# Jurnal Teknik Industri

# Jurnal Keilmuan dan Aplikasi Teknik Industri

Predicting the Readiness of Indonesia Manufacturing Companies toward Industry 4.0

Sean Yonathan Tanjung, Kresnayana Yahya, Siana Halim

New Product Development Method Trends and Future Research

Muhammad Shodiq Abdul Khannan, Alva Edi Tontowi, Muhammad Kusumawan Herliansyah, Andi Sudiarso

Multi-Objective Optimization of Machining Parameters for Multi-Pass CNC Turning to Minimize Carbon Emissions, Energy, Noise and Cost

Bening Maulina Fittamami, Eko Pujiyanto, Yusuf Priyandari

Developing a Group Model Building Causal Loop Diagram to Understand Millennial Generation Trust in Twitter as Early Warning System for Natural Disaster Hilya Mudrika Arini, Nurul Lathifah, Fina Ananda

Modeling the Multi-channel Section in the Supply Chain System using the Multiserver Queue Analogy

Petrus Setya Murdapa

A Mathematical Model for Solving Distribution System Problem by Considering Odd-Even Vehicle License Plate Rule

Andika Dwi Nugraha, Winarno, Aulia Fashanah Hadining

The Unrelated Parallel Machine Scheduling with a Dependent Time Setup using Ant Colony Optimization Algorithm

Farida Pulansari, Triyono Dwi Retno M.

Genetic Algorithm with Cluster-first Route-second to Solve the Capacitated Vehicle Routing Problem with Time Windows

Karina Aginta Putri, Nur Layli Rachmawati, Mirna Lusiani, Anak Agung Ngurah Perwira Redi

Accredited by: Director General of Intellectual Property Directorate General of Research and Development No. 32a/E/KPT/2017

UNIVE	RSITAS	S KRIS	STEN P	ETRA-S	URABAYA
Jurnal Teknik Industri	Vol. 23	No. 1	Hlm. 1-82	Surabaya June 2021	ISSN 1411-2485 (print) ISSN 2087-7439 (Online)

# JURNAL TEKNIK INDUSTRI

(Jurnal Keilmuan dan Aplikasi Teknik Industri)

Volume 23, Number 1, June 2021

ISSN 1411-2485 (print) / ISSN 2087-7439 (online)

#### **Editor-in-Chief:**

#### Siana Halim

Department of Industrial Engineering, Petra Christian University, Surabaya, Indonesia, Subject area: Mathematical Modeling, Industrial Statistics (Scopus H-Index = 4).

#### **Editors:**

#### **Hui Ming Wee**

Department of Industrial and Systems Engineering, Chung Yuan Christian University, Chung-Li, Taiwan, Subject Area: Industrial Engineering (Scopus H-Index = 46).

#### Daniel Indarto Prajogo

Department of Management, Monash University, Melbourne, Australia, Subject Area: Business, Management and Accounting, Decision Sciences (Scopus H-Index = 38.

#### I Gede Agus Widyadana

Department of Industrial Engineering, Petra Christian University, Surabaya, Indonesia, Subject Area: Logistics, Optimization, Industrial Engineering (Scopus H-Index = 12).

#### Erwie Zahara

Department of Marketing and Logistics Management, St. John's University Taiwan, Taiwan, Taiwan, Subject Area: Logistics Management (Scopus H-Index = 10).

#### **Huynth Trung Luong**

Department of Industrial and Systems Engineering, Asian Institute of Technology Thailand, Bangkok, Thailand, Subject Area: Industrial Engineering (Scopus H-Index = 12).

### **Reviewers:**

#### Danny Prabowo Soetanto

Department of Entrepreneurship, Lancaster University, Lancaster, United Kingdom, Subject Area: Business, Management and Accounting, Engineering, (Scopus H-Index = 10).

#### **Anthony Halog Basco**

School of Geography, University of Queensland, Brisbane, Australia, Subject Area: Environmental Science and Engineering (Scopus H-Index = 18).

#### Indra Gunawan

University of Adelaide, Adelaide, Australia, Subject Area: Reliability Engineering (Scopus H-Index = 14).

#### Budhi Arta Surva

Victoria University of Wellington, New Zealand, Subject Area: Portfolio Optimization, Econometrics, Statistics (Scopus H-Index = 4).

#### **Markus Hartono**

Department of Industrial Engineering, University of Surabaya, Indonesia, Subject Area: Ergonomics, (Scopus H-Index = 6).

#### Takashi, Irohara

Faculty of Science and Technology, Sophia University, Tokyo, Japan, Subject Area: Decision Science (Scopus H-Index = 9).

