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CBR Detail:

Sr. No.	Ref. No./Application No.	App. Number	Amount Paid	C.B.R. No.	Form Name	Remarks
1	202221049194	TEMP/E-1/56307/2022-MUM	1600	22701	FORM 1	ANALYSIS OF COMPOSITE MATERIAL-CEILING FAN BLADE USING EXPERIMENTS AND THE FINITE ELEMENT METHOD
2	E-12/2403/2022/MUM	202221049194	2500	22701	FORM 9	----

TransactionID	Payment Mode	Challan Identification Number	Amount Paid	Head of A/C No
N-0001013899	Online Bank Transfer	2908220016795	4100.00	1475001020000001

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FORM 1 THE PATENTS ACT 1970 (39 of 1970) and THE PATENTS RULES, 2003 APPLICATION FOR GRANT OF PATENT (See section 7, 54 and 135 and sub-rule (1) of rule 20)				(FOR OFFICE USE ONLY) Application No. Filing date: Amount of Fee paid: CBR No: Signature:	
1. APPLICANT'S REFERENCE /IDENTIFICATION NO. (AS ALLOTTED BY OFFICE)					
2. TYPE OF APPLICATION [Please tick (✓) at the appropriate category]					
Ordinary (✓)		Convention ()		PCT-NP ()	
Divisional ()	Patent of Addition ()	Divisional ()	Patent of Addition ()	Divisional ()	Patent of Addition ()
3A. APPLICANT(S)					
Name in Full	Nationality	Country of Residence	Address of the Applicant	State	
PravinKrishnat Desai	Indian	India	Assistant Professor Mechanical Engineering Kolhapur Incubation Centre (KIC) Dr. D. Y. PatilPratishthans College of Engineering Salokhenagar Kolhapur 416007	Maharashtra	
Suyog Vilas Tate-Patil	Indian	India	Assistant Professor Computer Science & Engineering Dr. D. Y. PatilPratishthans College of Engineering Salokhenagar Kolhapur 416007	Maharashtra	
Mr.SurajDhondiramPatil	Indian	India	Assistant Professor Mechanical Engineering Dr. D. Y. PatilPratishthans College of Engineering Salokhenagar Kolhapur 416007	Maharashtra	
Mr.AjitRamchandraChougale	Indian	India	Assistant Professor Computer Science & Engineering Dr. D. Y. PatilPratishthans College of Engineering Salokhenagar Kolhapur 416007	Maharashtra	

Mr.ShrikantdnyandeoBhopale	Indian	India	Assistant Professor Computer Science & Engineering Dr. D. Y. PatilPratishthans College of Engineering Salokhenagar Kolhapur 416007	Maharashtra
Mr.AmarDamodarPatil	Indian	India	Assistant Professor Civil Engineering Dr. D. Y. PatilPratishthans College of Engineering Salokhenagar Kolhapur 416007	Maharashtra

3B. CATEGORY OF APPLICANT [Please tick (✓) at the appropriate category]

Natural Person (✓)	Other than Natural Person()		
	Small Entity ()	Startup ()	Others ()

4. INVENTOR(S) [Please tick (✓) at the appropriate category]

Are all the inventor(s) same as the applicant(s) named above?	Yes (✓)	No ()
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If "No", furnish the details of the inventor(s)

S. No.	Name in Full	Nationality	Country of Residence	Address of the Inventor
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5. TITLE OF THE INVENTION

ANALYSIS OF COMPOSITE MATERIAL-CEILING FAN BLADE USING EXPERIMENTS AND THE FINITE ELEMENT METHOD

6. AUTHORISED REGISTERED PATENT AGENT(S)	Name and IN/PA No.	Khushbu Singh (INPA/3510)
	Mobile No.	+919019451138

7. ADDRESS FOR SERVICE OF APPLICANT IN INDIA	PravinKrishnat Desai Assistant Professor Mechanical Engineering Kolhapur Incubation Centre (KIC) Dr. D. Y. PatilPratishthans College of Engineering Salokhenagar Kolhapur 416007 Email ID: researchr08@gmail.com Phone No. +919019451138
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8. IN CASE OF APPLICATION CLAIMING PRIORITY OF APPLICATION FILED IN CONVENTION COUNTRY, PARTICULARS OF CONVENTION APPLICATION

Country	Application Number	Filing date	Name of the	Title of the Invention	IPC (as classified in the
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			Applicant		convention country)
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9. IN CASE OF PCT NATIONAL PHASE APPLICATION, PARTICULARS OF INTERNATIONAL APPLICATION FILED UNDER PATENT CO-OPERATION TREATY (PCT)					
International application number			International filing date		
NIL			NIL		
10. IN CASE OF DIVISIONAL APPLICATION FILED UNDER SECTION 16, PARTICULARS OF ORIGINAL (FIRST) APPLICATION: NIL					
Original (first) application No.			Date of filing of original (first) application		
11. IN CASE OF PATENT OF ADDITION FILED UNDER SECTION 54, PARTICULARS OF MAIN APPLICATION OR PATENT: NIL					
Main application/patent No.			Date of filing of main application		
12. DECLARATIONS					
<p>(i) Declaration by the inventor(s) (In case the applicant is an assignee: the inventor(s) may sign herein below or the applicant may upload the assignment or enclose the assignment with this application for patent or send the assignment by post/electronic transmission duly authenticated within the prescribed period).</p> <p>I/We, the above named inventor(s) is/are the true & first inventor(s) for this Invention and declare that the applicant(s) herein is/are my/our assignee or legal representative.</p> <ol style="list-style-type: none"> 1. PravinKrishnat Desai 2. Suyog Vilas Tate-Patil 3. Mr.SurajDhondiramPatil 4. Mr.AjitRamchandraChougale 5. Mr.ShrikantDnyandeoBhopale 6. Mr.AmarDamodarPatil <p>Filing date 29th August 2022</p>					
<p>(ii) Declaration by the applicant(s) in the convention country (In case the applicant in India is different than the applicant in the convention country: the applicant in the convention country may sign herein below or applicant in India may upload the assignment from the applicant in the convention country or enclose the said assignment with this application for patent or send the assignment by post/electronic transmission duly authenticated within the prescribed period)</p> <p>I/We, the applicant(s) in the convention country declare that the applicant(s) herein is/are my/our assignee or legal representative.</p> <ol style="list-style-type: none"> (a) Date (b) Signature(s) (c) Name(s) of the signatory 					
<p>(iii) Declaration by the applicant(s)</p> <ul style="list-style-type: none"> o I/We the applicant(s) hereby declare(s) that: - o I am/ We are in possession of the above-mentioned invention. o The complete specification relating to the invention is filed with this application. o The invention as disclosed in the specification uses the biological material from India and the necessary permission from the competent authority shall be submitted by 					

me/us before the grant of patent to me/us.

- o There is no lawful ground of objection(s) to the grant of the Patent to me/us.
- o I am/we are the true & first inventor(s).
- o I am/we are the assignee or legal representative of true & first inventor(s).
- o ~~The application or each of the applications, particulars of which are given in Paragraph 8, was the first application in convention country/countries in respect of my/our invention(s).~~
- o ~~I/We claim the priority from the above mentioned application(s) filed in convention country/countries and state that no application for protection in respect of the invention had been made in a convention country before that date by me/us or by any person from which I/We derive the title.~~
- o ~~My/our application in India is based on international application under Patent Cooperation Treaty (PCT) as mentioned in Paragraph 9.~~
- o ~~The application is divided out of my /our application particulars of which is given in Paragraph 10 and pray that this application may be treated as deemed to have been filed on DD/MM/YYYY under section 16 of the Act.~~
- o ~~The said invention is an improvement in or modification of the invention particulars of which are given in Paragraph 11.~~

13. FOLLOWING ARE THE ATTACHMENTS WITH THE APPLICATION

(a) Form 2

Item	Details	Fee	Remarks
Priority			
Complete Specification			
No. of Claim(s)			
Abstract			
No. of Drawing(s)			
Sequence Listing			
Form-18			

In case of a complete specification, if the applicant desires to adopt the drawings filed with his provisional specification as the drawings or part of the drawings for the complete specification under rule 13(4), the number of such pages filed with the provisional specification are required to be mentioned here.

- (a) Provisional/Complete specification
- (b) Complete specification (in conformation with the international application)/as amended before the International Preliminary Examination Authority (IPEA), as applicable (2 copies).
- (c) Sequence listing in electronic form
- (d) Drawings (in conformation with the international application)/as amended before the International Preliminary Examination Authority (IPEA), as applicable (2 copies).
- (e) Priority document(s) or a request to retrieve the priority document(s) from DAS (Digital Access Service) if the applicant had already requested the office of first filing to make the priority document(s) available to DAS.
- (f) Translation of priority document/Specification/International Search Report/International Preliminary Report on Patentability.
- (g) Statement and Undertaking on Form 3

Total feein Cash/ Banker's Cheque /Bank Draft bearing No.....

Date.....on..... Bank.

I/We hereby declare that to the best of my/our knowledge, information and belief the fact and matters stated herein are correct and I/We request that a patent may be granted to me/us for the said invention.

Dated this 29th day of August 2022



**Khushbu Singh
Agent for the Applicant
IN/PA-3510**

To,
The Controller of Patents
The Patent Office

FORM 2

**THE PATENT ACT, 1970
(39 OF 1970)
AND
THE PATENT RULES, 2003
(As Amended)**

**COMPLETE SPECIFICATION
(See Section 10; Rule 13)**

**“ANALYSIS OF COMPOSITE MATERIAL-CEILING FAN BLADE USING EXPERIMENTS AND THE FINITE
ELEMENT METHOD”**

We,

PravinKrishnat Desai	Indian	India	Assistant Professor Mechanical Engineering Kolhapur Incubation Centre (KIC) Dr. D. Y. PatilPratishthans College of Engineering Salokhenagar Kolhapur 416007	Maharashtra
Suyog Vilas Tate-Patil	Indian	India	Assistant Professor Computer Science & Engineering Dr. D. Y. PatilPratishthans College of Engineering Salokhenagar Kolhapur 416007	Maharashtra

Mr.SurajDhondiramPatil	Indian	India	Assistant Professor Mechanical Engineering Dr. D. Y. PatilPratishthans College of Engineering Salokhenagar Kolhapur 416007	Maharashtra
Mr.AjitRamchandraChougale	Indian	India	Assistant Professor Computer Science & Engineering Dr. D. Y. PatilPratishthans College of Engineering Salokhenagar Kolhapur 416007	Maharashtra
Mr.ShrikantdnyandeoBhopale	Indian	India	Assistant Professor Computer Science & Engineering Dr. D. Y. PatilPratishthans College of Engineering Salokhenagar Kolhapur 416007	Maharashtra
Mr.AmarDamodarPatil	Indian	India	Assistant Professor Civil Engineering Dr. D. Y. PatilPratishthans College of Engineering Salokhenagar Kolhapur 416007	Maharashtra

The following complete specification particularly describes the nature of this invention and the manner in which it is to be performed:

FORM 3
THE PATENTS ACT, 1970
(39 of 1970)
&
The Patents Rules, 2003
STATEMENT AND UNDERTAKING UNDER SECTION 8
(See section 8, rule 12)

We,

PravinKrishnat Desai	Indian	India	Assistant Professor Mechanical Engineering Kolhapur Incubation Centre (KIC) Dr. D. Y. PatilPratishthans College of Engineering Salokhenagar Kolhapur 416007	Maharashtra
Suyog Vilas Tate-Patil	Indian	India	Assistant Professor Computer Science & Engineering Dr. D. Y. PatilPratishthans College of Engineering Salokhenagar Kolhapur 416007	Maharashtra
Mr.SurajDhondiramPatil	Indian	India	Assistant Professor Mechanical Engineering Dr. D. Y. PatilPratishthans College of Engineering Salokhenagar Kolhapur 416007	Maharashtra
Mr.AjitRamchandraChougale	Indian	India	Assistant Professor Computer Science & Engineering Dr. D. Y. PatilPratishthans College of Engineering Salokhenagar Kolhapur 416007	Maharashtra
Mr.ShrikantdnyandeoBhopale	Indian	India	Assistant Professor	Maharashtra

			Computer Science & Engineering Dr. D. Y. PatilPratishthans College of Engineering Salokhenagar Kolhapur 416007	
Mr.AmarDamodarPatil	Indian	India	Assistant Professor Civil Engineering Dr. D. Y. PatilPratishthans College of Engineering Salokhenagar Kolhapur 416007	Maharashtra

Hereby declare:

- (i) That I/We have not made any application for the same/substantially the same invention outside India.
(ii) ~~That I/We who have made this application alone/jointly with made for the same/ substantially same invention, application(s) for patent in the other countries, the particulars of which are given below:~~

Country	Application No	Application Date	Status	Date of publication	Date of grant	Patent Number
Kindly see Annexure						

(iii) That the rights in the application(s) has/have been assigned to.
I/We undertake that upto the date of grant of the patent, by the Controller, I/We would keep him informed in writing the details regarding corresponding applications for patents filed outside India within six months from the date of filing of such application.

