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Analysis of Combination Tool for End mill and Reamer

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Abstract: ***The end of this paper was to clarify the simulation process of named factors in the interface of CAD/ CAM system CATIA. This process is important to enter the process of manufacturing of colourful perfection engineering factors of complex shape designed for the requirements of automotive and aerospace diligence. This project involves Analysis of the combination tool to perform desire operation. This combination tool can perform two operation which End milling, Reaming, this can be done in such manner that the lower part that is end mill will remove the material from previously drilled hole then the second stage of operation commence in which the reamer will finish off the small tiny particle in order to achieve desired flawless finish.***
Keywords: Combination tool, End milling, Reaming, Catia.

I. INTRODUCTION

CATIA V5 is one of the advanced CAD/ CAM systems, because in addition to modelling and offers specialized attestation and product assembly accoutrements, assemblies and design areas of thin essence wastes, different strength analysis, as well as pretend turning, mulling moulds, drillingetc. 3D model created from CAD part of CATIA is also fitted to a process of simulation, where is generated NC law for the colorful control systems, CNC machining centres [1]. In moment's CIM terrain and competition age, the main attention of manufacturer is a cost reduction. When it isn't possible to reduce the fixed cost, it's necessary to concentrate on variable cost like electricity, slice fluids. The design of the combination tool has been made on catia software and later the analysis of the tool is done on same. The analyses of different forces acting on the tool were studied. CNC milling machines are substantially used for perfection and further productivity. This requires a transfer of high speed as well as the high slice speed of machine tools [2].

II. LITERATURE REVIEW

1) From this paper we get to know that In Artificial world CNC machines are dominating because of its protean form of robotization. The structural accoutrements used in a machine tool play a decisive part in productivity, delicacy and face finish of the corridor manufactured in it [3].

2) A static analysis calculates the goods of steady lading on a structure, while ignoring indolence and damping goods, similar as those caused by time- varying loads. A static analysis can, still, include steady indolence loads (similar as graveness and rotational haste), and time varying loads that can be approached as static original Stationary analysis is used to determine the deportations, stresses, strains, and forces in structures or factors caused by loads that don't induce significant indolence and damping goods [4].

III. PROBLEM STATEMENT

It is observed that in the company the two operation were done in the CNC machine which takes time to change the tool, Hence, increases the cycle time of the CNC machine.

IV. ANALYSIS OF A COMBINATION TOOL

Material properties: Using Steel as a material having properties shown below.

TABLE I

Material	Steel
Young's modulus	2e+011N_m2
Poisson's ratio	0.266
Density	7860kg_m3
Coefficient of thermal expansion	1.17e-005_Kdeg
Yield strength	2.5e+008N_m2

Mesh generation: Discretisation of a modal into elements suitable for a FEM package.

TABLE IIIII

Entity	Size
Nodes	2102
Elements	6993

Element type and quality: The table below shows the element type in which two factors are showing which is connectivity and statistics, and another table shows the element quality in which they are showing the stretch and aspect ratio as per the criterion good, poor, bad, worst, average.

TABLE IVVVI

Connectivity	Statistics
TE4	6993 (100.00%)

TABLE IV

Criterion	Good	Poor	Bad	Worst	Average
Stretch	6921 (98.97%)	72 (1.03%)	0 (0.00%)	0.226	0.560
Aspect Ratio	5446 (77.88%)	1534 (21.94%)	13 (0.19%)	6.661	2.160

V. STATIC ANALYSIS

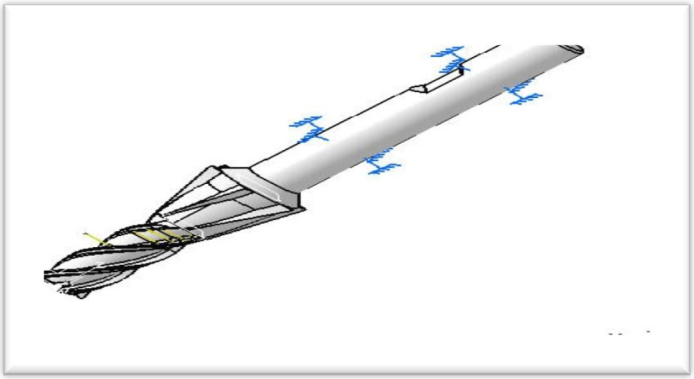


Fig. 5 Boundary condition

LOAD Computation: A load was applied on a tool and the applied load resultants are

- Fx = -2.500e+004 N
- Fy = -1.788e-007 N
- Fz = -2.813e-005 N
- Mx = 1.821e-007 Nxm
- My = -3.911e+002 Nxm
- Mz = 3.782e-001 Nxm

