www.ioirp.com
International Journal of Innovative Research in Technology, Science & Engineering (IJIRTSE)
ISSN: 2395-5619, Volume – 1, Issue – 2. April 2015

Modelling and Analysis of Aluminium Silicon Carbide Composite Wing Section for Beechcraft

[1]J.Arun, [2]M.Sundara Pandiyan
[1]P.G Student, Department of Computer Aided Design, GKM College of Engineering and Technology, Chennai.
[2]Assistant Professor, Department of Mechanical Engineering GKM College of Engineering and Technology, Chennai.

***Abstract*— Composite materials are the foremost successful material employed in the advance Engineering Industries. Metal composite possesses considerably improved properties together with high durability, toughness, hardness and less density compared to other two different materials. Wings area unit is the foremost vital elements in aircraft. The potency of the craft will increase, once the weight of the aircraft reduces. Hence decide to analyze the wing for this Beech craft NACA0012 wing section is chosen. In our project, we have a tendency to decide to structural and model analysis in Beech craft wing structure applying Aluminum composite metal like Aluminum 6061 Silicon carbide (Al6061SiC). The CAD model of a wing is established by victimization CATIA. The structural and model analysis area will do using ANSYS package. Structural parameters like total deformation, equivalent stresses, Von-Misses stress, shear stress, shear intensity on the skin of the aircraft wing are calculate. For that analysis the 6061 Silicon carbide composite have high strength, low density, maximum deformation when compared to Aluminum 6061.**

***Keywords*— Beech craft, Silicon carbide, Aluminum 6061, ANSYS, CATIA**

I. INTRODUCTION

In order to save rustic expedients plus save bang, heaviness cutback has been the primary focus of manufacturers in the introduce outline. Ballast cutback can be achieved expressly by the preamble of improve information, contrive optimization further superior manufacturing processes. The fly is undivided of the ability details for preponderance abatement in planes as it narratives for 10% - 20% of the unstrung worth. The prelude of mixture physicals was made it probable to debase onus of arm minus some cutback on noisy carrying endowment besides rigor. Whereas, the compound fabrics possess else limber sift heat storage skill plus dear 'strength to worth rate' as compared among those of Aluminum The BeechcraftT-34Mentor is a fan-pushed, individual-locomotive, warlike coach plane derived from the Beech boat Replica 35 Windfall. The once paraphrases of the T-34, dating from almost the recent 1940s to the 1950s, were piston-motor. These were yet succeeded by the upgraded T-34C Turbo-Teacher, powered by a turboprop motor. The T-34 bides in liturgy further than six decades afterwards it was initial created. To obtain understanding of the state-of-the-art of aluminum matrix composite materials To prove the wing section of aluminum composite in aeronautical field. To study the effect on mechanical properties of composites. Besides all these the main objective is to develop good strength based on composite that can be used for air craft wing section.

II. MODELING OF WING SECTION

For this Analysis Beech craft T-34 mentor aircraft wing are used. The airfoil used in the Beech craft T-34 mentor aircraft wing is supercritical airfoil. So NACA0012 airfoils throughout the wing structure are used. With the help of software, commercially known as "X foil" use to create the airfoil shape by plotting all the co-ordinates in the CATIA V5 part design workbench. The main benefit of this software is that all the co-ordinates are in the function of the chord length, that is (x/c, y/c).

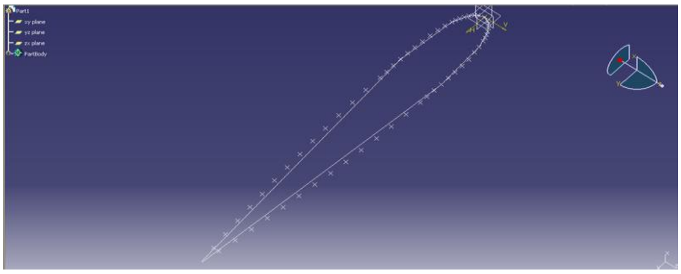


Fig.1 Airfoil NACA 0012

The CAD model of a wing is established by using CATIA. The full model consists of ribs, front and aft spars and the skin. The various design parameters are taken directly from the airplane characteristics manual and for internal structure suitable assumptions and simplifications will be done.

