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**The Role of Biomedical Engineering and Physical Therapy in the Management of Chronic Achilles Tendonitis in Athletes Chronic Illness**  
ARI KATHOTA UDAY KUMAR, G.MANITHA PRIYADHARSHINI, DARSHI SVAM BABU, PATNAIKUNI SOWMYA  
KEERATHANA

Assistant Professor<sup>1</sup>, Associate Professor<sup>2</sup>, Assistant Professor<sup>3,4</sup>  
Sri Venkateswara College of Engineering & Technology,  
Etcherla, Srikakulam, Andhra Pradesh-532410  
Department of ECE

**ABSTRACT**  
The purpose of this research is to determine whether or not athletes suffering from chronic Achilles tendinopathy may benefit from a combination of biomedical engineering and physical therapy. A simple random sample strategy was used to choose 15 athletes who had chronic Achilles tendinopathy. All participants had their pain levels assessed using a Numerical Rating Scale before to the exam. Following the pre-test, the subjects underwent four weeks of low-level laser therapy with eccentric exercises. Following this, they were measured again for pain and increased range of motion, just as they had been before the treatment. Research has shown that athletes suffering from chronic Achilles tendinopathy may find relief with the use of low-level laser therapy in conjunction with eccentric workouts. Eccentric exercise, biomedical engineering, physiotherapy, chronic Achilles tendinopathy, discomfort, and low-level laser treatment are all used as keywords.


**INTRODUCTION**  
There are a number of clinical symptoms associated with tendinopathy, a common

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**International Journal of Trend in Scientific  
Research and Development (IJTSRD)**  
International Open Access Journal  
ISSN No: 2456 - 6470 | www.ijtsrd.com | Volume - 2 | Issue - 4

## Performance and Emission Characteristics of a V.C.R C.I Engine using Chicken Waste Based Bio-Diesel with Blended Fuels

**P. Shivaji<sup>1</sup>, P. Sivaram<sup>2</sup>, K. Srinivasa Rao<sup>2</sup>**  
<sup>1</sup>P.G Student, <sup>2</sup>Assistant Professor  
Department of Mechanical Engineering, Sri Venkateswara College of Engineering and Technology,  
Etcherla, Srikakulam, Andhra Pradesh, India

### ABSTRACT

This project deals with the preparation of Oil (extraction of oil) from the chicken waste which is obtained from tri-glycerides through the transesterification process to find Performance and emission characteristics of V.C.R diesel engine with ratio 18:1 fuelled with rendered chicken oil with five different blends at speed 1500rpm. The chicken oil is prepared from waste chicken available at poultry form. The blends are made as B0, B5, B10, B15, B20, & B25. The performance characteristics like specific fuel Consumption, brake power, indicated power, brake thermal efficiency, indicated thermal efficiency viscosity, lower volatility and polyunsaturated character of animal fat oils pose normal engine operational problems. Transesterification is the method of optimizing the characteristics of animal fat oils.

This thesis about conversion of oil from chicken waste in to biodiesel and performance test conducted on stationary single cylinder diesel engine by using chicken waste extracted oil blends with diesel fuel for no load to full load condition. These tests were also conducted with conventional diesel fuel for

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International Journal of Management, Technology And Engineering ISSN NO : 2249-7455

## THERMAL ANALYSIS ENERGY PERFORMANCE AND PARAMETER IDENTIFICATION OF A STAINLESS STEEL ANNEALING FURNACE USING ANSYS

M.VANITHA<sup>1</sup> P.PADMAVATHI<sup>2</sup>

<sup>1</sup> M.Tech Student, Department of Mechanical Engineering, Sri Venkateswara College of Engineering and Technology, Etcherla, Srikakulam (dist.)

<sup>2</sup> Assistant Professor, Department of Mechanical Engineering, Sri Venkateswara College of Engineering and Technology, Etcherla, Srikakulam (dist.)

**Abstract-**

Various types of furnaces are available for numerous heating applications and also several problems associated with their operations non uniform thermal conditions on the load ineffective heat transfer from heat sources to the load, difficulty in controlling atmosphere inside the furnace, high energy losses etc are some of the important problems in furnace operations. Heating power produced by radiant tubes and its temperature distribution of continuous annealing furnace were analyzed using Ansys. Here in this project I am modeling of heating zone of continous annealing furnace by using creo3.0 and simulating the furnace heating zone using

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Volume-1, Issue-9, September-2018  
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## Experimental Analysis of a VCR Engine Performance Using Neem Methyl Ester and its Diesel Blends

M. Rambabu<sup>1</sup>, K. Eswararao<sup>2</sup>

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<sup>2</sup>Asst. Professor, Dept. of Mechanical Engineering, Sri Venkateswara College of Engineering and Technology, Etcherla, India

**Abstract:** Bio diesel is an alternative fuel which is produced from edible or non-edible vegetable oil or animal fat. It is a best renewable substitute of conventional fuel. As a replacement of petroleum fuel it is much cleaner alternative. Its physical components are similar to regular diesel fuel. Experimental analysis of variable compression diesel engine performance and emission using Neem Methyl Ester Bio diesel (NeME), and pure Diesel at various load conditions at fixed compression ratio 17.5:1 to compare the result at each compression ratio considering pure diesel as base line. The experiment has been conducted at fixed engine speed of 1500 rpm and engine tests have been conducted to get the comparative measures of Specific Fuel Consumption (SFC), Brake thermal efficiency(BTh) and emission such as CO, CO<sub>2</sub>, HC, and improved the emission characteristics.

**Keywords:** biodiesel, neem methyl ester, variable compression ratio engine, emission performance

oil by a method of alkaline catalysed transesterification. The lower calorific value of biodiesel is approximately 7 % lower than that of pure diesel. The viscosity of Neem methyl ester is evidently higher than the pure diesel. In the experimentation, four compression ratios are provided by the screw adjustment for the test engine starting 17.5:1 for pure diesel run at particular compression ratio. Transesterification of Neem oil was carried out by heating of oil, addition of KOH and methyl alcohol, stirring of mixture, separation of glycerol, washing with distilled water and heating for removal of water traces. The NeME so produced was used for the experimentation along with pure diesel at above said compression ratios for comparative study. Fuel properties such as flash point, fire point, kinematic viscosity and calorific value were determined for Neem methyl ester and are compared with the pure diesel.

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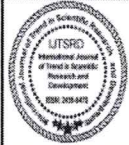


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ISSN No: 2456 - 6470 | Volume - 3 | Issue - 1 | Nov - Dec 2018

## Design and Structural Thermal Analysis of Gas Turbine Rotor Blade with Radial Holes using Solidworks

K Vidya Sagar<sup>1</sup>, Dr. N. Mahesh Kumar<sup>2</sup>, P. Siva Ram<sup>3</sup>  
<sup>1</sup>M.Tech Student, <sup>2</sup>Professor, <sup>3</sup>Assistant Professor  
Sri Venkateswara College of Engineering and Technology, Andhra Pradesh, India

### ABSTRACT

Cooling of gas turbine blades are major attention to high temperature working conditions. Numerous methods have been recommended for the cooling of blades and a unique technique is to be used to ensure radial holes to pass high velocity cooling air along the blade span. The forced convection heat transfer from the blade to the cooling air, it will reduce the temperature of the blade to permissible limits. Finite element analysis is used in the present work to examine steady state thermal & structural performance for stainless steel. Four different models comprising of solid blade and blades with varying number of holes (7, 8, 9 & 10 holes) were evaluated in this project to find out the optimum

on the blades so that they move and impart rotational energy to the rotor. Early turbine examples are windmills and waterwheels.

