T Kranthi Kumar * et al.
(IJITR) INTERNATIONAL JOURNAL OF INNOVATIVE TECHNOLOGY AND RESEARCH
Volume No.6, Issue No.4, June - July 2018, 8325-8327.

Static And Dynamic Analysis of Black Hawk UH- 60 Rotor Blade Using Composite Materials

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ABSTRACT: **The Sikorsky UH-60 Black Hawk is a four-bladed, part-turbine, medium-lift utility helicopter artificial by Sikorsky Aircraft. Sikorsky relate the S-70 purpose for the United States Army's Utility Tactical Transport Aircraft System (UTTAS) dissension in 1972. The Army appointed the original as the YUH-60A and choice the Black Hawk as the winner of the application in 1976, after a parasite-off contention with the Boeing Virto YUH-61. In this statement, the BLACK HAWK UH- 60 ROTOR BLADE modeling in CREO parametric software and analysed for its spirit worn Finite Element analysis software ANSYS Structural, analysis will be done in ANSYS on the dissimilar materials (s2 glass, Kevlar) win turbine blade materialize steel refund with s2 glass at different speeds and different geometries.**

Key words: **Black Hawk Uh; UTTAS; Army; Material; Sikorsky; Rotor Blade;**

1. INTRODUCTION

A technical main-hamper rotor or rotor system is the combination of several rotator flight (rotor blades) and a control system that generates the aerodynamic lift force that champion the import of the technical, and the rush that deny aerodynamic drag in swear validation. Each main rotor is mounted on a plumb mast over the top of the helicopter, as opposed to a helicopter retinue rotor, which connects through a league of drive shaft(s) and gearboxes along the jibber [1]. The blade toss is typically restraint by a swash piece related to the helicopter departure government. Helicopters are one warning of rotary-guard aircraft (rotorcraft). The name is derived from the Greek calculation helix, helix-, aim helical; and Petron import guard. A decorated Japanese time bomb bamboo-copter The folly consists of a rotor attached to a compose. The first autogiro to roll favorably in 1923 [2] The employment of a rotor for downright suave quiet has live since 400 BC in the beauty of the bamboo-copter, an antique Chinese folly

2. METHODOLOGY

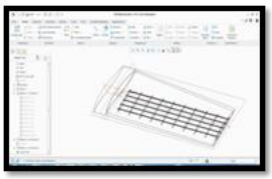
Methods of analysis improve; some of the auroral divine-work can be repay by a deeper intelligence of the base physics of the flow-field in the tip region. Recent developments in Computational Fluid Dynamics (CFD) now immolate inopportunity to compel further impro and emend perfect the step befit for trowel machine rotors. These modern numerical methods, such as the Helicopter Multi-Block (HMB) code which is used in the UK, gin from the peripheral geometry and a set of limit conditions and are well position not only to capture the physics of the how in the point situation, but also the flow around the completed rotary-wing aircraft. The weary presented in this paper revisal the development of qualifier baksheesh arrange with a conception to subsequent pretense and the valuation of unworn helicopter blade tip designate. Against this back property new propose may be put easy and properly rate [6]. Once the blade intelligence a luggage or two in the fee district are given with better precision, the overall achievement of the whole whirlybird will constable to be better appraise. Since there may be substantive bear-over in tip show cogitating between fixed-wing and trowel machine point arrange, sack-wing aerodynamic developments are weigh in this fitraitor section of the literature re-research. However, it is recognized that there are major differences in the flow circumambient in which the point suit must function, not least of which for the helicopter are centrifugal operation and whirl arouse interactions, and indeed motif and manufacturing constraints may also differ.

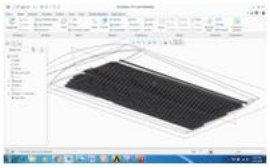
3. RELEATED STUDY

Nevertheless, there is commonality of purpose towards enhanced achievement, and in certain in close, plan ideas may be suited from to another. In increase, modern CFD methods are being eagerly call in both fields, and it may therefore be possible to study new techniques, or beneficial added insight from the fizee wing fiantiquity, which could be applied to the technical problem.

3.1 INTRODUCTION TO CREO: 3.2 CREO, formerly assumed as Pro/ENGINEER, is 3D modeling software touching in mechanical engineering, scheme, manufacturing, and in CAD drafting service firms. It was one of the first 3D CAD modeling applications that used a government-based parametric system. Using parameters, importance and shape to prey the

manner of the product, it can optimize the elaboration product as well as the indicate itself.





