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Number of research papers per teachers in the journals notified on UGC website in A.Y. 2020-21

S. No	Name of the author/s	Department of the teacher	Title of the paper	ISSN number	Link to article/paper/abstract of the article	Is it listed in UGC Care list/Scopus/Web of Science/other, mention
1	R.RAMBABU	AME	COMPATIBILITY OF A DIESEL ENGINE FOR JATROPHA AND TAMARIND SEED OIL MIXED BIOFUEL AND ITS IMPACT ON ENVIRONMENT	2451-2456	https://issuu.com/tjprc/docs/2-67-1594106736-228ijmperdjun2020228	UGC
2	Dr.V. Praveen	EEE	Two Stage Solar photovoltaic energy conversion system using Adaptive Neuro-Fuzzy interface system MPPT	1371-1378	https://sersc.org/journals/index.php/IJAST/article/view/20848	UGC
3	K.MUSALAIAH	MECH	SCHEDULING OF JOBS ON MACHINES USING NON TRADITIONAL OPTIMIZATION METHODS	*2320-2882*	www.ijcrt.org/volume9/issue5/5may2021	UGC
4	G Narasimhulu	EEE	Two Stage Solar photovoltaic energy conversion system using Adaptive Neuro-Fuzzy interface system MPPT	1371-1378	https://sersc.org/journals/index.php/IJAST/article/view/20848	UGC
5	Dr.G. NAGAMALLESWARA RAO	MECH	FABRICATION AND STUDY OF THE MECHANICAL PROPERTIES OF AA7129 ALLOY REINFORCED WITH B4C&TiC	2456-6470	www.ijtsrd.com/papers/ijtsrd31626	UGC

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6	Dr.G. NAGAMALLESWARA RAO	MECH	TAGUCHI METHOD FOR MULTI -OBJECTIVE OPTIMIZATION OF CUTTING PARAMETERS IN TURNING OPERATIONS AA7129 ALLOY REINFORCED WITH B4C & TiC	2581-4621	www.doi:10.46647/ijetms.2021.v05i03.001	UGC
7	N Balakrishna	EEE	Two Stage Solar photovoltaic energy conversion system using Adaptive Neuro-Fuzzy interface system MPPT	1371-1378	https://sersc.org/journals/index.php/IJAST/article/view/20848	UGC
8	Dr.G. NAGAMALLESWARA RAO	MECH	REVIEW ON OPTIMIZATION OF METAL MATRIX COMPOSITE CONNECTING ROD	2582-4376	DOI:10.47392/irjash.2020.71	UGC
9	Dr.G. NAGAMALLESWARA RAO	MECH	prediction process parameters using regression and artificial neural network on abrassive air jet machining in alumina reinforced zerconia composites	2394-5125	DOI:10.35940/ijrte.F9778.038620	UGC
10	Naresh Kumar Katakam	EEE	Two Stage Solar photovoltaic energy conversion system using Adaptive Neuro-Fuzzy interface system MPPT	1371-1378	https://sersc.org/journals/index.php/IJAST/article/view/20848	UGC

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COMPATIBILITY OF A DIESEL ENGINE FOR JATROPHA AND TAMARIND SEED OIL MIXED BIOFUEL AND ITS IMPACT ON ENVIRONMENT

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ABSTRACT

Experimental investigation runs by a diesel engine fuelled by jatropha with Tamarind Seed Oil Methylester (TSOME) mixed biodiesel. The biodiesel (B10) contains 5% of jatropha, 5% tamarind seed oil, and the remaining 90% of diesel by volume. Here, noted higher Brake Thermal Efficiency (BTE) for biofuel than neat diesel by the effect enhanced combustion rate. Further, change the standard compression ratio (CR) of 17.5 to 19.5 and 21. However, higher BTE reported at CR21, followed by lower CR conditions. CO emissions showed lower for the compression ratio 21 than the other CR conditions and higher for the diesel. But, it emits higher CO2and HC emissions for the CR 21 and lower for the diesel.