Gas, steam, and water turbines usually have a casing around the blades that contains and controls the working fluid. Credit for invention of the steam turbine is given both to the British engineer Sir Charles Parsons (1854-1931), for invention of the reaction turbine and to Swedish engineer Gustaf de Laval (1845-1913), for invention of the impulse turbine. Modern steam turbines frequently employ both reaction and impulse in the same unit, typically varying the degree of reaction and impulse from the

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DESIGN AND ANALYSIS OF I.C ENGINE COMBUSTION CHAMBER USING CFD

Authors

Challa Venkata Rao  
Kottapalli Srinivasa Rao

Abstract

ABSTRACT: Internal combustion engines are seen each day in vehicles, vehicles, and buses. The name inner combustion refers additionally to gas turbines except that the name is generally carried out to reciprocating inner combustion (I.C.) engines like the ones observed in normal cars. There are basically styles of I.C. Ignition engines, those which need a spark plug, and those that rely upon compression of a liquid. Spark ignition engines take a mixture of fuel and air, compress it, and ignite it the use of a spark plug. In this thesis, the combustion chamber is designed in line with the IC engine specs and analyzed for its heat switch price the use of Finite Element evaluation software ANSYS and calculate emissions. Modeling may be done in CREO parametric software. CFD analysis to determine the stress drop, speed and heat switch coefficient and to finding the emissions (O2, N2) of methane and ethane (mass fraction, mole fraction and mole concentration of methane and ethane).

Key Words

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DESIGN AND ANALYSIS OF CIRCULATING FLUIDIZED BED (CFB) BOILER AT DIFFERENT NANOFLUIDS

Authors

Dokkara praveen kumar  
Madanala Venkateshwara rao

Abstract

ABSTRACT: The circulating fluidized bed (CFB) boiler is a member of the fluidized bed boiler family. It has gained popularity, especially in the electric power-generation market, for its several practical advantages, such as efficient operation and minimum effect on the environment. Heavy industrialization & modernization of society demands in increasing of power cause to research & develop new technology & efficient utilization of existing power units. Variety of sources are available for power generation such as conventional sources like thermal, hydro, nuclear and renewable sources like wind, tidal, biomass, geothermal & solar. In this thesis the CFBC boiler designed in CREO parametric software and analysis in ANSYS software at different temperatures (8500C & 9500C), velocities (6 & 10m/s) and NANO fluids (water as a base fluid) and NANO fluid al2o3 at volume fractions 0.2, 0.4. In this project CFD analysis to determine mass flow rate , heat transfer rate, pressure drop and velocity at different velocities and different temperatures. Temperature analysis to determine the temperature distribution and heat flux at different materials.

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 **IJMECE**  
International Journal of Mechanical Engineering and Computer Science

ISSN2321-2152 www.ijmece.com  
Vol 7, Issue.2 April 2019

## Advice on how to prepare a research paper in the field of engineering

Chakravarthi, V.K, Tammineni Sravan Kumar, Sateesh, K, Terli Naidu

### ABSTRACT

Due in large part to engineering's more common reputation as a practical discipline revolving around experiments and measurements rather than a theoretical one, the discipline is not often associated with engaging language or literary style. The majority of engineering students would prefer not to spend their time doing research for term papers and instead focus on solving engineering problems using mathematical equations. However, engineering is primarily an academic field, and research plays a crucial role within it. part of the scholarly perspective on it. In a nutshell, good research paper writing skills are as important as strong mathematical problem-solving abilities for engineering students. I will do experiments. There are a lot of students who thrive in quantitative and lab-based disciplines, such as engineering, but struggle when it comes to writing. This makes it hard for them to write research papers. The good news is that we can follow some basic guidelines to produce an engaging and informative engineering research paper.

### INTRODUCTION

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International Journal of Mechanical Engineering and Construction  
ISSN2321-2152 www.ijmece.com  
Vol 8, Issue.3 Aug 2020

## Evaluating the Opportunity Costs of Labor Resource Wastage in China's Real Estate Brokerage

Chakravarthi,V.K, Udaya Bhanu.V, Simhachalam,N, Durga Prasad.K

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### ABSTRACT

Providing "an indispensable forum for the exchange of knowledge and experience between pro-fessionals from both academic and industrial environments" is the stated goal of the Bulletin of the Polish Academy of Sciences: Technical Sciences. Science and technology are tightly intertwined and very significant, especially in civil engineering. Prior to this one, in 2013 [1] and again in 2015 [2], there were two special sections published on civil engineering. In honor of the 70th anniversary of the Warsaw Building Research Institute (ITB), this special section on "Civil Engineering - Ongoing Technical Research" has been produced. The origins of such institutions may be traced to the middle of the nineteenth century, when they were established to investigate the characteristics of building materials used in mechanical constructions and the construction industry. They were founded in technological universities. It is worth noting that the earliest of these research units were established at the following universities of technology: Munich in 1870, Berlin in 1871, Vienne in 1873, Zurich in 1880, Lviv in 1884, and Warsaw in 1918. The Road Research institution of Warsaw University of Technology was the preeminent Polish construction research institution until 1939.

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### INTRODUCTION

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Cosmos Impact Factor-5.86

## Under seismic loading, experimental investigation was conducted on the punching shear behavior of RC slab-column connections including shear slabs.

KANDARPA SRINIVAS, Dr CHITTURI VENKATRATNAM, G. MANMADHALEELA, KUNA VIJAY KRISHNA

Assistant Professor<sup>1</sup>, Professor<sup>2</sup>, Assistant Professor<sup>3,4</sup>

Sri Venkateswara College of Engineering & Technology,

Etcherla, Srikakulam, Andhra Pradesh-532410

Department of ECE

### ABSTRACT

The practicality of reinforced concrete flat slab-column constructions makes them commonly employed. Nevertheless, punching-shear failure in the slab-column connections is a real possibility in these kinds of buildings. The slab-column connection is vulnerable to brittle punching failure in the absence of shear reinforcement, particularly in seismic zones where lateral stress is common. A excellent kind of transverse reinforcement that prevents punching failure, shear studs are efficient. The purpose of this study is to investigate

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**EFFECT OF PVA CONCENTRATION ON STRUCTURAL,  
MORPHOLOGICAL, OPTICAL AND ELECTRICAL PROPERTIES  
OF PVA CAPPED SnS NANOCRYSTALLINE FILMS GROWN BY  
CHEMICAL BATH DEPOSITION**

**POTNURU MOHANKRISHNA, VELAGA SURYAKALA, GADU RAMBABU, DASARI TIRUMALA RAO**

Assistant Professor<sup>1,2,3</sup> Associate Professor<sup>4</sup>

Sri Venkateswara College of Engineering & Technology,

Etcherla, Srikakulam, Andhra Pradesh-532410

Department of ECE

**ABSTRACT**

Chemical bath deposition (CBD), a straightforward and inexpensive wet chemical method, has been used to effectively produce nanocrystalline films of polyvinyl alcohol (PVA) capped tin monosulfide (SnS) on glass substrates. The concentrations of PVA used ranged from 0.5 wt % to 2 wt %. The XRD analysis showed that the SnS phase is best represented by peaks with an orientation of (040). The use of XRD spectra allowed for the estimation of many characteristics, including stacking faults, dislocation density, lattice strain, and average crystallite size. The XRD findings were further validated by Raman analysis. The films deposited at a 2 wt % concentration of PVA showed acceptable morphology in the SEM and AFM micrographs. FTIR analysis confirmed that the films contained PVA. The experimental films' high absorbing nature was

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# Modeling of Load Frequency Control for A Hybrid Power System using PID Controller

Konni Seetharamayya<sup>1</sup>

Assistant Professor, Electrical and Electronics Engineering,  
Sri Venkateswara College of Engineering  
and Technology, Srikakulam Dist, Andhra Pradesh, India

**Abstract:** Interconnected power system is plays one the of critical role in modern electrical power system Engineering. the power load demand varies randomly both area frequency and tie-line power interchange also vary. For interconnection of two or more areas in power system, frequency should be maintained within the scheduled value, which can be achieved by employing one of the most prominent techniques called as Automatic Load Frequency Control (ALFC). In ALFC, frequency can be controlled in three ways, namely Flat frequency regulation, Parallel frequency regulation and Flat tie-line loading. Among these controls, Parallel frequency regulation is commonly used method, because constant frequency can be maintained by equalizing the power generation with the power demand. The objectives of LFC are to minimize the deviations in these variables (area frequency and tie-line power interchange) and to ensure their steady state errors to be zero. In this area of energy crisis, renewable energy is the most promising solution to increasing energy needs. But the power production by these resources cannot be controlled unlike in thermal plants. As a result, standalone operation of renewable energy is not reliable. Hence grid-connection of these along with conventional plants is

frequency within the limits, one is at the generating end and the other is at the load end [2].

