List of papers published in Peer-Reviewed Journals in the Year 2021

NAME OF THE DEPARTMENT- ***INDUSTRIAL AND PRODUCTION ENGINEERING*** YEAR: 2021

Sr. No.	Name of The Teacher	Title of The Paper/Review Article	Name of The Journal/Publisher	Applicable Indexing (WOS /SCOPUS)	Impact Factor, If Any	Specify Whether First/ Corresponding/Other Author
1.	Dr. Atul Kumar Sahu	Modeling the predictive values of ultimate tensile strength in welded joint by response surface methodology	Materials Today: Proceedings 21 (2020)	Scopus	1.24	Yes First and corresponding author
2.	Dr. Ganesh Prasad Shukla	"A four-stage maturity model of green manufacturing orientation with an illustrative case study",	Sustainable Production and Consumption/Elsevier	WPS/SCOPUS	5.34	Yes First and corresponding author
3.	Mr. Leeladhar Rajput	Structural analyses of nano-stitched composite laminates based on FSDT using finite element approach	Mechanics of Materials	WOS	3.266	First Author and corresponding author
4.	Mr. Anurag Singh	Efficient solar drying techniques: a review	Environmental Science and Pollution Research	WOS	4.223	Second Author

Materials Today: Proceedings xxx (xxxx) xxx

Contents lists available at ScienceDirect

Materials Today: Proceedings

journal homepage: www.elsevier.com/locate/matpr

Modeling the predictive values of ultimate tensile strength in welded joint by response surface methodology

Atul Kumar Sahu [a,*], Nitin Kumar Sahu [a], Anoop Kumar Sahu [b], Mridul Singh Rajput [c], Harendra Kumar Narang [c]

[a] Department of Industrial & Production Engineering, School of Studies in Engineering & Technology, Guru Ghasidas Vishwavidyalaya, Bilaspur 495009, Chhattisgarh, India
[b] Department of Mechanical Engineering, School of Studies in Engineering & Technology, Guru Ghasidas Vishwavidyalaya, Bilaspur 495009, Chhattisgarh, India
[c] Department of Mechanical Engineering, National Institute of Technology, Raipur 492010, Chhattisgarh, India

ARTICLE INFO

Article history:
Available online xxxx

Keywords:
Metal Inert Gas
Response Surface Methodology (RSM)
Process parameters
Box-Behnken design
Ultimate tensile strength
Evaluation

ABSTRACT

Strength always remains the prime requirement of any produced products, which normally explicate the capability of the products to sustain stress into it. Ultimate tensile strength is principally used to clarify the maximum values of stress, which can be resist by any product or material entity before breaking. Accordingly, study is conducted to verify the methodological way of determining the predictive values of ultimate tensile strength in welded joint. Response surface methodology is used in present study to grace decision results. In present study, the Metal Inert Gas (MIG) welding process is experimentally performed in mild steel plate specimens by considering three distinguish values of welding current, voltage and plate thickness. The objective of the study is to enroll the predictive equation to assists in deriving the elevated values of ultimate strength of the welded joint. The primary objective of present study is to demonstrate the utilization of competent structure of Response surface methodology under the dimensional arena of welding process. Here, the authors devised equation, which competently possess caliber to define the predicted values of ultimate tensile strength for the precise values of process parameter. The same assist in precisely understanding the behavior of ultimate tensile strength (dependent variable) under the influence of independent variables i.e. welding current, voltage and plate thickness. Response surface methodology is used and experiments based on Box-Behnken Design are performed in present study. The work is supported by MINITAB software for generating graphs and originating driving equation between response and process parameters. The predictive values are determined based on multiple regression equation and compared with actual experimental values to demonstrate capability and applicability.

Selection and peer-review under responsibility of the scientific committee of Material TECH 2021.

