool nearing its fracture. Their observations revealed that the triggering natural frequencies leading to the tool's breakage aligned with the initial, like 20Hz, 40Hz, 60hz and 80Hz, and so forth. Notably, they identified the highest displacement occurring at of 13.835 Hz. Yet, natural responsible for tool's fracture was pinpointed at 22.150 Hz. [17] Erdogan Kose and Abdullah Kurt explored the impact of the feed rate on cutting tool stresses. They employed a finite element method (FEM) via ANSYS to scrutinize stress distributions on the cutting tool. The outcomes highlighted the feed rate as the primary influential cutting parameter affecting tool stresses. To optimize the matching process economically, the recommended ranges for cutting speed and feed rate are between 225 and 400 m/min, and 0.11 to 0.125 mm/rev, respectively. [18] According to S. H. Rathod and M. Razik, the experimental findings indicate that the primary factors contributing to the rise in cutting temperature are the cutting speed (v), feed rate (f) and the depth of cut (d). Furthermore, they concluded that alterations in CS, Doc. Exert t significant influence on elevating temperature during cutting. [19] A. Nagarajan examined the efficacy of coated tools when machining hardened steel in dry conditions through ANSYS. The Tin-coated tool demonstrates superior. Investication shows that, cutting has a dual effect: it diminishes wear and tear on the tool tip and enhances heat dissipation to the surroundings. Consequently, this leads to an extended tool lifespan and improved surface finish of the machined product. [20] S. Sowjanya and D. Sreeramulu conducted an assessment of life of tool of the HSS tool across various cutting parameters in the turning process. Their findings indicate a reduction in tool life with increased feed rate and cutting speed. The optimal scenario emerges at a 0.5mm depth of cut, marked by a CF of 392N and life OF TOOL 472min. cut [21] According to V. Kumar et al., the forces generated by the spindle rotation, feed rate and depth of cut (measuring 2000 N, 1100 N, 1000 N, respectively) induce vibrations in the tool. These vibrations are attributed to causing significant wear and tear on the tool. [22] S. A. Shambharkar examined the model using finite element analysis across different force levels, determining the stresses formed at the tool's tip and its deformation. When the Doc. was extended beyond 2.5. mm, vibrations initiated within the tool. Consequently, this vibration affected the tool's geometry, rendering it unusable. [23] In 2021, M. Sagar, M. Awhale and S. K. Biradar conducted an investigation into the stresses arising in grooving tool holders. They employed both theoretical orthogonal formulation and experimental analysis through the ANSYS finite element software. The findings revealed lower stresses in holder while 2200rpm as opposed at 1000rpm. This underscores that the life expectancy of grooving tool holders is contingent upon torque and RPM. [24] In 2021, K. M. Nalli Sunil et al. conducted modeling using NX 10.0 and performed analysis utilizing the ANSYS Explicit solver. Stress versus deformation cures were generated for different depths—0.1mm, 0.2mm, and 0.3mm. The outcomes of the experimental optimization revealed that the depth of cut emerged as the sole significant parameter impacting the results. [25]

In 2022, A. K. Madan et al. investigated the design, optimization and cutting tool analysis, taking into account factors such as stress, equivalent stress, and steady-state thermal conditions. They utilized multiple software tools including solid works and notably, relied on ANSYS for more effective and improved outcomes.

2. Experimental Apparatus

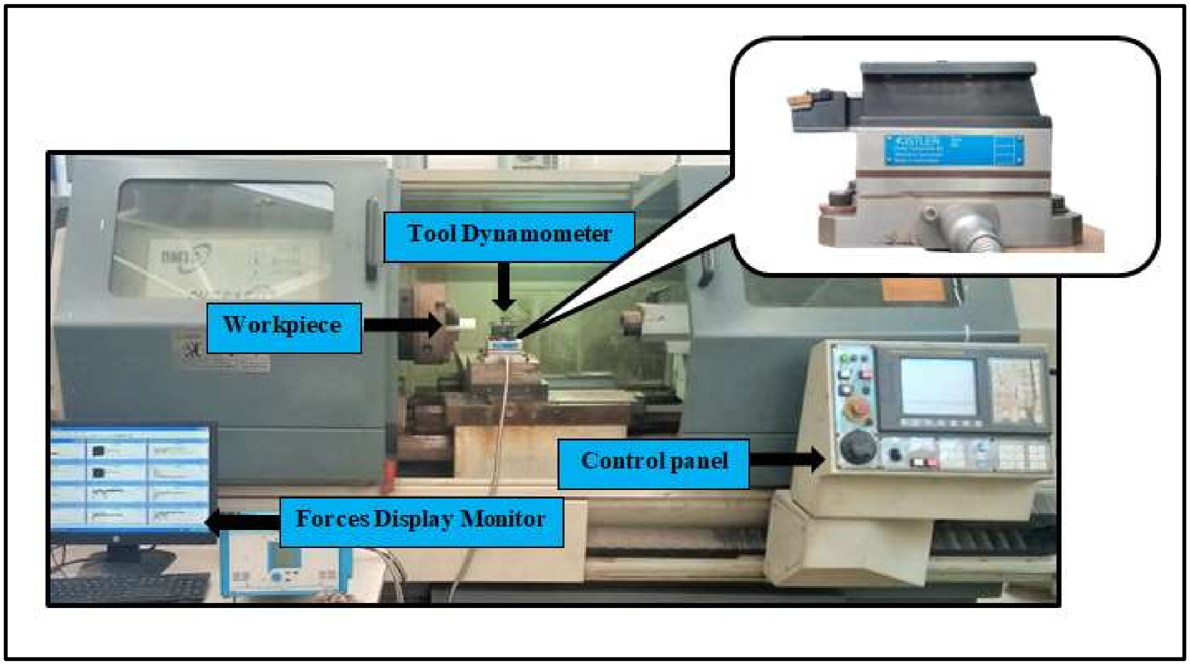

Fig. 3 Experimental set up for Measuring Forces by Kistler Dynamometer

The entire experiment was performed on a "DMTG" make CNC lathe, as shown in Figure 3. Teflon material is used as experimental, which is machined by the "TNMG" Turning Insert by using a polymer (Nylon) Flitched tool holder, which is shown in fig.1. forces such as Cutting, feed and Radial forces were measured using Kistler type 9119A2 Dynamometer. Minitab, readily available software, was employed for structuring the experimental design and run sequence, guiding the execution of the experiments accordingly. Table 2 shows the main experiments' results and the corresponding variable input parameter.