LPF problem arises when individual generation areas are interconnected by transmission lines called as tie-lines. Large-scale power systems are liable to performance deterioration due to the presence of sudden small load perturbation parameter uncertainties, structural variations, etc. Frequency deviation is undesirable because most of the AC motors run at speeds that are directly related to frequency (3). Thus it is imperative to maintain system frequency constant. This is done by implementing Load Frequency Control (LFC). There are many LFC methods developed for controlling frequency. They include flat frequency control (FFC), tie-line bias control (TBC) and flat tie-line control (FTC). In FFC, some areas act as load change absorbers and others as base load (4). The thermal areas have been modelled using transfer function. Speed governor, turbine and generator constitute the various parts namely the speed governing system, turbine model, generator load models (5). The Particle swarm



Experimental-Investigation-On-Natural-Convection-Heat-Transfer-Aug... 1 / 5 - 100% +

INTERNATIONAL JOURNAL OF SCIENTIFIC & TECHNOLOGY RESEARCH VOLUME 9, ISSUE 03, MARCH 2020 ISSN 2277-8616

## Experimental Investigation On Natural Convection Heat Transfer Augmentation With Vibration Effect By Using Water- $\text{Al}_2\text{O}_3$ Nanofluid

**B.SUDHAKARA RAO, S.RAVI BABU**

**ABSTRACT:** Conventional fluids including water, engine oil, ethylene glycol, and transformer oil have a lower thermal conductivity of fluid compared to strong. The nanofluid is used in different applications like commercial, heat exchange, motor car, and biomedical, etc. The nanoparticles and sodium dodecyl sulfate are mixed into a base fluid (water) for distinct volume fractions (0.05%, 0.1%, 0.15%, and 0.2%) and supply diverse heat inputs 30W, 40W, 50W, 60W. The  $\text{Al}_2\text{O}_3$  nanoparticles are high thermal conductivity than CuO. The SDS (sodium dodecyl sulfate) mixed with  $\text{Al}_2\text{O}_3$  nanoparticles are suspension kingdom for a long time without settling at the lowest allocation of the square rectangular prismatic enclosure. The unbalanced motor positioned below the cylindrical surface then its floor is vibrated and its temperature increases. The dimmer stat used to various voltages and frequency 100Hz-190Hz. The fluid at constant in enters gadget then enhancement of heat transfer coefficient increase.

**Keyword:** Natural convection, Heat transfer, Constant heat flux, Boundary theory layer, Vibration, Frequency.

### I. INTRODUCTION

The metallic oxides are  $\text{Al}_2\text{O}_3$  are nano-sized debris 50-80nm, sodium dodecyl sulfate and base fluid of water blended into glass breaker via the usage of the magnetic stirrer technique in 1 hour without settle within the bottom part of the enclosure but sodium dodecyl sulfate is used to surface is corrosion. The cylindrical floor temperature measured an axial distance of boundary layer thickness because the lowest part of a boundary layer is less will temperature increase and above in advance will temperature decreases that component due to the fact boundary layer thickness is greater. The two strategies


The cylindrical heater rod covered with brass fabric consists of  $\text{D}^1$  (18.5mm\*250mm) and its floor located on Eight K-type thermocouples and its each thermocouple distance is 33.3mm. The 6 point temperature indicator connected to the six K-type thermocouples (data received system) and its temperature recorded. A 3 core cable linked vibrator to dimmer stat and its frequency or amplitude tiers growth to decrease. An accelerometer was used to pick out up a vibration sign from the cylinder and transmit the same to a vibration meter that could measure amplitude, pace or acceleration.

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 International Journal of Advances in Engineering and Management (IJAEM)  
Volume 2, Issue 2, pp: 692-702 www.ijaem.net ISSN: 2395-5252

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## A CFD Based Thermal Analysis of Solar Air Heater Duct Artificially Roughened With 'S' Shape Ribs on Absorber Plate

L. Mohana Rao<sup>1</sup>Reddi Sekhar Mallakunta<sup>2</sup>

<sup>1</sup>Department of Mechanical Engineering, Asst.professor, SVCET, Etcherla-532410.  
<sup>2</sup>Department of Mechanical Engineering, SVCET, Etcherla-532410.

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Date of Submission: 08-07-2020 Date of Acceptance: 23-07-2020

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**ABSTRACT:** In the present work performance of solar air heater duct provided with artificial roughness in the form of 'S' shaped ribs geometry has been analyzed using CFD. The main objective is to increase the heat transfer rate by providing artificial roughness over the absorber plate. The effect of 'S' shaped ribs geometry on Nusselt number, friction factor and performance enhancement are investigated for relevant Reynolds number ranging from 6000-18000. Different turbulent models have been used for solving the problem and the results are then compared with Dittus-Boelter equation. Renormalization-group (RNG) k-ε model-based results have been found in good agreement with Dittus-Boelter equation and providing artificial roughness on absorber plate. In the absorber plate by providing protrusions, fixing ribs and different type of shape can make it rough. Whereas ribs on absorber plate as an artificial roughness can disturb the laminar sub layer and produce turbulence in the flow of air which can help to enhance the performance of solar air heater. This arrangement also increases the pumping power requirement of air because of increase in friction in the duct. Lots of experiment has conducted to analyses the consequences of providing artificial roughness in absorber plate for the heat transfer and the flow characteristic. Bhushan and Singh [1] have analyses that solar air heater has very low thermal efficiency

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Volume 46, Part 1, 2021, Pages 752-755


**Experimental investigation on mechanical properties of FeCoCrNiMo High Entropy Alloy & B<sub>4</sub>C reinforced Al6061 hybrid MMCs**

Suresh Chitturi <sup>a</sup>  , Munmun Bhaumik <sup>a</sup>, Kesava Dandu <sup>a</sup>, Ravi Kiran Mudidana <sup>b</sup>

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 **International Research Journal of Engineering and Technology (IRJET)** e-ISSN: 2395-0056  
Volume: 07 Issue: 12 | Dec 2020 www.irjet.net p-ISSN: 2395-0072

## Experimental Investigation on Forced Convective Heat Transfer Enhancement Using Transformer Oil-Al<sub>2</sub>O<sub>3</sub>Nano Fluid

Ravali Priya.J<sup>1</sup>, M. Ravi Kiran<sup>2</sup>

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<sup>2</sup>Assistant Professor, Department of Mechanical Engineering, SVCET, Etcherla, Andhra Pradesh, India

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**Abstract** - Natural convective heat transfer along a vertical cylinder immersed in transformer oil-Al<sub>2</sub>O<sub>3</sub> nanofluids for various concentrations (0, 0.05, 0.1, 0.15, 0.2vol %) under constant heat flux condition was investigated experimentally and presented. Thermal stratification was observed outside the boundary layer in the ambient fluid after steady-state condition is achieved as the fluid temperature goes on increasing along the axial direction. Temperature deviations of the cylinder along the axial direction and temperature variations of fluid in radial direction are shown graphically. It is observed that the temperatures of the cylinder and the fluid increases along the axial direction and the fluid temperature decreases in the radial direction. Experiments were conducted for various heat inputs (30 W, 40 W, 45 W and 50 W) and volume concentrations and observed that the addition of titanium oxide nanoparticles up to 0.15 vol % enhances the thermal performance and then the further addition of nanoparticles leads to deterioration. The maximum enhancement in the natural convection heat transfer performance is observed as 19.8%, i.e., heat transfer coefficient is increased from 314.172 w/m<sup>2</sup>k to 614.465 w/m<sup>2</sup>k at 0.15vol %.