KEYWORDS: Jatropha, Tamarind Seed Oil, Brake Power, Efficiency & Emission

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Original Article

1. INTRODUCTION

Energy is an essential input for a nation's scientific, engineering, communal, and financial development [1]. Once upon a time in history, wood supplied as much as 90% of our energy needs [2],[3]. Because of its efficiency and low carbon fuels, costs could be dropped globally. The current energy situation has become very skewed towards conventional fuels such as petroleum and coal, which produces resulted in the generalfinancial development of the world[6]. The poweraccessible for the cultivationprocess in the country and metropolitan areas have been produced by using fossil and stationary energy resources such as fuel oil, coal, and atomic energy and a partialamount by hydropower[7]. These foundations have a hugepersuade on our financial system and ecological aspects[8]. These have validdeliberationalso have been conveyed about for its use and convenience of abundantvervepossessions. DhanaRaju et al.,[9] performed their test concentrated on the biofuel mix with tamarind seed methyl ester (TSME) with both the increase of Dimethyl carbonate (DMC) and 1-Pentanol as oxygenated fuel added substances to evaluate the qualities of presentation, burning and emanation[10].Tests were conducted on single-chamber engines performing under different load conditions for the power of Diesel, TSME20, and TSME20 with DMC and 1-Pentanol fuel added substances are mainly used to boost the properties of biodiesel to an excess capacity due to its

International Journal of Advanced Science and Technology

Two Stage Solar Photovoltaic Energy Conversion System Using Adaptive Neuro -Fuzzy Interface System MPPT

G. Narasimhulu, Dr.V. Praveen , N. Balakrishna, Naresh Kumar Katakam

Abstract

Energy that can be obtained from photo voltaic is a natural energy source and it has main advantage of environmental sustainment, inexhaustibility. This paper presents solar energy conversion system implementing with ANFIS technique to deliver maximum power to the load at any time. ANFIS based MPPT offers the benefits of both fuzzy and neural network. The proposed ANFIS MPPT provides faster response for dynamic stability under environment changing conditions. The proposed system is executed on MATLAB Simulink and the results are checked under changing environmental conditions. The major outcomes of this model include increased power output to the grid making it easier for power transmission and reducing the distortions in the tracking maximum power.

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SCHEDULING OF JOBS ON MACHINES USING NON TRADITIONAL OPTIMIZATION METHODS

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Abstract: Scheduling plays an important role in achieving timely and cost effective production. which is becoming increasingly important in today's highly competitive manufacturing environments. Scheduling is a decision making process that is concerned with the allocation of limited resources to competing tasks (operations of jobs) over a time period with the goal of optimizing one or more objectives. This project exploits the interactions between the job scheduling on machines with an objective of minimization of make span and to study the overall feasibility of generation of optional schedules. A heuristic scheduling algorithm is developed which takes into account machine constraints and determines the starting and completion times of operations for each job by using priority rules such as Most Work Remaining (MWKR), shortest processing time (SPT) and random rules. In this work job shop scheduling problem is done for a particular type of FMS environment by means of one of the following Non Traditional Methods viz., Tabu Search Method, Simulated Annealing, Differential Evolution Method & Variable Neighbourhood Search.

Among the above, project objective issues (determining elapsed time and job idle time) is to be resolved by choosing the Tabu Search method. Tabu search is a metaheuristic algorithm which can be used for solving combinational optimization problems.