Table 2 Results of the main experiments with corresponding variable input parameter

Exp. No.	Machining Parameters			Output Parameter		
	Speed	Feed	DOC	Force (N)		
	Vc (m/min)	f (mm/rev)	a_p (mm)	Fc	Ff	Ft
1	70	0.10	0.50	29.43	49.05	19.62
2	70	0.10	1.00	29.43	39.24	19.62
3	70	0.10	1.50	39.24	29.43	19.62
4	70	0.20	0.50	19.62	39.24	19.62
5	70	0.20	1.00	29.43	29.43	19.62
6	70	0.20	1.50	39.24	19.62	19.62

7	70	0.30	0.50	19.62	39.24	29.43
8	70	0.30	1.00	29.43	39.24	29.43
9	70	0.30	1.50	39.24	19.62	29.43
10	120	0.10	0.50	19.62	39.24	19.62
11	120	0.10	1.00	19.62	39.24	19.62
12	120	0.10	1.50	29.43	29.43	19.62
13	120	0.20	0.50	19.62	39.24	19.62
14	120	0.20	1.00	29.43	39.24	19.62
15	120	0.20	1.50	29.43	29.43	29.43
16	120	0.30	0.50	19.62	49.05	29.43
17	120	0.30	1.00	29.43	39.24	29.43
18	120	0.30	1.50	29.43	29.43	29.43
19	170	0.10	0.50	19.62	49.05	29.43
20	170	0.10	1.00	29.43	49.05	29.43
21	170	0.10	1.50	29.43	29.43	29.43
22	170	0.20	0.50	19.62	58.86	29.43
23	170	0.20	1.00	29.43	49.05	29.43
24	170	0.20	1.50	39.24	49.05	39.24
25	170	0.30	0.50	9.81	58.86	29.43
26	170	0.30	1.00	29.43	49.05	29.43
27	170	0.30	1.50	39.24	39.24	39.24

The optimization process utilized the Taguchi Method, a statistical approach aimed at enhancing product quality. Taguchi formulated quality in relation to minimizing societal loss. This technique implements a robust design strategy employing specially crafted arrays known as orthogonal arrays, reducing the number of experimental trials compared to complete factorial designs. By employing the S/N ratio, the Taguchi method renders the process less susceptible to external disturbances, aiding in a more straightforward analysis of result.

3. Result and Discussion

3.1. Taguchi and ANOVA

The statistical software Minitab was employed for the experimental design and data analysis throughout the entire study. Taguchi's L27 orthogonal array (OA) was utilized in this research, involving three distinct sets of experiments. This approach significantly contributed to more accurate predictions and precise outcomes. Table 4 outlines these three experimental sets. Moreover, Table 2 illustrates that CS, F and Doc. Influencing CF. The comprehensive analysis includes Taguchi Regression Analysis, the Response Table for Signal Noise Ratios (Smaller is better) and a Main Effect Plot for Means, discussed in detail below:

3.1.1. Regression Analysis: Fc versus Speed, Feed, DOC

Table no. 3 Taguchi Analysis: CS, F, DoC. for FC

Source	DF	Contribution	Adj SS	Adj MS	F-Value	P-Value
Regression	3	70.85%	1096.02	365.34	18.64	0.000
Speed	1	3.11%	48.12	48.12	2.45	0.131
Feed	1	0.00%	0.00	0.00	0.00	1.000
DOC	1	67.74%	1047.90	1047.90	53.45	0.000
Error	23	29.15%	450.88	19.60		
Total	26	100.00%				

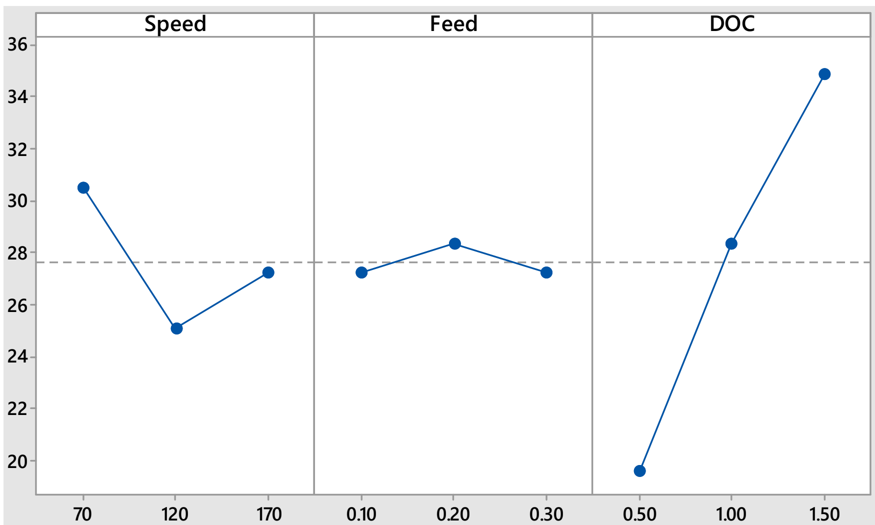

Fig. no. 4 Main Effects Plot for Means

Table 3 highlights the significance of all three process parameters concerning cutting force (Fc). Notably, the depth of cut emerges as the most influential factor, contributing 67.74%. Following this, cutting speed holds a 3.11/5 contribution, while the feed exerts the lease influence. Moreover, approximately 29.15% of the responses are attributed to error, implying the possible significance of interaction effects or unaccounted process parameters. Figure 4 depicts a high force at a 95% confidence level. Optimal settings for minimizing force are observed at CS 120m/min, F 0.10mm/rev. and DoC. of 0.50mm., resulting in a minimum force of 19.62. The regression equation representing this statistically is Fc= 16.28- 0.037 Speed- 0.0 Feed+ 15.26 DOC.

3.1.2. Regression Analysis: Ff versus Speed, Feed, DOC

Table no. 4 Taguchi Analysis: CS, F and DoC. for Ff

Source	DF	Contribution	Adj SS	Adj MS	F-Value	P-Value
Regression	3	75.77%	2111.85	703.95	23.97	0.000

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Speed	1	32.42%	903.55	903.55	30.77	0.000
Feed	1	0.19%	5.35	5.35	0.18	0.674
DOC	1	43.16%	1202.95	1202.95	40.96	0.000
Error	23	24.23%	675.43	29.37		
Total	26	100.00%				