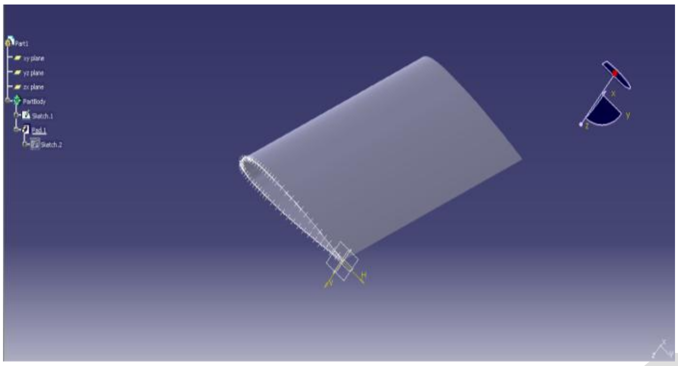


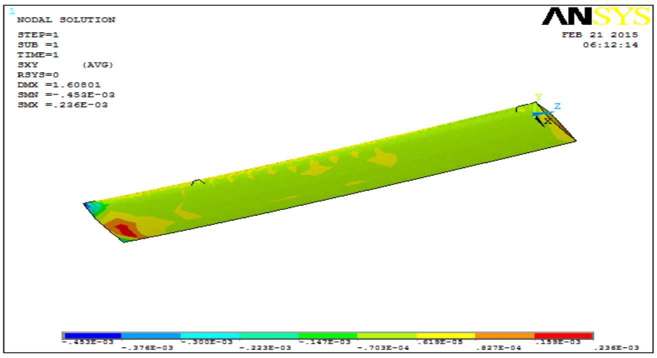
Fig.2 Airfoil NACA 0012

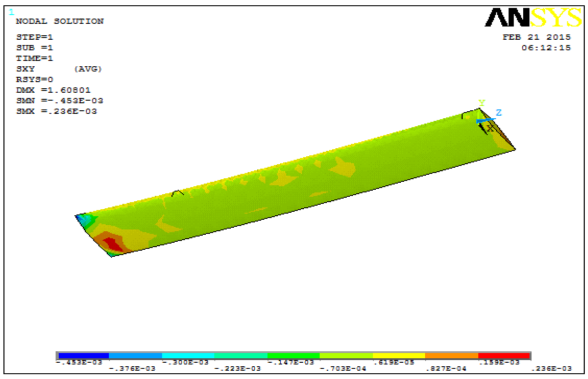
III. Calculation of Load

- Use either SI (MKS) or CGS as primary units. (SI units are encouraged.) English units may be used as secondary units (in parentheses). An exception would be the use of English units as identifiers in trade, such as "3.5- Lift force = load factor * weight of an aircraft.
- The total lift force required to climb through 170, the aircraft should be able to generate the lift force 2375.35N
- Thus is the total lift force developed by each wing is 1187.6766 N
- This force is converted into the pressure load, which is in the form of uniformly distributed load by divided this force by the semi wing area of 8.345 m2
- Therefore, the total pressure load applied from the bottom of the surface is 142.32Pa.

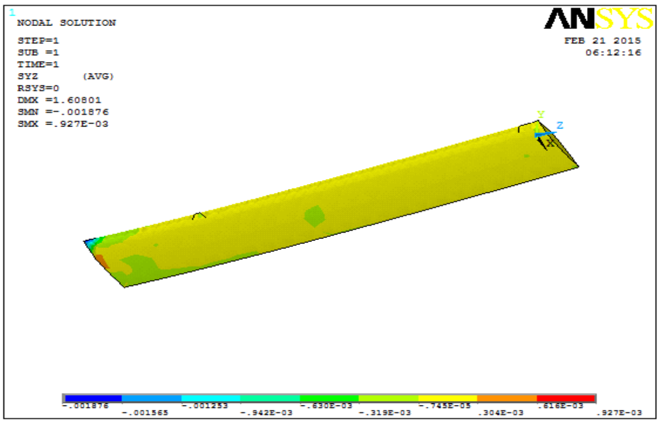
IV. Analysis os Aluminium Silicon Carbide Wing