1. Introduction

The strength is always considered as a major parameter for highlighting the quality of the material or product. In present study, the authors worked in the direction of appraising ultimate tensile strength by devising the predictive modeling equations using RSM. RSM is normally a predictive modeling technique that can be used for formulating the response equation [1]. Here, the authors considered welding current, voltage and plate thickness as independent parameters and the ultimate tensile strength as a dependent parameter for generating response equations. It is found that Pai et al. [2] optimize the machining parameters and investigated the effects of these parameters on surface roughness in grinding 6061Al-SiC25P (MMCs) specimen by RSM. Aggarwal et al. [3] utilized RSM to investigate the effects of cutting speed, feed rate, depth of cut, nose radius and cutting environment in CNC turning of AISI P-20 tool steel. Philip et al. [4] used RSM to study the effects of the machining parameters such as spindle speed, feed rate & depth of cut on surface roughness of duplex stainless steel in end milling operation. Sahin and Motorcu [5] used RSM in turning of mild steel using coated carbide tools. They developed model using cutting speed, feed rate and depth of cut as input parameters. Arbizu and Perez [6] developed RSM models to determine surface quality of parts obtained through turning processes. Ozel and Karpat [7] utilized neural network modeling to predict surface roughness and tool wear of flank for varieties of cutting conditions in turning process. They developed Regression models

* Corresponding author.
E-mail address: atul85sahu@gmail.com (A.K. Sahu).

https://doi.org/10.1016/j.matpr.2021.02.798
2214-7853/
Selection and peer-review under responsibility of the scientific committee of Material TECH 2021.

Sustainable Production and Consumption 26 (2021) 971–987

Contents lists available at ScienceDirect

Sustainable Production and Consumption

journal homepage: www.elsevier.com/locate/spc

Research article

"A four-stage maturity model of green manufacturing orientation with an illustrative case study"

Ganesh Prasad Shukla*, Gajendra Kumar Adil

Shailesh J. Mehta School of Management, Indian Institute of Technology Bombay, Mumbai, 400076, India

ARTICLE INFO

Article history:
Received 10 September 2020
Revised 21 December 2020
Accepted 6 January 2021
Available online 9 January 2021

Keywords:
Green manufacturing orientation
Green manufacturing maturity stages
Green initiatives
Case study

ABSTRACT

Maturity models describe a process or an activity's characteristics at different stages, which generally evolve from an initial stage to a more advanced stage. Notably, most maturity models in green manufacturing (GM) do not clearly define and characterize the maturity stages, and are also not empirically validated. Therefore, this study considers four discrete maturity stages of GM, viz., I. compliance driven; II. eco-opportunist; III. green innovator and IV. green manufacturing evangelist, based on drivers for proactiveness towards greenness. It defines a construct "green manufacturing orientation" and develops a maturity stage model for green manufacturing orientation following a two-stage methodology. In the first stage, a conceptual model is developed by analyzing extant literature which fills an important research gap in literature. In the second stage, a case study is used to illustrate the application of this proposed conceptual model through eight key green initiatives that have been carried out. It was observed that the case firm, over a period of time moved to a higher level of GM maturity. Moreover, there was also a progressive trend in the firm's GM orientation. However, a uniform enhancement of GM orientation was not witnessed in the case.

1. Introduction

Manufacturing is an important sector in the world economy. The sector largely produces goods, and supports several industrial segments, such as retail, construction, transportation and utilities. However, manufacturing firms have been causing significant harm to the natural environment throughout different phases of their transformational journey that comprise the manufacturing cycle for goods (Chuang and Yung, 2014; Mangla et al., 2015). These in turn are associated with the extraction of raw materials, use of water and energy, air emissions in the manufacturing processes, cargo transportation, as well as various environmental impacts generated during the use of products vis a vis their random disposal by consumers (Govindan et al., 2014). A growing awareness of the threats associated with the deterioration of the natural environment has developed an added interest in tracking the negative consequences of manufacturing (Claver et al., 2007; Ormazabal et al., 2016; Yin et al., 2020). As a solution towards this problem, Green Manufacturing (GM) was introduced; it strives for renewing production processes, while establishing environment-friendly operations within the manufacturing field (Baah et al., 2020). Manufacturing firms have been trying to implement GM actions at a more fundamental level in order to comply with various environmental regulations (Bansal and Roth, 2000; Claver et al., 2007; Tsai et al., 2013). Additionally, businesses that are self-motivated to be socially responsible do tend to consider GM on their own, based on their respective awareness of environmental deterioration that has been triggered by their predecessors and/or their past activities (Angell and Klassen, 1999; Claver et al., 2007; Jabbour et al., 2014). In recent times, customers have been demanding products and services that minimize environmental impact (Abarca, 2001; Bastas and Liyanage, 2019; Fernando and Wah, 2017; Jabbour et al., 2014). Such pressures from different stakeholders have had great influence on a firm's environmental orientation (Kolk and Mauser, 2002; Gonzalez-Benito and Gonzalez-Benito, 2006; Bremmers et al., 2007; Jabbour, 2010; Sellitto et al., 2020). Extant literature has enumerated a range of possible positions that a firm can take against stakeholders' pressures as regards environmental issues, extending from the most reactive (or even unresponsive) to the most proactive stances, thereby giving rise to the notion of evolutionary maturity stage models (see for instance, Kolk and Mauser, 2002; Azzone and Noci, 1998; Jeswani et al., 2008; Jabbour et al., 2014; Ormazabal et al., 2016; Potrich et al., 2019).