KEYWORDS - Make Span, Waiting time, Processing time, Route matrix, Generations

1. INTRODUCTION

Now a days, the manufacturing industries are experiencing many impulsive market conditions like reduced product life cycles, technological progress, extreme pressure from competitors, and increasing customer's believes on high quality products at a lower cost, high dynamic market conditions and more customer's ambitions. The product price is not a measuring tool for manufacturing performance; instead other cutthroat parameters such as flexibility, quality, and delivery are also equally important. For this reason, the manufacturers wish a type of production methods over which alterations can be seen with minimum possible time and cost to produce medium to small batches of products. So, manufacturing flexibility is the most sought after property of the modern production systems and such type of flexibility can be attained through the adaptation and implementation of FMS (Flexible manufacturing systems).[1]

The job-shop is an important scheduling theory, as it is measured to be a good demonstration of the general domain and has gained a reputation being is more difficult to evolve the combinational optimistic problems. Problems arising in the fields like scheduling assignment, vehicle routing are mostly Non polynomial (NP) hard problem. These problems need efficient results. If checking with an NP-hard problem, one may have three ways to go: one chooses to apply an enumerative method that yields an optimum solution, or apply an approximation algorithm that runs in polynomial time. Research in scheduling theory has evolved over the past four decades and has been the subject of much significant literature with techniques ranging from unrefined dispatching rules to highly effective parallel branch and bound algorithms and bottleneck based heuristics. Not surprisingly, approaches have been formulated from a diverse spectrum of researchers ranging from management scientists to production workers. However with the advent of new technologies, such as neural networks and evolutionary computation, researchers from fields such as biology, genetics and neurophysiology have also become regular contributors to scheduling theory emphasising the multidisciplinary nature of this field.

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Abstract

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Keywords: Adaptive neuro –fuzzy interface system (ANFIS), MPPT, Grid, Power quality.

1. INTRODUCTION

Power generation from sun light (solar energy) increases from recent years with the increase of efficiency of solar system and the improvements made by the manufacturing of photovoltaic panel [1]. Energy that can be obtained from photo voltaic is a natural energy source and it has main advantage of environmental sustainment, inexhaustibility and it is distributed over the earth. Generation from distribution system increases with the development, renewable energy from PV system becomes a great demand of energy source.

With the increase of photovoltaic system installation, the system needs a suitable control algorithm to extract maximum amount of power. Hence there are many researches are developing MPPT algorithm to improve the solar energy conversion system. MPPT algorithms will increase the solar energy conversion system efficiency and minimizes the ripple content .The reduction of ripple in current or voltage is the main goal of researches [2].

Here in our paper we propose a method where current and voltage are used as inputs parameters to ANFIS system that determines the power delivered to the grid and makes lower cost in design [11]. This paper was organized in 4 sections presenting the section 1 with introduction, Section 2 presents equalent model of a PV cell, boost converter simulink model and section 3 consist system modeling with ANFIS technique. Simulation results for proposed system are provided in section 4.

2. PHOTOVOLTAIC SYSTEM

Photovoltaic cell is made of semiconducting materials similar to those are used in electronic component devices. Photovoltaic cells works whenever the sunlight is absorbed by the cell, the electrons loose there atoms and allowing the electrons to pass through the semiconducting material in order to generate electricity.

Hence Photovoltaic (PV) effect is conversion of sun light(Photons) into electricity (Voltage).

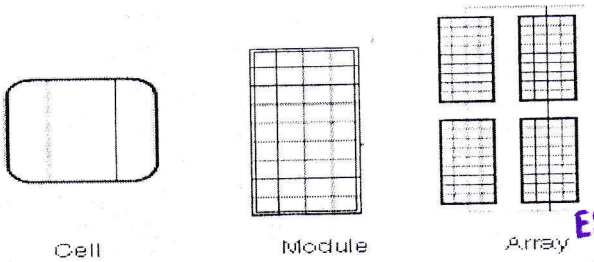

Fig1: Basicsolar cells, modules, and array module

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Fabrication and Study of the Mechanical Properties of AA7129 Alloy Reinforced with B4C &TiC