**Key Words:** Forced Convection, Heat Transfer, Constant Heat Flux, Thermal Stratification, Transformer Oil-Al<sub>2</sub>O<sub>3</sub>, Nanofluids

### 1. INTRODUCTION

Conventional heat transfer fluids such as water, engine oil, kerosene, ethanol, transformer oil, ethylene glycol have lower

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Improving the efficiency of isolated-footing resting on loose sand soil ... 2 / 19 | - 100% + | 🔍 ↻

International Journal of  
Information Technology & Computer Engineering

ISSN 2347-3657  
Volume 9, Issue 1, Jan 2021

### Using grout diaphragm walls to improve the efficiency of isolated footing sitting on loose sand soil: an experimental study as well as quantitative research

Gayatri, K., Swetha, S., Jagannadha Rao, P., Udaya Bhanu, V

#### Abstract

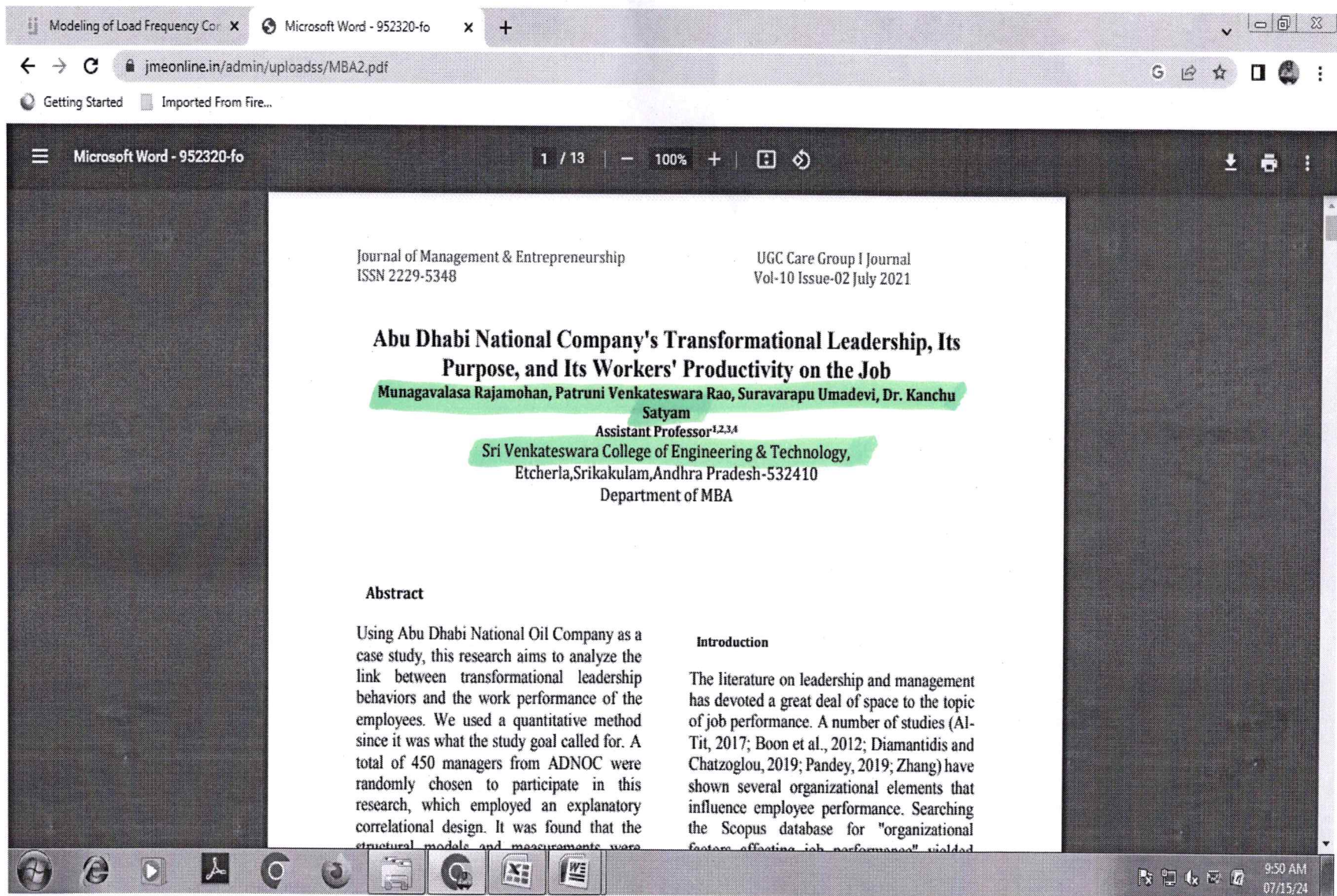
Foundations often encounter heightened demands due to increasing loads from many sources, such as extra storeys, eccentric loads, and greater living loads. This is why it is now standard practice to place horizontal reinforcements under footings in order to increase the bearing capacity of loose-dense sand subgrades. Both the vertical settlement and the horizontal movement of the soil beneath the selected loaded footing may be mitigated by grouting the perimeter of the footing. This research aims to evaluate the effectiveness of a circular foundation sitting on granular soil injected with grout diaphragm walls by conducting comprehensive experimental work on twenty-one (21) soil models. In particular, the relation between the width (b) and length (L) of grouted walls and the bearing capacity of granular soil was examined in this work. According to the findings, a great way to increase the subgrade layer's bearing capacity is to construct grouted wall injection on each side of the current footing. In order to verify the accuracy of the selected computational procedures, two programs were utilized: the 3D PLAXIS program and the 2D Finite Element Program GeoStudio 2018. A circular foundation lying on granular soil has its bearing capacity significantly affected by reinforcement, according to the results, which is in agreement with the experimental observations.

**Keywords** Grout, Bearing capacity, Settlement, Circular footing, Improved soil.

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www.ijres.org Volume 09 Issue 12 | 2021 | PP. 01-06

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## Enhancement of heat transfer rate using CuO (Copper Oxide) nanofluid in heat exchanger

Sanjeevi Naveen kumar<sup>1</sup>, Mudidana Ravikiran<sup>2</sup>

<sup>1</sup>PG Scholar, Department of Mechanical Engineering, SVPT, Echterla, Andhra Pradesh  
<sup>2</sup>Assistant Professor, Department of Mechanical engineering, SVPT, Echterla, Andhra Pradesh, India

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**Abstract**  
Energy conservation, conversion, and recovery are vital thinking among people due to environmental issues. The effectively way to save energy of materials and facilities in which heat exchanger plays a significant role. Mostly in industries uses heat exchangers for enchantment of heat transfer. The commonly used heat transfer fluids are water, ethylene glycol and propylene glycol as base fluids in heat exchanger. Dispersion of Nano particles in a base fluid shows solution in problems such as high-pressure loss, erosion of material. The thermal conductivity of the base fluid increase by adding Nano particle which in turn increase the heat transfer rate. In this paper heat exchanger performance is analyzed by adding Copper oxide with base fluid (a mixture of Distilled water and propylene glycol). The thermal property i.e., overall heat transfer coefficient of heat exchanger is calculated and compared with base fluid. Experiments were conducted for various volume concentration 0.1%, 0.3% and 0.5% and observed that the addition of Copper oxide nanoparticles enhances the thermal performance. The maximum enhancement in the convective heat transfer is observed at 0.5% volume concentration.