Dated this 29th day of August, 2022



Khushbu Singh
Agent for the Applicant
IN/PA-3510

TO
THE CONTROLLER OF PATENTS,
THE PATENT OFFICE, CHENNAI

* The annexed data/information may include entries that relate to continuation applications, continuation-in-part applications, child continuity applications, divisional applications and other similar applications. Though the applicant readily believes that said applications do not relate to the same or substantially the same invention as the instant application, in the absence of any interpretation of the expression "same/substantially the same", said data is being included only by way of abundant caution.

FIELD OF THE INVENTION

This invention relates to the field of Mechanical Engineering. The vast majority of household appliances and mechanical gadgets in the modern world employ electric force. Due to the massive use of electricity, there is a major problem with power all over the globe. The instrument that burns via electric force is the roof fan. This has been restricted by techniques for reducing the sharp edge's weight. Utilizing fiber-supported composite materials in the fan sharp edges is the best way to reduce force use without sacrificing security. The intention is to compare the weight, cost, and force utilisation of the composite fan edge to that of the aluminium fan sharp edge. In this invention a novel approach of Design and Manufacturing of Composite Blades for ceiling Fans is proposed.

BACKGROUND OF THE INVENTION

A ceiling fan is defined as a hard-wired, non-oscillating fan that is suspended from the ceiling for circulating air via the rotation of horizontal fan blades. Electric motor powered ceiling fans have been used for cooling building occupants since the 1880's with little change in the basic configuration of the fan. They consist of four or five flat blades attached to an electric motor, which is usually suspended from the ceiling by a down rod. Most ceiling fans have at least three speeds and also may have a reversing switch for operation in the winter. Often ceiling fans ship with attached lighting fixtures or can be retrofitted with lighting kits. Before the advent of mechanical air conditioning, ceiling fans were ubiquitous in residential, commercial, and industrial buildings, but they lost popularity with the increased penetration of central air conditioning. A ceiling fan is a mechanical fan, usually electrically powered, suspended from the ceiling of a room, that uses hub-mounted rotating paddles to circulate air. A ceiling fan rotates much more slowly than an electric desk fan; it cools people effectively by introducing slow movement into the otherwise still, hot air of a room, inducing evaporative cooling. Fans never actually cool air, unlike air-conditioning equipment, but use significantly less power (cooling air is thermodynamically expensive). Conversely, a ceiling fan can also be used to reduce the stratification of warm air in a room by forcing it down to affect both occupants' sensations and thermostat readings, thereby improving climate control energy efficiency.

A ceiling fan is a device hanging from the ceiling of a room. Ceiling fans utilize hub-mounted rotating paddles in order to produce a cooling effect as a result of air circulation. The circulation of air creates a wind-chill effect that makes a person feel cooler. The ceiling

fan blades are usually made up of aluminum, steel, wood, etc. The ceiling fans have become a common appliance both in domestic and industrial applications. Though the power consumed by these fans is less, it is to be considered that these fans run on a continuous duty and this makes the power consumption significant. Energy crisis and less availability of natural resources being the major challenge, selection of better material and effective manufacturing processes, can reduce both the power consumption and the manufacturing cost. Composite materials have found a wide range of application in replacing the conventional materials with enhanced strength and mould ability.

In recent days, various materials like composites are experimented in almost all parts of the house hold appliances and it has also ventured into ceiling fan. Due to reduction in weight, composite materials are preferred over conventional aluminum blade. Composites are compound materials, differ from alloys in the fact that individual components retain their characteristics but are so incorporated into composites so as to take advantages only of attributes, not that characteristics of short comings, to obtain improved materials.

Composite materials (also called composition materials or shortened to composites) are materials made from two or more constituent materials with significantly different physical or chemical properties, that when combined, produce a material with characteristics different from the individual components. The individual components remain separate and distinct within the finished structure. Properties of composites are strongly influenced by the properties of their constituent materials, their type, distribution and the interaction between them. Like conventional materials, composites are not homogeneous and isotropic. At present aluminum is widely deployed in blade manufacturing mainly due to the advantages such as less density compared to steel, corrosion resistance and aesthetic look. Though aluminum has wide advantages when compared to steel, it stays back in certain properties such as less strength to weight ratio, paint coating etc. In composites, materials are combined in such a way as to enable us to make better use of their virtues while minimizing to some extent the effects of their deficiencies. This process of optimization can release a designer from the constraints associated with the selection and manufacture of conventional materials. He can make use of tougher and lighter materials, with properties that can be tailored to suit particular design requirements. And because of the ease with which complex shapes can be manufactured, the complete rethinking of an established design in terms of composites can often lead to both cheaper and better solutions. The 'composites' concept is not a human

invention. Wood is a natural composite material consisting of one species of polymer — cellulose fibres with good strength and stiffness — in a resinous matrix of another polymer, the polysaccharide lignin. Nature makes a much better job of design and manufacture than we do, although Man was able to recognize that the way of overcoming two major disadvantages of natural wood that of size (a tree has a limited transverse dimension), and that of anisotropy (properties are markedly different in the axial and radial directions) — was to make the composite material that we call plywood. Bone, teeth and mollusc shells are other natural composites, combining hard ceramic reinforcing phases in natural organic polymer matrices. Man was aware, even from the earliest times, of the concept that combining materials could be advantageous, and the down-to-earth procedures of wattle-and-daub (mud and straw) and ‘pide’ (heather incorporated in hard-rammed earth) building construction, still in use today, pre-date the use of reinforced concrete by the Romans which foreshadowed the pre-tensioned and post-tensioned reinforced concretes of our own era.

SUMMARY OF THE INVENTION

Composites like other structural materials must be joined to create useful assemblies. The manner, in which this operation performed is a determining factor on the efficiency of the structure produced. Hence the need to understand the joint behavior of these materials becomes important. In relation to use conventional joints on composite structure a lot of investigation has been done both theoretically and experimentally. Generally there are two major features of composite material joining that need to be known, the first is the joint strength and the second is the failure mode. Both of them were influenced by various parameters.

The specimens used for the assembling the bolted joints are fabricated using hand layup method. The measurements and dimensions are taken as per the ASTM standards. The method used for manufacturing the composite specimens is as described below.

Hand lay-up technique is the simplest method of composite processing. The infrastructural requirement for this method is also minimal. The processing steps are quite simple. First of all, a release gel is sprayed on the mold surface to avoid the sticking of polymer to the surface. Thin plastic sheets are used at the top and bottom of the mold plate to get good surface finish of the product. Reinforcement in the form of woven mats or chopped strand mats are cut as per the mold size and placed at the surface of mold after perspex sheet. Then thermosetting polymer in liquid form is mixed thoroughly in suitable proportion with a

prescribed hardner (curing agent) and poured onto the surface of mat already placed in the mold. The polymer is uniformly spread with the help of brush. Second layer of mat is then placed on the polymer surface and a roller is moved with a mild pressure on the mat-polymer layer to remove any air trapped as well as the excess polymer present. The process is repeated for each layer of polymer and mat, till the required layers are stacked. After placing the plastic sheet, release gel is sprayed on the inner surface of the top mold plate which is then kept on the stacked layers and the pressure is applied. After curing either at room temperature or at some specific temperature, mold is opened and the developed composite part is taken out and further processed.

BRIEF DESCRIPTION OF THE DRAWINGS

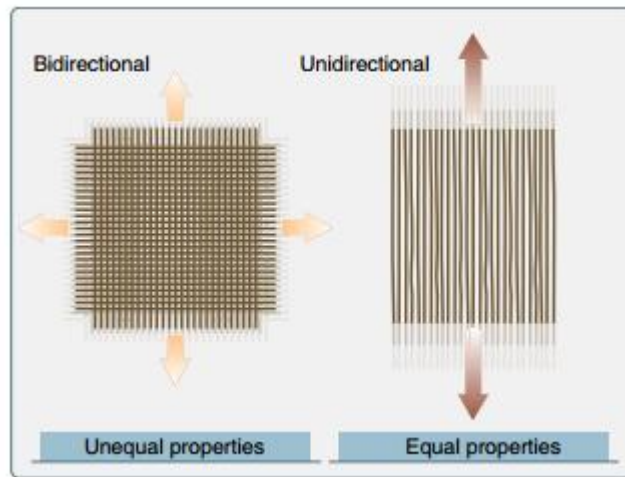


Figure.1. Bidirectional and Unidirectional Material Properties.

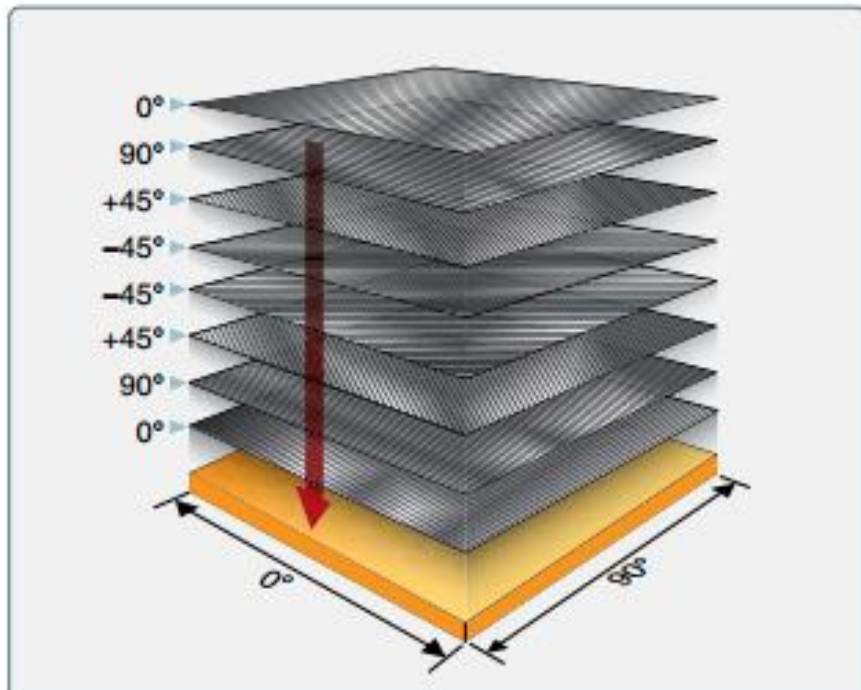


Figure.2. Quasi-isotropic material lay-up

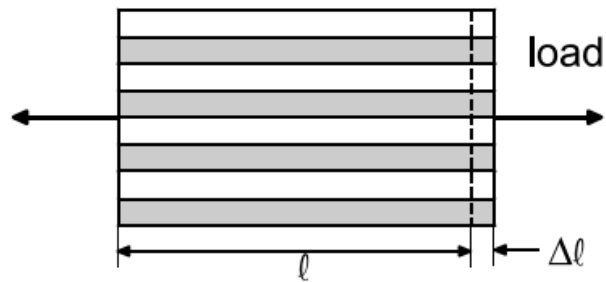


Figure.3. Simple Unidirectional Composite Lamina Under Tensile Load.

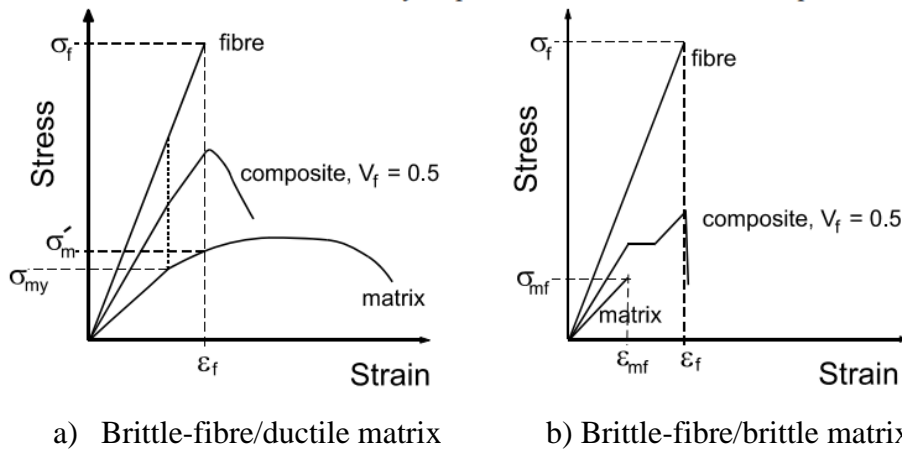


Figure.4. Schematic illustrations of the stress/strain curves of two types of composite