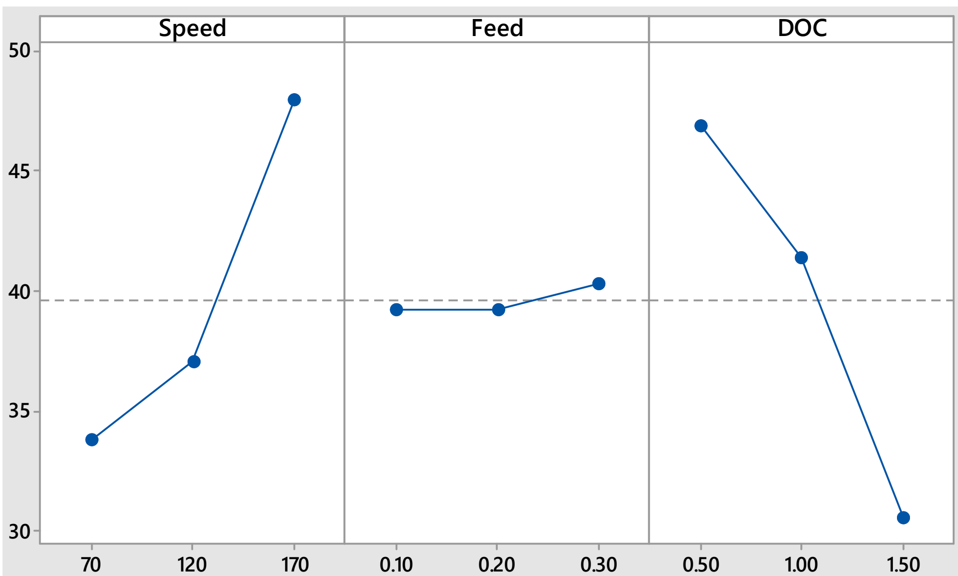

Fig. no. 5 Main Effects Plot for Means

Table 4 demonstrates the significance of all three process parameters concerning feed force (Fc). Particularly, DoC. And CS emerge as the most impactful factors, contributing 43.16% and 32.42% respectively; while the feed rate shows the least significance at 0.19%. Additionally, around 24.23% of the responses are attributed to error, suggesting potential significance in interaction effects or unaccounted process parameters. Sharma S. et al. [12] noted that feed forces and depth of cut exhibit a direct proportionality with cutting forces. The analysis indicates that an Max DoC. results in heightened cutting and feed forces. Furthermore, Figure 5 illustrates a higher force of 58.86 N exerted on the turning insert. The optimal settings for minimizing feed force are identified CS 70m/min. F 0.20mm/rev. and DoC. 1.5mm, resulting in a minimum force of 19.62. Statistical regression equation representing this relationship is Ff= 37.86 + 0.1417 Speed + 5.4 Feed – 16.35 DOC.

3.1.3. Regression Analysis: Ft versus Speed, Feed, DOC

Table no. 5 Taguchi Analysis: CS, F and DoC. for Ft

Source	**DF**	**Contribution**	**Adj SS**	**Adj MS**	**F-Value**	**P-Value**

Regression	3	67.78%	652.27	217.42	16.13	0.000
Speed	1	35.56%	342.17	342.17	25.38	0.000
Feed	1	27.22%	261.98	261.98	19.43	0.000
DOC	1	5.00%	48.12	48.12	3.57	0.072
Error	23	32.22%	310.09	13.48		
Total	26	100.00%				

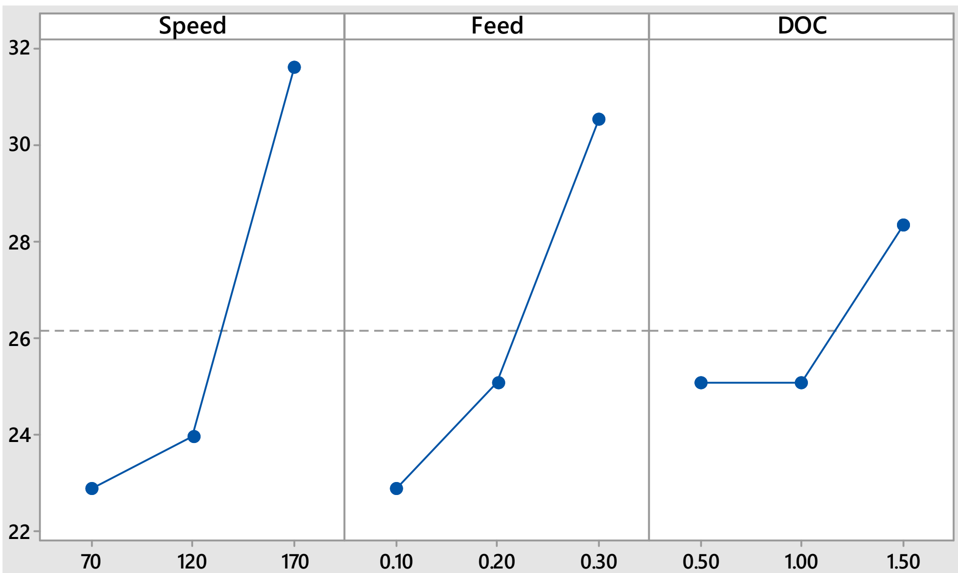

Fig. no. 6 Main Effects Plot for Means

Table 5 indicates the significance of all three process parameters concerning radial or tangential force (Ft). According to Dijmarescu [13], since turning isn't strictly orthogonal cutting, an additional force, radial or tangential force (Ft), affects the tool. CS and F most significant factors, contributing 35.56% and 27.22%, respectively, while the depth of cut shows less significance at 5.00%. Error contributes 32.22% to the results. The behavior of tangential forces is linked to cutting speed, similar to cutting and feed forces. In Figure 6, a higher tangential force of 39.24N is observed at CS 170m/min, F 0.10mm/rev and Doc. 0.5mm results min. 19.62N.

3.2 Finite Element Analysis (FEA) is a versatile tool widely used in various studies. According to A. Nagarajan [19], ANSYS Mechanical stands as a valuable mechanical analysis tool, enabling the import of geometry from different CAD systems. It aids in validating product performance and integrity across different phased of product design and development. Mesh generation involves creating polygonal or polyhedral meshes to approximate geometric domains, commonly termed "grid generation". These grids are utilized for computer screen rendering or physical simulations like finite element analysis. In material science, deformation signifies changes in an object's shape or size due to applied forces.

This experiment regarding the FEA and Von Mises results for the cutting tool while the dynamic behavior of the tool structure is investigated through harmonic response analysis, exploring the tool's natural frequency fractures due to cutting forces. The model's validity is established by comparing experimental cutting force data. Table 2 showcases observed cutting forces, pivotal for analyzing total deformation and Equivalent (Von Mises) Stresses are graphically presented in Fig. 7 to 11 (a, b,) respectively, Table 6 illustrates the Total Deformation and Equivalent (Von Mises) stresses alongside the corresponding variable input parameters.