**Keywords:** Heat transfer rate, Shell and tube heat exchanger, Copper oxide nano particle, Nusslet Number

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## How OHM and Viscous Dissipation Interact with MHD Jeffery Nanofluid Flow The Effect of Magnetic Dipoles

**DASARI TIRUMALA RAO, POTNURU MOHANKRISHNA, YANAMANDRA RAVI SEKHAR,  
SAMPATHIRAO AMBIKA**

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Etcherla, Srikakulam, Andhra Pradesh-532410

Department of ECE

## ABSTRACT

A numerical investigation of a nanofluid called Jeffrey is carried out across a stretched sheet in the presence of a magnetic dipole effect, as well as the combined effects of viscous dissipation and ohmic heating. The original set of governing equations is simplified to a system of linked non-linear ordinary differential equations with appropriate boundary conditions by using the similarity transformation. By using the shooting and MATLAB bvp4c methods, the resultant equations are numerically solved. Previous research has explored the influence of several dimensionless factors on fluid velocity, temperature, and concentration, and these effects have been confirmed with a few limiting examples. For a variety of parameter values, we tabulate and analyze the skin friction coefficient and the local Nusselts number numerically. The following terms are essential: Ohmic Heating, Jeffrey Nano Fluid, Viscous Dissipation, and Stretching

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## Offloading computations to unmanned aerial vehicles using deep reinforcement learning for catastrophe management

Vanjarapu Vykunta Rao, Konni Seetharamayya, Adavipalli Chandana, Yellamilli Bhuvan Satya Subrahmanyam

### ABSTRACT

Unmanned Aerial Vehicle (UAV) research and development may benefit from the rise of the Internet of Things (IoT) made possible by mobile computing. Disaster management, forest fire control, and distant operations are examples of low latency applications that are crucial to the development of mobile edge compute offloading in UAVs. In order to meet the goal demand and reduce transmission latency, the optimum offloading strategy is built on the application of deep reinforcement learning (DRL), and the task completion efficiency is enhanced utilizing an edge intelligence algorithm. Reduced execution latency and average energy usage are the results of the combined optimization. This DRL network-integrated edge intelligence technique takes use of computational operations to boost the likelihood that tracking and data transmission are both useful. The suggested combined optimization outperforms the current approaches for UAV development in terms of execution latency, offloading cost, and effective convergence. With the help of the suggested DRL, the UAV may make choices in real-time depending on the situation of the catastrophe and the availability of computer resources.

**Keywords:** deep reinforcement learning algorithm, edge intelligence, UAV energy consumption

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**Photocatalytic effect of CuO nanostructures under sun light irradiation for environmental application**

G.Adilakshmi<sup>1</sup>, S C V Ramana Murty Naidu<sup>2</sup>, V.Srinivasan<sup>3</sup>, M. Kalyan Chakravarthi<sup>4</sup>  
B.V.Febiyola<sup>5</sup> Imran Khan<sup>6</sup> J.Prakash Arul Jose<sup>7</sup>

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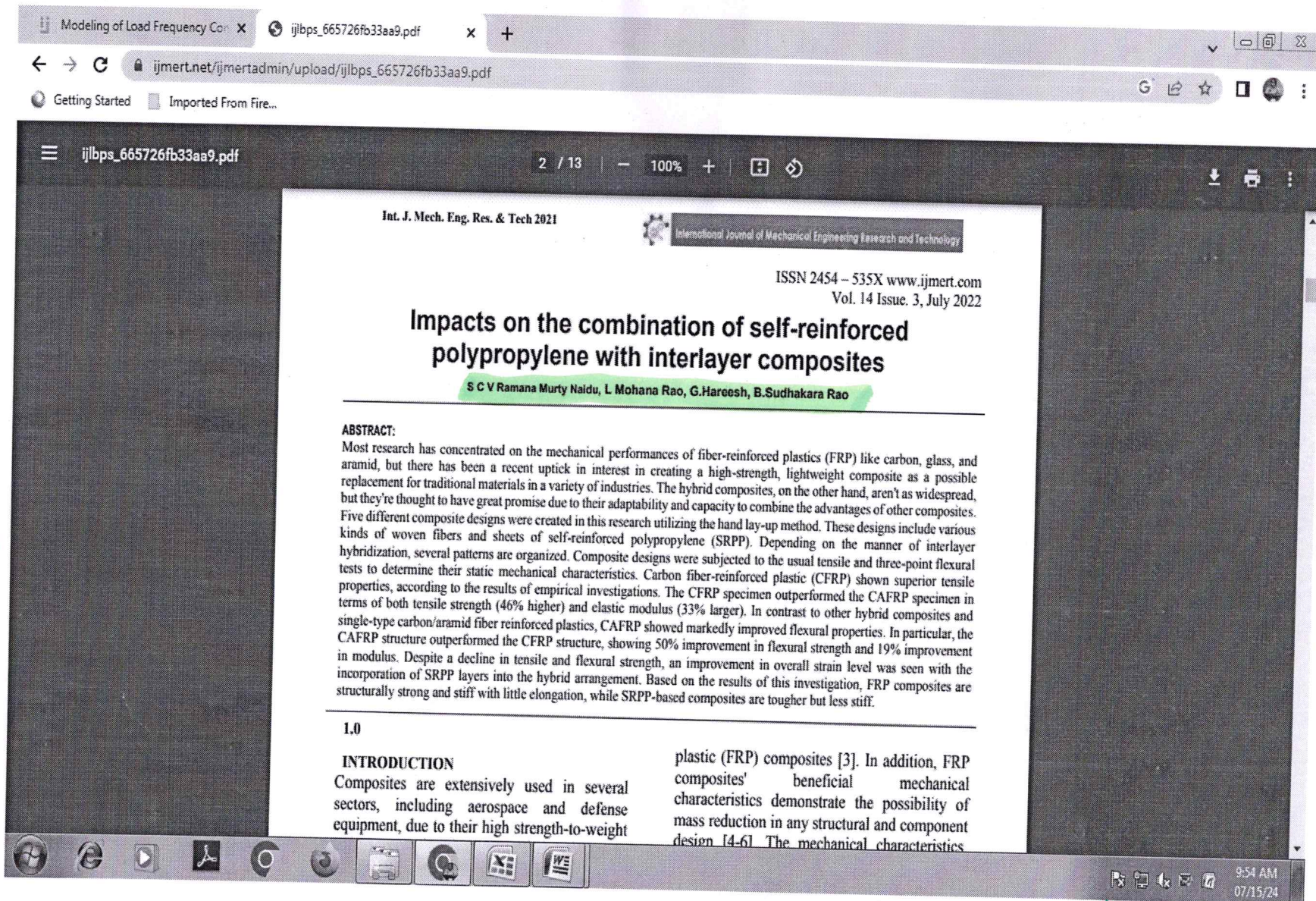
<sup>6</sup>Imran Khan Master's student Jamia Millia Islamia Okhla, New Delhi 110025, India .

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Journal of Management & Entrepreneurship  
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### A Czech Employee's Perspective on the Benefits and Drawbacks of Working from Home During the COVID-19 Pandemic

Mr. K. Laveen kumar, Dr. ch. Vinoda rao, Mr. S. upendra guptha, Mr. K. suresh,  
Associate professor, IQAC Coordinator<sup>1</sup>, Professor, DIRECTOR-MBA<sup>2</sup>, Assistant Professor<sup>3,4</sup>  
KGRL COLLEGE (A) PG COURSES, BHIMAVARAM.

#### Abstract

The widespread use of remote labour as a response to the COVID-19 pandemic has created new opportunities and problems for individuals and companies alike. This article seeks to examine the pros and cons of working remotely during the 2020 and 2021 pandemic from the perspective of the Czech Republic's workforce. The gender gap in Gen Z's views and experiences with remote work is one area that this research

aims to address. The primary objective was achieved via the selection and analysis of 475 print and online sources that offered quantitative and qualitative data related to the topic. Next, we have a greater understanding of these concerns thanks to the survey, comparison, and synthesis.