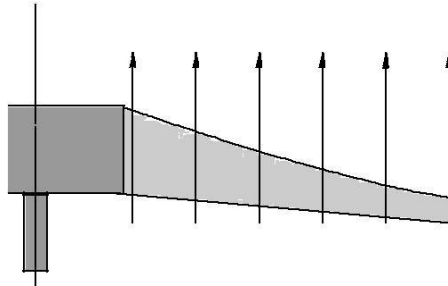


Figure.5. Uniform Velocity from hub to tip

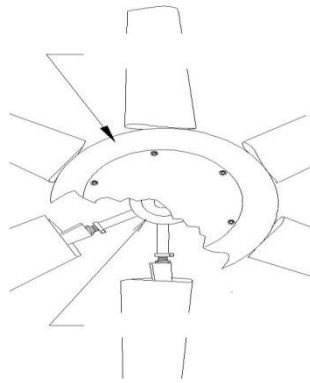


Figure.6. Fan Hub

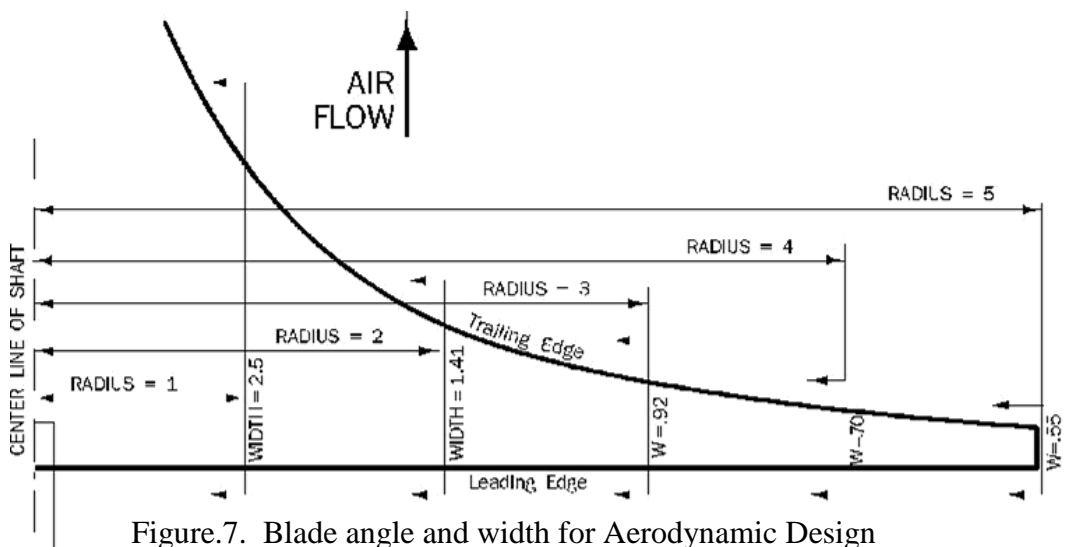


Figure.7. Blade angle and width for Aerodynamic Design

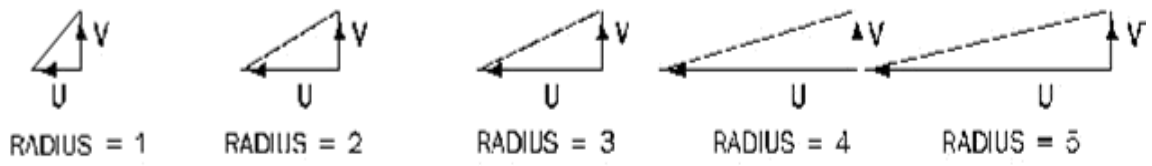


Figure.8. Vector Diagrams.

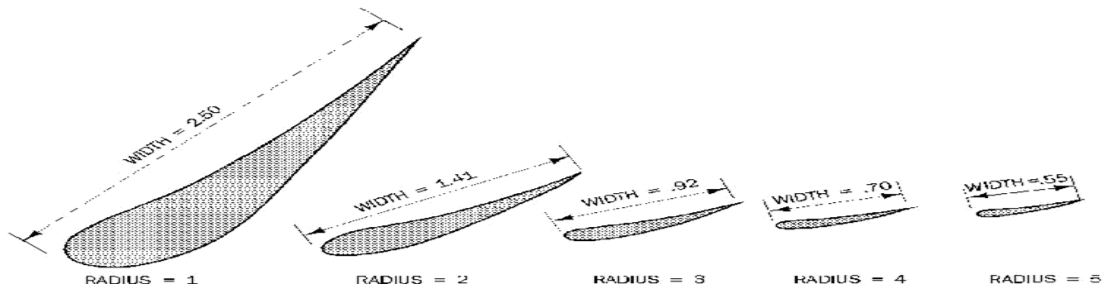


Figure.9. Resultant vectors

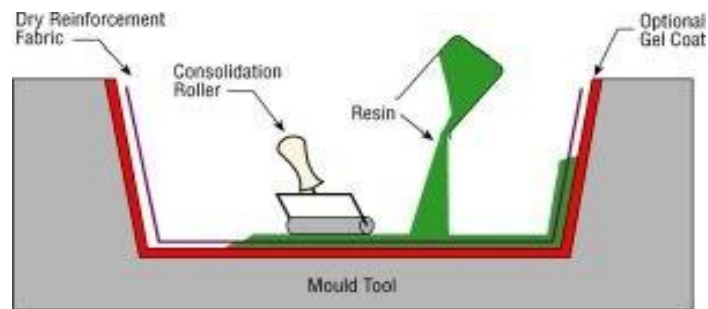


Figure.10. Hand layup process



Figure.11. Workstation preparation for hand layup



Figure.12. Blade with mould



Figure.13. Composite material fan Blade

BRIEF DESCRIPTION OF THE INVENTION

Composite materials are becoming more important in the construction of aerospace structures. Aircraft parts made from composite materials, such as fairings, spoilers, and flight controls, were developed during the 1960s for their weight savings over aluminum parts. New generation large aircraft are designed with all composite fuselage and wing structures, and the repair of these advanced composite materials requires an in-depth knowledge of composite structures, materials, and tooling. The primary advantages of composite materials are their high strength, relatively low weight, and corrosion resistance.

The engineer uses materials for structural or load-bearing purposes is quickly aware of an important feature of engineering solids, which is that they are never as strong as would expect them to be from our knowledge of the strengths of the chemical bonds which hold them together. The reason for this is that all materials contain defects of various kinds which can never be entirely eliminated in practical manufacturing operations. For example, the strength of bulk glass and other ceramics is determined not by their strong covalent or ionic bonds, but by the many tiny pores or sharp cracks that exist either on the surface or in the interior. The most highly polished and dense bulk ceramic will rarely have a strength that exceeds one thousandth of the theoretically predicted strength. Similarly, metals contain faults in the stacking of atoms in their crystalline arrays, and the most damaging of these imperfections — dislocations — cause most bulk metal samples to deform plastically at loads which are, again, perhaps a thousandth or less of the theoretically calculated shear strength. The strength of any sample of a glass or ceramic is actually determined by the size of the largest defect, or crack, which it happens to contain. Roughly, the strength is proportional to the inverse square root of the length of the largest flaw, a relationship developed in a thermodynamic argument by Griffith in the 1920s.

Fibers or particles embedded in matrix of another material are the best example of modern-day composite materials, which are mostly structural. Laminates are composite material where different layers of materials give them the specific character of a composite material having a specific function to perform. Fabrics have no matrix to fall back on, but in them, fibers of different compositions combine to give them a specific character. Reinforcing materials generally withstand maximum load and serve the desirable properties. Further, though composite types are often distinguishable from one another, no clear determination

can be really made. To facilitate definition, the accent is often shifted to the levels at which differentiation take place viz., microscopic or macroscopic. In matrix-based structural composites, the matrix serves two paramount purposes viz., binding the reinforcement phases in place and deforming to distribute the stresses among the constituent reinforcement materials under an applied force. The demands on matrices are many. They may need to withstand temperature variations, be conductors or resistors of electricity, have moisture sensitivity etc. This may offer weight advantages, ease of handling and other merits which may also become applicable depending on the purpose for which matrices are chosen.

Composite materials consist of a combination of materials that are mixed together to achieve specific structural properties. The individual materials do not dissolve or merge completely in the composite, but they act together as one. Normally, the components can be physically identified as they interface with one another. The properties of the composite material are superior to the properties of the individual materials from which it is constructed. An advanced composite material is made of a fibrous material embedded in a resin matrix, generally laminated with fibers oriented in alternating directions to give the material strength and stiffness (Figure.1.). A fiber is the primary load carrying element of the composite material. The composite material is only strong and stiff in the direction of the fibers. Unidirectional composites have predominant mechanical properties in one direction and are said to be anisotropic, having mechanical and/or physical properties that vary with direction relative to natural reference axes inherent in the material (Figure.2.). Components made from fiber reinforced composites can be designed so that the fiber orientation produces optimum mechanical properties.

Strength Characteristics Structural properties, such as stiffness, dimensional stability, and strength of a composite laminate, depend on the stacking sequence of the plies. The stacking sequence describes the distribution of ply orientations through the laminate thickness. As the number of plies with chosen orientations increases, more stacking sequences are possible. For example, a symmetric eight-ply laminate with four different ply orientations has 24 different stacking sequences. **Fiber Orientation** The strength and stiffness of a composite buildup depends on the orientation sequence of the plies. The practical range of strength and stiffness of carbon fiber extends from values as low as those provided by fiberglass to as high as those provided by titanium. This range of values is determined by the orientation of the plies to the applied load. Proper selection of ply orientation in advanced composite materials is necessary

to provide a structurally efficient design. The part might require 0° plies to react to axial loads, $\pm 45^\circ$ plies to react to shear loads, and 90° plies to react to side loads. Because the strength design requirements are a function of the applied load direction, ply orientation and ply sequence have to be correct. It is critical during a repair to replace each damaged ply with a ply of the same material and ply orientation. The fibers in a unidirectional material run in one direction and the strength and stiffness is only in the direction of the fiber. Pre-impregnated (prepreg) tape is an example of a unidirectional ply orientation. The fibers in a bidirectional material run in two directions, typically 90° apart. A plain weave fabric is an example of a bidirectional ply orientation. These ply orientations have strength in both directions but not necessarily the same strength. The plies of a quasi-isotropic layup are stacked in a 0° , -45° , 45° , and 90° sequence or in a 0° , -60° , and 60° sequence. These types of ply orientation simulate the properties of an isotropic material. Many aerospace composite structures are made of quasi-isotropic materials.

Unidirectional continuous-fibre composites Consider a simple unidirectional composite lamina reinforced with continuous fibres which are initially well-bonded to the matrix so that under load fibres and matrix deform together (figure.3).

There are two common situations which may be taken as examples, as illustrated in figure.4. In most practical composites, the highperformance reinforcing fibres can usually be regarded as being brittle, ie. they deform elastically to failure, showing little or no non-linear deformation. In metal- and polymer-matrix composites, the unreinforced matrix is usually capable of some irreversible plastic deformation and in such materials the matrix failure strain is usually much greater than that of the fibres. By contrast, in ceramicmatrix composites the matrix is also brittle, and although much weaker than the reinforcing fibres it is often almost as rigid as the fibres.

One of the most important design considerations in a fan wheel is that it must impart to the air stream a uniform velocity and pressure over its entire area. The necessity for uniform flow and pressure is easily explained: If certain portions of the blade are not able to develop the pressure necessarily being carried by other portions of the blade, back flow of air at these points will occur. Such would be the case in the vicinity of the hub if a typical airplane propeller were adapted as a axial flow fan (figure.5.).

The question of how large a fan hub should be is commonly asked. The answer is simple: A hub must be large enough to pick up where the blades are no longer able to carry the load. As the radius is reduced and the center of the fan approached, the reduction in the speed of the

blade section reduces the potential work which may be accomplished by the blade and increases the mean blade angle (Figure.6.). Blade width will begin to increase abnormally and the blade angle will rise sharply until additional width and angle are no longer practical. At this point the hub must begin.

The term “pitch” is defined as the advance of the air stream per revolution of the fan wheel. Pitch may be expressed in feet per revolution but, for convenience and in order to make it a dimension-less quantity, pitch will be referred to here in terms of hub diameters. For example, a fan with an (aerodynamic) hub diameter of 4 feet, operating at a pitch of 2 hub diameters, would be moving air axially through the wheel at a rate of 8 feet per revolution of the wheel (figure.7.).

Blade angle, or blade setting, is not to be confused with pitch. Blade angle denotes the angle of the blade with the plane of rotation at a given point on the blade. It is important to note that, for uniform flow and constant pitch, every point on the blade.

The drawing below represents a front elevation of a blade blowing upward, rotating toward the observer about the center line of the driving shaft, shown at left (Figure.8.). The leading edge is assumed to be straight and the increase in required width as the center is approached is taken up by the trailing edge.

The vector diagrams above show the relative velocity of the blade and the air, taken at the sections indicated. The vertical vectors represent air velocity at each radius and are equal as required by efficient design. The horizontal vectors represent the speed of the blade at each radius and decrease from tip to center (Figure.9). The resultant vectors represent the blade angle and resultant velocity of the blade at each radius for a blade which is only free wheeling and performing no work on the air stream.

The schematic of hand lay-up is shown in figure.10. The time of curing depends on type of polymer used for composite processing. For example, for epoxy based system, normal curing time at room temperature is 24-48 hours. This method is mainly suitable for thermosetting polymer based composites. Capital and infrastructural requirement is less as compared to other methods. Production rate is less and high volume fraction of reinforcement is difficult to achieve in the processed composites. Hand lay-up method finds application in many areas like aircraft components, automotive parts, boat hulls, diase board, deck etc.

An initial preparation of all the materials and tools that are going to be used is a fundamental standard procedure when working with composites (Figure.11.). This is mainly because once the resin and the hardener are mixed, the working time (prior to the resin mix gelling) is

limited by the speed of the hardener chemically reacting with the epoxy producing an exothermic reaction.

Also, as part of the initial preparation, the woven cloth of carbon fiber must be cut according to the shape of the part.