A. Minimum and Maximum Pivot

TABLE VI

Value	Dof	Node	x (mm)	y (mm)	z (mm)
1.5026e+007	Ty	777	-2.8147e+000	-2.3916e+000	1.3169e+001
5.2411e+009	Tx	1520	3.1621e+000	-3.8732e+000	4.0758e+000

B. Deformed Mesh

Fig. 7 Static case solution-Deformed mesh

C. Von Mises Stress

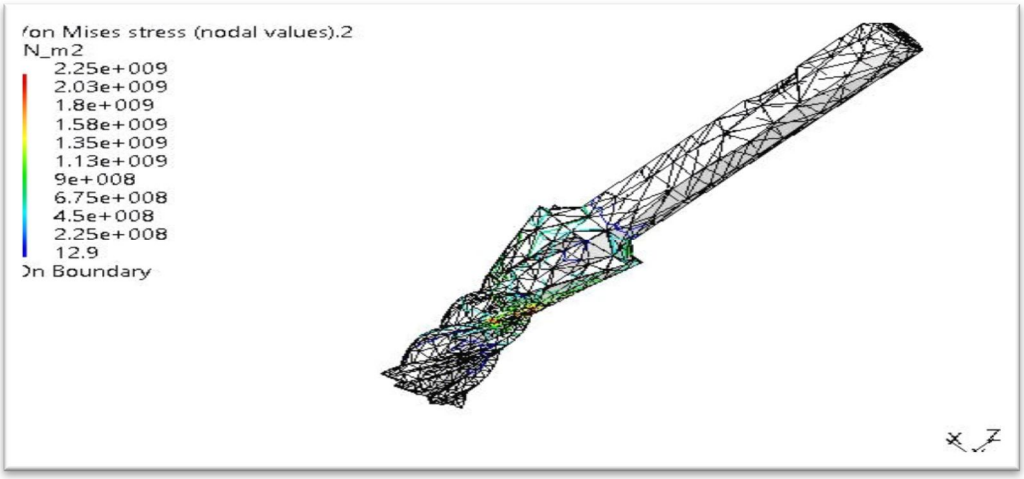


Fig. 8 Static case solution-Von Mises stress

Above figure represents a scalar field quantity obtained from the volume distortion energy density and used to measure the state of stress.

The Maximum von Mises stress is 2.25e+009 Nm^2

The Minimum von Mises stress is 12.9 Nm^2

VI. CONCLUSION

Through analysing the design of the tool it is concluded that the prototype model of the tool in which the analysis were implemented has ability to take enough load. Although, It is not fully prepared for the mass production still the further analysis needed to be done.

REFERENCES

[1] PRISMATIC MILLING SIMULATION PROCESS AND CNC PROGRAMMING IN THE CAD/CAM SYSTEM CATIA V5R20, annals of DAAAM for 2011 & Proceedings of the 22nd International DAAAM Symposium, Volume 22, No. 1, ISSN 1726-9679 ISBN 978-3-901509-83-4, Editor B. Katalinic, Published by DAAAM International, Vienna, Austria, EU, 2011

[2] Analysis of Single Point Cutting Tool Using ANSYS, ISSN: 2321-8169 Volume: 4 Issue: 5 331 – 338, Mr. Safal A. Shambharkar Asst.Professor, Department of Mechanical Engg., Jhulelal Institute of Technology, Nagpur

[3] T. Subrahmanyam, G. Sai Karthik, N. Sai Sudheer, S. Farooq Basha, Ch. Sridhar Yesaswi, ISSN: 2319–9598, Volume-4 Issue-5, March2017

[4] STATIC AND DYNAMIC ANALYSIS OF A CNC MILLING SPINDLE HAREESHA, e-ISSN: 2395-0056 Volume: 02 Issue: 07 | Oct-2015 P-ISSN: 2395-0072

