ICT-PEP 2022 - International Conference on Technology and Policy in Energy and Electric Power: Advanced Technology for Transitioning to Sustainable Energy and Modern Power Systems, Proceedings • Pages 261 - 264 • 2022 • 4th International Conference on Technology and Policy in Energy and Electric Power, ICT-PEP 2022 • Jakarta • 18 October 2022through 20 October 2022 • Code 185683

Document type
Conference Paper

Source type
Conference Proceedings

ISBN
979-835031027-6

DOI
10.1109/ICT-PEP57242.2022.9988905

View more

Improved Design Skirt Board and Analysis to Reduce Build Up Dust: Case Study at Rembang Power Plant

Sunarno, Andi Desi[a] ; Haryadi, Gunawan Dwi[b] ; Rozi, Khoiri[b] ; Saprudin, Ferdiand Rosi[a]

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Full text options Export

Abstract

Author keywords

Indexed keywords

SciVal Topics

Metrics

Funding details

Abstract

The problem related to coal transportation is the dust generated that flies in the environment which has the potential to endanger the health of employees and also the surrounding equipment. Transfer chute becomes a focusing area whereas coal collides on the chute wall and next conveyor which causes dust to form. Performing a simulation, using tool CFD Analysis , of coal flow analysis and air velocity flow on the skirt board so that an analysis of the formation of coal dust can be calculated, both of existing design and modified design . Improvement design by change the geometry in the length and height of the skirt board , then simulated CFD using parameter's simulation according to the existing design . The results of the simulation analysis show that the material flow velocity in the

ICT-PEP 2022

18-20 October
Jakarta, Indonesia

International Conference on Technology and Policy in Energy and Electric Power

Proceedings

ADVANCED TECHNOLOGY FOR TRANSITIONING TO SUSTAINABLE ENERGY AND MODERN POWER SYSTEMS

ISBN : 979-8-3503-1027-6
IEEE Catalog Number : CFP22Y28-ART
IEEE Conference Number : #57242

2022 International Conference on Technology and Policy in Energy and Electric Power (ICT-PEP) | 979-8-3503-1027-6/22/$31.00 ©2022 IEEE | DOI: 10.1109/ICT-PEP57242.2022.9988917

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Table of Content

Technical Paper

2022 International Conference on Technology and Policy in Energy and Electric Power (ICT-PEP) | 979-8-3503-1027-6/22/$31.00 ©2022 IEEE | DOI: 10.1109/ICT-PEP57242.2022.9988942

Improved Design Skirt Board and Analysis to Reduce Build Up Dust: Case Study at Rembang Power Plant

Publisher: IEEE

Andi Desi Sunarno ; Gunawan Dwi Haryadi ; Khoiri Rozi ; Ferdiand Rosi Saprudin **All Authors**

Abstract: The problem related to coal transportation is the dust generated that flies in the environment which has the potential to endanger the health of employees and also the su... **View more**

Metadata

Abstract:
The problem related to coal transportation is the dust generated that flies in the environment which has the potential to endanger the health of employees and also the surrounding equipment. Transfer chute becomes a focusing area whereas coal collides on the chute wall and next conveyor which causes dust to form. Performing a simulation, using tool CFD Analysis, of coal flow analysis and air velocity flow on the skirt board so that an analysis of the formation of coal dust can be calculated, both of existing design and modified design. Improvement design by change the geometry in the length and height of the skirt board, then simulated CFD using parameter's simulation according to the existing design. The results of the simulation analysis show that the material flow velocity in the existing design is 9.75 m/s, the dust formed is calculated at 39.81 ton s / h o u r. While the simulation on the new design obtained a material flow velocity of 5.88 m/s, dust formed 11.24 ton s / h our. Dust reduction of the existing skirt board design compared to the new design by 72%.

Published in: 2022 International Conference on Technology and Policy in Energy and Electric Power (ICT-PEP)

Date of Conference: 18-20 October 2022

Date Added to IEEE *Xplore*: 29 December 2022

ISBN Information:

INSPEC Accession Number: 22474507

DOI: 10.1109/ICT-PEP57242.2022.9988905

Publisher: IEEE

Conference Location: Jakarta, Indonesia

▸ **Funding Agency:**

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Contents

Dust particles affect the power generation efficiency seriously to consider [1]. Transfer chute as explained by Swinderman, R. Tod, et al [2], is part of the coal transportation system that functions to connect one conveyor to another. Coal collisions on the transfer chute walls and the conveyor subsequently become one of the causes of dust formation. Sign of dust Formation Reading the transfer chute mounted on the conveyor structure is the skirt board. Installed after loading chute which aims to form the profile of the coal pile and stabilize the coal pile to be able to match the belt speed. Another function is, to reduce spills and coal dust out of the conveyor system.