The first layer of fiber reinforcement is then laid. This layer must be wetted with resin and then softly pressing using a brush or a roller make the resin that was added in the previous step wick up through the fiberglass cloth. If the fiber is not completely wet, more resin can be added over the top and spread around. At this stage a second layer of carbon fiber is added and special care must be taken to eliminate all air bubbles possible (Figure.12.). This can be accomplished by either rolling any air bubbles out with a small hand rolling tool or brushing out the air bubbles with a paintbrush. This step is repeated until the desired thickness is obtained. As the carbon fiber layers are added to build laminates and total part thickness the individual layers may be oriented at varying angles to accomplish specific strength in the direction of the reinforcement weave- this is called 'clocking'. Sometimes during the buildup of successive layers of reinforcement a cover sheet of plastic can be temporarily put over the layup and rolled together with the layers underneath to reduce the mess and squeeze out excess resin. It is important when the proper amount of resin has been used for the layup that any excess resin in the cup is placed on and in an area that does not have any flammable material, such as a concrete sink or slab (Figure.13). We should watch the exothermic reaction that is taking place as the resin 'gels'. Typically the cup gets hotter than the composite panel, because of the heat of reaction that is being transferred to the cup.

ANALYSIS OF COMPOSITE MATERIAL-CEILING FAN BLADE USING EXPERIMENTS AND THE FINITE ELEMENT METHOD

ABSTRACT

A ceiling fan is a mechanical fan, usually electrically powered, suspended from the ceiling of a room, that uses hub-mounted rotating paddles to circulate air. A ceiling fan rotates much more slowly than an electric desk fan; it cools people effectively by introducing slow movement into the otherwise still, hot air of a room, inducing evaporative cooling. Fans never actually cool air, unlike air-conditioning equipment, but use significantly less power (cooling air is thermodynamically expensive). Conversely, a ceiling fan can also be used to reduce the stratification of warm air in a room by forcing it down to affect both occupants' sensations and thermostat readings, thereby improving climate control energy efficiency. Due to the massive use of electricity, there is a major problem with power all over the globe. The instrument that burns via electric force is the roof fan. This has been restricted by techniques for reducing the sharp edge's weight. Utilizing fiber-supported composite materials in the fan sharp edges is the best way to reduce force use without sacrificing security. The intention is to compare the weight, cost, and force utilisation of the composite fan edge to that of the aluminium fan sharp edge. In this invention, a composite fan cutting edge made of glass fiber-supported polymer is planned and created in order to reduce the weight of the fan edge.

CLAIMS

1. The fibers in a bidirectional material run in two directions, typically 90° apart. A plain weave fabric is an example of a bidirectional ply orientation. These ply orientations have strength in both directions but not necessarily the same strength. The plies of a quasi-isotropic layup are stacked in a 0° , -45° , 45° , and 90° sequence or in a 0° , -60° , and 60° sequence.
2. Ceramicmatrix composites the matrix is also brittle, and although much weaker than the reinforcing fibres it is often almost as rigid as the fibres. The matrix failure strain is therefore usually less than that of the fibres.
3. Fan blades with a relatively flat pitch—between 10 and 12 degrees do not require a very large motor to reach a high speed. A steeper blade pitch, such as 14 to 15 degrees, will require a more powerful motor to achieve the same speed.
4. Front elevation of a blade blowing upward, rotating toward the observer about the center line of the driving shaft, shown at left. The leading edge is assumed to be straight and the increase in required width as the center is approached is taken up by the trailing edge.
5. The time of curing depends on type of polymer used for composite processing. For example, for epoxy based system, normal curing time at room temperature is 24-48 hours. This method is mainly suitable for thermosetting polymer based composites. Capital and infrastructural requirement is less as compared to other methods. Production rate is less and high volume fraction of reinforcement is difficult to achieve in the processed composites.

FORM 9
THE PATENTS ACT, 1970
(39 of 1970)
&
The Patents Rules, 2003
REQUEST FOR PUBLICATION
[See sections 11A(2); rules 24A]

We,

Pravin Krishnat Desai	Indian	India	Assistant Professor Mechanical Engineering Kolhapur Incubation Centre (KIC) Dr. D. Y. Patil Pratishthans College of Engineering Salokhenagar Kolhapur 416007	Maharashtra
Suyog Vilas Tate-Patil	Indian	India	Assistant Professor Computer Science & Engineering Dr. D. Y. Patil Pratishthans College of Engineering Salokhenagar Kolhapur 416007	Maharashtra
Mr. Suraj Dhondiram Patil	Indian	India	Assistant Professor Mechanical Engineering Dr. D. Y. Patil Pratishthans College of Engineering Salokhenagar Kolhapur 416007	Maharashtra
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Mr. Shrikant Dnyandeo Bhopale	Indian	India	Assistant Professor Computer Science & Engineering Dr. D. Y. Patil Pratishthans College of Engineering Salokhenagar	Maharashtra

			Kolhapur 416007	
Mr.AmarDamodarPatil	Indian	India	Assistant Professor Civil Engineering Dr. D. Y. PatilPratishthans College of Engineering Salokhenagar Kolhapur 416007	Maharashtra

hereby request forearlypublicationofourapplicationforPatentApplicationNo._____dated**29th**
August,2022undersection11A(2)oftheAct.

Datedthis29thday ofAugust 2022



Khushbu Singh
INPA/-3510
AttorneyfortheApplicant

To
TheControllerofPatents,
ThePatentOffice

Welcome RAVI AGGARWAL [Sign out](#)Controller General of Patents, Designs & Trade
Marks

सत्यमेव जयते

G.A.R.6
[See Rule 22(1)]
RECEIPT

Docket No 52473

Date/Time 2022/08/29 17:49:04

To
RAVI AGGARWAL

UserId: ravi.aggar

P-25B, Sector-23, Sanjay Nagar

CBR Detail:

Sr. No.	Ref. No./Application No.	App. Number	Amount Paid	C.B.R. No.	Form Name	Remarks
1	202221049223	TEMP/E-1/56368/2022-MUM	1600	22721	FORM 1	A NOVEL METHOD OF DESIGN AND MANUFACTURING OF COMPOSITE BLADES FOR CEILING FAN
2	E-12/2406/2022/MUM	202221049223	2500	22721	FORM 9	----

TransactionID	Payment Mode	Challan Identification Number	Amount Paid	Head of A/C No
N-0001014028	Online Bank Transfer	2908220022518	4100.00	1475001020000001

Total Amount : ₹ 4100.00

Amount in Words: Rupees Four Thousand One Hundred Only

Received from RAVI AGGARWAL the sum of ₹ 4100.00 on account of Payment of fee for above mentioned Application/Forms.

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FORM 1 THE PATENTS ACT 1970 (39 of 1970) and THE PATENTS RULES, 2003 APPLICATION FOR GRANT OF PATENT (See section 7, 54 and 135 and sub-rule (1) of rule 20)				(FOR OFFICE USE ONLY) Application No. Filing date: Amount of Fee paid: CBR No: Signature:	
1. APPLICANT'S REFERENCE /IDENTIFICATION NO. (AS ALLOTTED BY OFFICE)					
2. TYPE OF APPLICATION [Please tick (✓) at the appropriate category]					
Ordinary (✓)		Convention ()		PCT-NP ()	
Divisional ()	Patent of Addition ()	Divisional ()	Patent of Addition ()	Divisional ()	Patent of Addition ()
3A. APPLICANT(S)					
Name in Full	Nationality	Country of Residence	Address of the Applicant	State	
PravinKrishnat Desai	Indian	India	Assistant Professor Mechanical Engineering Kolhapur Incubation Centre (KIC) Dr. D. Y. PatilPratishthans College of Engineering Salokhenagar Kolhapur 416007	Maharashtra	
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Mr.AmarDamodarPatil	Indian	India	Assistant Professor Civil Engineering Dr. D. Y. PatilPratishthans College of Engineering Salokhenagar Kolhapur 416007	Maharashtra	
3B. CATEGORY OF APPLICANT [Please tick (✓) at the appropriate category]					
Natural Person (✓)		Other than Natural Person()			
		Small Entity ()	Startup ()	Others ()	
4. INVENTOR(S) [Please tick (✓) at the appropriate category]					
Are all the inventor(s) same as the applicant(s) named above?		Yes (✓)		No ()	
If "No", furnish the details of the inventor(s)					
S. No.	Name in Full	Nationality	Country of Residence	Address of the Inventor	
5. TITLE OF THE INVENTION					
ANALYSIS OF COMPOSITE MATERIAL-CEILING FAN BLADE USING EXPERIMENTS AND THE FINITE ELEMENT METHOD					
6. AUTHORISED REGISTERED PATENT AGENT(S)		Name and IN/PA No.	Khushbu Singh (INPA/3510)		
		Mobile No.	+919019451138		
7. ADDRESS FOR SERVICE OF APPLICANT IN INDIA		PravinKrishnat Desai Assistant Professor Mechanical Engineering Kolhapur Incubation Centre (KIC) Dr. D. Y. PatilPratishthans College of Engineering Salokhenagar Kolhapur 416007 Email ID: researchr08@gmail.com Phone No. +919019451138			
8. IN CASE OF APPLICATION CLAIMING PRIORITY OF APPLICATION FILED IN CONVENTION COUNTRY, PARTICULARS OF CONVENTION APPLICATION					
Country	Application Number	Filing date	Name of the	Title of the Invention	IPC (as classified in the

			Applicant		convention country)
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9. IN CASE OF PCT NATIONAL PHASE APPLICATION, PARTICULARS OF INTERNATIONAL APPLICATION FILED UNDER PATENT CO-OPERATION TREATY (PCT)

International application number	International filing date
NIL	NIL

10. IN CASE OF DIVISIONAL APPLICATION FILED UNDER SECTION 16, PARTICULARS OF ORIGINAL (FIRST) APPLICATION: NIL

Original (first) application No.	Date of filing of original (first) application
----------------------------------	--

11. IN CASE OF PATENT OF ADDITION FILED UNDER SECTION 54, PARTICULARS OF MAIN APPLICATION OR PATENT: NIL

Main application/patent No.	Date of filing of main application
-----------------------------	------------------------------------

12. DECLARATIONS

(i) Declaration by the inventor(s)

(In case the applicant is an assignee: the inventor(s) may sign herein below or the applicant may upload the assignment or enclose the assignment with this application for patent or send the assignment by post/electronic transmission duly authenticated within the prescribed period).

I/We, the above named inventor(s) is/are the true & first inventor(s) for this Invention and declare that the applicant(s) herein is/are my/our assignee or legal representative.

1. PravinKrishnat Desai
2. Suyog Vilas Tate-Patil
3. Mr.SurajDhondiramPatil
4. Mr.AjitRamchandraChougale
5. Mr.ShrikantDnyandeoBhopale
6. Mr.AmarDamodarPatil

Filing date 29th August 2022

(ii) Declaration by the applicant(s) in the convention country

(In case the applicant in India is different than the applicant in the convention country: the applicant in the convention country may sign herein below or applicant in India may upload the assignment from the applicant in the convention country or enclose the said assignment with this application for patent or send the assignment by post/electronic transmission duly authenticated within the prescribed period)

I/We, the applicant(s) in the convention country declare that the applicant(s) herein is/are my/our assignee or legal representative.

- (a) Date
- (b) Signature(s)
- (c) Name(s) of the signatory

(iii) Declaration by the applicant(s)

- o I/We the applicant(s) hereby declare(s) that: -
- o I am/ We are in possession of the above-mentioned invention.
- o The complete specification relating to the invention is filed with this application.
- o ~~The invention as disclosed in the specification uses the biological material from India and the necessary permission from the competent authority shall be submitted by~~

- me/us before the grant of patent to me/us.
- There is no lawful ground of objection(s) to the grant of the Patent to me/us.
 - I am/we are the true & first inventor(s).
 - I am/we are the assignee or legal representative of true & first inventor(s).
 - The application or each of the applications, particulars of which are given in Paragraph 8, was the first application in convention country/countries in respect of my/our invention(s).
 - I/We claim the priority from the above mentioned application(s) filed in convention country/countries and state that no application for protection in respect of the invention had been made in a convention country before that date by me/us or by any person from which I/We derive the title.
 - My/our application in India is based on international application under Patent Cooperation Treaty (PCT) as mentioned in Paragraph 9.
 - The application is divided out of my /our application particulars of which is given in Paragraph 10 and pray that this application may be treated as deemed to have been filed on DD/MM/YYYY under section 16 of the Act.
 - The said invention is an improvement in or modification of the invention particulars of which are given in Paragraph 11.

13. FOLLOWING ARE THE ATTACHMENTS WITH THE APPLICATION

(a) Form 2

Item	Details	Fee	Remarks
Priority			
Complete Specification			
No. of Claim(s)			
Abstract			
No. of Drawing(s)			
Sequence Listing			
Form-18			

In case of a complete specification, if the applicant desires to adopt the drawings filed with his provisional specification as the drawings or part of the drawings for the complete specification under rule 13(4), the number of such pages filed with the provisional specification are required to be mentioned here.