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ABSTRACT

In the present work Al7129 metal matrix reinforced with Titanium carbide (TiC) and Boron carbide (B4C) powder is fabricated through stir casting route. Metal matrix composites were manufactured by altering percent weight fraction 5 to 25 wt. % in steps of 5%weight with average particle size. The importance of composites as engineering materials is considered by the fact that out of over 1600 engineering materials available in the market today consists of 200 composites. These composites initially to many experiments and the wear behavior of these composites were traversed to a maximum extent and were reported by number of research scholars for the past 25 years. In the present study based on the literature review, the effect Carbide on Stir Cast Aluminum Metal Matrix Composites is discussed. aluminum hybrid composites are a new generation of metal matrix composites that have the potentials of satisfying the demands of advanced engineering applications such as in used in the aircraft manufacturing sector, aerospace, automobile, space, underwater and transportation applications. This is mainly due to upgraded mechanical and tribological properties like stiff, strong, abrasion and impact resistant and is not easily corroded. This paper attempts to review the different combination and configuration of reinforcing materials used in processing of hybrid aluminum matrix composites and how it effects the mechanical, corrosion and wear performance of the materials.

KEYWORDS: *AA7129, B4C &TiC, Fabrication, Mechanical Properties*

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1. INTRODUCTION

In various fields and applications like aerospace, defence, automobiles and other important structural applications, ceramic reinforced metal matrix composites have been used extensively asthese material possesses important properties i.e. high strength to weight ratio making them very important material in these fields [1]. These materials are customized materials, which consistof matrix phase reinforced with ceramic reinforcements havingvery hard and brittle nature. Common reinforcement used areBoron Carbide (B4C), Aluminium Oxide (Al2O3), Silicon Carbide (SiC), Titanium Carbide (TiC) to fabricate metal matrix composites (MMC) materials [2]. MMC's possesses improved physical andmechanical properties achieved through combined effect of softalloy matrix and hard, brittle reinforcement. Depending upon type of reinforcement used and its volume fraction in metal matrix, aluminiummetal matrix composites (AMC's) are able to achieve largervalues of strength, rigidity, resistance to wear, fatigue, resistance to corrosion and creep.

Narender Panwar et al. [3] compared stir casting with Compo Casting, Squeeze casting, Friction stir processing, Spray casting etc. processes highlighting sir casting as simple and cost effective technique providing a fairly uniform distribution of particles in metal matrix to manufacture metal matrix composites. Rajesh Kumar et al. [4] used aluminium as matrix and Silicon Carbide (SiC), Graphite, Aluminium Oxide (Al2O3) as reinforcements and discussed about stir casting method, working parameters involved in it by varying proportion of reinforcement and showed that processing parameters, type of reinforcement and its fraction plays important role in imparting physical properties to metal matrix composites. Uppada Rama et al. [5] reinforced Aluminium 7075 matrix with fly ash in constant weight percentage and Silicon Carbide (SiC) in distinct weight percentages and reported uniform presence and diffusion of fly ash and silicon carbide particles throughout the matrix through microstructure studies whereas the grain size reinforcement is observed in EBSD analysis. Balaji et al. [6] in their studies regarding microstructure of composites, uniformly distributed. Ritesh Raj et al. [7] fabricated Al6061-B4Ccomposites containing 5–20 wt% of B4C particles in increment of5% by weight using stir casting technique. Microstructural characterization showed that the distribution of Boron Carbide (B4C) particulatesin the matrix was almost uniform and at some locations minute agglomeration and accumulation of particles were observed. Bhaskar Chandra et al. [8] in their study reported betterment of mechanical properties such as tensile strength and hardness with increase of weight

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Taguchi Method for Multi-Objective Optimization of Cutting Parameters in Turning Operations AA7129 Alloy Reinforced with B_4C & TiC