Table no. 6. Experimental result of Total Deformation and Equivalent (Von mises) Stresses with corresponding variable input parameter

Input			**Forces**	**Total Deformation maximum**	**Equivalent (Von mises) Stresses (MPa)**	
CS	F	DoC.			Min.	Max.
70	0.20	0.50	19.62	0.0059278	4.1081e-6	1.3034
120	0.20	1.50	29.43	0.0088917	6.1622e-6	1.9551
120	0.30	1.00	39.24	0.0118560	8.2162e-6	2.6068
170	0.20	1.50	49.50	0.1482000	1.0270e-5	3.2585
170	0.30	0.50	58.86	0.0177830	1.2324e-5	3.9102

Based on the ANSYS Findings, CS, F and DoC. the most impactful parameters for forces during turning operations. Table 6 displays the results indicating total deformation and Equivalent (Von Mises) Stresses corresponding to various input variables. The minimum force of 19.62N was registered at CS 70m/min, F0.20m/min and DoC. 0.5mm, and the feed rate was at its maximum of 0.30mm/rev. As a result of forces, total deformation increased with increased forces as well as Equivalent (Von Mises) Stresses also increased.as per recorded ANSYS results, Total deformation Minimum 0.000mm – maximum 0.0059278mm recorded while applied the 19.62N Min force.as the forces increased the total deformation also increased at maximum force 58.86N the total deformation is Minimum 0.000mm - 0.0177830mm. Here Equivalent (Von Mises) Stresses (MPa) also increased with respect to forces increased. At minimum level of force 19.62N, the Equivalent (Von Mises) Stresses min. 4.1081e-6 – max.1.3034 recorded, and at maximum levels of force 58.86N the Equivalent (Von Mises) Stresses min. 1.2324e-5– max. 3.9102 recorded.

The software conducted finite element analysis on the model, examining various forces and assessing stresses at the tool tip as well as deformation. In the analysis of the Flitched tool holder, it was noted that maximum stresses occur at the insert's tip, a primary reason for its failure. Results depicting total deformation and Equivalent (Von Mises) Stresses for the Flitched tool holder are shown in 7 to 11 (a & b) respectively. The most significant deformation occurs at the insert tip, causing compression between the insert and the mild steel plate. This compressed part in the Flitched tool, mad of Nylon, experiences heat generation during metal cutting due to shearing action, elevating the tool's temperature. This elevated temperature softens that blunt the tool and contribute to the failure of the Flitched tool holder. It is concluded that optimizing the tool holder's design will minimize total deformation and Equivalent stresses, thereby enhancing the tool's lifespan.