- (a) Provisional/Complete specification
- (b) Complete specification (in conformation with the international application)/as amended before the International Preliminary Examination Authority (IPEA), as applicable (2 copies).
- (c) Sequence listing in electronic form
- (d) Drawings (in conformation with the international application)/as amended before the International Preliminary Examination Authority (IPEA), as applicable (2 copies).
- (e) Priority document(s) or a request to retrieve the priority document(s) from DAS (Digital Access Service) if the applicant had already requested the office of first filing to make the priority document(s) available to DAS.
- (f) Translation of priority document/Specification/International Search Report/International Preliminary Report on Patentability.
- (g) Statement and Undertaking on Form 3

Total feein Cash/ Banker's Cheque /Bank Draft bearing No.....

Date.....on..... Bank.

I/We hereby declare that to the best of my/our knowledge, information and belief the fact and matters stated herein are correct and I/We request that a patent may be granted to me/us for the said invention.

Dated this 29th day of August 2022



**Khushbu Singh
Agent for the Applicant
IN/PA-3510**

To,
The Controller of Patents
The Patent Office

FORM 2

**THE PATENT ACT, 1970
(39 OF 1970)
AND
THE PATENT RULES, 2003
(As Amended)**

**COMPLETE SPECIFICATION
(See Section 10; Rule 13)**

**“A NOVEL METHOD OF DESIGN AND MANUFACTURING OF COMPOSITE BLADES
FOR CEILING FAN”**

We,

Pravin Krishnat Desai	Indian	India	Assistant Professor Mechanical Engineering Kolhapur Incubation Centre (KIC) Dr. D. Y. Patil Pratishthans College of Engineering Salokhenagar Kolhapur 416007	Maharashtra
Suyog Vilas Tate-Patil	Indian	India	Assistant Professor Computer Science & Engineering Dr. D. Y. Patil Pratishthans College of Engineering Salokhenagar Kolhapur 416007	Maharashtra

Mr.Suraj Dhondiram Patil	Indian	India	Assistant Professor Mechanical Engineering Dr. D. Y. Patil Pratishthans College of Engineering Salokhenagar Kolhapur 416007	Maharashtra
Mr.Ajit Ramchandra Chougale	Indian	India	Assistant Professor Computer Science & Engineering Dr. D. Y. Patil Pratishthans College of Engineering Salokhenagar Kolhapur 416007	Maharashtra
Mr.Shrikant dnyandeo Bhopale	Indian	India	Assistant Professor Computer Science & Engineering Dr. D. Y. Patil Pratishthans College of Engineering Salokhenagar Kolhapur 416007	Maharashtra
Mr.Amar Damodar Patil	Indian	India	Assistant Professor Civil Engineering Dr. D. Y. Patil Pratishthans College of Engineering Salokhenagar Kolhapur 416007	Maharashtra

The following complete specification particularly describes the nature of this invention and the manner in which it is to be performed:

FIELD OF THE INVENTION

This invention relates to the field of Mechanical Engineering. The major goal of this invention is to investigate the basic problems with fan blade design and create new, user-friendly software that would enable the creation of ideal, flexible blade designs. According to FEM theory, a design process for fan blades is carried out to get the best results. The intended blade form is changed such that the modified blade will weigh less and cost less to produce from the current blade material. It gets the best outcomes using FEM and compares them to results from currently used blades.

BACKGROUND OF THE INVENTION

A mechanical device hanging from a room's ceiling, often powered by electricity, is a ceiling fan. That circulates air using revolving blades located on the hub. The primary function of a ceiling fan is to move the air around a space. Natural resources (metals like aluminium) are in short supply, but they can be replaced with materials like Nylon66, which is less expensive than aluminium. For the study of complex components, structures, etc., the finite element numerical analysis has recently been established as the optimum approach. Vernier callipers, micrometres, and other measuring tools are used to measure the dimensions for designing with the use of current blade dimensions. CATIA software is used to create a CAD model. The ANSYS programme imports this model. Properties like the Young's modulus, density, and poisson ratio of both materials have been taken into consideration. Results are expressed in terms of blade deformation and stress brought on by one's own weight and various rotational velocities. After obtaining the findings, compare nylon 66 to metal. However, the same thickness did not provide the desired results, thus the nylon 66 blade's thickness was increased. These outcomes are noticeably superior than earlier ones. Therefore, it could be feasible to replace it with nylon66 plastic. The material used to make ceiling fan blades must be resistant to corrosion, exhibit excellent shock absorption, and exhibit good dimensional stability. Nylon 66 - Made by polycondensing adipic acid and hexamethylenediamine, Nylon 66 (polyhexamethylenediamine adipamide) is a thermoplastic polyamide. A variety of fibre kinds are extruded from the resultant polymer. To create a solid, elastic pigment, the fibres are pulled, or stretched, in a procedure that lengthens them, lowers their diameter, and realigns the molecules of the substance so that they are parallel to one another. Nylon's thermo-plasticity, which gives it strength and plastic qualities, also allows for permanent

deformation of the fibres. Nylon 66 is another name for nylon 6-6. The two most popular forms of nylon for the textile and plastics industries are nylon 6 and nylon 66. Nylons, also known as polyamides, are crystalline engineering thermoplastics with exceptional abrasion and fatigue resistance and high melting points, strengths, and ductility. Metal was intended to be replaced with nylon synthetically, and nylon has since been used in a variety of items with improved qualities. It was employed in many different kinds of vehicle components and took the role of silk in military applications like parachutes. Nylon fibres are used in a wide range of products, such as clothing, carpets, rope, and musical instruments. Solid nylon is utilised to replace mechanical components that were formerly cast in metal, including machine screws, gears, and levers. Extrusion and injection moulding are the processes used to make engineering-grade nylon. Additionally, it is used in home appliances. The first synthetic polymer to be commercially successful was nylon. There are two typical processes for producing nylon for use in fibre applications. First method involves reacting molecules with amine (NH₂) groups on one end and molecules with an acid (COOH) group on the other. The amount of carbon atoms between the two acid groups and the two amines determines the name of the resultant nylon. These are converted into intermediate-molecular-weight monomers, which are subsequently reacted to create lengthy polymer chains.

SUMMARY OF THE INVENTION

The ceiling fan has developed into a vital tool for both household and commercial uses. We already knew that fans use less electricity, but since they run nonstop with only brief pauses, they use a lot of power, which results in excessive power consumption. The primary goal of modern electrical appliance firms is to have low power consumption, light weight, and efficient use of natural resources. The aforementioned objective may be accomplished by using improved design, materials, and production techniques. Despite the fact that aluminium alloy 7075 has numerous advantages, it has several limitations, including a good strength to weight ratio, lesser corrosion resistance, a greater cost, etc. We may utilise composite materials in lieu of aluminium alloy 7075 that may also incorporate natural fibres, where the direction of the fibres influences the qualities of the composite material. Natural fibres are strong for their weight and have qualities that are comparable to those of the aluminium alloy 7075. The work on this project is concentrated on two natural fibres: basalt rock fibre and hemp fibre.

Amazing Comfortson et al. has carried out study which presents that the Energy crisis is the major problem faced widely. Though wide range of researches is being laid in the areas of alternate energy sources, proper management of the available energy sources will contribute in controlling this energy crisis, particularly in high populous countries such as India. Ceiling fan being one of the vital electric appliance, consumes considerable electric power in most domestic and Industrial application. Imparting fibre reinforced composite blade in ceiling fans reduces the weight of the blade, thereby considerably reducing the power consumption. In this work the fabrication of composite fan blade made up of glass fibre reinforced polymer is carried out and the performance of this fan is compared with the conventional fans. Compared to existing ceiling fan blade, the composite blade saves 26% of power, and reduces the cost by 28%. The weight is reduced by 27% thus reducing the power consumption. It is also determined that the flow velocity through the composite blade is 15% more than that of the conventional fan.

S.Prabhakaran, M.Senthilkumaret al. has reveals that, the recent world most of the household appliances and industrial appliances are using electric power. Because of the enormous use of Electric power, electricity shortage is main problem throughout the world. Ceiling fan is the one of the appliance that consumes electric power. This has been minimized by means of reducing the weight of the blade. The best way to reduce the power consumption without sacrificing safety is to employ fiber reinforced composite materials in the fan blades. The objective is to compare the power consumption, cost and weight of composite fan blade with that of aluminum fan blade. In this work the design and fabrication of composite fan blade made up of glass fiber reinforced polymer is carried out by which weight of the fan blade can be reduced. Compared to existing ceiling fan blade, the composite blade saves 30% of power, and 34% less in cost. From the fabrication it was found that the weight reduction of 28% is achieved using composite material without sacrificing the strength.

Rupesh V. Bhortake,et al. has carried out study which presents that Ceiling fans are one of the main power consuming sources. Total power consumption is multiple of fan rotation frequency. As India is facing the power crisis it is important to reduce the power consumption in every power consuming device. Hence Power reduction in ceiling fan is perhaps one of the most important parameter. Every power reduction process starts with identification of power consumption sources. Ceiling fans are extensively used to create an indoor breeze, improve the space air distribution and hence enhance the feeling of comfort. The fan speed, diameter, number of blades, blade angle and vibrations all play an important role in deciding the power

consumption. Few previous studies have investigated fan induced flow and its characteristics under different geometric and operating conditions. In this study, response surface methodology is used to predict power consumption characteristics. The experiments were conducted based on the three different fans having three different blades, three room size, three different ceiling fan rod lengths three regulator knob positions and mathematical model was developed.

Rupesh V. Bhortake et al. has reveals that the Vibration in ceiling fan is an important parameter for study. Total vibration is dependent on fan rotation frequency. As vibrations contribute to more power consumption, and also causes excess wear and tear resulting in bearing failure, hence it is important to reduce the vibrations. Every vibration reduction process starts with identification of vibration sources [1]. Ceiling fans are extensively used to create an indoor breeze, improve the space air distribution and hence enhance the feeling of comfort. The fan speed, diameter, number of blades, blade angle and vibrations all play an important role in deciding the vibrations. Few previous studies have investigated fan induced flow and its characteristics under different geometric and operating conditions. In this study, response surface methodology is used to predict vibration characteristics.

D.W. Kammelet et al. has carried out study on High volume low speed (HVLS) fans are configured as large diameter paddle fans with 10 foils(blades). The foils range from 4-12' long making the diameter of the fan approximately 8-24' indiameter. The foils are positioned horizontally attached to a hub mounted on a ¾-1 hp motor shaft. The fan operates at a speed of between 117 and 50 rpm (8-24' diameter). The fans have been used in industrial buildings to circulate ventilation air at a low velocity (3 mph). The fans have also been used in poultry and livestock barns to provide supplemental cooling of the animals by increasing air circulation and air velocity in the barn. Horizontal velocity data at the cow level (5' from floor) was collected on several dairy farms where the HVLS fans have been installed to document velocities achieved with different fan arrangements.

Nihar Shah et al. has reveals that Ceiling fans contribute significantly to residential electricity consumption, especially in developing countries with warm climates. The paper provides analysis of costs and benefits of several options to improve the efficiency of ceiling fans to assess the global potential for electricity savings and green house gas (GHG) emission reductions. Ceiling fan efficiency can be cost-effectively improved by at least 50% using commercially available technology. If these efficiency improvements are implemented in all ceiling fans sold by 2020, 70 terawatt hours per year could be saved and 25 million metric tons of carbon dioxide equivalent (CO₂-e) emissions per year could be avoided, globally. We

assess how policies and programs such as standards, labels, and financial incentives can be used to accelerate the adoption of efficient ceiling fans in order to realize potential savings.

D. Almazo et al. has developed new methodology for the selection and design of propeller oriented to the experimental verification of theoretical results. The problem of propeller selection and design usually present itself in the following manner: a certain air volume and static pressure are required for a certain system. Once the necessity of fan design on a theoretical basis has been recognized, it is possible to determine the dimensions for a fan unit so that it will perform in accordance with a certain set of specifications. The same procedures in this work then can be applied in other propeller selection.

Oday I. Abdullah et al. has carried out study on finite element method has been used to determine the stresses and deformations of an axial fan blade. Three dimensional, finite element programs have been developed using eight-node superparametric shell element as a discretization element for the blade structure. All the formulations and computations are coded in Fortran-77. This work was achieved by modeling the fan blade as a rotating shell. The investigation covers the effect of centrifugal forces on stresses and deformations of rotating fan blades. Extensive analysis has been done for various values, speed of rotation, thickness, skew angle, and the effect of the curvature on the stress and deformation. The numerical results have shown a good agreement compared with the available investigations using other methods.