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Abstract. **This paper will discuss parametric optimization of the turning process using the Taguchi method in order to improve the quality of manufactured goods, as well as engineering design development for studying variation Turning of Al7129 metal matrix reinforced with Titanium carbide (TiC) and Boron carbide (B4C) powder. Metal Matrix Composite with Carbide tool for carrying out experiment to optimize material removal rate and surface roughness.**
There are three machining parameters i.e., spindle speed, feed rate and depth of cut. Different experiments are done by varying one parameter and keeping other two fixed so that optimised value of each parameter can be obtained. In this project dry turning of Al7129 as a work piece and carbide insert tool. The range of cutting parameters are cutting speed (180, 350 and 500 m/min), feed rate (25, 80 and 125 mm/rev), depth of cut (0.2, 0.6 and 1 mm). Taguchi orthogonal array is designed with three levels of turning parameters with the help of software Minitab version 16. Taguchi method stresses the importance of studying the response variation using the signal to noise (S/N) ratio, resulting in minimization of quality characteristic variation due to uncontrolled parameters. It is predicted that Taguchi method is a good method for optimization of various machining parameters as it reduces number of experiments. A confirmatory test confirms the results, which indicate the optimum values of the input factors.

***Keywords*—Optimization, Depth of Cut, Feed rate, Spindle Speed, Taguchi Orthogonal Array**

1. INTRODUCTION

Turning is a major machining process that includes metal cutting as well as the removal of metal chips to produce a finished product with the desired shape, size, and surface roughness. Engineers must overcome obstacles in order to obtain optimal parameters for desired output using available sources.

Taguchi's method describes how to reduce variation in order to improve quality through offline or online quality control. Offline quality control helps to improve process quality, whereas online quality control helps to maintain conformance to the original or intended design. The primary goal of Taguchi's design is to ensure that the product performs well even in adverse conditions.

It contributes to the product's durability. The Taguchi method is used in a very short period of time and with minimal effort. As a result, Taguchi's method is being used in a variety of industries to improve process quality in the manufacturing sector.

Surface roughness and cutting force are both critical parameters in the machining process. Cutting force is required for power machining calculations. Cutting forces have an impact on dimensional accuracy, work-piece deformation, and chip formation.

In industries, components with a specific surface roughness are always required based on the needs of the customer. This can be accomplished through the optimization process.

1.1. Single Point Cutting Tool

Single point cutting tools have one principal cutting edge which is mainly used for cutting. These tools are used for turning, boring, planning etc. used in machines like lathe, boring and shaping machines. Single point cutting tools contain following parts: - shank (this is the main body of the tool), flank (which is adjacent below the cutting edge), face (the surface upon which chip slides), nose radius (it is the point where cutting edge intersects with side cutting edge.

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With the increase of photovoltaic system installation, the system needs a suitable control algorithm to extract maximum amount of power. Hence there are many researches are developing MPPT algorithm to improve the solar energy conversion system. MPPT algorithms will increase the solar energy conversion system efficiency and minimizes the ripple content .The reduction of ripple in current or voltage is the main goal of researches [2].

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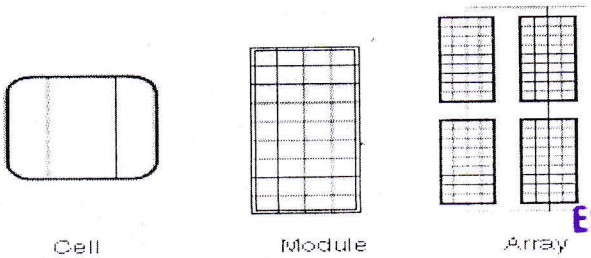

Fig1: Basicsolar cells, modules, and array module

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Review on Optimization of Metal Matrix Composite Connecting Rod

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Abstract

Every vehicle runs on internal combustion engine and used at least one connecting rod in automobile field. More number of compressive and tensile forces is acting on the connecting rod due to fuel consumption so that failure can occur. To overcome this problem, carbon steel connecting rod is replaced by aluminium matrix composites due to good characteristics like better thermal conductivity, good heat transfer rate, lighter in weight, great strength, high stiffer and suitable for I.C. engine. In this investigation, a review has been attempted to find the better composite material and optimization of connecting rod in order to reduce the weight, displacement, strain, and stress by increasing the strength or by maintaining the strength. Also this review paper guides towards proper selection of reinforcement which has to be added to composite materials by considering economical and feasible manufacturing process in designing and production. Generally stir casting process is used for fabricating composites that are used in making connecting rods.