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Decentralized PV Distributed Generation Integrated with Blockchain Technology: A Case Study in Lagos

Publisher: IEEE

Abigail Oyekola ; Tek Tjing Lie ; Adam Taylor **All Authors**

Abstract: The paper presents an investigation on energy trading through the secured blockchain energy-trading platform used by Nigerians. This is achieved by modelling and simulati... **View more**

Metadata

Abstract:
The paper presents an investigation on energy trading through the secured blockchain energy-trading platform used by Nigerians. This is achieved by modelling and simulating a decentralized distributed solar photovoltaic (PV) generation network in the Lagos State of Nigeria that adopts blockchain technology as the energy-trading platform. The MATLAB/Simulink software was used to model and simulate a section of the Nigerian energy network, where PV distributed generation (DG) systems were installed in decentralized locations. Subsequently, the Python software was used to create an algorithm illustrating how the secured blockchain energy-trading platform should function. Then, the RETScreen Expert software was used to conduct the financial sensitivity and risk analyses of implementing this project in the Nigerian energy industry. The simulation study results showed that implementing a decentralized distributed PV generation network into the Nigeria energy system could improve the reliability and efficiency of energy generation and supply during different seasons of the year. It was also found that the blockchain energy-trading platform could serve as a source of income for some people.

Published in: 2022 International Conference on Technology and Policy in Energy and Electric Power (ICT-PEP)

Date of Conference: 18-20 October 2022

INSPEC Accession Number: 22474487

Date Added to IEEE *Xplore*: 29 December 2022

DOI: 10.1109/ICT-PEP57242.2022.9988786

ISBN Information:

Publisher: IEEE

Conference Location: Jakarta, Indonesia

Funding Agency:

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Contents

In the agricultural sector of rural Nigeria, farmers produce energy by either growing corn to make ethanol or by converting the wind to electricity for easy access, rather than relying on an ineffective electricity grid for energy and power [1]. Presently in Nigeria, petroleum and dry natural gas have an estimated energy consumption of 81.9% when compared with renewable energy (RE), which supplies below 18.1% [2] [3]. The energy consumption level has increased from less than 400MWh in 1979 to 1900MWh in 2007, with a projection of approximately 300,000MWh by 2030 [4].

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Keywords

Metrics

Performance Comparison of SSSC and TCSC Devices on Load Frequency Control of Interconnected Power System with Geothermal Power Plant Integration

Publisher: IEEE

Ch.Naga Sai Kalyan ; B. Srikanth Goud ; M. Kiran Kumar ; B. Nagi Reddy ; G. Sambasiva Rao ; Mohit Bajaj All Authors

Abstract: In this paper, the efficacy of flexible alternating current transmission (FACTS) devices such as static synchronous series compensator (SSSC) and Thyristor controller ser... **View more**

Metadata

Abstract:
In this paper, the efficacy of flexible alternating current transmission (FACTS) devices such as static synchronous series compensator (SSSC) and Thyristor controller series compensator (TCSC) in maintaining the stability of interconnected power system (IPS) is presented. Initially, fractional-order (FO) type PID (FOPID) optimized with water cycle algorithm (WCA) is suggested as the secondary regulator. Multi-area realistic hydro-thermal (MARHT) system with the integration of a geothermal power plant (GTPP) in only area-1 is taken out for investigation. Analysis has been accomplished by laying a step load perturbation of 10% on area-1. However, the supremacy of FOPID has been demonstrated with PID and FOPI. Further, the devices of SSSC and TCSC are placed in conjunction with the tie-line for performance enhancement. Simulation results reveal the sovereignty of TCSC in perturbed conditions and battery energy storage (BES) devices are incorporated in both areas to attain improvement in system dynamical behaviour.

