

**LEMBAR**  
**HASIL PENILAIAN SEJAWAT SEBIDANG ATAU *PEER REVIEW***  
**KARYA ILMIAH : JURNAL ILMIAH**

Judul Jurnal Ilmiah (Artikel) : Mosque Design Strategy For Energy And Water Saving

Jumlah Penulis : 4 orang (**Bangun IR Harsritanto**, Satrio Nugroho, Favian Dewanta, Aditya Rio Prabowo)

Status Pengusul : penulis ke-1

Identitas Jurnal Ilmiah :

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- Alamat Artikel : [https://doc-pak.undip.ac.id/11217/1/Artikel\\_Mosque%20design%20strategy%20for%20energy%20and%20water%20saving.pdf](https://doc-pak.undip.ac.id/11217/1/Artikel_Mosque%20design%20strategy%20for%20energy%20and%20water%20saving.pdf)
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Reviewer 2



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 NIP. 196509131998032001  
 Unit : Arsitektur FT UNDIP

Reviewer 1



Prof. Dr. Ir. Edi Purwanto, M.T.  
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Alamat Artikel : [https://doc-pak.undip.ac.id/11217/1/Artikel\\_Mosque%20design%20strategy%20for%20energy%20and%20water%20saving.pdf](https://doc-pak.undip.ac.id/11217/1/Artikel_Mosque%20design%20strategy%20for%20energy%20and%20water%20saving.pdf)  
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Semarang,  
Reviewer 1

Prof. Dr. Ir. Edi Purwanto, M.T.  
NIP. 196312311990031022  
Unit : Arsitektur FT UNDIP

**LEMBAR  
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Semarang,  
Reviewer 2

*Atik Suprpti*

Prof. Dr. Ir. Atik Suprpti, MTA.  
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# Mosque design strategy for energy and water saving

[Harsritanto, Bangun Indrakusumo Radityo](#)<sup>a</sup> ; [Nugroho, Satrio](#)<sup>a</sup>; [Dewanta, Favian](#)<sup>b</sup>; [Prabowo, Aditya Rio](#)<sup>c</sup> [Save all to author list](#)<sup>a</sup> Architecture Department, Engineering Faculty, Universitas Diponegoro, Semarang, Indonesia<sup>b</sup> School of Electrical Engineering, Telkom University, Bandung, Indonesia<sup>c</sup> Mechanical Departement, Engineering Faculty, Universitas Sebelas Maret, Surakarta, Indonesia

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## Abstract

The built environment plays an essential role as a climate change agent. Natural resource exploitation, energy consumptions, and waste management need to be built for more environment-friendly. The Mosque is a religious building built in every space on earth since a quarter of the world population is Muslim. This situation brought an urgency for making Mosques more sustainable and friendly to the natural environment. Carrying these facts, this study aimed to suggest a design strategy for making a sustainable mosque. Through a collaboration of passive design strategy, present technologies work of literature, and a study case, this study shortlisted primary design strategies in (1) building layouts, (2) lighting strategy, (3) HVAC strategy, (4) water conservation strategy, and (5) IT strategy. By keeping these major design strategies, Mosques can be made more environmentally sustainable. Several design recommendations are suggested in each major design strategy that may bring help for making sustainable Mosque on every space on this earth. © 2021 Bangun Indrakusumo Radityo Harsritanto et al., published by De Gruyter.

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## Research Article

Bangun Indrakusumo Radityo Harsritanto\*, Satrio Nugroho, Favian Dewanta, and Aditya Rio Prabowo

# Mosque design strategy for energy and water saving

<https://doi.org/10.1515/eng-2021-0070>  
received January 30, 2021; accepted April 29, 2021

**Abstract:** The built environment plays an essential role as a climate change agent. Natural resource exploitation, energy consumptions, and waste management need to be built for more environment-friendly. The Mosque is a religious building built in every space on earth since a quarter of the world population is Muslim. This situation brought an urgency for making Mosques more sustainable and friendly to the natural environment. Carrying these facts, this study aimed to suggest a design strategy for making a sustainable mosque. Through a collaboration of passive design strategy, present technologies work of literature, and a study case, this study shortlisted primary design strategies in (1) building layouts, (2) lighting strategy, (3) HVAC strategy, (4) water conservation strategy, and (5) IT strategy. By keeping these major design strategies, Mosques can be made more environmentally sustainable. Several design recommendations are suggested in each major design strategy that may bring help for making sustainable Mosque on every space on this earth.