Keywords: Connecting rods, better composite material, mechanical properties, stir casting process.

1. Introduction

Practically connecting rods are used as intermediate link between piston and crankshaft in all varieties of automobile internal combustion engines to convert linear motion into rotational. Another function of connecting rod is transferring lubrication oil from crank pin to piston pin. It is subjected to cyclic tensile and compressive loads as highly stressed component. Generally the material used for connecting rod is ferrous material (example: carbon steel). Now in day the light weight materials (titanium and aluminium alloys or composites) are used due to desired mechanical properties.

Connecting rod should be lighter and consume less fuel and at the same time they should provide comfort and safety to passenger that unfortunately leads to increase the weight of the vehicle. This tendency in automobile field causes the optimization and implementation of new composite materials which are light in weight and meet desirable requirements.

Connecting rods are available in various sections like I-section, rectangular, circular, tubular or H-section. Generally I-section is preferred for high speed engines which provide the maximum rigidity with minimum weight and circular section is used for low speed engines. Its strength and stiffness can be increased by changing its section or by changing some parameters of connecting rod. By changing the material of the connecting rod weight and cost can also be reduced. These are widely used in variety of engines such as, in-line engines, V-engine, opposed cylinder engines, radial engines and oppose-piston engines

It is subjected to various complex loads due to gas pressure & the inertia forces of the reciprocating parts. The stresses induced into the connecting rod

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PREDICTION PROCESS PARAMETERS USING REGRESSION AND ARTIFICIAL NEURAL NETWORK ON ABRASIVE AIR JET MACHINING IN ALUMINA REINFORCED ZERCONIA COMPOSITES

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ABSTRACT: Alumina reinforced zerconia ceramic composite materials are the good mechanical and electrical properties In this research work alumina as the base material and zerconia has the reinforcement material 99.99% pure white colour 300 nm particle size of alumina powder used and 99.99% pure 400nm particle size of powder was used by adding the zerconia powder into alumina powder to increase the mechanical and electrical properties and surface finish of the specimens addition of reinforcing material based on weight basis in this sample composite containing different concentration of zercinium applied to aluminium oxide are 15 grams, 30 grams and 45 grams i.e 5% wt, 10%wt and 15% wt respectively, Preparation of ceramic composite material by using powder metallurgy sintering technique. In this work reviewed that various results of experiments have been conducted based on L27 Orthogonal array by changing the pressure, abrasive flow rate, standoff distance and specimen type and conducted experiment on micro abrasive air jet machine Responses are Material Removing Rate and Surface Roughness and also predict the responses and check the experimental and prediction values are good agreement or not. To predict the responses by Regression analysis and ANN model Experimental date were used for training and testing the network and also compare Variance, MSE AND MAPE.

KEYWORDS: n-al_2o_3,n-Zro_2, MAAJM,SIC, DOE, Regression, ANN

I. INTRODUCTION

Ceramics is one of the most ancient industries going back thousands of years Ceramics is an inorganic non metallic solid made up of powders these materials low weight because used in space industries, ceramics materials are high strength materials used in cutting purpose also used in refractory materials, thermal and electrical insulating materials. Ceramics are manufactured by many techniques such as stir casting, coating and powder metallurgy sintering method. In this research work to prepared ceramics materials using powder metallurgy sintering technique and powders are taken 99.99% pure alumina white colour and 300nm particle size as base metal and zerconia pure white colour 400nm size powder particles as reinforcement so prepare alumina reinforced zerconia ceramic composite materials with different weight proportions of the reinforcement materials as shown in table 1. Zro_2 reinforce in alumina to improve mechanical and electrical properties [1, 3&5]. Alumina powder is a alpha structures and zerconia has three structures say initially monoclinic, and heated up to 1100^0c monoclinic structure convert into tetragonal and further heated up to 1500^0c tetragonal phase turned into monoclinic phase this [2,7]. My previous paper explains preparation method of ceramic materials using sintering method. First prepared ceramic powder i.e al_20_3 and zro_2 with required proportions, and properly mixing both powders using vibratory ball milling method after that mixing powder poured into required size and shape of the die and compact the powder within the dia applied 15kN load in 120sec.after that green piece is remove from the die this green piece is sintered at 1500^0c in 5 hours in box furnace and cooled 5 hours with in furnace finally we got the required size and shape of the alumina reinforced zerconia ceramic composite specimen.