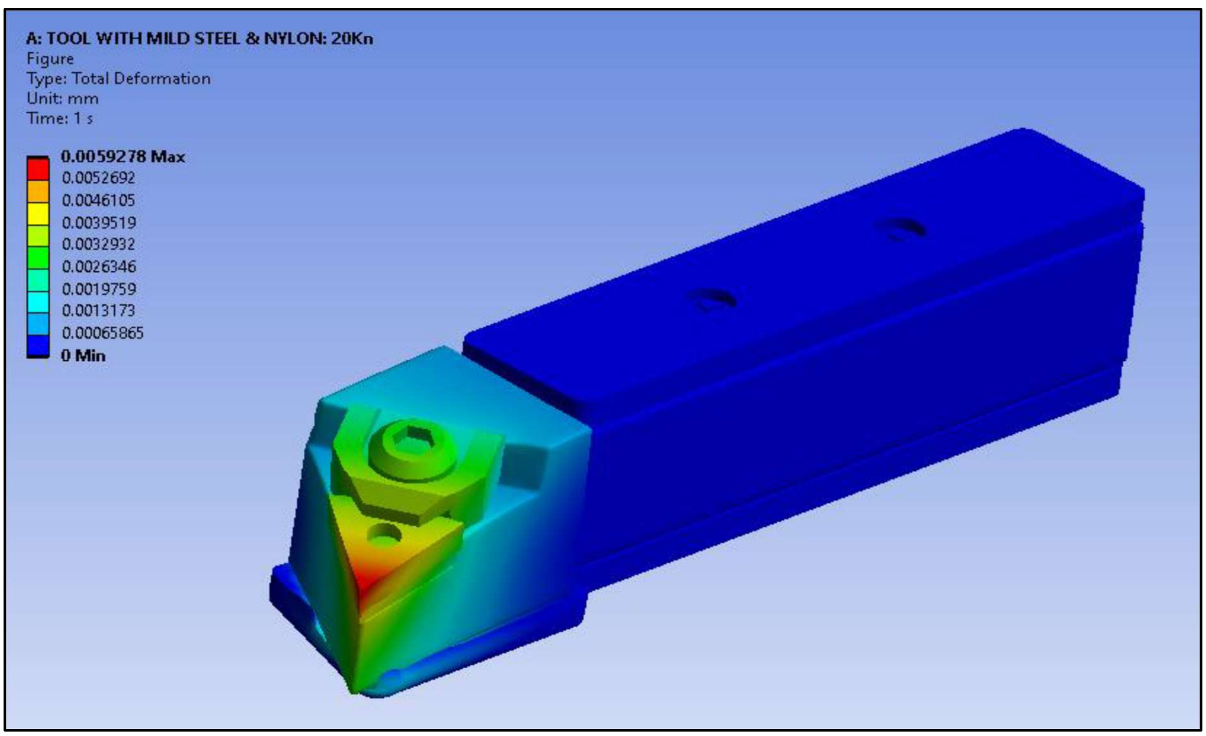

Fig. no. 7.a. Load - 20 KN Total Deformations

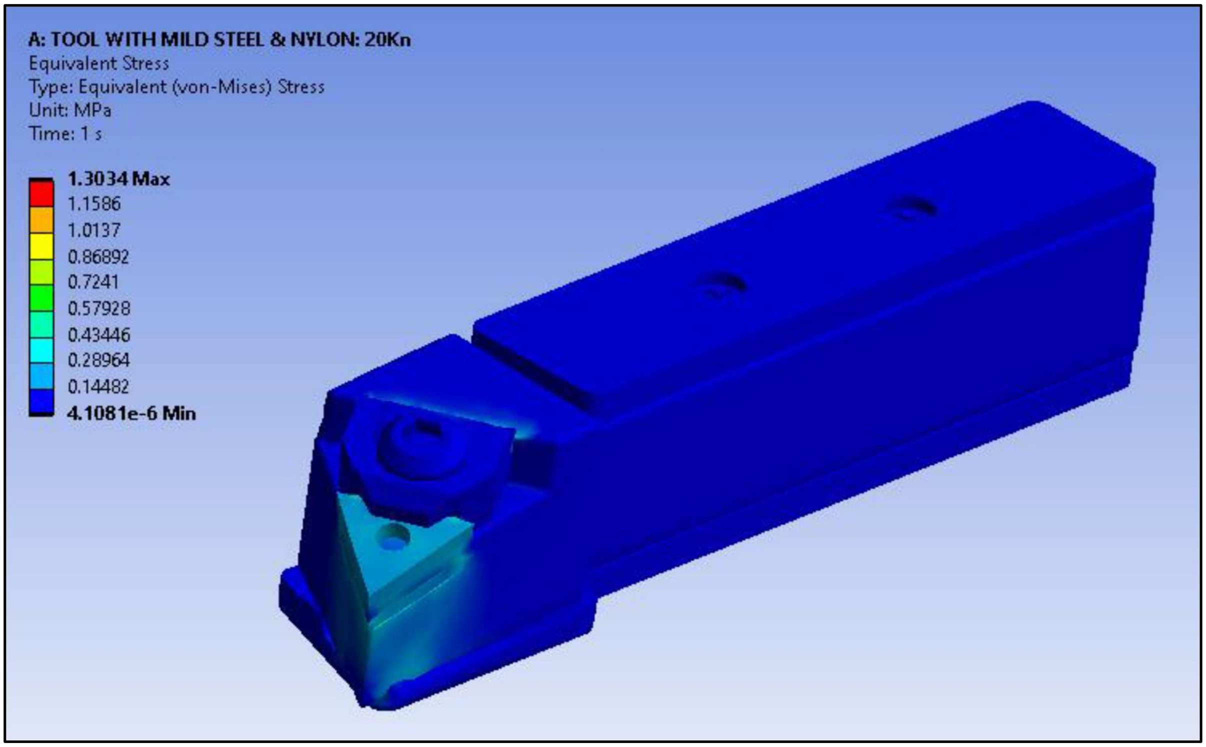

Fig. no. 7.b. Load - 20 KN Equivalent (Von mises) Stresses

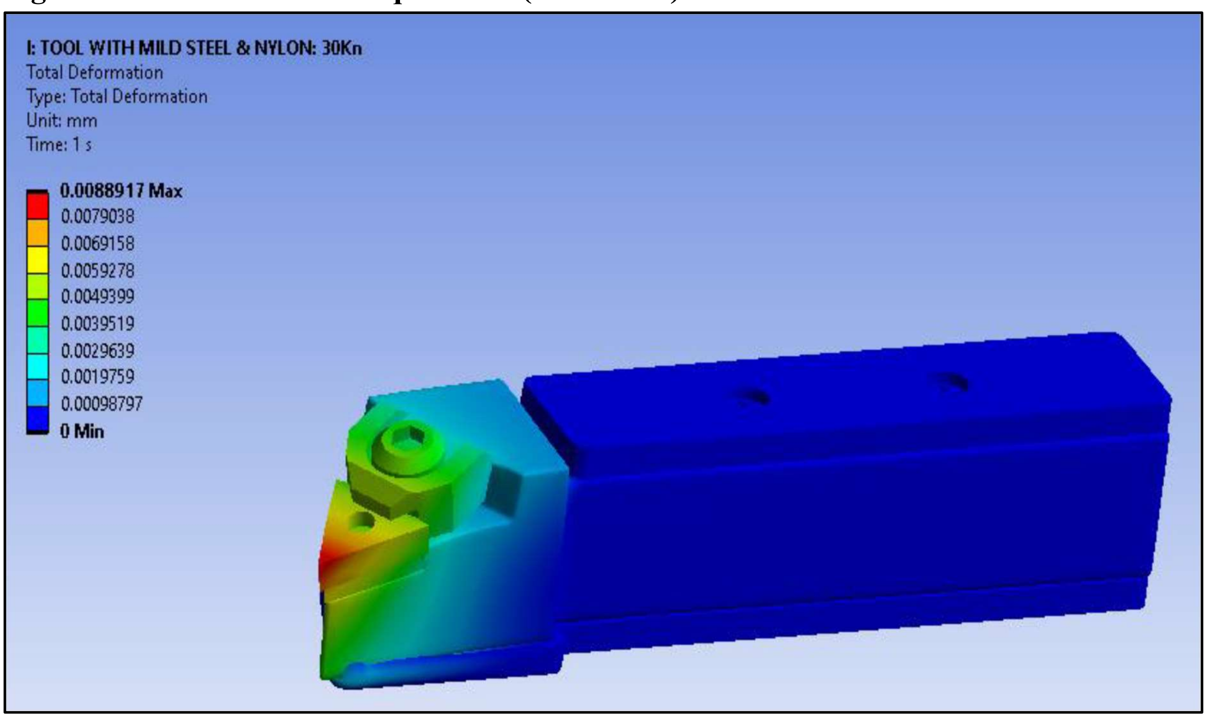

Fig. no. 8.a. Load - 30 KN - Total Deformation

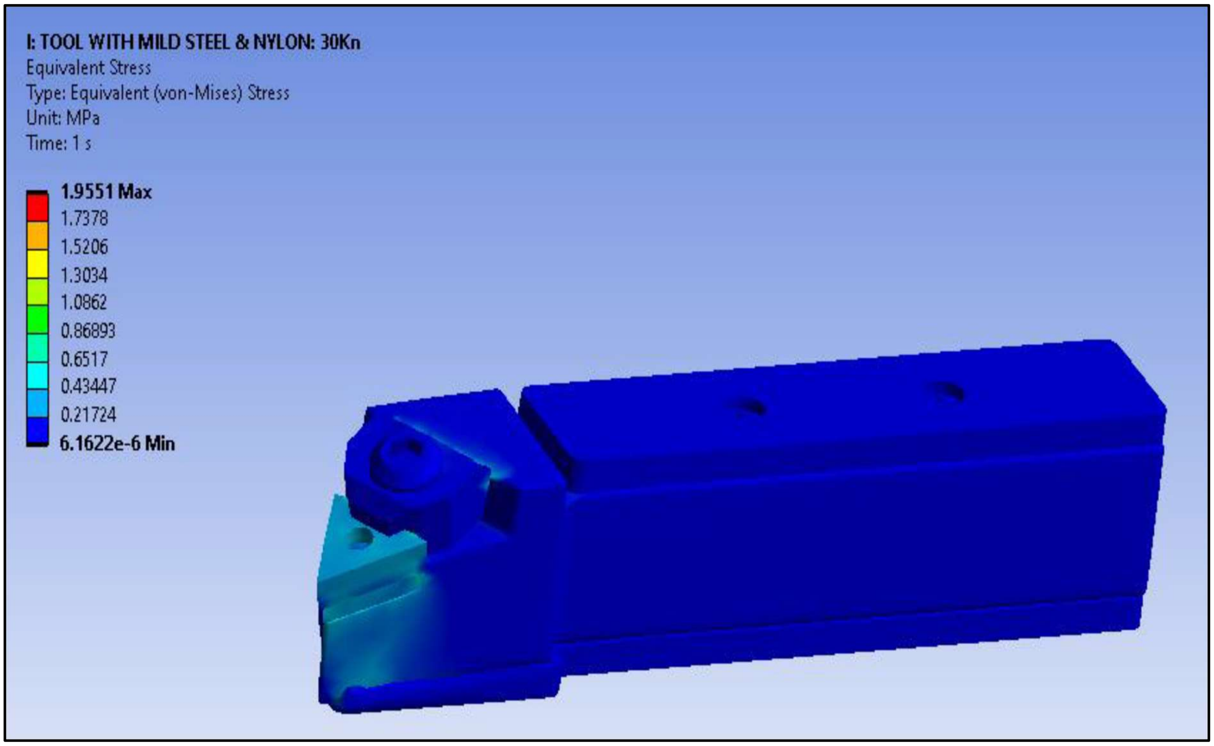

Fig. no. 8.b. Load - 30 KN - Equivalent (Von mises) stresses

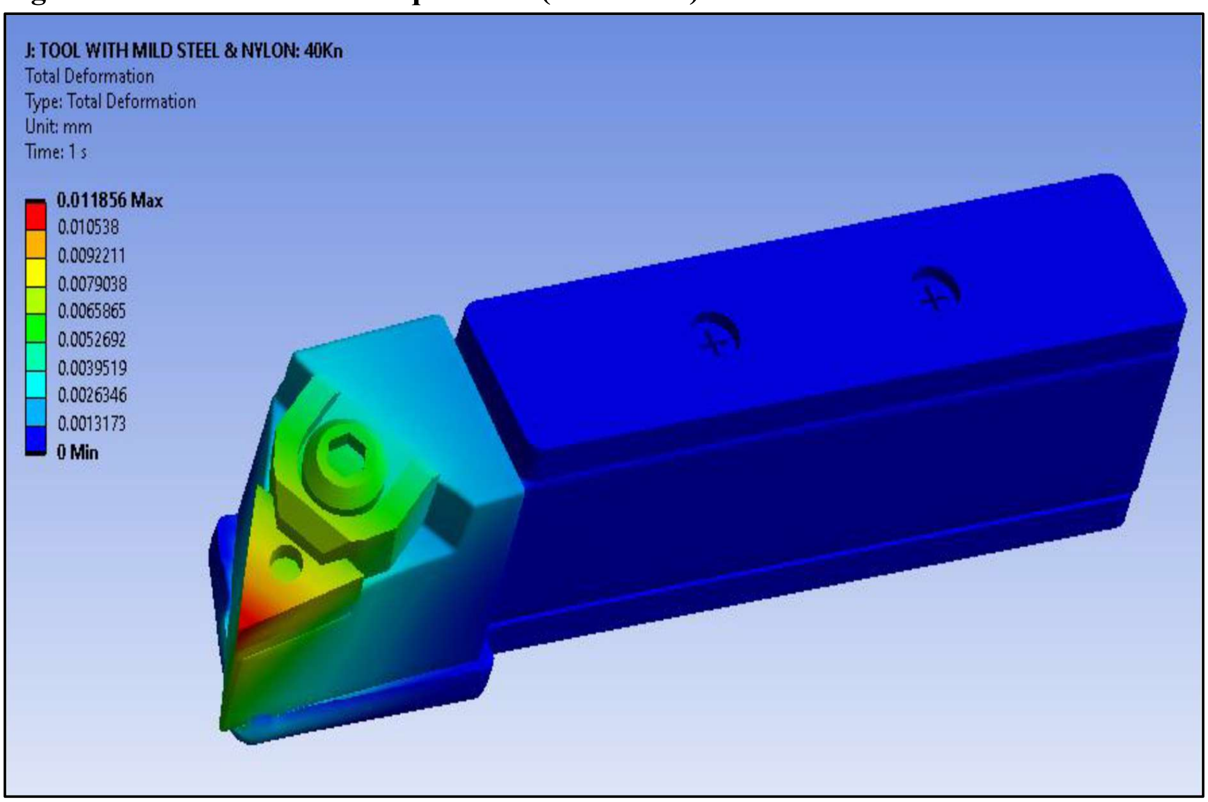

Fig. no. 9.a. Load - 40 KN Total Deformation and

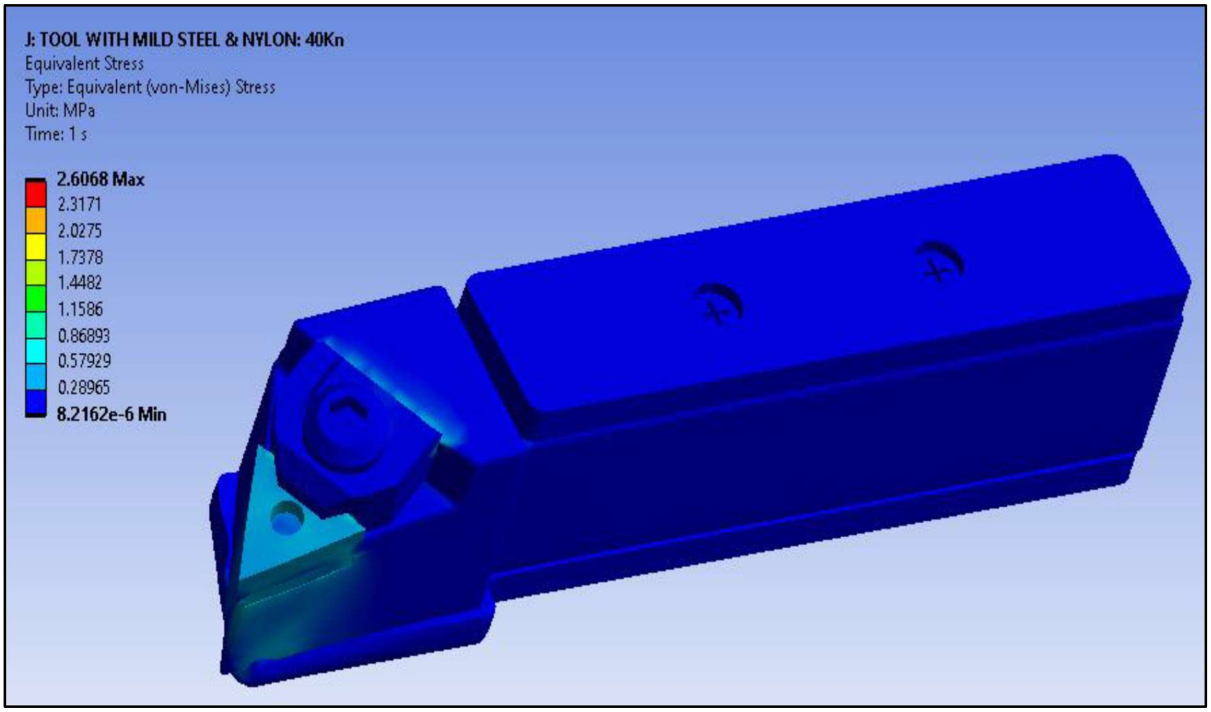

Fig. no. 9.b. Load - 40 KN Equivalent (Von mises) Stresses

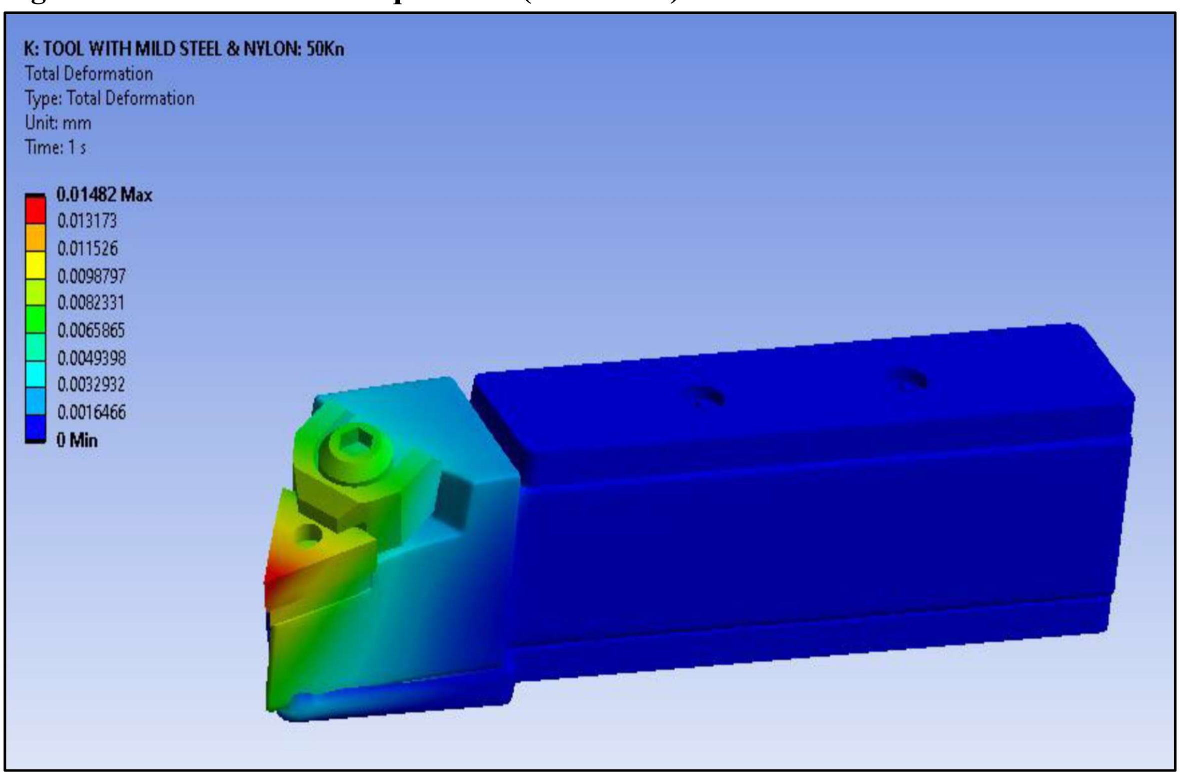

Fig. no. 10.a. Load - 50 KN Total Deformations

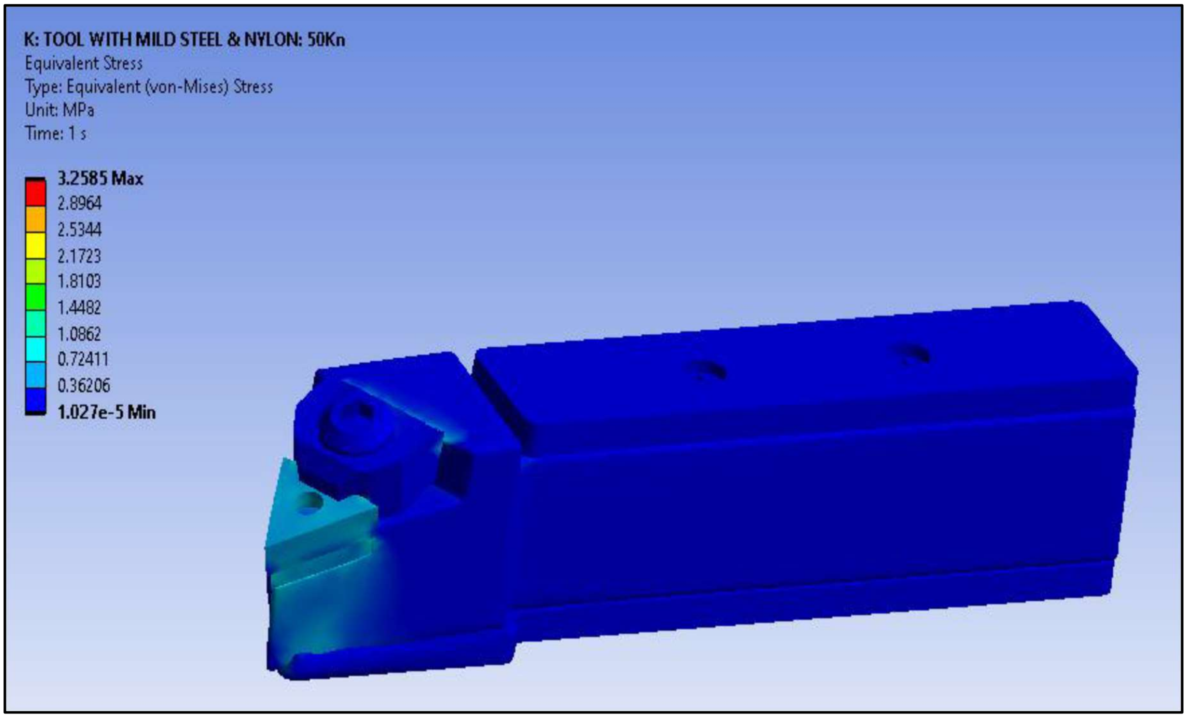

Fig. no. 10.b. Load - 50 KN Equivalent (Von mises) stresses

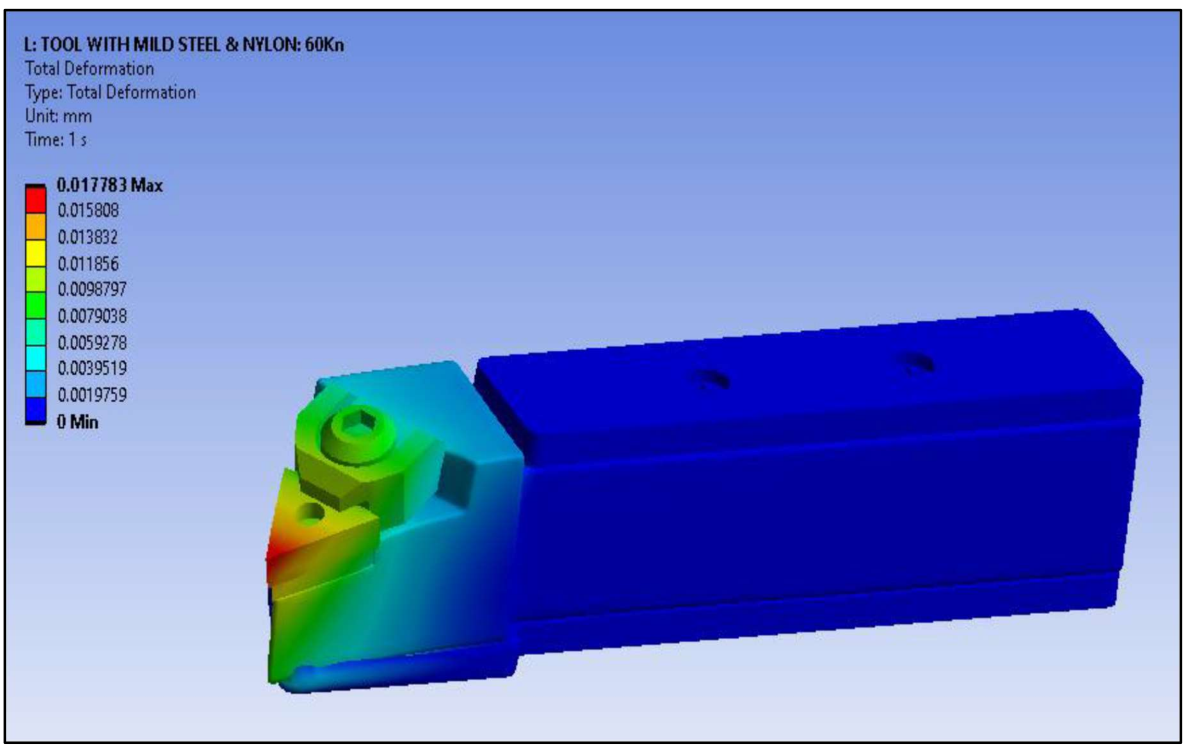

Fig. no. 11.a. Load - 60 KN Total Deformations

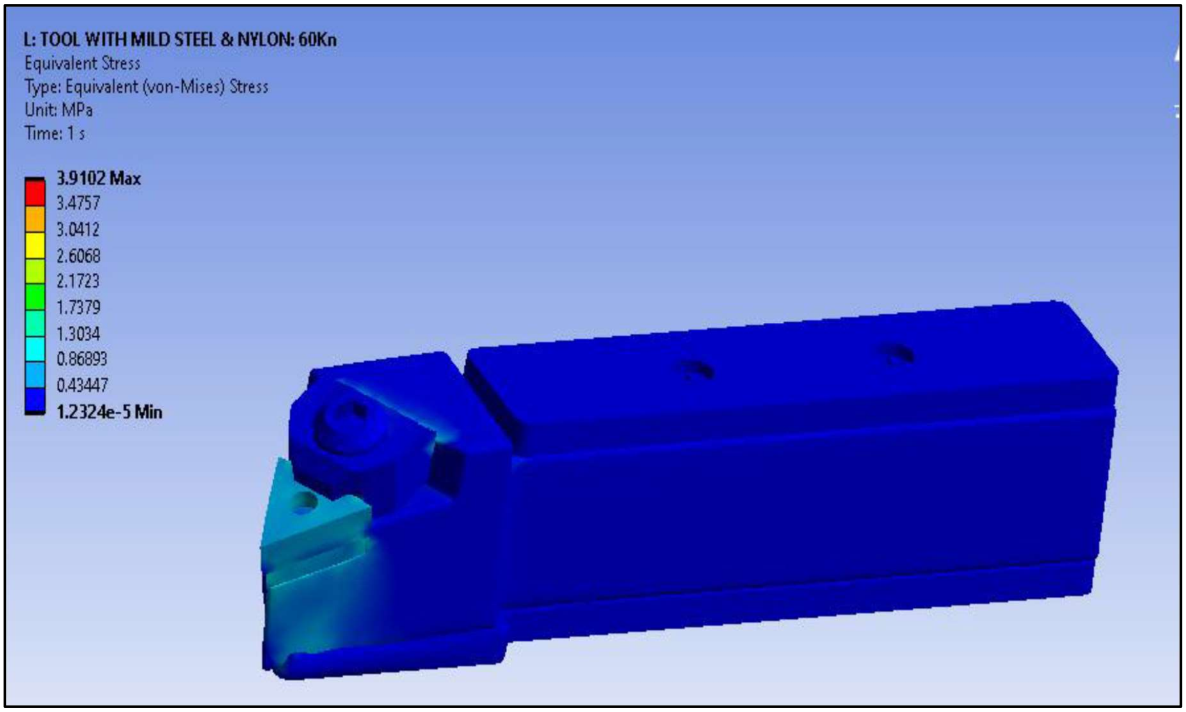

Fig. no. 11.b. Load - 60 KN Equivalent (Von mises) stresses

4. Conclusion

