SINERGI
Universitas Mercu Buana
http://publikasi.mercubuana.ac.id/index.php/sinergi

COVER LETTER

Dedik Romahadi
Universitas Mercu Buana
dedik.romahadi@mercubuana.ac.id
081291412973

27 Maret 2023

Dear,
We wish to submit an original research article entitled “Intelligent system design for identification of unbalance and misalignment using Fuzzy Logic methods” for consideration by SINERGI.

We confirm that this work is original and has not been published elsewhere, nor is it currently under consideration for publication elsewhere.

In this paper, we report on / show that:

Topic	:	Intelligent system design for identification of unbalance and misalignment using Fuzzy Logic methods
Brief Background	:	To avoid unplanned downtime, monitoring the current state of the machine is essential. For this reason, vibration analysis systems and devices are currently being developed. When all of the machine's energy can be used to produce work, the machine is considered perfect. However, no machine is perfect because some of the energy it contains is lost in the form of other forms of energy, such as vibration [1]–[3]. Tools are needed to detect and analyze the vibrations generated by modern motors because they operate at high speeds and many of the vibrations generated are high frequency. To determine the location of the problem in the machine based on visible features in the vibration, each damaged component causes vibrations that are different from each other. Excessive vibration is the result of damaged shafts, bearings, gears, loose connections, inadequate lubrication and imbalance of rotating machine parts. Vibrations in the engine require special attention, as they can cause various defects and damage to the engine parts [4]–[7]. The first technique to assess the condition of an engine is vibration analysis. Research on unbalance damage in engines is discussed by Ágoston [8]. In his journal titled analysis of mechanical structural vibration in rotating machines to predict damage due to unbalanced conditions of

		the rotor shaft system, he states that the previous method of detecting engine damage is predictive maintenance, a maintenance method based on the condition of the equipment being inspected. The trick is that the operator must go into the field to check the condition of the machine by touching it directly. This method is less reliable because it requires downtime and therefore requires much more time and cost. The industry can benefit from intelligent maintenance systems by maximizing equipment uptime and determining its remaining useful life [9], [10]. To help diagnose vibration in a plant, an expert system is needed that can serve as a resource to non-experts in making decisions about a problem. An expert system is a commonly used computer-based system that is currently being developed with the main goal of transferring the knowledge and skills of an expert into a computer-based system [11]–[15]. An expert system is an intelligent computer program that uses knowledge and inference techniques to solve problems that are so difficult that they must be solved by an expert [16], [17]. Humans can benefit from fuzzy logic when making decisions. As more and more situations require decisions that cannot be answered with a simple yes or no, the use of fuzzy logic to support decisions becomes more necessary [18]–[21]. An example of the use of fuzzy logic in the analysis process is the development of a fuzzy logic based system for detecting and diagnosing misalignment in induction motors [22]–[24]. The author uses the fuzzy logic method to evaluate alignment errors and vibration unbalance damage in balancing and alignment demo machines, addressing the above problems and some of the advantages of this method for expert systems [25]–[27]. The MATLAB application is used to implement the whole system[28]–[30].
Research Problem	:	It is very important in maintaining engine performance in prime condition. The problem that often occurs is that the machine experiences unbalance and misalignment damage. Although reading measurement results related to unbalance and misalignment problems is easy for those who are experts, they usually still need references in determining the level and source of damage. As far as the author knows, there has been no research that discusses the use of fuzzy logic for detecting unbalance and misalignment damage on machines. It is not yet known the success of the application of fuzzy logic in diagnosing unbalance and misalignment.
Overview of Method	:	The research process begins by measuring the demo motor with the Oneprod Falcon Vibration Analyzer to obtain data in the form of total vibrations RMS, phase, and spectrum.

		The three measurement results are checked to ensure that the data does not contain errors caused by incorrect settings or damage to the equipment. These data are prepared as input to the fuzzy system. The construction of the fuzzy logic starts with the determination of the membership function in the input and output areas. The selected fuzzy logic logarithm type is Mamdani. There are three inputs with trapezoidal and generalized bell-shaped membership functions. For the output, there is a generalized bell-shaped membership function. In the next step, the fuzzy rules for each type of input and output are determined. All these activities are performed using the fuzzy toolbox system in MATLAB.
Significant finding	:	• The novel fuzzy logic model • The implementation methodology of a diagnostic system for unbalance and misalignment, employing fuzzy logic. • The development of novel software applications and the design of user interfaces.

We have no conflicts of interest to disclose.

Thank you for your consideration of this manuscript.

Sincerely,

Dedik Romahadi, ST., M.Sc

SINERGI
Universitas Mercu Buana
http://publikasi.mercubuana.ac.id/index.php/sinergi

AUTHORSHIP STATEMENT

We wish to submit an original research article entitled "*Intelligent system design for identification of unbalance and misalignment using Fuzzy Logic methods*" for consideration by SINERGI.

All persons who meet authorship criteria are listed as authors, and all authors certify that they have participated sufficiently in work to take public responsibility for the content, including participation in the concept, design, analysis, writing, or revision of the manuscript.

Author 1		
Name	:	Dedik Romahadi
Affiliation	:	Universitas Mercu Buana
Email Address	:	dedik.romahadi@mercubuana.ac.id
Author 2		
Name	:	Dafit Feriyanto, M.Eng., Ph.D
Affiliation	:	Universitas Mercu Buana
Email Address	:	Dafit.feriyanto@mercubuana.ac.id
Author 3		
Name	:	Fajar Anggara, ST., M.Eng
Affiliation	:	Universitas Mercu Buana
Email Address	:	Fajar.anggara@mercubuana.ac.id
Author 4		
Name	:	Wang Dong
Affiliation	:	Beijing Institute of Technology
Email Address	:	2573399372@qq.com

POTENTIAL REVIEWERS

Please submit 3 (three) potential reviewers (*that have not listed in SINERGI*) to speed up the review process that competent for the topic and has a good reputation in that area.

Reviewer 1		
Name	:	**Dr.Eng. Tri Agung Rohmat, B.Eng., M.Eng.** Department of Mechanical & Industrial Engineering, Faculty of Engineering, Gadjah Mada University, Jl. Grafika No. 2, Yogyakarta, 55281, Indonesia Email: triagung_rohmat@ugm.ac.id URL references:https://acadstaff.ugm.ac.id/tar1970 Research area: CFD, Combustion, Energy Conversion, Thermmodynamics
Affiliation	:	Universitas Gadjah Mada
Email Address	:	triagung_rohmat@ugm.ac.id
Reviewer 2		
Name	:	**Ir. Joko Waluyo, M.T., Ph.D** Department of Mechanical & Industrial Engineering, Faculty of Engineering, Gadjah Mada University, Jl. Grafika No. 2, Yogyakarta, 55281, Indonesia Email: jokowaluyo@ugm.ac.id URL references: https://acadstaff.ugm.ac.id/MTk2NTExMjQxOTk3MDMxMDAx Research area: Energy Conversion, Latent Heat Thermal energy storage, CFD
Affiliation	:	Universitas Gadjah Mada
Email Address	:	jokowaluyo@ugm.ac.id
Reviewer 3		
Name	:	**Dr. Muhamad Nadjib** Department of Mechanical Engineering, Universitas Muhamadiyah Yogyakarta, Indonesia URL references: Research area:Heat Transfer Enhancement, Computational Fluid Dynamics (CFD), Renewable Energy (Solar and Geothermal Energy), Energy Storage
Affiliation	:	Universiti Muhamadiya Yogyakarta
Email Address	:	nadjibar@umy.ac.id/nadjibar@gmail.com