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Analysis of benzene exposure considering workers characteristic in the oil and gas industry

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Abstract

Operations and processes in the oil and gas industry have hazardous chemicals. Hence the possibility of having a work accident is high. Chemicals that exist are produced by activities related to the oil and gas industry processes, one of which is benzene. Because it has a severe impact on occupational health and safety, benzene exposure must be measured. Measurements were run through risk analysis to assess Hazard Index (HI) and make predictions of benzene exposure by focusing on the characteristics of workers, which can worsen the effect of the exposure. This study elaborated on several workers' characteristics from a literature study's human factors point of view. These characteristics were smoking, age, type of task, personal protective equipment use, exposure duration, regulations, hand

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Analysis of benzene exposure considering workers characteristic in the oil and gas industry

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Abstract. Operations and processes in the oil and gas industry have hazardous chemicals. Hence the possibility of having a work accident is high. Chemicals that exist are produced by activities related to the oil and gas industry processes, one of which is benzene. Because it has a severe impact on occupational health and safety, benzene exposure must be measured. Measurements were run through risk analysis to assess Hazard Index (HI) and make predictions of benzene exposure by focusing on the characteristics of workers, which can worsen the effect of the exposure. This study elaborated on several workers' characteristics from a literature study's human factors point of view. These characteristics were smoking, age, type of task, personal protective equipment use, exposure duration, regulations, hand washing habits, length of exposure, and nutritional status. Literature study results showed that regulatory characteristics, handwashing habits, and length of exposure were worsening the benzene exposure to workers. The other factors were in between agreed and disagreed in worsening the benzene exposure. These results perform as a base study in the further benzene analysis of oil and gas end distributor.

1. Introduction

Operations and processes in the oil and gas industry have hazardous chemicals; hence the possibility of having a work accident is high. Chemical work accidents in the course of carrying out work can threaten every worker to face occupational health and safety risks caused by his work. Case studies of workers in oil refineries investigating health hazards are critical to identifying health hazards for worker safety [1].

The oil and gas industry is the primary source of volatile aromatic hydrocarbons in the environment [2]. Benzene is the primary aromatic hydrocarbon compound whose presence is produced one of them by activities related to the oil and gas industry process. Benzene is a hazardous chemical classified as a class 1 carcinogen and mutagen that can be infected by humans and animals through dermal, oral, and inhalation exposure [3]. Benzene exposure to workplace workers mainly occurs through inhalation compared to dermal and oral [4]. The average benzene exposure in humans through inhalation has been reported to be around 50 to 80% [5]. Acute exposure to benzene concentrations can also affect fatigue, dizziness, headache, drowsiness, confusion, tremors, and loss of consciousness [7] [8]. Chronic exposure can cause more serious adverse health effects, such as myeloid leukemia, myeloma,

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Mathematical model for calculating the equilibrium point of the refrigerant circuit

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Abstract. Calculating the equilibrium point of the refrigerant circuit is one of the most important processes in the air treatment industry. Knowing the evaporation and condensation temperatures serves not only to obtain information on the performance and operating point of the compressor, but also to evaluate the performance of the machine under different climatic conditions. Often, the solution of the refrigerant circuit is accomplished by empirical methods or numerical methods such as the Newton – Raphson method or the medium method. Since the iteration time with these methods is unknown at the time of the iteration start, it is very important to implement algorithms that provide convergence information or not, and which can bring the system to a solution in the shortest possible time. The implementation of such a method would pave the way for simulating the behaviour of machines in the air treatment industry as an advanced verification process for real evaluation of machine performance. In this article, experimental results and mathematical model calculations will be presented and discussed.

1. Introduction

Calculating the equilibrium point of the refrigeration circuit is a critical operation in machines containing such a circuit, especially in the air treatment industry. We can say this because we often need to control parameters such as temperature, humidity or both simultaneously.

For different application purposes the refrigeration circuit may be in different configurations. Here we mention configurations with variable gas flow regulated by inverters, circuit with more than one compressor located in parallel or cascade or refrigeration circuit where the condensing or evaporating element can be composed of more than one part. In this paper we will refer to the simplest model of the refrigeration circuit, although the following reasons apply to each model of the refrigeration circuit. [1] Below we will schematically present the refrigeration circuit that will be studied.