**Keywords:** mosque, sustainable building, innovative design, energy saving, water saving, IoT

## 1 Introduction

Mosque was derived from the Arabic term of “masjid” or “space to perform sujud” that related to meaning as

submission space [1]. Mosque as Muslim worshipping built environment was built as a space not only to do prayer (salah) but also to do many worshipping activities such as reminding Allah name (zikr), reading Al Quran, and religious education as school, etc. [2,3]. The Mosque has always become the central part of Islam culture that demanded to be supported by high-quality building or architecture artifacts [4]. The Mosque that was built by the Prophet Mohammed SAW first on Madina was delivered as a model of environmentally sustainable practices [5]. The Nabawi (prophet building) Mosque design and technology probably did not suit modern and next-generation. However, the principles of specific sustainable strategies can be adopted as a guideline and actuated on the planning and designing of the Mosques. The philosophy of the first Mosque built by the prophet, a guideline regarding space, and form design with the Islamic principles shall be followed [6].

There were several studies performed on sustainability design concentrated on the energy usage model of Mosques. Most of them show that Mosques have been found to consume an excessive huge quantity of energy [7,8]. The discussion of the modern Mosque design problem is the way to get architectural aesthetic and highly delivered to an arrogance over the context [9]. However, there still many Mosques on earth are having potentials for sustainable Mosque design [10]. The sustainable Mosque that gives information on building nowadays was considered in all aspects of built environments. The generic strategies of Mosque design can have both good and lousy sustainability effects [11].

Through studies of Mosque design, building materials, space compositions, operational supports, and micro-macro climate, architectural codes must assist the architect to apply passive designing strategies and collaborate with current developing technologies. After that, through comparing the basic or architectural and essential operational characteristics of Mosques with sustainable building codes such as Green Building Council Indonesia [12], USA’s Leadership in Energy and Environmental Design (LEED) [13], English Building Research Establishment Environmental Assessment Method (BREEAM) [14], Malaysia Green

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Favian Dewanta: School of Electrical Engineering, Telkom University, Bandung, Indonesia

Aditya Rio Prabowo: Mechanical Department, Engineering Faculty, Universitas Sebelas Maret, Surakarta, Indonesia

## Research Article

Tomasz Lipiński\* and Robert Ulewicz

# The effect of the impurities spaces on the quality of structural steel working at variable loads

<https://doi.org/10.1515/eng-2021-0024>

Received Jan 16, 2020; accepted Jul 04, 2020

**Abstract:** The quality of carbon steels working at variable loads mainly depend of microstructure, but also of impurities. The quantity and morphology of non-metallic inclusions and spaces between impurities are correlated with the content of admixtures in the alloy, while their phase composition and structure, in particular shape, dimensions and dispersion, are determined by the course of metallurgical processes. Non-metallic inclusions as impurities found in steel can affect its performance characteristics. Their impact depends not only on their quality, but also, among others, on their size and distribution in the steel volume. The literature mainly describes the results of tests on hard steels. The article discusses the results of a study investigating the effect of the number of large non-metallic inclusions (over 10  $\mu\text{m}$  in size) on the fatigue strength of structural steel during rotary bending. The study was performed on 6 heats produced in an industrial plant. Fourteen heats were produced in 140 ton electric furnaces. All heats were desulfurized and refined with argon. The experimental variants were compared in view of the tempering the research steel. The fatigue strength of steel with an impurity spaces was determined during rotary bending: the results revealed that fatigue strength is determined by the impurity spaces and tempering temperature.

**Keywords:** steel, fatigue strength, impurities, non-metallic inclusions, quality of steel

## 1 Introduction

The research conducted so far shows that the material's resistance to fatigue depends on many factors, among which the most important are its strength properties, microstruc-

tural and structural structure as well as the amount and type of stress acting on the element or sample [1].

Analyzing the problem, it should be emphasized that the intensity of the formation of micro gaps and their growth rate, as well as the level of stress causing fatigue cracking of elements are determined by the resistance encountered by the dislocations moving in the material. The tensile strength or hardness of the material can be considered a measure of this resistance [2–4].

An important role in the creation and development of fatigue crack is played by the interaction of internal microstructural stresses, caused by the presence in steel of non-metallic inclusions, with stresses arising as a result of loading the element with external forces. Internal stresses are a function of the morphology of pollution. However, the conditions for heat treatment have a significant impact on their level, by creating thermal stress at the inclusion-matrix boundary (steel microstructure) [5–8].

A number of studies were devoted to tests of steel fatigue life with impurities occurring in its structure, the authors of which show negative impacts of inclusions [9–12]. It was also confirmed that the shape of non-metallic inclusions in steel has a significant impact on fatigue life [13, 14].

On the basis of SAE4340 steel tests carried out on the device causing rotational bending of the samples, it was found that the cracks began at the place of occurrence of aluminum-manganese inclusions, provided that they were in the vicinity of the sample surface. Inclusions greater than 6  $\mu\text{m}$  were found in fatigue breakthrough foci. Hence, it was concluded that smaller inclusions do not adversely affect fatigue strength [12, 15].

A number of studies have found that [2, 16, 17]:

- the nucleation site of the cracks are 20  $\mu\text{m}$  inclusions, located on or near the surface of the sample,
- there are three variants of nucleation of cracks with non-metallic inclusions:
  - conclusion cracks,
  - formation of discontinuities between phases boundaries in complex inclusions,
  - formation of micro-gaps between the inclusions and the matrix.