The specimens which are manufactured using hand layup method are tested for their tensile strength with the help of universal testing machine. Tensile Tests are performed for several reasons. The results of tensile tests are used in selecting materials for engineering applications. Tensile properties frequently are included in material specifications to ensure quality. Tensile properties often are measured during development of new materials and processes, so that different materials and processes can be compared. Finally, tensile properties often are used to predict the behavior of a material under forms of loading other than uniaxial tension. The strength of a material often is the primary concern. The strength of interest may be measured in terms of either the stress necessary to cause appreciable plastic deformation or the maximum stress that the material can withstand. These measures of strength are used, with appropriate caution (in the form of safety factors), in engineering design. Also of interest is the material's ductility, which is a measure of how much it can be deformed before it fractures. Rarely is ductility incorporated directly in design; rather, it is included in material specifications to ensure quality and toughness. Low ductility in a tensile test often is accompanied by low resistance to fracture under other forms of loading. Elastic

properties also may be of interest, but special techniques must be used to measure these properties during tensile testing, and more accurate measurements can be made by ultrasonic techniques

BRIEF DESCRIPTION OF THE DRAWINGS



Figure.1. Universal testing machine



Figure.2. Failure of specimen after tensile



Velocity

Displacement

Acceleration

Figure.3. Velocity and acceleration

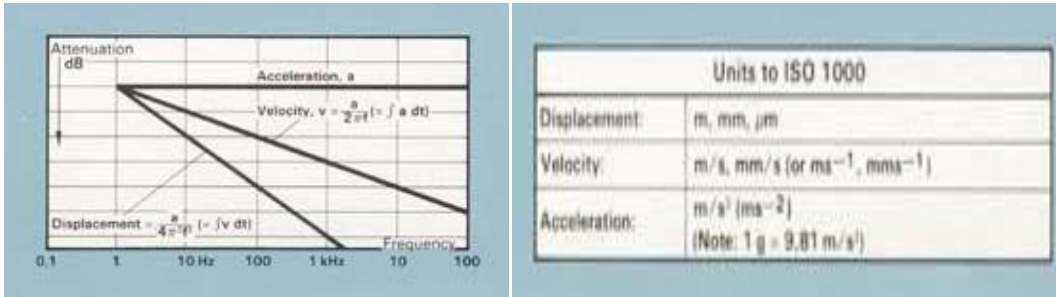


Figure.4. Acceleration, Velocity, or Displacement parameters



Figure.5. Accelerometers are versatile sensors used for high or low frequency vibration as well as shock measurements.

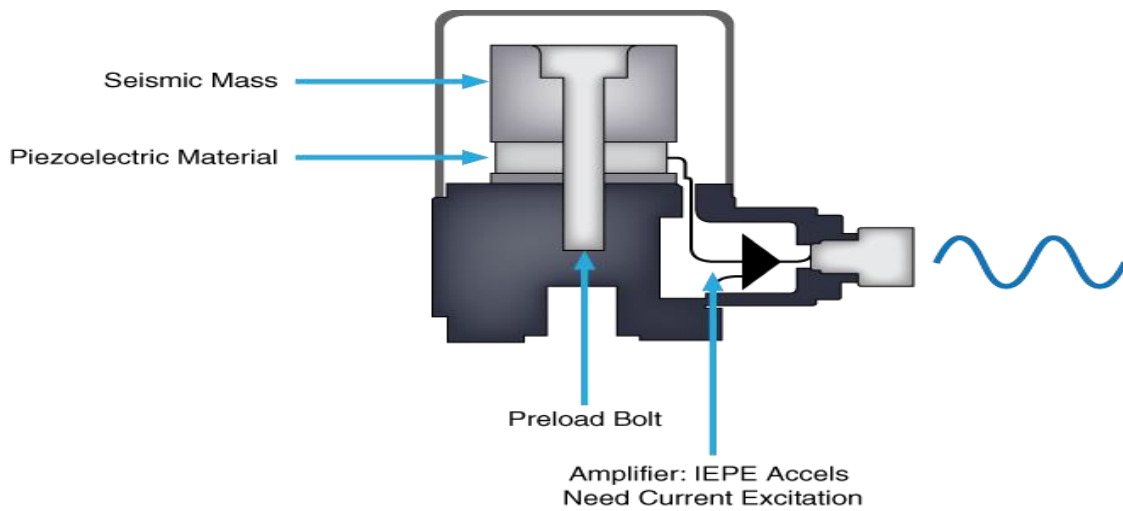


Figure.6. IEPE accelerometers output voltage signals proportional to the force of the vibration on the piezoelectric crystal.

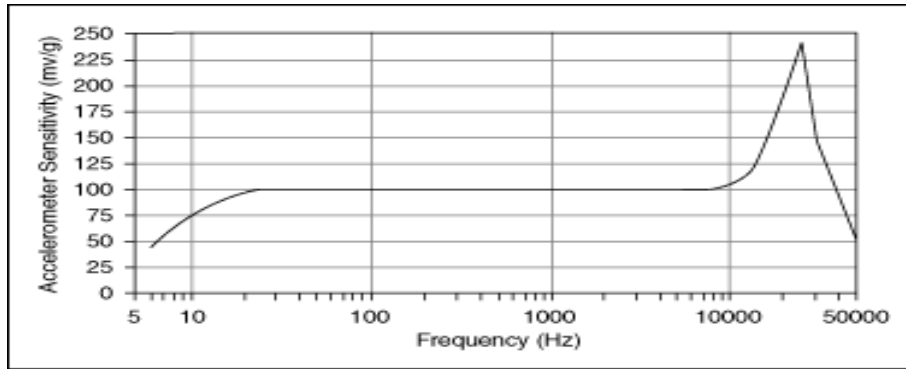


Figure.7. Accelerometers have a wide usable frequency range where sensitivity is relatively flat.



Figure.8. Vibration testing Experimental Setup



Figure.9. Clamping Fibre glass Blade using C-clamp



Figure.10. Clamping Fibre glass Blade using C-clamp



Figure.11. Accelerometer is attached to fan blade for measuring natural frequency at last mode point

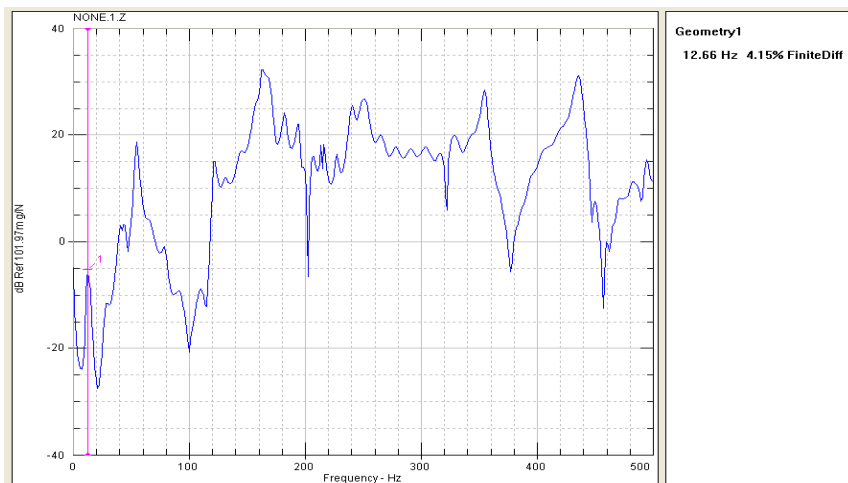


Figure.12. Natural frequency of Aluminium blade at mode 1 is 12.63Hz

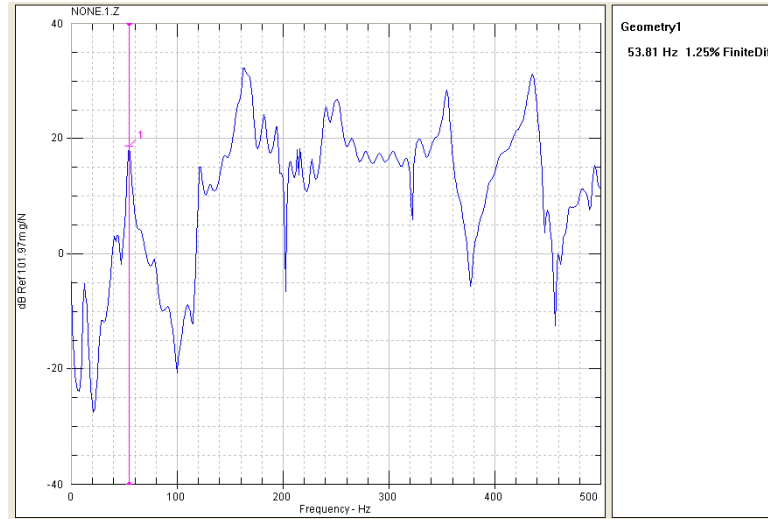


Figure.13. Natural frequency of Aluminium blade at mode 2 is 53.41Hz

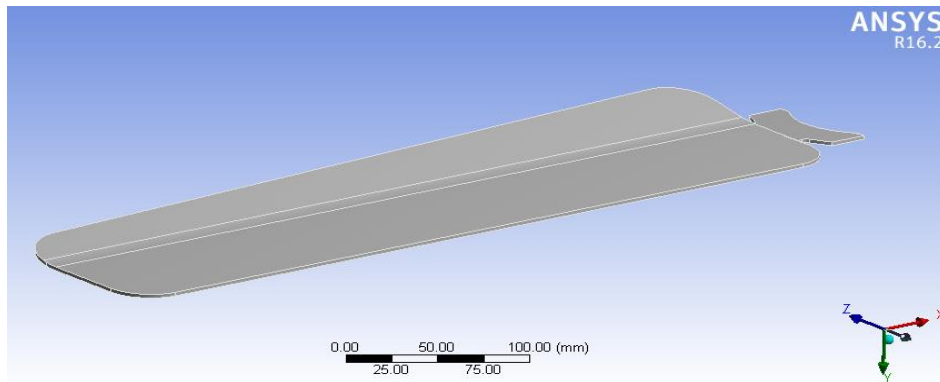


Figure.14. 9⁰ Blade Angle CAD Model of Ceiling fan

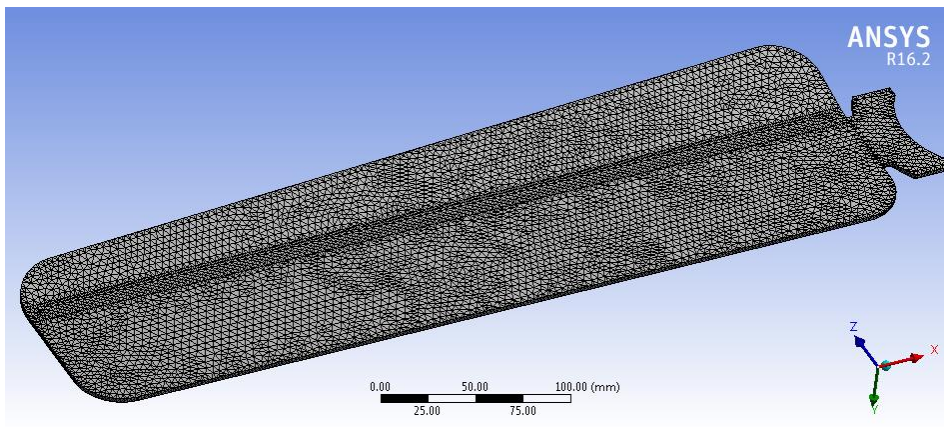


Figure.15. Tetrahedron Mesh Model of Ceiling fan Blade

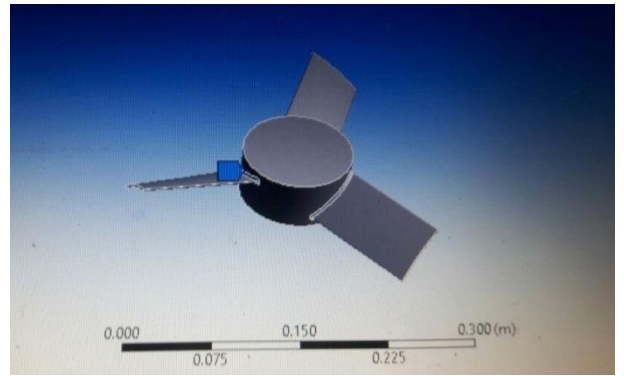
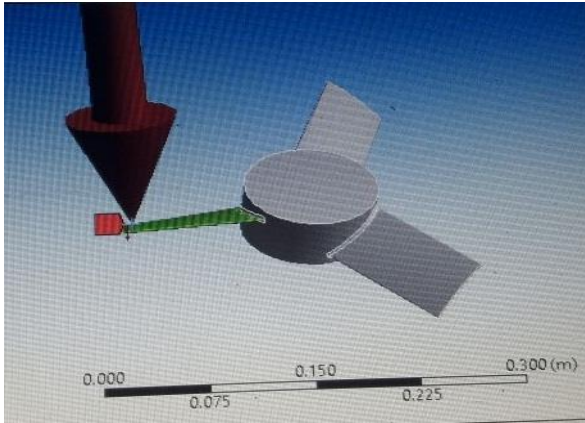


Figure.16. Constrains and load applied on Blade of Ceiling fan

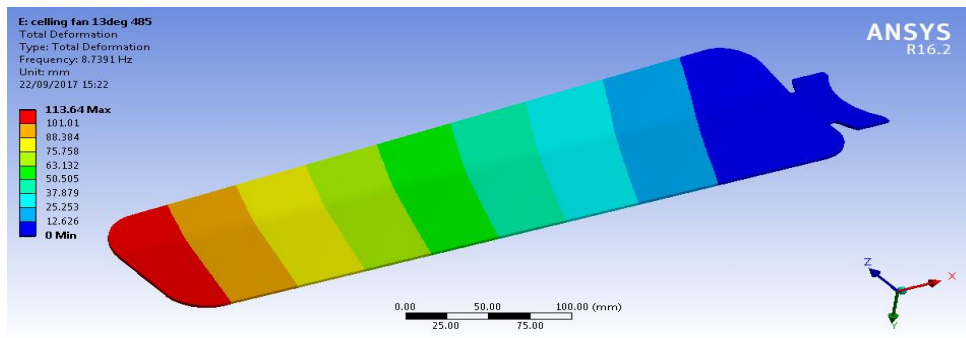


Figure.17. Modal Analysis of 13⁰ angle Blade of Ceiling fan

Model (E4) > Modal (E5) > Solution (E6)

Mode	Frequency [Hz]
1.	8.7391
2.	35.197
3.	77.258
4.	112.3
5.	144.57
6.	184.7

Figure.18. Natural frequency of 13⁰ blade angle has following 6 mode and their frequencies.