Published in: 2022 International Conference on Technology and Policy in Energy and Electric Power (ICT-PEP)

Date of Conference: 18-20 October 2022

INSPEC Accession Number: 22474488

Date Added to IEEE *Xplore*: 29 December 2022

DOI: 10.1109/ICT-PEP57242.2022.9988824

ISBN Information:

Publisher: IEEE

Conference Location: Jakarta, Indonesia

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Contents

Monitoring and regulation of widespread complex interconnected power system (IPS) in real-time is always a difficult task. The encouragement of integrating non-conventional generation sources for electric generation to the IPS has become more complex. Thus sophisticated regulatory mechanisms are necessitated to be employed to ensure system stability and reliability. It is well known that load on an IPS network will vary continuously and the generation must match the varying load demand to overcome the frequency fluctuations. The fluctuations in control area frequency arise with the real power mismatch (RPM) [1]. RPM is nothing but the difference between real power demand and generation. Frequency fluctuation is having a direct analogy with RPM. Hence, the frequency will be regulated by regulating the RPM in real-time.

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Figures

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Keywords

Metrics

Speed Control of Separately Excited DC Motor Using NARMA-L2 Controller

Publisher: IEEE

Basharat Ullah ; Shahid Hussain ; Muhammad Yousuf ; Faisal Khan ; Sumeet Khalid ; Siddique Akbar ; Ali Muhammad **All Authors**

Abstract: An Intelligent Neural Network (NN) based nonlinear Autoregressive-moving average (NARMA-L2) Controller is developed for speed control of separately excited D.C. Motor by ... **View more**

Metadata

Abstract:
An Intelligent Neural Network (NN) based nonlinear Autoregressive-moving average (NARMA-L2) Controller is developed for speed control of separately excited D.C. Motor by performing the features of Artificial Neural Networks (ANN). The aim of the proposed approach is to improve tracking performance of separately excited D.C. motor as compared to the conventional (PI) control approach. Performance Comparison of SEDM for NARMA-L2 controller and the conventional PI controller is also discussed. The entire speed control mechanism for SEDM is modelled by using the MATLAB 8.0 toolbox. The intelligent NARMA-L2 controller is operated in two steps: - the first, the variations in external loads is performed to check the speed control performance of NARMA-L2. The second, the controller is operated at various reference speed. Simulation results shows the effectiveness, advantages and good performance of the NARMA-L2 which is described through the comparison of conventional PI controller and NARMA-L2 controller. Excellent results added to the simplicity of the drive system, makes the ANN based NARMA-L2 controller strategy very suitable for a wide range of applications such as industries, paper mills etc.

Published in: 2022 International Conference on Technology and Policy in Energy and Electric Power (ICT-PEP)

Date of Conference: 18-20 October 2022

INSPEC Accession Number: 22474538

Date Added to IEEE *Xplore*: 29 December 2022

DOI: 10.1109/ICT-PEP57242.2022.9988795

ISBN Information:

Publisher: IEEE

Conference Location: Jakarta, Indonesia

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Contents

Industrial sector demands for electrical drives having high performance characteristics is enhancing now a days. The employment of variable speed applications in industrial sector are progressively increased. Hence, it is required to make high flexible and high-performance electrical drives. Motor drive system with high performance has specific characteristics such as good load regulating reaction and dynamic speed command. Electric drives are characterized in two types as: DC drives and AC drives. DC drives has wide range of applications as compare to AC drives such as adjustable speed control, good speed regulation and frequent start of reversing and breaking [1]. Some significant applications of DC drives are traction, hoists, mine winders, printing presses, rolling mills paper mills, machine tools, excavators, textile mills, and cranes [2]. DC motors has wider use in control of variable speed system and position control applications. DC motors has good performances in speed control for slowing down and speeding up. Supply in DC motor is directly connected to the motor field and hence, an exact voltage control is achieved that is required torque and speed control. DC drives has the importance of backbone in industrial applications because of its advantages such as flexible, reliable, low cost, simplicity etc. DC motors are commonly taken as flexible speed motors and developed a wider option range for this purpose [3].

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Predictive Bearing Maintenance Based on Transfer Learning with Preprocessing and Machine Learning Models Analysis

Publisher: IEEE

Pornnapat Amornsrivarakul ; Phatham Loahavilai **All Authors**

Abstract: In energy and power systems, the bearing is a crucial part of machineries such as generators and motors. The analysis of preprocessing methods and machine learning models... **View more**

Metadata

Abstract:
In energy and power systems, the bearing is a crucial part of machineries such as generators and motors. The analysis of preprocessing methods and machine learning models is presented through validating bearing conditions classification. Two types of bearing (drive end and fan end) conditions are obtained from Case Western Reserve University Bearing Data Center, in which the drive end condition is used to train a basic model. The corresponding model is then used to evaluate the fan end condition (namely transfer learning). The features for machine learning are generated from a series of preprocessing: pre-normalization, envelope, skewness, kurtosis, root mean square, standard deviation, Fourier transform, DC removal, post-normalization, and frequency-domain features extractions. Repeatable preprocessing and machine learning algorithms are explored. Numerical preprocessing methods for time-domain and frequency-domain feature extractions are suggested. The model could predict faults from different locations using data from only a single location.