* Corresponding author.
E-mail addresses: ganeshshukla@iitb.ac.in, ganeshshukla2006@gmail.com (G.P. Shukla), adil@iitb.ac.in (G.K. Adil).

https://doi.org/10.1016/j.spc.2021.01.009
2352-5509/

Mechanics of Materials 155 (2021) 103771

Contents lists available at ScienceDirect

Mechanics of Materials

journal homepage: www.elsevier.com/locate/mechmat

Structural analyses of nano-stitched composite laminates based on FSDT using finite element approach

Leeladhar Rajput [a,*], Akash Shrivastava [b]

[a] Department of Industrial & Production Engineering, School of Studies Engineering & Technology, Guru Ghasidas University, Bilaspur, C.G., India
[b] Department of Mechanical Engineering, School of Studies Engineering & Technology, Guru Ghasidas University, Bilaspur, C.G., India

ARTICLE INFO

Keywords:
Composite laminate
FSDT
Nano-stitching
Finite element method
CNT-Stitching
Carbon nanotube (CNT)
Micromechanics
Delamination
Static analysis

ABSTRACT

Here, the numerical analyses of nano-stitched graphite-epoxy laminated composite are presented. A micro-mechanical model is used to obtain the effective elastic properties of the nano-stitched layers by considering a very thin layer of polymer nanocomposite. The mechanical and structural characteristics are examined for thin and thick plates using the first-order shear deformation theory (FSDT) and a finite element analysis. Governing equilibrium equations and constitutive equations have been presented to investigate the out-of-plane shear stresses and in-plane normal stresses in the laminated plates. Further, transverse bending deflection and normal stresses are determined for different sets of composite laminates. Comparative studies of CNT stitched and unstitched laminated plates have been carried out for sinusoidal loading and different boundary conditions. . Results show a good agreement between present and available analytical results. The evaluation indicates that there is a significant reduction in normal and transverse stress components with the use of only 5% of vertically aligned carbon nanotubes (CNT) at the interface of the conventional laminated plates.

1. Introduction

Laminated composite structures are used in many applications due to high strength to weight ratio as compared to conventional materials. But, laminated composite plates are prone to damage due to delamination under static or dynamic load (O'Brien et al., 2008). Delamination in composite plates are caused by transverse shear stress. Therefore, complete stress analysis is necessary to understand and predict the failure behaviour of composite structure. Many nano-engineered composite structures have been developed to enhance the mechanical characteristics of the graphite-epoxy laminated composite structure. Vertically aligned carbon nanotubes (CNTs) have also been used as a stitching member to reinforce the two laminae of the graphite-epoxy laminate composite plate.

The carbon nanotube, invented in 1991 (S. Iijima, 1991) has mechanical properties greater than other fibers. It is widely used in many aerospace engineering due to high stiffness, as calculated by Treacy et al. (1996). In Shen and Li (2004), the effective properties of CNT have been calculated by assuming it as a transversely isotropic material. In Hassanzadeh-Aghdam and Ansari (2019), Kulkarni et al. (2010), and Kundalwal and Ray (2012); (2014), CNT was modeled as a transverse isotropic solid for micromechanical analysis. Using atomic simulation, the Young's modulus for CNT was found to be 5 TPa, which is five times greater than that of diamond (Srivastava et al., 2003). In Odegard et al. (2003) and Song and Youn (2006), modeling techniques have been presented to obtain elastic properties of aligned CNT stitched composites. Recently, Oskouie et al. (2019) have presented a micromechanics-based approach for effective mechanical properties of CNT/CF polymer hybrid nanocomposites. A multi-procedure micromechanics approach based on the Mori-Tanaka model (Hasanzadeh et al., 2019) is proposed to evaluate the effective properties of piezoelectric hybrid composites containing carbon nanotubes.