BRIEF DESCRIPTION OF THE INVENTION

The following general rules for test procedure may be applied to almost every tensile test. Load and strain ranges should be selected so that the test will fit the range. The maximum values to be recorded should be as close to the top of the selected scale as convenient without running the risk of going past full scale. Ranges may be selected using past experience for a

particular test, or specification data for the material (if available). Note that many computer-based testing systems have automatic range selection and will capture data even if the range initially selected is too small. The identity of each specimen should be verified, and pertinent identification should be accurately recorded for the test records and report. The dimensions needed to calculate the cross-sectional area of the reduced section should be measured and recorded. These measurements should be repeated for every specimen; it should not be assumed that sample preparation is perfectly consistent.

The load-indicator zero and the plot-load-axis zero, if applicable, should be set before the specimen is placed in the grips. Zeroes should never be reset after the specimen is in place. The specimen is placed in the grips and is secured by closing the grips. If preload is to be removed before the test is started, it should be physically unloaded by moving the loading mechanism. The zero adjustment should never be used for this purpose. Note that, in some cases, preload may be desirable and may be deliberately introduced. For materials for which the initial portion of the curve is linear, the strain zero may be corrected for preload by extending the initial straight portion of the stress-strain curve to zero load and measuring strain from that point. The strain value at the zero-load intercept is commonly called the “foot correction” and is subtracted from readings taken from strain scale. When the extensometer, if applicable, is installed, the technician should be sure to set the mechanical zero correctly. The strain-readout zero should be set after the extensometer is in place on the specimen.

The test procedure should be in conformance with the published test specification. Proper and improper engagement of a specimen will be repeated consistently for every test. It is important that the test specification be followed for speed of testing. Some materials are sensitive to test speed, and different speeds will give different results. Also, many testing machine load and strain-measuring instruments are not capable of responding fast enough for accurate recording of test results if an excessive test speed is used.

The technician should monitor the test closely and be alert for problems. One common sign of trouble is a load-versus-strain plot in which the initial portion of the curve is not straight. This may indicate off-center loading of the specimen, improper installation of the extensometer, or the specimen was not straight to begin with.

Another potential trouble sign is a sharp drop in indicated load during the test. Such a drop may be characteristic of the material, but it also can indicate problems such as slippage between the specimen and the grips or stick-slip movement of the wedge grip inserts in the grip body. Slippage may be caused by worn inserts with dull teeth, particularly for hard, smooth specimens.

The stick-slip action in wedge grips is more common in testing of resilient materials, but it also can occur in testing of metals. Specimens cut from the wall of a pipe or tube may have curved tab ends that flatten with increasing force, allowing the inserts to move relative to the grip body. Short tab ends on round specimens also may be crushed by the wedge grips, with the same result. If the sliding faces are not lubricated, they may move in unpredictable steps accompanied by drops in the load reading. Dry-film molybdenum disulfide lubricants are effective in solving stick-slip problems in wedge grips, particularly when testing is done at elevated temperature. When wedge grips are used, the specimen must be installed so that the clamping force is contained within the grip body. Placing the specimen too near the open end of the grip body results in excessive stress on the grip body and inserts and is a common cause of grip failure. Warning: Grip failures are dangerous and may cause injury to personnel and damage to equipment.

Data generally may be grouped into “raw data,” meaning the observed readings of the measuring instruments, and “calculated data,” meaning the test results obtained after the first step of analysis. In the most simple tensile test, the raw data comprise a single measurement of peak force and the dimensional measurements taken to determine the cross-sectional area of the test specimen. The first analysis step is to calculate the “tensile strength,” defined as the force per unit area required to fracture the specimen. More complicated tests will require more information, which typically takes the form of a graph of force versus extension. Computer-based testing machines can display the graph without paper, and can save the measurements associated with the graph by electronic means. A permanent record of the raw test data is important, because it allows additional analyses to be performed later, if desired, and because it allows errors in analysis to be found and corrected by reference to the original data.

Test records may be needed by many departments within an organization, including metallurgy, engineering, commercial, and legal departments. Engineering and metallurgy departments typically are most interested in material properties, but may use raw data for error checking or additional analyses. The metallurgy department wants to know how variations in raw materials or processing change the properties of the product being produced and tested, and the engineering department wants to know the properties of the material for design purposes. Shipping, receiving, and accounting departments need to know whether or not the material meets the specifications for shipping, acceptance, and payment. The sales department needs information for advertising and for advising prospective customers. If a product incorporating the tested material later fails—particularly if persons are injured—the

legal department may need test data as evidence in legal proceedings. In this case, a record of the raw data will be important for support of the original analysis and test report.

Analysis of test data is done at several levels. First, the technician observes the test in progress, and may see that a grip is slipping or that the specimen fractures outside the gage section. These observations may be sufficient to determine that a test is invalid. Immediately after the test, a first-level analysis is performed according to the calculation requirements of the test procedure. ASTM test specifications typically show the necessary equations with an explanation and perhaps an example. This analysis may be as simple as dividing peak force by cross-sectional area, or it may require more complex calculations.

The outputs of this first level of analysis are the mechanical properties of the material being tested. Upon completion of the group of tests performed on the sample, a statistical analysis may be made. The statistical analysis produces average (mean or median) values for representation of the sample in the subsequent database and also provides information about the uniformity of the material and the repeatability of the test. The results of tests on each sample of material may be stored in a database for future use. The database allows a wide range of analyses to be performed using statistical methods to correlate the mechanical-properties data with other information about the material. For example, it may allow determination of whether or not there is a significant difference between the material tested and similar material obtained from a different supplier or through a different production path. The test report usually contains the results of tests performed on one sample composed of several specimens. When ASTM specifications are used for testing, the requirements for reporting are defined by the specification. The needs of a particular user probably will determine the form for identification of the material, but the reported results will most likely be as given in the ASTM test specification. The information contained in the test report generally should include identification of the testing equipment, the material tested, and the test procedure; the raw and calculated data for each specimen; and a brief statistical summary for the sample. Each piece of test equipment used for the test should be identified; including serial numbers, capacity or range used, and date of certification or date due for certification. Identification of the material tested should include the type of material (alloy, part number, etc.); the specific batch, lot, order, heat, or coil from which the sample was taken; the point in the processing sequence (condition, temper, etc.) at which the sample was taken; and any test or pretest conditions (test temperature, aging, etc.).

Identification of the test procedure usually will be reported by reference to a standard test procedure such as those published by ASTM or perhaps to a proprietary specification

originating within the testing organization. The raw data for each specimen are recorded, or a reference to the raw data is included so that the data can be obtained from a file if and when they are needed. Frequently, only a portion of the raw data—dimensions, for example—is recorded, and information on the force-versus-extension graph is referenced. A tabulation of the properties calculated for each specimen is recorded. The calculations at this stage are the first level of data analysis. The calculations required usually are defined in the test procedure or specification. A brief statistical summary for the sample is a feature that is becoming more common with the proliferation of computerized testing systems, because the computations required can be done automatically without added operator workload.

The statistical summary may include the average (mean) value, median value, standard deviation, highest value, lowest value, range, etc. The average or median value would be used to represent this sample at the next level of analysis, which is the material database. Examination of this initial statistical information can tell a great deal about the test as well as the material. A low standard deviation or range indicates that the material in the sample has uniform properties (each of several specimens has nearly the same values for the measured properties) and that the test is producing consistent results. Conversely, a high standard deviation or range indicates that a problem of inconsistent material or testing exists and needs to be investigated.

A continuing record of the average properties and the associated standard deviation and range information is the basis for statistical process control, which systematically interprets this information so as to provide the maximum information about both the material and the test process.

A body is said to vibrate when it describes an oscillating motion about a reference position. The number of times a complete motion cycle takes place during the period of one second is called the Frequency and is measured in hertz (Hz). The motion can consist of a single component occurring at a single frequency, as with a tuning fork, or of several components occurring at different frequencies simultaneously, as for example, with the piston motion of an internal combustion engine. Vibration signals in practice usually consist of very many frequencies occurring simultaneously so that we cannot immediately see just by looking at the amplitude-time pattern, how many components there are, and at what frequencies they occur. These components can be revealed by plotting vibration amplitude against frequency. The breaking down of vibration signals into individual frequency components is called frequency analysis, a technique which may be considered the cornerstone of diagnostic vibration measurements. The graph showing the vibration level as a function of frequency is called a

frequency spectrogram. When frequency analyzing machine vibrations we normally find a number of prominent periodic frequency components which are directly related to the fundamental movements of various parts of the machine. With frequency analysis we are therefore able to track down the source of undesirable vibration. It is not always possible to obtain the exact analytical solution at any location in the body, especially for those elements having complex shapes or geometries. Always matters are the boundary conditions and material properties. In such cases, the analytical solution that satisfies the governing equation or gives extreme values for the governing functional is difficult to obtain. Hence for most of the practical problems, the engineers resort to numerical methods like the finite element method to obtain approximate but most probable solutions. Finite element procedures are at present very widely used in engineering analysis. The procedures are employed extensively in the analysis of solids and structures and of heat transfer and fluids, and indeed, finite element methods are useful in virtually every field of engineering analysis. In any analysis we always select a mathematical model of a physical problem, and then we solve that model. Although the finite element method is employed to solve very complex mathematical models, but it is important to realize that the finite element solution can never give more information than that contained in the mathematical model. The physical problem typically involves an actual structure or structural component subjected to certain loads. The idealization of the physical problem to a mathematical model requires certain assumptions that together lead to differential equations governing the mathematical model. The finite element analysis solves this mathematical model. Since the finite element solution technique is a numerical procedure, it is necessary to assess the solution accuracy. If the accuracy criteria are not met, the numerical solution has to be repeated with refined solution parameters (such as finer meshes) until a sufficient accuracy is reached. Once the mathematical model has been solved accurately and the results have been interpreted, we may well decide to consider next a refined mathematical model in order to increase our insight into the response of the physical problem. Furthermore, a change in the physical problem may be necessary, and this in turn will also lead to additional mathematical models and finite element solutions. The key step in engineering analysis is therefore choosing appropriate mathematical models. These models will clearly be selected depending on what phenomena are to be predicted.

A Novel Method of Design and Manufacturing of Composite Blades for Ceiling Fan

ABSTRACT

Fan blades are one among the foremost common engineering parts which are employed by everyone in day to day life. The increasing energy and decreasing efficiency in the present and future generations of Industries have become the major issues. This can be achieved by minimizing the weight and increasing the efficiency of the fan blades. In this invention, the design and analysis of fan blade which is made up of natural fibers (hemp fiber and basalt rock fiber) is carried out, design, fabrication and testing of composite fan blade (using glass fiber material) and also composite blade is tested and compared with existing blade. In this project the composite blade has been designed and fabricated. The existing fan blade weighs about 295grams where as the weight of composite fan blade is 215grams, which is 28% lesser than existing blade. It is observed that the power consumed by the existing blade (0.052units) is more as compared with composite blade(0.037units). so there is reduction of 30% of power consumption by the existing ceiling fan. Cost of composite ceiling fan blade is Rs. 279/- which is 44% less than existing aluminum blade. The strength of the composite blade almost equalwith compared aluminum blade. From the study, it is concluded that fiber reinforced plastic material is a suitable material for manufacturing the composite ceiling fan blade. The major advantageof composite material ceiling fan blade as compared with conventional aluminium blade are High strength to weight ratio, Excellent corrosion resistance., Good aesthetic appearance, No need for painting, and Weight reduction.

CLAIMS

1. Glass fiber Ceiling fan blade natural frequency value is less than Aluminum Ceiling fan blade. We can state here Glass fiber blade is suitable for ceiling fan application. These blades we can run at similar speed like existing fan and also it help full for power consumption.
2. The general postprocessor, is used to review results at one substep (time step) over the entire model. One can obtain contour displays, deformed shapes, and tabular listings to review and interpret the results of the analysis.
3. Modes of natural frequencies from 1 to 6 changes in similar deviation. 15° blade angle has lowest frequencies at all 6 modes, but this angle can't produce optimum required air flow. So, 11° blade angle is best suited and deliver very nice air flow with optimum frequencies range.
4. Glass-fiber ceiling fan blade is capable for running under condition similar to aluminum blade. Glass fiber blade body sustain similar vibration frequencies. Natural frequency is at every mode is near about same and within 10% deviation.