**Keywords:** home working, positives, negatives, Czech Republic.

#### Introduction

Coronavirus SARS-CoV-2 pandemic  
Deloitte, 2021; TiN, 2021). Consistent with the global average, 63% of Czech Republic firms have claimed that the

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# Flax- and Graphene-Reinforced Natural Fiber Nanocomposites under Cryogenic Environment for Constructional Applications

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**TL;DR:** In this paper , a novel nanocomposite material made up of unsaturated polyester resin, graphite at the nanoscale, and flax fibres at the micro-scale is presented.

**Abstract:** Mostly at the micro- and nanoscales, efforts were made to produce innovative thermoplastic nanocomposite materials. These composites were reinforced with natural fibres and artificial additives with improved mechanical characteristics. This research entails the creation of a novel nanocomposite material made up of unsaturated polyester resin, graphite at the nanoscale, and flax fibres at the microscale. Flax fibres make up 4, 8, and 12% of the binding matrix's weight, respectively. A constant quantity of nanoparticles equal to 4 wt% of the binding matrix is used. In order to stick the graphene to natural fibres, an appropriate surface alteration approach is needed, and this work will focus c read more

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Research Article

# Effect of Dwell Time on Fracture Load of Friction Stir Spot Welded Dissimilar Metal Joints

Hindawi  
Advances in Materials Science and Engineering  
Volume 2022, Article ID 2163507, 7 pages  
<https://doi.org/10.1155/2022/2163507>

P. Sathyascelan,<sup>1</sup> V. M. Manickavasagam,<sup>2</sup> P. Ravichandran,<sup>3</sup> D. V. S. S. V. Prasad,<sup>4</sup> S. C. V. Ramana Murthy Naidu,<sup>5</sup> S. Pradeep Kumar,<sup>6</sup> Ateeb Ahmad Khan,<sup>7</sup> R. Karthik,<sup>8</sup> and Gizachew Assefa Kerga<sup>9</sup>

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The dissimilar materials joining in heavy structural fabrication industries is tedious work for welding and design engineers, since the weld region's critical properties are not as good as the base metal. The problem is solved by using friction stir welding (FSW). The friction stir welding (FSW) is a solid-state joining process. Nowadays, the fasteners are eliminated by friction stir welding (FSW). FSW is used for joining of dissimilar materials. The friction stir welding (FSW) is a solid-state joining process. The friction stir welding (FSW) is a solid-state joining process. The friction stir welding (FSW) is a solid-state joining process.

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**Kolukula Satish<sup>1</sup>, R. Vara Lakshmi<sup>2</sup>**

<sup>1</sup>Post Graduate Student, Sri Venkateswara College of Engineering & Technology, Etcherla

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**Abstract** • There are many models to characterize the behavior of the heat exchangers encountered in many industries. Shell and Tube heat exchangers are having special importance in boilers, oil coolers, condensers, and pre-heaters. They are also widely used in process applications as well as the refrigeration and air conditioning industry. The robustness and medium weighted shape of Shell and Tube heat exchangers make them well suited for high pressure operations. In this present work, three types of fluids are considered such as water,  $\text{SiO}_2$  and  $\text{Al}_2\text{O}_3$  nano particles. Thermal properties of different volume of concentration of nano particles are calculated theoretically to run the analysis. CATIA software is used to create the model and analysis have been performed in solid works flow simulation software. From the CFD results, overall heat transfer, effectiveness and friction factor are calculated and compared with respect to the velocity.

**Key Words:** Water,  $\text{SiO}_2$ ,  $\text{Al}_2\text{O}_3$ , CATIA software, CFD

Rough surfaces are generally surface modifications that promote turbulence in the flow field, primary in single phase flows and do not increase the heat transfer surface area. Their geometric features range from random sand-grain roughness to discrete three dimensional surface protuberances.

Extended surfaces more commonly referred to as finned surfaces provide an effective heat transfer surface area enlargement. Plain fins have been used routinely in many heat exchangers. The newer developments, however have led to modified finned surfaces that also tend to improve the heat transfer coefficients by disturbing the flow field in addition to increasing the surface area.

Displaced enhancements devices are inserts that are used primarily in confined forced convection and they improve energy transport indirectly at the heat exchange surface by displacing the fluid from the heated or cooled surface of the duct with bulk fluid from the core flow.



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## Enhancement of heat transfer rate using MgO nanofluid in heat exchanger

M. Manikanta<sup>1</sup>, B. Sudhakara Rao<sup>2</sup>,

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<sup>2</sup>Assistant Professor, Sri Venkateswara College of Engineering & Technology, Etcherla

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**Abstract -**

Energy conservation, conversion, and recovery are vital thinking among people due to environmental issues. The effectively way to save energy of materials and facilities in which heat exchanger plays a significant role. Mostly in industries uses heat exchangers for enchantment of heat transfer. The common used heat transfer fluids are water, ethylene glycol and propylene glycol as base fluids in heat exchanger. Dispersion of Nano particles in a base fluid shows solution in problems such as high pressure loss, erosion of material. The thermal conductivity of the base fluid increases by adding Nano particle which in turn increases the heat transfer rate. In this paper heat exchanger performance is analyzed by adding Magnesium oxide with base fluid (a mixture of Distilled water and propylene glycol). The thermal property i.e. overall heat transfer coefficient of heat exchanger is calculated and compared with base fluid. Experiments were conducted for various volume concentration 0.1%, 0.3% and 0.5% and observed that the addition of magnesium oxide coolant with the volume fractions of 0.1-0.5% and the nanofluid flow rates of 12.5g/s-62.5g/s. They also varied the ambient air velocity and the nanofluid inlet temperatures from 1-5 m/s and 35 to 45 respectively. Their results stated that the overall heat transfer coefficient enhanced up to 104% at 0.5% volume fraction, 62.5g/s flow rate and 5 m/s ambient air velocity compared to the base fluid and 39% enhancement in pressure drop was recorded at the highest mass flow rate of 62.5g/s.

T Aseer Brabin et al. [2], conducted the experiments on an automobile radiator with ethylene glycol based Cu nanofluids. They varied the volume fraction of the nanoparticles in the range of 0-2% and observed that 3.8% of heat transfer enhancement with the dispersion 2% MgO nanopowder at the Reynolds number of 6000 and 5000 for air and coolant respectively. K. Karimullah Khan et al. [3], experimentally studied the overall heat transfer coefficient of CuO/water nanofluid in a car radiator. Their results show that the overall heat transfer coefficient increases with the volume

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## EXPERIMENTAL INVESTIGATION ON FREE CONVECTION HEAT TRANSFER AUGMENTATION USING TRANSFORMER OIL – Cuo NANO FLUID

A. Dhanunjaya rao<sup>1</sup>, M. Ravi kiran<sup>2</sup>

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\*\*\*

**Abstract** - Conventional fluids such as water, engine oil, kerosene, ethanol, and ethylene glycol have lower thermal conductivity compared to solids. Lower thermal conductivity of fluid became an obstacle to use in different applications. To overcome this obstacle, a new method such as dispersing nano sized solid particles in fluids which enhance the thermal conductivity of base fluids significantly and it is named as nano fluids. These nano fluids are succeeded in many applications whereas coming to natural convection it faces debacle. Nano fluids used to enhance the convection heat transfer but conversely by using the nano fluids deterioration occurred. Some of the researchers got enhancement but they got enhancement in lower volume fractions. The reason behind the deterioration is aggregation of nano particles leads to clogging and then to sedimentation and to find out the heat transfer applications, the thermal conductivity of heat transfer fluids plays a vital role in the development of energy-efficient heat transfer equipment.