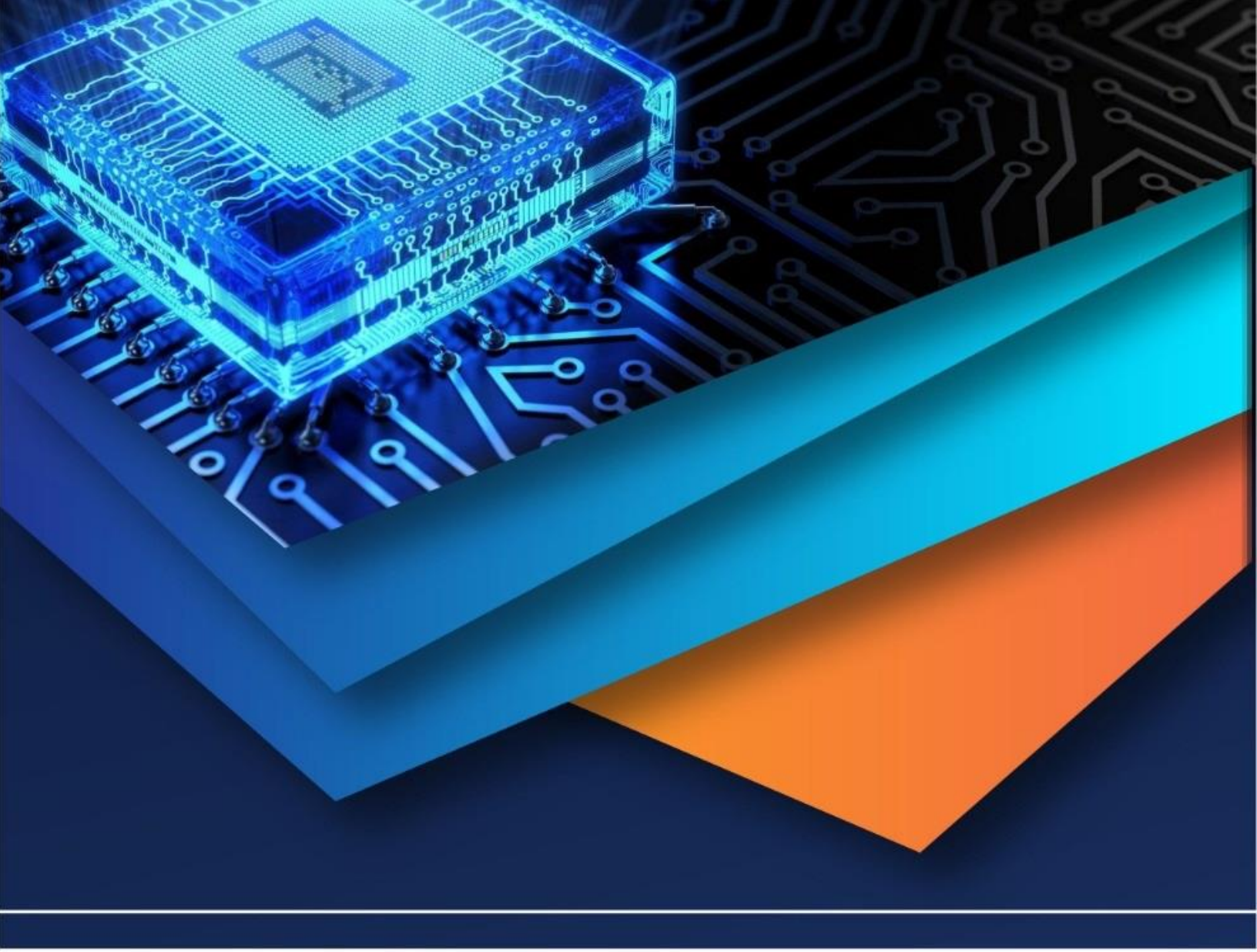
[5] Yu Guo , Bin Lin , and Weiqiang Wang School of Mechanical Engineering, Tianjin University, Tianjin 300350, China. Mathematical Problems in Engineering Volume 2019, Article ID 1796926

[6] Mukul Gupta1 , Preety Gupta2 , Mudita Singh3& K.K.Yadav4, IOSR Journal of Mechanical and Civil Engineering (IOSR-JMCE) e-ISSN: 2278-1684,p-ISSN: 2320-334X, Volume 15, Issue 2 Version

[7] AN ANALYSIS OF THE EFFECTIVENESS OF REAMING AS A SECONDARY OPERATION FOR HOLE PRODUCTION by MAHMOD SORATGAR, B.S., M.S. A DISSERTATION IN INDUSTRIAL ENGINEERING, 1987

[8] Prediction of Process Forces and Stability of End Mills with Complex Geometries R. Grabowskia, B. Denkenaa , J. Köhlera, Procedia CIRP 14 (2014) 119 – 124

[9] DESIGN AND MANUFACTURING OF COMBINED TOOL FOR RAILWAY COACHES 1K.Sunil kumar, 2R.Bhavithran, 2R.Bhuvanesh, 2S.Subin, 2B.Yuwan sarvesh 1Assistant Professor, Department Of Mechanical engineering, Vel tech engineering College, Chennai, India, ISSN NO: 2279-543X



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