Dated this 29th day of August 2022



Khushbu Singh
Agent for the Applicant
IN/PA-3510

FORM 3
THE PATENTS ACT, 1970
(39 of 1970)
&
The Patents Rules, 2003
STATEMENT AND UNDERTAKING UNDER SECTION 8
(See section 8, rule 12)

We,

Pravin Krishnat Desai	Indian	India	Assistant Professor Mechanical Engineering Kolhapur Incubation Centre (KIC) Dr. D. Y. Patil Pratishthans College of Engineering Salokhenagar Kolhapur 416007	Maharashtra
Suyog Vilas Tate-Patil	Indian	India	Assistant Professor Computer Science & Engineering Dr. D. Y. Patil Pratishthans College of Engineering Salokhenagar Kolhapur 416007	Maharashtra
Mr.Suraj Dhondiram Patil	Indian	India	Assistant Professor Mechanical Engineering Dr. D. Y. Patil Pratishthans College of Engineering Salokhenagar Kolhapur 416007	Maharashtra
Mr.Ajit Ramchandra Chougale	Indian	India	Assistant Professor Computer Science & Engineering Dr. D. Y. Patil Pratishthans College of Engineering Salokhenagar Kolhapur 416007	Maharashtra
Mr.Shrikant dnyandeo Bhopale	Indian	India	Assistant Professor Computer Science & Engineering Dr. D. Y. Patil Pratishthans College of Engineering	Maharashtra

			Salokhenagar Kolhapur 416007	
Mr.Amar Damodar Patil	Indian	India	Assistant Professor Civil Engineering Dr. D. Y. Patil Pratishthans College of Engineering Salokhenagar Kolhapur 416007	Maharashtra

Hereby declare:

- (i) That I/We have not made any application for the same/substantially the same invention outside India.
(ii) ~~That I/We who have made this application alone/jointly with made for the same/ substantially same invention, application(s) for patent in the other countries, the particulars of which are given below:~~

Country	Application No	Application Date	Status	Date of publication	Date of grant	Patent Number
Kindly see Annexure						

(iii) That the rights in the application(s) has/have been assigned to.
I/We undertake that upto the date of grant of the patent, by the Controller, I/We would keep him informed in writing the details regarding corresponding applications for patents filed outside India within six months from the date of filing of such application.

Dated this 29th day of August, 2022



Khushbu Singh
Agent for the Applicant
IN/PA-3510

TO
THE CONTROLLER OF PATENTS,
THE PATENT OFFICE, CHENNAI

* The annexed data/information may include entries that relate to continuation applications, continuation-in-part applications, child continuity applications, divisional applications and other similar applications. Though the applicant readily believes that said applications do not relate to the same or substantially the same invention as the instant application, in the absence of any interpretation of the expression "same/substantially the same", said data is being included only by way of abundant caution.

FORM 9
THE PATENTS ACT, 1970
(39 of 1970)
&
The Patents Rules, 2003
REQUEST FOR PUBLICATION
[See sections 11A(2); rules 24A]

We,

Pravin Krishnat Desai	Indian	India	Assistant Professor Mechanical Engineering Kolhapur Incubation Centre (KIC) Dr. D. Y. Patil Pratishthans College of Engineering Salokhenagar Kolhapur 416007	Maharashtra
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Mr.Amar Damodar Patil	Indian	India	Assistant Professor Civil Engineering Dr. D. Y. Patil Pratishthans College of Engineering Salokhenagar Kolhapur 416007	Maharashtra

hereby request for early publication of our application for Patent Application No._____ dated **29th August, 2022** under section 11A(2) of the Act.

Dated this 29th day of August 2022



Khushbu Singh
INPA/-3510
Attorney for the Applicant

To
The Controller of Patents,
The Patent Office

202221049194
CORRIGENDUM

The patent application no 202221049194 dt- 29/08/2022 - ANALYSIS OF COMPOSITE MATERIAL-CEILING FAN BLADE USING EXPERIMENTS AND THE FINITE ELEMENT METHOD of IPC : F04D0025080000, F24F0005000000, F24F0007007000, F24H0003040000, A47B0013000000 having 21 pages and claim no 5 was published through online module on 09/09/2022 J no: 36/2022 , but Inadvertently this said application had been left out of the said journal. All the documents submitted by the applicant were also available through online in official website in pdf format from the above said publication date. The abstract of the patent application 202221049194 of Pravin Krishnat Desai, Assistant Professor Mechanical Engineering Kolhapur Incubation Centre (KIC) Dr. D. Y. Patil Pratishthans College of Engineering Salokhenagar Kolhapur 416007. Suyog Vilas Tate-Patil, Assistant Professor Computer Science & Engineering Dr. D. Y. Patil Pratishthans College of Engineering Salokhenagar Kolhapur 416007. Mr.Suraj Dhondiram Patil, Assistant Professor Mechanical Engineering Dr. D. Y. Patil Pratishthans College of Engineering Salokhenagar Kolhapur 416007. Mr.Ajit Ramchandra Chougale, Assistant Professor Computer Science & Engineering Dr. D. Y. Patil Pratishthans College of Engineering Salokhenagar Kolhapur 416007. Mr.Shrikant dnyandeo Bhopale, Assistant Professor Computer Science & Engineering Dr. D. Y. Patil Pratishthans College of Engineering Salokhenagar Kolhapur 416007. Mr.Amar Damodar Patil, Assistant Professor Civil Engineering Dr. D. Y. Patil Pratishthans College of Engineering Salokhenagar Kolhapur 416007. Having the inventors Pravin Krishnat Desai, Assistant Professor Mechanical Engineering Kolhapur Incubation Centre (KIC) Dr. D. Y. Patil Pratishthans College of Engineering Salokhenagar Kolhapur 416007. Suyog Vilas Tate-Patil, Assistant Professor Computer Science & Engineering Dr. D. Y. Patil Pratishthans College of Engineering Salokhenagar Kolhapur 416007. Mr.Suraj Dhondiram Patil, Assistant Professor Mechanical Engineering Dr. D. Y. Patil Pratishthans College of Engineering Salokhenagar Kolhapur 416007. Mr.Ajit Ramchandra Chougale, Assistant Professor Computer Science & Engineering Dr. D. Y. Patil Pratishthans College of Engineering Salokhenagar Kolhapur 416007. Mr.Shrikant dnyandeo Bhopale, Assistant Professor Computer Science & Engineering Dr. D. Y. Patil Pratishthans College of Engineering Salokhenagar Kolhapur 416007. Mr.Amar Damodar Patil, Assistant Professor Civil Engineering Dr. D. Y. Patil Pratishthans College of Engineering Salokhenagar Kolhapur 416007. Should be read as

“A ceiling fan is a mechanical fan, usually electrically powered, suspended from the ceiling of a room that uses hub-mounted rotating paddles to circulate air. A ceiling fan rotates much more slowly than an electric desk fan; it cools people effectively by introducing slow movement into the otherwise still, hot air of a room, inducing evaporative cooling. Fans never actually cool air, unlike air-conditioning equipment, but use significantly less power (cooling air is thermodynamically expensive). Conversely, a ceiling fan can also be used to reduce the stratification of warm air in a room by forcing it down to affect both occupants’ sensations and thermostat readings, thereby improving climate control energy efficiency. Due to the massive use of electricity, there is a major problem with power all over the globe. The instrument that burns via electric force is the roof fan. This has been restricted by techniques for reducing the sharp edge’s weight. Utilizing fiber-supported composite materials in the fan sharp edges is the best way to reduce force use without sacrificing security. The intention is to compare the weight, cost, and force utilisation of the composite fan edge to that of the aluminium fan sharp edge. In this invention, a composite fan cutting edge made of glass fiber-supported polymer is planned and created in order to reduce the weight of the fan edge.”

202221049223

Corrigendum

The patent application no 202221049223 dt- 29/08/2022 - A NOVEL METHOD OF DESIGN AND MANUFACTURING OF COMPOSITE BLADES FOR CEILING FAN of IPC : F04D0025080000, F01D0005280000, F04D0029380000, F04D0029320000, F04D0029340000 having 20 pages and claim no 4 was published through online module on 09/09/2022 J no: 36/2022, but Inadvertently this said application had been left out of the said journal. All the documents submitted by the applicant were also available through online in official website in pdf format from the above said publication date. The abstract of the patent application 202221049223 of Pravin Krishnat Desai, Assistant Professor Mechanical Engineering Kolhapur Incubation Centre (KIC) Dr. D. Y. Patil Pratishthans College of Engineering Salokhenagar Kolhapur 416007. , Suyog Vilas Tate-Patil, Assistant Professor Computer Science & Engineering Dr. D. Y. Patil Pratishthans College of Engineering Salokhenagar Kolhapur 416007. , Mr.Suraj Dhondiram Patil, Assistant Professor Mechanical Engineering Dr. D. Y. Patil Pratishthans College of Engineering Salokhenagar Kolhapur 416007. , Mr.Ajit Ramchandra Chougale, Assistant Professor Computer Science & Engineering Dr. D. Y. Patil Pratishthans College of Engineering Salokhenagar Kolhapur 416007. , Mr.Shrikant dnyandeo Bhopale, Assistant Professor Computer Science & Engineering Dr. D. Y. Patil Pratishthans College of Engineering Salokhenagar Kolhapur 416007., Mr.Amar Damodar Patil, Assistant Professor Civil Engineering Dr. D. Y. Patil Pratishthans College of Engineering Salokhenagar Kolhapur 416007. Having the inventors Pravin Krishnat Desai, Assistant Professor Mechanical Engineering Kolhapur Incubation Centre (KIC) Dr. D. Y. Patil Pratishthans College of Engineering Salokhenagar Kolhapur 416007. , Suyog Vilas Tate-Patil, Assistant Professor Computer Science & Engineering Dr. D. Y. Patil Pratishthans College of Engineering Salokhenagar Kolhapur 416007. , Mr.Suraj Dhondiram Patil, Assistant Professor Mechanical Engineering Dr. D. Y. Patil Pratishthans College of Engineering Salokhenagar Kolhapur 416007. , Mr.Ajit Ramchandra Chougale, Assistant Professor Computer Science & Engineering Dr. D. Y. Patil Pratishthans College of Engineering Salokhenagar Kolhapur 416007. , Mr. Shrikant dnyandeo Bhopale, Assistant Professor Computer Science & Engineering Dr. D.Y. Patil Pratishthans College of Engineering Salokhenagar Kolhapur 416007., Mr.Amar Damodar Patil, Assistant Professor Civil Engineering Dr. D. Y. Patil Pratishthans College of Engineering Salokhenagar Kolhapur 416007. should be read as

“Fan blades are one among the foremost common engineering parts which are employed by everyone in day to day life. The increasing energy and decreasing efficiency in the present and future generations of Industries have become the major issues. This can be achieved by minimizing the weight and increasing the efficiency of the fan blades. In this invention, the design and analysis of fan blade which is made up of natural fibers (hemp fiber and basalt rock fiber) is carried out, design, fabrication and testing of composite fan blade (using glass fiber material) and also composite blade is tested and compared with existing blade. In this project the composite blade has been designed and fabricated. The existing fan blade weighs about 295grams where as the weight of composite fan blade is 215grams, which is 28% lesser than existing blade. It is observed that the power consumed by the existing blade (0.052units) is more as compared with composite blade(0.037units). so there is reduction of 30% of power consumption by the existing ceiling fan. Cost of composite ceiling fan blade is Rs. 279/- which is 44% less than existing aluminum blade. The strength of the composite blade almost equalwith compared aluminum blade. From the study, it is concluded that fiber reinforced plastic material is a suitable material for manufacturing the composite ceiling fan blade. The major advantageof composite material ceiling fan blade as compared with conventional aluminium blade are High strength to weight ratio, Excellent corrosion resistance., Good aesthetic appearance, No need for painting, and Weight reduction

(54) Title of the invention : PERFORM EXPERIMENTS ON FILTER COLUMN FOR NITRATE AND CHROMIUM (VI) REMOVAL WITH VARYING FILTER MATERIAL AND CONTACT TIME

(51) International classification :C02F0001440000, C02F0001463000, C02F0001520000, C02F0001000000, C02F0101300000

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(57) Abstract :
 Perform experiments on filter column for nitrate and chromium (VI) removal with varying filter material and contact time ABSTRACT Nitrate can cause severe problems, including eutrophication and infection diseases, such as cyanosis and cancer of the alimentary canal. Also all forms of chromium can be toxic at high levels. The conventional treatments used for groundwater include coagulation and flocculation is not effective for the removal of nitrates. Ion-exchange, deionization, reverse osmosis, electrocoagulation are the methods widely used for removal of nitrates and chromium which have disadvantages like expensive, non availability of materials easily, sludge formation, the waste stream from reverse osmosis process is exceptionable. Overall the methods adopted for removal of nitrate and chromium generates some environmental pollution and therefore, there is need of the clean technology which can be provided easily by using filter media available locally and naturally. The potential damage to water can be prevented by using this treatment for removal of nitrate and chromium (VI). The adopted technique is low cost because the filter medias to be used in the set up are non expensive and easily available. Also the adopted technique does not require skilled supervision, gives zero sludge formation. Process is simple, eco-friendly, and gives effective efficiency. In this invention we proposed the experiments on filter column for nitrate and chromium (VI) removal with varying filter material and contact time. It is seen that if the size of the filter media is decreases then there is more area available for adsorption. So the filter media size should be as possible as low, also there is problem of low size of filter media is observed that the very fine particles are come in the outlet sample. So the care should be taken regarding selecting the filter media size.