The present work studied the performance of a Flitched tool holder in machining Teflon polymer material by TNMG Turning inserts used under dry conditions. This work compares forces and stresses under different conditions. The study focused on CS, F and DoC. as input factores, measuring forces and stresses in terms of Fc, Ff and Ft. These factors are manipulated across three levels, thus adopting a Taguchi-based L27 orthogonal array for experiment design and analysis. ANOVA was utilized to assess the significance of each parameter concerning the mentioned responses.

Additionally, the research delved into FEM of tool particularly analyzing potential facture. Static and Dynamic FEM analyzes of TNMG Flitched tool holder were conducted for this purpose. Following the static analysis, the study derived the following conclusions from these analyses:

- Regarding the cutting forces holds the highest significance, contributing about 67.74%. Cutting speed follows as the next significant factor, with a contribution of 3.11%, while the feed exhibits the least impact. The optimal configuration to minimize cutting force, at a value of 19.62, observed doc 0.50mm, CS 120m/min and F 0.10mm/rev.
- Concerning the feed force (Ff), it is evident that the depth of cut and cutting speed stand out as the most influential factors, contributing about 43.16% and 32.42% respectively. Conversely, the feed rate exhibits the least impact, with a contribution of only 0.19%. The optimal

setup to minimize speed force, at a value of 19.62, was observed with a doc. 1.5mm, CS 70m/min and F 0.20mm/rev.

- Regarding the radial or tangential force (Ft), cutting speed and feed rate emerge as the most impactful factors, contributing around 35.56% and 27.22% respectively. In contrast, the depth of cut shows less significance, with a contribution of 5.00%. The optimal configuration to minimize the tangential or radial force is achieved with a cutting speed of 70m/min, a feed rate of 0.10mm/rev and a depth of cut at 0.5mm.

- Total deformation Min. 0.000mm – max. 0.0059278mm recorded while applied the Min. 19.62N force. As the forces increased the total deformation increased, at max. 58.86N force the total deformation is Min. 0.000mm – Max. 0.0177830mm recorded. Similarly, Equivalent (Von Mises) Stresses (MPa) also increased with respect to forces increased. At min. level of force 19.62N, the Equivalent (Von Mises) Stresses min. 4.1081e-6 – max.1.3034 recorded, and at max. Levels of force 58.86N the Equivalent (Von Mises) Stresses min. 1.2324e-5– max. 3.9102 recorded.
- It is investigated and experimentally observed that, Flitched tool holder for TNMG Insert is sustained up to the max. Force 60N which, is generally induced while machining PTFE –Teflon with other steel tool.

In a summary, Polymer Flitched tool holder has the capability of machining PTFE –Teflon and performed effectively.

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