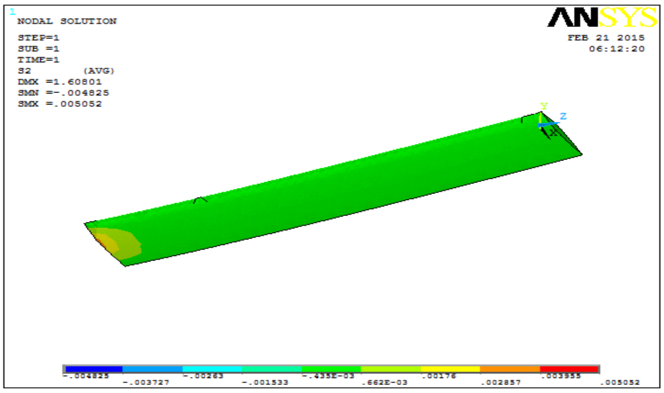
The properties of Al6061 Silicon carbide like density ,hardness ,young's modulus are obtained from density test, hardness test using universal testing machine ,young's modulus are calculated and by using those properties total deformation, equivalent stresses which is also known as Von-misses stress, shear stress, shear intensity on the skin of the aircraft wing are analyses by ANSYS Software.

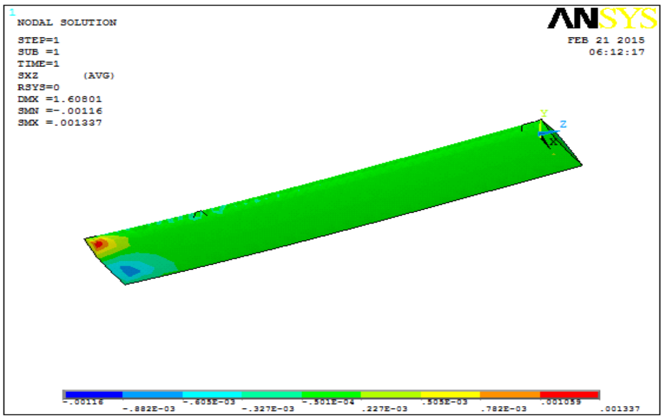


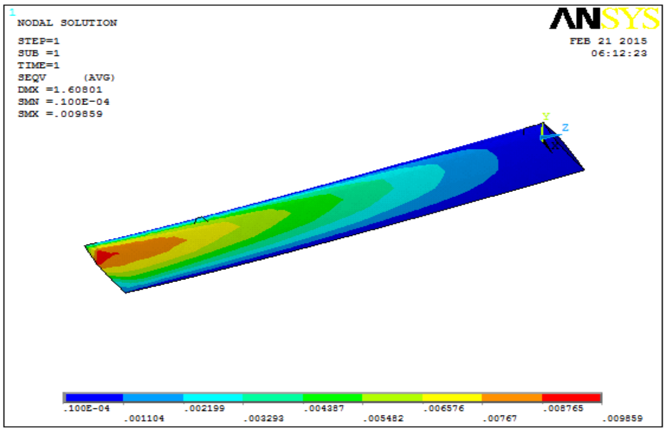


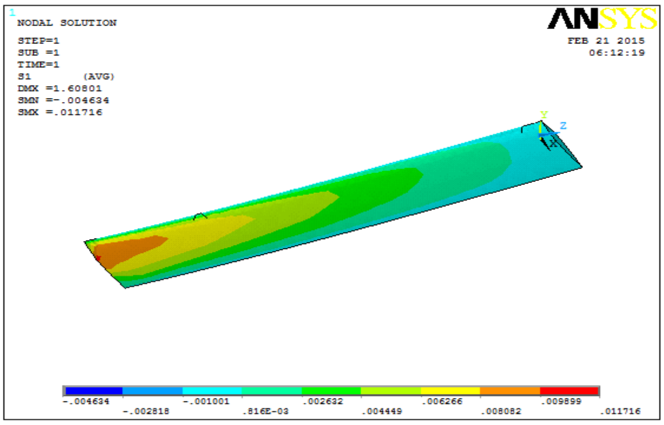
International Journal of Innovative Research in Technology, Science & Engineering (IJIRTSE)
ISSN: 2395-5619, Volume – 1, Issue – 2. April 2015