### 1.1 Obstacles encountered to enhancement of heat transfer:

It has to be admitted that despite considerable previous research and development efforts put on heat transfer enhancement, few important improvements in cooling capabilities have been constrained because of the low thermal conductivity of conventional heat transfer fluids. However, it is well known that metals in solid form have orders of magnitude larger thermal conductivity of copper at room temperature is 700 times greater than that of water and is 3000 times greater than that of engine oil. And, the thermal

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Vol-12 Issue-01 No.01: 2022

## Configuration and Voltage Control of a Solar-Wind Hybrid Microgrid Employing STATCOM with Fuzzy Logic Controller

Ungati vasudevarao rao (Research Scholar)<sup>1</sup>, V.Vyunkunta Rao (Assistant Professor)<sup>2</sup>  
Konni. Seetharamayya (Assistant Professor)<sup>3</sup>

**SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY NH-16,  
ETCHERLA, SRIKAKULAM, (A.P)-532410**

### Abstract

The ability of wind and solar photovoltaic (PV) systems to generate electricity is heavily dependent on weather conditions. Their output fluctuates due to their intermittent nature. As a result, the requirement for energy transmission and distribution systems to compensate quickly is becoming increasingly crucial for this reason fuzzy logic controller is used to better results. The Static Synchronous Compensator (STATCOM) is a device that can be used to compensate for reactive power and reduce voltage fluctuations generated by the

design. The voltage fluctuation at the end of the bus bar is reduced by 8% when utilising a traditional PI controller, according to certification. The results of Fuzzy logic controller optimization are compared to those of a traditional controller and a GA-based PI controller, and better results are produced.

**Index Terms:** Flexible AC transmission systems (FACTS); Genetic Algorithm; PV-Wind hybrid system; Static synchronous compensator; Voltage control.

### I. INTRODUCTION

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Research Article

Optimization and Mechanical Characteristics of AA6061/Zirconia Nanocomposites Fabricated by Ultrasonic-Aided Stir Casting Method

Hindawi

Journal of Nanomaterials  
Volume 2022, Article ID 2453412, 15 pages  
<https://doi.org/10.1155/2022/2453412>

Amel Gacem,<sup>1</sup> Moamen S. Refat,<sup>2</sup> H. Elhosiny Ali,<sup>3,4,5</sup> S. C. V. Ramana Murty Naidu,<sup>6</sup> B. Beemarani,<sup>7</sup> Pranjali Deole,<sup>8</sup> S. Sandeep Kumar,<sup>9</sup> S. Rama,<sup>10</sup> Amnah Mohammed Alsuhailbani,<sup>11</sup> and Abdi Diriba<sup>12</sup>

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<sup>11</sup>Department of Physics, Riyadh 11671, Saudi Arabia  
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Modeling of Load Frequency Cor X W Effect of Friction Stir Welding on X +

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Research Article

Effect of Friction Stir Welding on the Mechanical and Microstructural Behaviour of AA7075 Aluminium Alloy

C. R. Mahesha<sup>1</sup>, R. Suprabha<sup>2</sup>, Nellore Manoj Kumar<sup>3</sup>, Koushik Kosanam<sup>3</sup>, Harishchander Anandaram<sup>4</sup>, S. C. V. Ramana Murty Naidu<sup>5</sup>, M. Kalyan Chakravarthi<sup>6</sup> and Venkatesan Govindarajan<sup>7</sup>

<sup>1</sup> Department of Industrial Engineering and Management, Dr. Ambedkar Institute of Technology, Bangalore 560056, India  
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<sup>3</sup> Department of Manufacturing Systems Engineering & Management, California State University, 18111 Nordhoff St, Northridge, CA 91330, USA  
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<sup>6</sup> School of Engineering, Andhra Pradesh 532001, India  
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Received 21 June 2022; Accepted 25 August 2022; Published 10 September 2022

Academic Editor: Pudhupalayam Muthukutti Gopal

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In this research work, an attempt was made to weld AA7075 aluminium alloy using the friction stir welding (FSW) technique. The experimental runs were designed using the Taguchi L16 orthogonal array and focus was laid on varying tilt angle, tool rotation speed, tool feed rate, and axial load, whereas weld quality was accessed in terms of tensile strength and microhardness. The microstructure was examined using optical microscope. The results of the experiment show that the tensile strength of the welds decreased the microhardness of the welds. The microstructure of the welds showed that the weld should be subjected to higher tool torque conditions. A tool tilt, the weld pressure, and the lower pressure could not be enough to prevent volumetric defects. The reduced

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ISSN: 2278-4632  
Vol-12 Issue-01 No.01: 2022

**Grid-Connected Hybrid Microgrids Using Modified UIPC for Power Flow Control  
of Interconnected AC-DC Microgrids Using ANN**

Annepu Appala Raju (Research Scholar)<sup>1</sup>, Konni. Seetharamayya (Assistant Professor)<sup>2</sup>  
V.Vykunta Rao (Assistant Professor)<sup>3</sup>


**SRI VENKATESWAR A COLLEGE OF ENGINEERING AND TECHNOLOGY NH-16,  
ETCHERLA, SRIKAKULAM, (A.P)-532410**

**Abstract**

This research proposes a new method for power flow regulation of interconnected AC-DC microgrids in grid-connected hybrid microgrids based on a modified unified interphase power controller (UIPC). The examined system is a standard grid-connected hybrid microgrid with one AC microgrid and one DC microgrid. These microgrids are linked together using a modified UIPC rather than parallel-connected power converters. The typical UIPC structure, which requires three power converters in each phase, is adjusted as the first contribution of this study, such that power exchange control across AC-DC microgrids is implemented with a lesser number of power converters. One power converter in each phase, referred to as a line power converter (LPC), and a power converter that regulates the DC bus voltage, referred to as a bus power converter (BPC), are included in the redesigned structure.

The AC microgrid is linked to the main grid by LPCs, which include DC buses that can function

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Volume 69, Part 3, 2022, Pages 1038-1042


## Analyzing emission characteristics of bio-fuel at varying mass fraction of nanoparticles

S. Arul Selvan<sup>a</sup> , S. Jyothi<sup>b</sup>, M. Saravanan<sup>a</sup>, S.C.V. Ramana Murty Naidu<sup>c</sup>, Pramod B. Magade<sup>d</sup>, Ajay Singh Yadav<sup>e</sup>

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Virtual Ally: Campus Navigation System using Tableau 2 / 9 100%

 International Journal of  
Information Technology & Computer Engineering

ISSN 2347-3657  
Volume 11, Issue 1, Jan 2023

## Virtual Ally: A Tableau-Based Campus Navigation System

S S R M Raju Paidi, Kondala Hemalatha, Basava Kusuma Kumari, Peddinti Sateesh

**Abstract:-** A huge influx of freshmen is accepted annually by the institution. Despite the presence of floor maps, finding one's way about the campus and locating various administrative buildings, departments, libraries, and cafeterias may be quite a challenge. Because of this, it is not easy for a newbie to reach the necessary location in a timely manner. When it comes to finding specific places and the fastest way to go from one place to another on campus, a map-based program like Virtual Ally is invaluable. Consequently, no one on campus will be as confused or irritated. The primary goal of this system is to design a prototype for an app that can be used on smartphones to navigate the university campus. Tableau and Android Studio are used in the development of the suggested system. The system maps each spot using the tableau sketching tool and utilizes coordinates derived by studying map pictures to find each region.

**KEYWORDS**  
A smart campus, indoor navigation, Tableau, and a mapping positioning system are all terms that describe this campus navigation system.

**INTRODUCTION**

Navigating entails precisely identifying the user's position and then displaying instructions to lead them in practical ways to reach their goal. The way. To help students find their way around campus, "Virtual Ally" A new system called tableau for UCoE has been created. It lets users find certain spots on campus and shows them the environment around those regions.