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## Research Article

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# Analysis of EMG Signals during Stance and Swing Phases for Controlling Magnetorheological Brake applications

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**Abstract:** The development of ankle foot orthoses (AFO) for lower limb rehabilitation have received significant attention over the past decades. Recently, passive AFO equipped with magnetorheological brake had been developed based on ankle angle and electromyography (EMG) signals. Nonetheless, the EMG signals were categorized in stance and swing phases through visual observation as the signals are stochastic. Therefore, this study aims to classify the pattern of EMG signals during stance and swing phases. Seven-time domains features will be extracted and fed into artificial neural network (ANN) as a classifier. Two different training algorithms of ANN namely Levenberg-Marquardt (LM) and Scaled Conjugate Gradient (SCG) will be applied. As number of inputs will affect the classification performance of ANN, different number of input features will be employed. In this study, three participants were recruited and walk on the treadmills for 60 seconds by constant the speed. The ANN model was designed with 2, 10, 12, and 14 inputs features with LM and SCG training algorithms. Then, the ANN was trained ten times and the performances of each inputs features were measured using classification rate of training, testing, validation and overall. This study found that all the inputs with LM training algorithm gained more than 2% average classification rate than SCG training algorithm. On the other hand, classification accuracy of 10, 12 and 14 inputs were 5% higher than 2 inputs. It can be concluded that LM training algorithm of ANN was performed better than SCG algorithm with at least 10 inputs.

**Keywords:** EMG signals, TD features, ANN, Gait phases, MR brake

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## 1 Introduction

Stroke may cause locomotion impairment and affect human body in different ways that can lead to cause of death. According to National Stroke Association of Malaysia, approximately 40,000 of stroke cases are reported each year [1]. A syndrome known as foot drop frequently occurs unilaterally in connection with stroke. It happens due to partial or total central paralysis of the muscles on lower

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## Research Article

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# A new method for solving quadratic fractional programming problem in neutrosophic environment

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**Abstract:** In the current study, a neutrosophic quadratic fractional programming (NQFP) problem is investigated using a new method. The NQFP problem is converted into the corresponding quadratic fractional programming (QFP) problem. The QFP is formulated by using the score function and hence it is converted to the linear programming problem (LPP) using the Taylor series, which can be solved by LPP techniques or software (e.g., Lingo). Finally, an example is given for illustration.

**Keywords:** linear programming, quadratic fractional programming, neutrosophic set, trapezoidal neutrosophic numbers, Taylor series

## 1 Introduction

Fractional programming (FP) plays important roles in many applications such as economics, non-economic, and indirect applications. Many authors studied the LFP (Charnes and Cooper [1]).

Numerous authors have studied FP under uncertainty (for instance, Ammar and Khalifa [2], Effati and Pakdaman [3], Ammar and Khalifa [4], Tantawy [5], Odior [6], Pandey and Punnen [7], Dantzig [8], Mojtaba et al. [9], Gupta and

Chakraborty [10], Dempe and Ruziyeva [11], Safaei [12], and Dutta and Kumar [13]). Saha et al. [14] developed a new method by converting the LFP into a single linear programming problem (LPP) for some cases of the nominator and denominator functions. Das et al. [15] introduced a note on a method presented by Safaei [12]. Liu et al. [16] proposed a novel methodology to determine the global optimization for a class of LFP on a large scale. Tas et al. [17] introduced all definitions and concepts related to metric spaces in neutrosophic environment. There are many researchers who introduced various topics in Neutrosophic environment (Topal et al. [18] and Topal et al., [19]). Alharbi and Khalifa [20] studied LFP in fuzzy environment.

Quadratic fractional programming (QFP) problems have enormous applications in operations research literature. It can be classified on the basis of the homogeneity of the constraints and the factorability of the objective function (Sharma and Singh [21]). Khurana and Arora [22] proposed a method for solving QFP problem including homogeneous constraints. Suleiman and Nawkhass [23] recommended that a modified simplex method is superior in addressing QFP problems. In addition, they solved the problem by applying Wolfe's method. Youness et al. [24] used a two-dimensional algorithm to introduce a parametric methodology for solving non-linear FP models.

Fuzzy sets were developed first by Zadeh [25] and then further studied by Dubois and Prade [26]. Kumar and Dutta [27] investigated an application of FP to determine the solution of an inventory management problem in fuzzy environment. Gupta et al. [28] introduced a model of multiple objective QFP model with a set of quadratic constraints and a methodology based on the iterative parametric functions to obtain a set of solutions of the problem. Khalifa et al. [29] used fuzzy set theory to solve the multi-objective fractional transportation problem.

Very recently, some applications of neutrosophic sets were discussed in various fields of operations research, for instance, assignment problem (Khalifa and Kumar [30]) and complex programming (Khalifa et al. [31]).

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