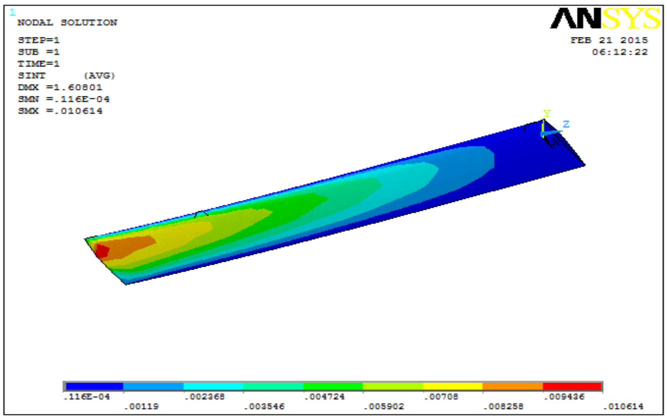












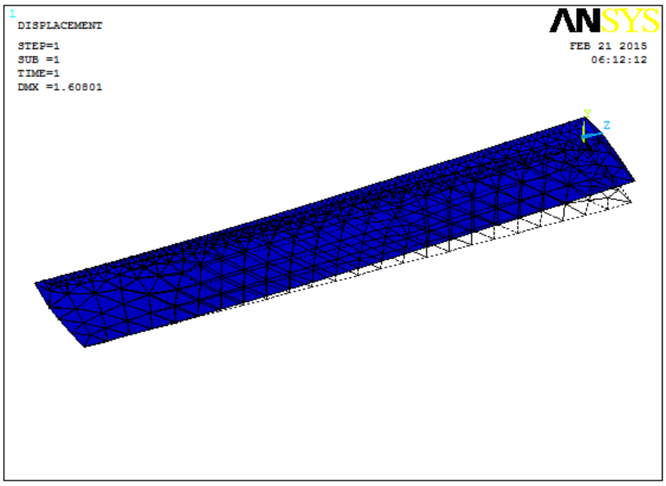


Fig.3 Von-misses stress, shear stress, shear intensity and dynamic analysis on the skin of the aircraft wing

V. CONCLUSION

The CAD model of a wing is established by victimization CATIA. The structural and model analysis area will do using ANSYS package. Structural parameters like total deformation, equivalent stresses, Von-Misses stress, shear stress, shear intensity on the skin of the aircraft wing are calculate. For that analysis the 6061 Silicon carbide composite have high strength, low density, maximum deformation when compared to Aluminum 6061.Hence prove that wing section of Aluminum Silicon carbide composite in aeronautical field will increase the strength and also reduce weight compared to the Aluminum.

References

[1] Eng.bogdancaloian, Eng.Dorinlozici and eng.Radubisca, 2009“Stress and Modal Analysis Report for Avert Program”, DOI 10.13111/ 2066-8201.
[2] Mr. Mayurkymarkevadiya, 2013“CFD Analysis of Pressure Coefficient for NACA 4412”, IJETT Vol. 4 ISSUE 5
[3] Md. Shamim Mahmud, 2013 “Analysis of effectiveness an airfoil with BicamberSurface”,ISSN 2049-3444, Vol 3, No 5.
[4] Dr.R.Rajappan, V.Pugazhenthi,2013”Finite element analysis of aircraft wing using composite structure”,IJES, Vol 2, issue2.
[5] Vikram Singh and R.C. Prasad , 2004 “Tensile And Fracture Behavior Of 6061 Al-Sicp Metal MatrixComposites”International Symposium of Research Students on Materials Science and Engineering
[6] Geetha Mable Pinto, JagannathNayak, A NityanandaShetty, 2009“Corrosion Behaviour of 6061 Al - 15vol. Pct. SiC Composite and its Base Alloy in a Mixture of 1:1 Hydrochloric and SulphuricAcidMedium”International Journal of ElectrochemicalScience
[7] N R PRABHU SWAMY, C S RAMESHand T CHANDRASHEKAR ,2010 “Effect of heat treatment on strength and abrasive wear behavior of Al6061–SiCp composites”
[8] Prashant S N, MadevNagaral and V Auradi, 2012 “Preparation And Evaluation Of Mechanical And Wear Properties Of Al6061 Reinforced With Graphite And Sic Particulate Metal Matrix Composites”IJMERR
[9] K.K.Alaneme,B.O.Ademilua,M.O.Bodunrin, (2013), Mechanical properties and corrosion behaviour of aluminium hybrid composites reinforced with silicon carbide and bamboo leaf ash, Tribology in Industry,vol.35,no.1,25-35
[10] J.D. Anderson Jr. (2007) “Introduction to Flight”, fifth edition, The McGraw-Hill companies.
[11] John D.Anderson,jr. (1995) ‘Computational Fluid Dynamics The Basics with Applications’
[12] Dr.JanRoskam and Dr.Chuan-Tau, (1997), ‘Airplane Aerodynamics and Performance’.