Shipping cost optimization on the Indonesian sea tollway due to weather

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Abstract. Indonesian sea tollway main objective is to decrease price gap between the western and eastern part of Indonesia. Although, the price gap is still felt in eastern Indonesia, that means the objectives of this program has not yet reached its optimum mainly due to operational cost. This paper is trying to optimize shipping costs by reducing the speed with slow steaming due to weather. The method called Slow Steaming was added with the aim of optimizing the speed of the ship. In total, there are three scenarios created to achieve these research objectives. The first scenario used current operational data, while the second scenario use ship speed loss due to weather, and the last scenario used ship speed loss due to weather and slow steaming method. The results showed that reducing ship speed with scenarios two and three can optimize the total shipping cost. Decreasing the shipping speed due to weather and using 10% and 12% slow steaming method can reduce between 16,35% and 18,5% of total shipping costs depend on the route. It can be concluded that scenario III has the lowest shipping cost, but with a note that with different specific conditions of slow steaming for each route.

1. Introduction

Indonesia is one of the archipelagic nations with 17,504 islands. Sea transportation is significant for archipelagic nations since this is the best way to connect between locales from East to West Indonesia and it has a major job for economic activities [1]. Indonesia faces issues regarding sea transportation identified with port availability, delivering courses, costly coordination transportation costs, uneven distribution of logistics that does not reach the remote area. These factors affect the price gap between the western and eastern parts of Indonesia, which appeared by the number of Gross Domestic Product (GDP). The Eastern district delivered under 20 percent of GDP while the Western district contributes more than 80 percent [2].

To overcome this problem the Indonesian government through the Ministry of Transportation is implementing a sea tollway concept model. The Indonesian government began implementing this program in 2015, which began with 6 routes that developed in 2016 with the same number of routes but more ports were visited, in total 31 ports and in 2017 became 16 routes with 41 ports in implementing the sea tollway program, Indonesia faces numerous difficulties. In the first place, the backload brought from East to West was deficient. Second, the price gap is still felt in eastern Indonesia even though the

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Optimization of bi-objective permutation flow shop scheduling with electricity cost consideration

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Abstract. Increasing energy demand can create undesired problems for many governments worldwide. Several policies, such as time-of-use (TOU) tariffs, have been put in place to overcome such demand. The TOU policy's objective is to reduce electrical load during peak periods by shifting the use to off-peak periods. To that end, this paper addresses the bi-objective permutation flow-shop scheduling, minimizing total weighted tardiness and electricity costs. We propose a meta-heuristic algorithm based on SPEA2 to solve the problem. We conducted numerical experiments to evaluate the efficacy of the proposed algorithm by comparing it with NSGA-II. The results show that the proposed approach was more efficient compare with NSGA-II.

1. Introduction

Climate change and global warming are primarily due to the emissions of greenhouse gases. Emissions mainly resulted from the combustion of fossil fuels for economic and household activities. Because fossils fuels have been the primary source of energy generation, more and more greenhouse carbon dioxide will be emitted as the demand for electricity increases due to economic development and population growth.

The manufacturing sector consumes a massive amount of global energy consumption. In Japan, it consumes about 45% of the total energy [1]. Therefore, many countries have imposed several regulations to enforce the manufacturing sector to adopt energy-saving initiatives. One of the policies is time-of-use (TOU) tariffs. Energy suppliers charge different prices for different usage times. The TOU policy relocates the usage from the peak (higher prices) to off-peak (lower prices) periods [2].

Moon et al. [3] initiated the adoption of TOU policy in production scheduling. They proposed a hybrid genetic algorithm (HIGA) that outperformed standard genetic algorithm (GA). A multi-objective optimization (MOO) involving ecology, economic, and environmental of a flow-shop scheduling problem was solved by using simulated annealing [4]. Fang et al. [5] studied the effects of speed of machines a single machine scheduling. Ding et al. [6] proposed a mixed-integer programming (MIP) model for an unrelated parallel machine scheduling that minimizes the cost of electricity. They solved it using the column generation technique. Kurniawan et al. [7] investigated a bi-objective job-shop scheduling for minimizing the total weighted tardiness and electricity cost. They proposed a local search framework based on the distribution of elites to balance the exploration space towards both objectives.