Published in: 2022 International Conference on Technology and Policy in Energy and Electric Power (ICT-PEP)

Date of Conference: 18-20 October 2022

Date Added to IEEE *Xplore*: 29 December 2022

ISBN Information:

INSPEC Accession Number: 22474482

DOI: 10.1109/ICT-PEP57242.2022.9988804

Publisher: IEEE

Conference Location: Jakarta, Indonesia

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Contents

Bearing is a crucial equipment to lessen friction between moving parts in rotating machinery such as motor and generator which drops power consumption. There are four components making up bearing consisting of: ball, cage, inner race, and outer race. However, bearing might not work efficiently or end their lifetime earlier than usual if there is an unpredictable defect occurring on its components. Failures of bearing could create generators downtime, which can lead to power outage, and create a significant economic loss. For example, the United States of America lost $44 billion in 2015 due to interruption of electrical power [1]. To save time, energy, and money, bearing predictive maintenance is a promising choice. The bearing parts were illustrated in Fig. 1.

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Figures

References

Keywords

Metrics

Impact Analysis of DoS Attack at Vulnerable Point with the Exchange of Frequency Containment Reserves Control in MIDC System

Publisher: IEEE

Umar Fitra Ramadhan ; Adji Prastiantono ; Junsu Park ; Donghwi Kim ; Minhan Yoon **All Authors**

Abstract: The inevitable change of Renewable energy source (RES) penetration led to network instability, especially in isolated systems. Reserve operation balancing arrangements th... **View more**

Metadata

Abstract:
The inevitable change of Renewable energy source (RES) penetration led to network instability, especially in isolated systems. Reserve operation balancing arrangements through high voltage direct current (HVDC) systems become a viable option to increase the flexibility of renewable energy deployment and transfer capacity. As a result, HVDC systems become fundamental roles in overall network system stability. However, the reserves balancing arrangements through the HVDC system are vulnerable to information and communication technologies (ICT). Thus, the cyber-physical security of the HVDC system between the two regions needs to be explored. In this article, we discussed the new integration of several HVDC lines which consisted of multiple two-terminal HVDC as known as a multi-infeed HVDC (MIDC) system security. Moreover, an MIDC system could suffer from several potential cyber-attacks, resulting in mismatches of power imbalances for both regions. This paper discusses the impact of novel optimal strategies that the attacker could launch a Denial of Service (DoS) attack to corrupt system stability in the MIDC system.

Published in: 2022 International Conference on Technology and Policy in Energy and Electric Power (ICT-PEP)

Date of Conference: 18-20 October 2022

INSPEC Accession Number: 22474519

Date Added to IEEE *Xplore*: 29 December 2022

DOI: 10.1109/ICT-PEP57242.2022.9988783

ISBN Information:

Publisher: IEEE

Conference Location: Jakarta, Indonesia

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In order to accomplish a Paris agreement goal, The Korean government targeting a new goal of renewable energy sources (RES) penetration through the updated Nationally Determined Contribution (NDC) i.e., 30-35% in 2040 [1]. Nowadays, HVDC systems with reserve balancing arrangements have been used to increase the renewable energy flexibility in each region and transfer-capacity flexibility for both regions. Our recent work in [2] proposed an evaluation study of HVDC link with several balancing arrangement concepts in the MIDC system. The main constraint of the MIDC system consists of three characteristics, e.g., a different power system network size, the difference in HVDC interconnection capacity and type. As a result, without the correct reserves, balancing arrangement might lead to network constraints. The analysis of cyber threat modeling has been increasing in the deployment of HVDC technologies. According to [3], each HVDC type comprises three controller types, e.g., internal, external, and remote control. However, balancing reserves arrangement with the MIDC system used remote control. The aim of remote control in the MIDC system is to maintain the value of each HVDC set point, which is collected from real-time measurement data. The reserves balancing arrangement, especially the exchange of frequency containment reserve (E-FCR), high dependence on supervisory control and data acquisition (SCADA), also wide-area measurements, protection, and control (WAMPAC) platforms.

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Figures

References

Citations

Keywords