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MODELANDANALYSISOFCOMPOSITEPROPELLER

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ABSTRACT

Marine propeller walking and its vocabulary, as well as the simulation and flow simulation of a marine propeller, are the goals of this research project. ANSYS software was used to analyze a maritime propeller. Marine propeller blade deformation, stress, and strain can be determined using both static and dynamic analytical methods. E-glass Epoxy, Aluminum Alloy and Carbon Epoxy were used to optimize propeller blades with varying numbers of blades (3, 5, and 6). CATIA software was used to create this three-dimensional model.

Keywords: Static and dynamic analysis of maritime propellers using CATIA's Finite Element Analysis (FEA) software.

1. INTRODUCTION

A propeller is a type of fan that transmits strength by means of converting rotational movement into thrust. A stressdifference is producedamong the aheadand rear surfaces of the airfoil-formed blade,and afluid(togetherwith airor water) is increased at the back of the blade. Propeller dynamics, like those of plane wings, may be modelled bymeansofeitherorbothBernoulli'sprinciplean dNewton'sthirdlaw.Amarinepropellerofthiskin disonceina while colloquially known as a screw propeller or screw, howeverthere isa extraordinary eleganceof propellersknown as cycloidalpropellers - they are characterised by way of the higher propulsive performance averagingzero.Seventy two as compared to the screw propellers common of zero.6and thepotential tothrow

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thrustinanyrouteatanytime.Theirhazardsarebettermechanicalcomplexityandhigherprice.

Fig.1.PropellersoftheRMSOlympic,asistershiptotheRMSTitanic

Smith was aware of the Navy's belief that screw propellers as depicted in fig.1 could be unsuitable for seagoing carriers, and he set out to prove this notion wrong. In September 1837, he set out from London's Blackwall to Hythe, Kent, with stops in Ramsgate, Dover, and Folkestone in his little ship (now fitted with an iron propeller of an unmarried flip). allasthedesiresofenergy

Theoryofoperation

On the 25th, Smith's vessel was spotted making progress through difficult seas thanks to Royal Navy officials as it headed back to London. A rekindled interest from the Admiralty led to Smith being given the go-ahead for construction of a full-scale ship to show the technology's efficacy more definitively.

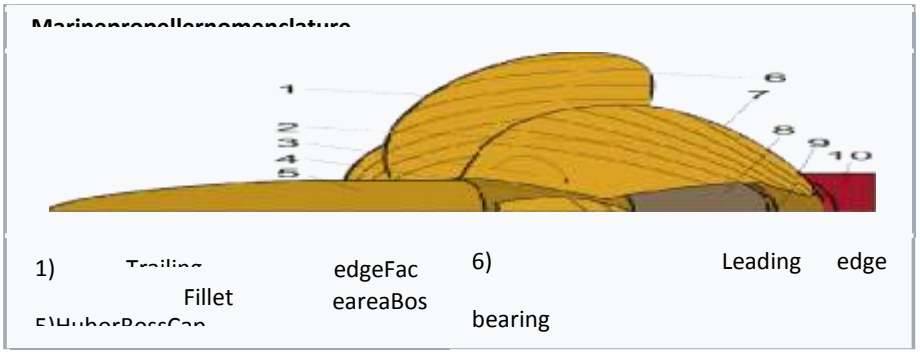

Fig.2.Marinepropellernomenclature

Figure 2 shows that a propeller is the most common type of ship propulsion device, delivering momentum to the fluid that causes a force to be applied to the ship. For a free-tip propeller of any size, an actuator disc in a great fluid provides the maximum possible efficiency. Propellers on the ocean floor are formed from pieces that work like "screws" in the water, propelling the vessel forwards and backwards (consequently the not unsual connection with marine propellers as "screws"). Typically, marine propellers have three, four, or five blades; however, designs that are aimed at reducing noise are also common.

have more powerful blades. As with fixed-pitch propellers, the blades are joined to a chairman (hub) that ought to be as strong as possible.

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2. LITERATUREREVIEW

Using computational fluid dynamics (CFD), Dunna Sridhar [1] tested propeller open water frictional resistance and overall propulsion performance. For the creation of meshes and

geometric modeling With a thrust force of 346Kn at 30 rpm, CATIA-V5 is utilized for four bladed propellers. The computed findings are then compared to the previously collected experimental data to verify their accuracy.

A propeller made of aluminum and composite material was designed by Dr. Y.SeetharamaRao[2] for stress analysis using ANSYS software to examine its electrical properties and deformation. Unique ingredients were utilised to reduce the stress levels in those chemicals. The theoretical and experimental values are compared. Maximum deflection and regular stresses were the goals of the comparison analysis between metal and composite propellers.