Micro abrasive air jet machine is one of the advanced machining technique works on mechanical energy based where high velocity of micro abrasive SIC particles are utilized to remove unwanted material on work piece by impact erosion here there is no direct contact between the work piece and tool so no friction is induce between them[8]. The abrasive jet obtained by accelerating fine abrasive particles in highly pressurised gas or carrier gas. Small diameters of nozzle is fitted at end of the pipe for converting pressure energy into velocity energy and also

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Two Stage Solar Photovoltaic Energy Conversion System Using Adaptive Neuro -Fuzzy Interface System MPPT

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Abstract

Energy that can be obtained from photo voltaic is a natural energy source and it has main advantage of environmental sustainment, inexhaustibility. This paper presents solar energy conversion system implementing with ANFIS technique to deliver maximum power to the load at any time. ANFIS based MPPT offers the benefits of both fuzzy and neural network. The proposed ANFIS MPPT provides faster response for dynamic stability under environment changing conditions. The proposed system is executed on MATLAB Simulink and the results are checked under changing environmental conditions. The major outcomes of this model include increased power output to the grid making it easier for power transmission and reducing the distortions in the tracking maximum power.

Keywords: Adaptive neuro –fuzzy interface system (ANFIS), MPPT, Grid, Power quality.

1. INTRODUCTION

Power generation from sun light (solar energy) increases from recent years with the increase of efficiency of solar system and the improvements made by the manufacturing of photovoltaic panel [1]. Energy that can be obtained from photo voltaic is a natural energy source and it has main advantage of environmental sustainment, inexhaustibility and it is distributed over the earth. Generation from distribution system increases with the development, renewable energy from PV system becomes a great demand of energy source.

With the increase of photovoltaic system installation, the system needs a suitable control algorithm to extract maximum amount of power. Hence there are many researches are developing MPPT algorithm to improve the solar energy conversion system. MPPT algorithms will increase the solar energy conversion system efficiency and minimizes the ripple content .The reduction of ripple in current or voltage is the main goal of researches [2].

Here in our paper we propose a method where current and voltage are used as inputs parameters to ANFIS system that determines the power delivered to the grid and makes lower cost in design [11]. This paper was organized in 4 sections presenting the section 1 with introduction, Section 2 presents equalent model of a PV cell, boost converter simulink model and section 3 consist system modeling with ANFIS technique. Simulation results for proposed system are provided in section 4.

2. PHOTOVOLTAIC SYSTEM

Photovoltaic cell is made of semiconducting materials similar to those are used in electronic component devices. Photovoltaic cells works whenever the sunlight is absorbed by the cell, the electrons loose there atoms and allowing the electrons to pass through the semiconducting material in order to generate electricity.

Hence Photovoltaic (PV) effect is conversion of sun light(Photons) into electricity (Voltage).

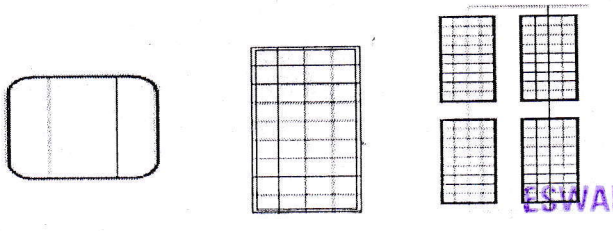

Fig1: Basicsolar cells, modules, and array module

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