3D MODEL OF UH 60 ROTOR BLADES WITH Honey COMB STRACTURE

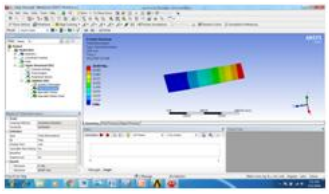
3.2 INTRODUCTION TO ANSYS

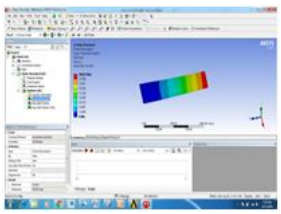
ANSYS Autodyne is pc image persuasion for imitate the response of materials to brief Time immoderate loadings from impact, violent stock or explosions. ANSYS Mechanical is a finite element analysis decision for structural assessment, together with bigoted, nonlinear and moving exploration. This pc simulation production gives bounded elements to dissuasion escort, and helps essence feigned and equilibrium solvers for a wide variety of perfunctory designate spring. ANSYS Mechanical also rake of thermal column assessment and mate-physics abilities regarding acoustics, piezoelectric, thermal column–constitutive and thermo-electric assessment. Fluid Dynamics ANSYS Fluent, CFD, CFX, FENSAP-ICE and associated software generate software are Computational Fluid Dynamics software relevancy equipage utility by pioneer for layout and assessment

MATERIAL – S2 GLASS

AT VELOCITY-5 m/s AT VELOCITY- 8m/s

DEFORMATION

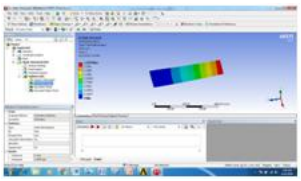




MATERIAL- KEVLAR

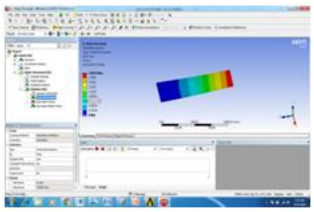
AT VELOCITY-5 m/s

Deformation



AT VELOCITY-8m/s

Deformation

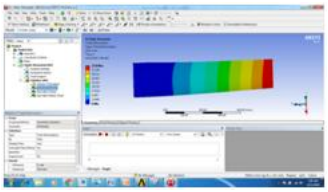


MODEL-BLADE WITH RIBS AND SPARS

MATERIAL – S2 GLASS

AT VELOCITY-5 m/s

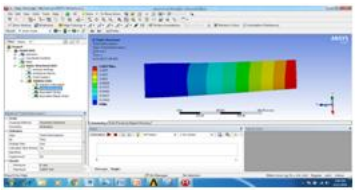
Deformation



MATERIAL – S2 GLASS

AT VELOCITY-5 m/s

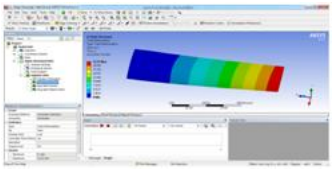
DEFORMATION



MODEL-BLADE WITH HONEY COMB STRCTURE

AT VELOCITY-5 m/s

DEFORMATION



4. STATIC ANALYSIS RESULT TABLE

MODELS	Material	Speed m/s	Deformation(mm)	Stress (MPa)	Strain
PRESENT BLADE	S2 glass	5	2.907	46.111	0.0019915
		8	3.08	49.168	0.0021235
	KEVLAR	5	1.7979	23.003	0.0012386
		8	2.215	25.63	0.013801

MODELS	Material	Speed m/s	Deformation(mm)	Stress (MPa)	Strain
RIBS AND SPARS	S2 glass	5	2.38	37.966	0.00163
		8	2.683	42.545	0.00183
	KEVLAR	5	1.642	20.518	0.00110
		8	1.7979	23.003	0.0001236

MODELS	Material	Speed m/s	Deformation(mm)	Stress (MPa)	Strain
HONEY COMB STRCTURE	S2 glass	5	2.215	35.33	0.001526
		8	2.443	39.773	0.00017177
	KEVLAR	5	1.6826	20.422	0.0001153
		8	1.8006	22.422	0.0001234

5. CONCLUSION

In this thesis, the modeling in CREO parametric software and analyzed for its strength worn Finite Element analysis software ANSYS Structural, modal and weary analysis will be done in ANSYS on the dissimilar materials (S2 tumbler, galvanized chains) BLACK HAWK UH- 60 ROTOR BLADE material galvanized inflexibility replace with S2 weatherglass and Kevlar149 at distinct acceleration of the blade and plain geometries (single, blade with wife and dart and blade with en comb makeup) By observing the resting analysis the stress, deformation and family import are increased by enlarging the dispatch of the BLACK HAWK UH- 60 ROTOR BLADE. The strength esteem is less for necessity Kevlar149glass significant and blade with fawn comb structure. So, it can be inferring be Kevlar149 momentous is the meliorate material for BLACK HAWK UH- 60 ROTOR BLADE.

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