3. PROPELLERSINCATIA

Fig.3.ThreebladepropellerinCATIA

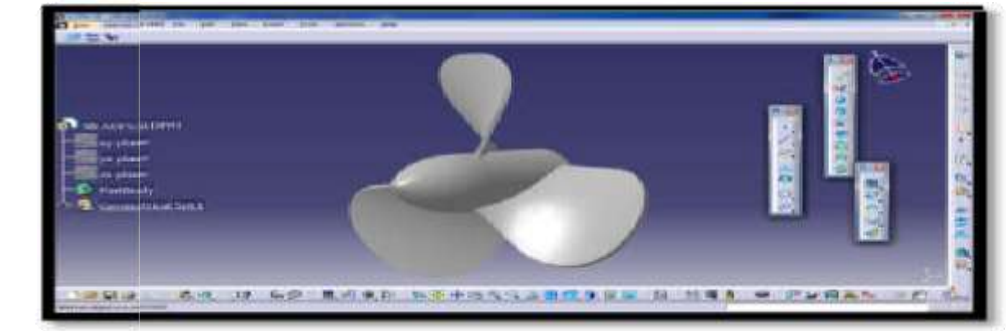


Fig.4.FivebladepropellerinCATIA

4. INTRODUCTIONTOFEA

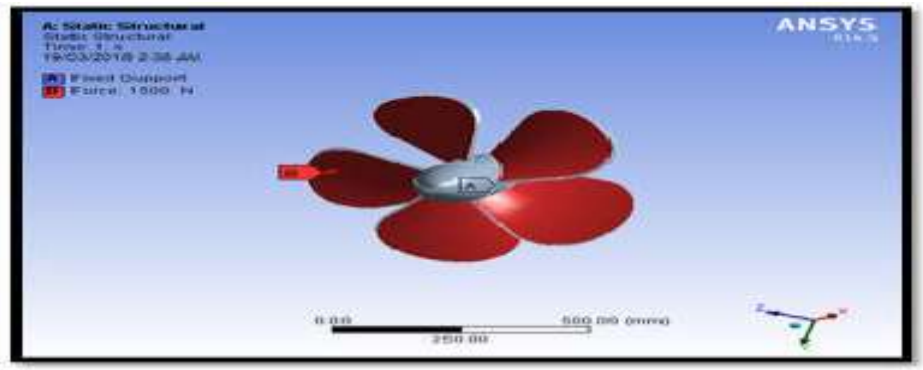
Engineering and technology problems can be solved via finite detail analysis. It is utilized when there is no precise solution that can be expressed in some mathematical form. As a result, it is a numerical method rather than an analytical one. This type of procedure is needed since analytical methods are not capable of dealing with the actual, complex issues that may arise in engineering. A bent beam's stresses and traces can be calculated analytically using engineering energy or the mathematical principle of elasticity, but neither of these methods is very effective for figuring out what's happening in a portion of a car suspension system while cornering.

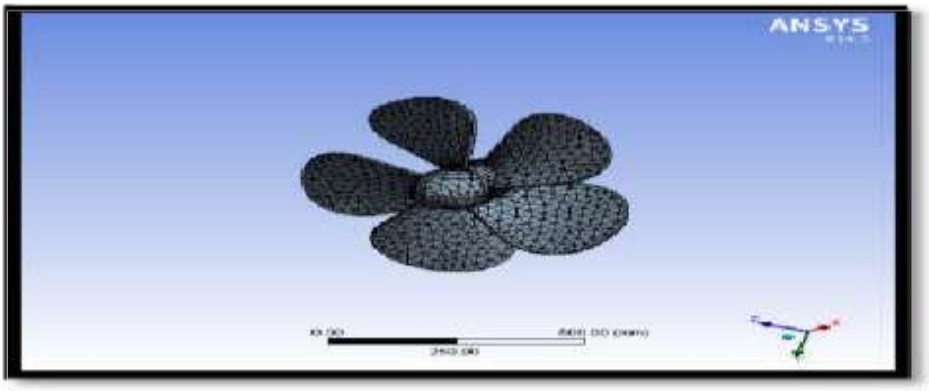
5. STATICANALYSISOFMARINEPROPELLER

5.1. SaveCATIAModelas.IGESformat

Meshingofthepropeller

6. RESULTTABLE





Model	FORCE(N)	Material	Deformation(mm)	Stress(MPa)	strain
No 'of blades 6	2500	Carbon epoxy	0.72808	8.774	0.000195
		Aluminum alloy	0.339	8.7744	9.149e-5
		E-glass epoxy	0.46734	8.777	0.00012376
	1500	Carbon epoxy	0.243685	5.2644	0.00011711
		Aluminum alloy	0.2034	5.2646	5.4899e-5
		E-glass epoxy	0.2804	5.2664	7.42e-5

TABLE:1

8. CONCLUSION

9.The current effort focuses on the nomenclature, simulation, and flow simulation of maritime propellers, with a particular focus on how they work. ANSYS software is used to model a maritime propeller.

10.

11.The marine composite propeller with five blades was subjected to transient analysis because, based on the results of the static study, the propeller with five blades produces more energy. Glass epoxy cloth is a better option. As a result, propeller no. 5 and cloth E-glass epoxy could be finalized. The stress value of the propeller at the number of blades five grows as the time and load increase.

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