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Int. J. Mech. Eng. Res. & Tech 2023

International Journal of Mechanical Engineering Research and Technology

ISSN 2454 – 535X www.ijmert.com  
Vol. 15 Issue. 3, July 2023

### Assessing the steadiness and dependability of a GIS-integrated broadband current array sensing system

Anem Apparao, Koyyana Pravcen, Padapana Usha Rani, Baratam Murali

#### ABSTRACT

By keeping an eye on things like power frequency overvoltage, relative dielectric loss, and partial discharge, a broadband current array sensing system may help gas insulated switchgear identify defects even more accurately and prevent equipment problems. While designing a defect observer and calculating the system stability criteria under b∞ conditions, the dynamic model of the system is examined and used to derive the system state equation. Using cloud models, we confirm the system's stability under varying packet loss rates and propose a strategy based on electromagnetic compatibility to keep packet loss rates below 50%.

**Keywords:** gas insulated switchgear, current sensing, stability, reliability, system control

#### Introduction

infrastructure [2-4]. The Broadband Current Array Sensing System (BCASS) measures the current at

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Available online 1 June 2023

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## Effective utilization of biodiesel blends with nano additives on diesel engine towards eco-sustainability

S. Premnath <sup>a</sup>, C. Selvamani <sup>b</sup>  ✉, Raj Kumar Yadav <sup>c</sup>, Jagdish Prasad Ahirwar <sup>d</sup>,  
S.C.V Ramana Murty Naidu <sup>e</sup>  ✉, Balaji Boopathi <sup>f</sup>  ✉, Potnuru Sivaram <sup>g</sup>  ✉


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

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Volume 92, Part 1, 2023, Pages 240-248

# Analysis of aerodynamic characteristics of car diffuser for dissimilar diffuser angles on Sedan's using CFD


S.C.V. Ramana Murty Naidu<sup>a</sup>, V.M. Madhavan<sup>b</sup>, Sandeep Chinta<sup>c</sup>, R. Manikandan<sup>d</sup>, A. Premkumar<sup>e</sup>, R. Girimurugan<sup>f</sup>  

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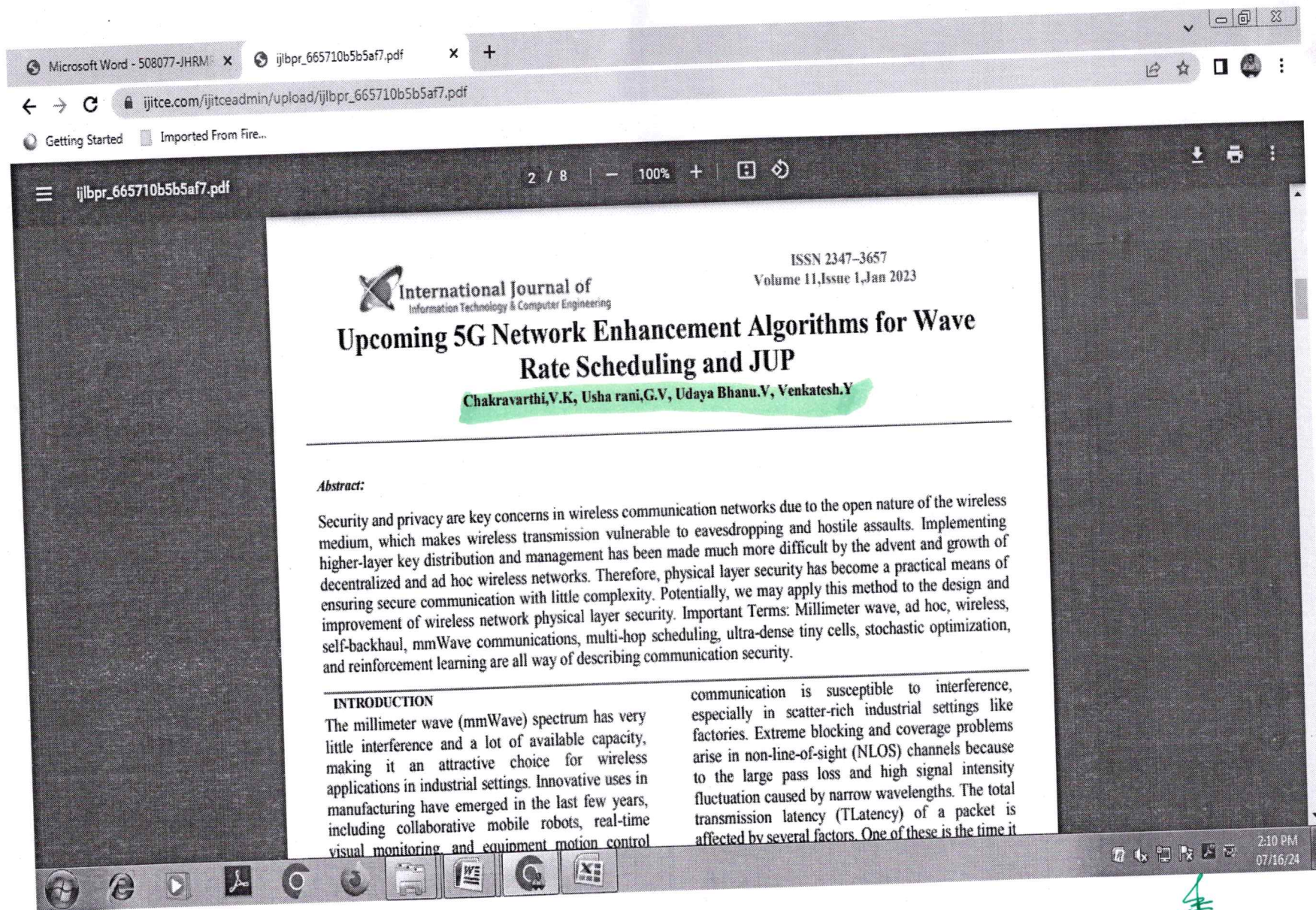
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International Journal of Mechanical Engineering Research and Technology

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Vol. 15 Issue. 1, Jan 2023

## Optimizing PEEK impact strength through multi-objective FDM 3D printing

**Dr.B.Hari Sankar, I. Mohana Rao, Vavilapalli Prabhakar, Palaka Nagaraju**  
Department of Mechanical Engineering

**ABSTRACT**  
Because of their adaptability and low cost, thermoplastic materials including polylactic acid, nylon, polyethylene terephthalate glycol, acrylonitrile butadiene styrene, polylactic acid, and thermoplastic polyurethane are preferred in fused deposition modeling 3D printing. Unfortunately, compatibility issues with current equipment and procedures caused by high grade thermoplastic material have prevented its widespread use in FDM 3D printing. Making the necessary changes to 3D printing gear, software, and settings to accommodate new materials may be a time-consuming and costly process. The unique processing conditions and parameters required by each material make quality control and consistency maintenance a challenging task. Because of this variation, 3D printing cannot produce consistently high-quality parts. In addition, specific considerations are needed for optimizing the FDM settings for high-grade polymers (HGP) such as polyether ether ketone (PEEK) because of the unique properties of these materials. As a result of the printing process's large temperature gradient and uneven heat distribution, residual stresses and deformations might occur, diminishing the material's quality and, more specifically, its impact strength. Using only three process parameters—build orientation, in-fill density, and chamber temperature—this paper improves a commercially available 3D printing PEEK. Additionally, the study endeavors to develop a model that can foretell the 3D printed object's Impact Strength (IS), a crucial factor to consider. In this article, we look for evidence of a relationship between the impact strength, printing time, and material use, which are all response variables or output variables. There seems to be a strong link between them, as shown by the results. The subsequent IS of 86.5 kJ/m<sup>2</sup>, print time of 89 minutes, and

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