The CNT-based stitching can be synthesized by the prepreg and infusion method (García et al., 2007). The nano-stitched composite consists of graphite fiber, spurr polymer, and aligned CNT fiber perpendicular to the laminae interfaces to strengthen the inter-lamination properties of the laminates (Ajayan and Tour, 2007). Nano-stitched composite considered in present work, has CNTs of 8 nm mean outer diameter (Wang et al., 2007) and are equally spaced by an average value of 20 nm at the ply juncture, which gives a typical distribution of aligned CNT. Here the effect of 5% CNT is studied and furthermore the percentage variation of CNT can be carried out to optimize the stress analysis. The CNT volume fraction and interphase

* Corresponding author.
E-mail addresses: leeladhar.rajput@ggu.ac.in (L. Rajput), shri.aka1990@gmail.com (A. Shrivastava).

https://doi.org/10.1016/j.mechmat.2021.103771
Received 18 April 2020; Received in revised form 13 January 2021; Accepted 14 January 2021
Available online 5 February 2021

Environmental Science and Pollution Research
https://doi.org/10.1007/s11356-021-15792-4

GREEN ENERGY FOR ENVIRONMENTAL SUSTAINABILITY

Efficient solar drying techniques: a review

Prashant Kumar Jangde [1] · Anurag Singh [2] · Thottipalayam Vellingri Arjunan [1]

Received: 30 April 2021 / Accepted: 29 July 2021

Abstract

In the absence of effective drying techniques, a lot of food gets wasted as there is a lack of post-harvest processes. In India, most of the agricultural produces like paddy, maize, wheat, corn, oil seeds, pulses, chillies, etc. require a temperature range of 50–80 °C for effective drying. Hence, in these conditions, solar drying techniques seem to be the most economical; also, it is safe and eco-friendly. Various types of solar dryers are used across India and worldwide; these are direct solar dryer, green house dryer and indirect solar dryer. Nowadays, indirect type solar dryers are most commonly used because of their several advantages over direct solar dryers. In case of indirect type solar dryers, the products to be dried are kept inside a separate compartment known as drying chamber. Hot air is obtained from the solar collectors either by direct heating method or by using a secondary heating medium and then supplied to the drying chamber for heating of the products. This paper presents a detailed review of various innovative designs of indirect type solar dryers and compares the performance of different types of dryer configuration in terms of collector efficiency, dryer efficiency, drying time and maximum air temperature. Also, the effects of various operating parameters on the thermal performance of such dryers have been discussed.

Keywords Solar drying · Indirect solar drying · Drying techniques · Agriculture product drying

Introduction

The quest for developing efficient methods to harness the maximum potential of renewable energy sources is the need of the hour. Decades ago, the drawbacks and shortcomings of non-renewable energy sources have been identified and acknowledged worldwide, and since then researchers across the world are looking for potential alternates. Among the several options available, solar energy has been recognized as the best alternate energy source due to several advantageous reasons, such as it is clean, cheap and available in abundance without any environmental impacts. Solar energy is now being used in various applications that can be divided into two major groups according to the method of energy collection and its use; those are (i) solar thermal energy where solar radiation energy is collected in the form of heat using collectors, and later on it is used for several applications such as water heating, space heating, cooling and ventilation, cooking, process heat, water treatment, etc. and (ii) solar electricity generation where solar energy is directly converted into electricity by means of a photovoltaic cell. One of the many applications of former group where solar thermal energy is used as a heat source is drying of various agriculture and industrial products.

Sun drying is still the most common method being used to preserve and store the agricultural products in many countries around the world. As adequate food preservation methods are not available, farmers have to spread their products to be dried in thin layers on open grounds or on mats where they are exposed to sun and wind. Mahesh et al. (2012) reported that significant losses may occur during natural sun drying because of various influences, such as rodents, birds, insects, rain, storms and microorganisms. The quality of the dried products by the open sun drying may also be degraded

Responsible Editor: Philippe Garrigues

✉ Prashant Kumar Jangde
jangde5@gmail.com

Anurag Singh
anuragsingh2907@gmail.com

Thottipalayam Vellingri Arjunan
arjun_nivi@yahoo.com

[1] Department of Mechanical Engineering, School of Studies Engineering and Technology, Guru Ghasidas Vishwavidyalaya, Bilaspur, C.G., India

[2] Department of Industrial and Production Engineering, School of Studies Engineering and Technology, Guru Ghasidas Vishwavidyalaya, Bilaspur, C.G., India

Published online: 09 August 2021