#### Andre' Liem

Department of Product Design, Norges Teknisk-Naturvitenskapelige Universitet, Trondheim, Norway, Subject Area: Product Design (Scopus H-Index = 6).

## Hindriyanto Dwi Purnomo

Department of Information Technology, Satya Wacana Christian University, Salatiga, Indonesia, Subject Area: Optimization (Scopus H-Index = 6).

# Bernardo Nugroho Yahya

Department of Industrial and Management Engineering, Hankuk University of Foreign Studies, Seoul, South Korea, Subject Area: Industrial Engineering (Scopus H-Index = 7).

## Eka Budiarto

Swiss German University, Bumi Serpong Damai, Tangerang Selatan, Indonesia, Subject Area: Mathematical Modeling (Scopus H-Index = 3).

#### Gan Shu San

Department of Mechanical Engineering, Petra Christian University, Surabaya, Indonesia, Subject Area: Mathematical Modeling (Scopus H-Index =4).

#### Iwan Halim Sahputra

Birmingham University, Birmingham, United Kingdom, Subject Area: Material Technique, Engineering, (Scopus H-Index = 6).

#### Indriati N, Bisono

Department of Industrial Engineering, Petra Christian University, Surabaya, Indonesia, Subject Area: Experiment Design (Scopus H-index = 2).

#### Ronald Sukwadi

Department of Industrial Engineering, Universitas Katolik Indonesia Atma Jaya, Jakarta, Indonesia, Subject Area: Decision Science (Scopus H-Index = 6).

#### Yugowati, Praharsi

Politeknik Perkapalan Negeri Surabaya, Indonesia, Subject Area: Optimization (Scopus H-Index = 3).

#### Liem Fervanto

Applied Material, Sunnyvale, California, USA, Subject Area: Sig-Sigma (Scopus H-Index = 2).

#### The Jin Ai

Department of Industrial Engineering, Universitas Atma Jaya, Yogyakarta, Indonesia, Subject Area: Particle Swarm Optimization, Vehicle Routing Problem, Inventory Management, Industrial Engineering.

#### Hendy Rahardjo

Chalmers University of Technology, Chalmers, Sweden, Subject Area: Quality Management, Statistical Engineering, Healtcare, Improvement (Scopus H-Index = 14).

#### Henry Pribadi

Prasetiya Mulya Business School, Jakarta, Indonesia, Subject Area: Business Management.

#### Inggrid

Australian National University, Canberra, Australia, Subject Area: Econometrics, Economics.

#### Jani Rahardjo

Department of Industrial Engineering, Petra Christian University, Surabaya, Indonesia, Subject Area: Total Quality Management, Six-Sigma, Decision Science.

# I Nyoman Sutapa

Department of Industrial Engineering, Petra Christian University, Surabaya, Indonesia, Subject Area: Supply Chain Management, Reverse Engineering (Scopus H-Index = 1).

#### Tanti Octavia

Department of Industrial Engineering, Petra Christian University, Surabaya, Indonesia, Subject Area: Warehouse Management, Industrial Engineering (Scopus H-Index = 1).

#### Suprayogi

Department of Industrial Engineering, Bandung Institute of Technology, Indonesia, Subject Area: Transportation and Distribution, Maritime Logistic, Operation Research, Soft Computing and Algorithm Design (Scopus H-Index = 5).

# Administrative Assistant: Sumarno

#### **Editor and Administration Address:**

# Institute of Research and Community Outreach Petra Christian University

Jl. Siwalankerto 121-131, Surabaya, 60236

Phone. 031-2983139, 2983147, Fax. 031-8436418

Email: jurnal\_ti@peter.petra.ac.id; Home page:http://jurnalindustri.petra.ac.id

#### Published by:

# Institute of Research and Community Outreach

Petra Christian University

**Jurnal Teknik Industri** is a refereed journal, published twice a year, in June and December. Subscription (Incl. postage) Rp. 100.000/year (for Indonesia), US \$50/year (for abroad), and should be transferred to Resmana Lim qq Pusat Penelitian, acc no: 034-01-54451-12-1 Bank CIMB Niaga cab. Andayani, Surabaya, INDONESIA.

The Editor accepts the scientific essay about the results of the research, surveys, and review the literature that is closely related to the field of industrial engineering.

# JURNAL TEKNIK INDUSTRI

(Jurnal Keilmuan dan Aplikasi Teknik Industri)

Volume 23, Number 1, June 2021

ISSN 1411-2485 (print) / ISSN 2087-7439 (online)

# **Contents**

Industry 4.0	
Sean Yonathan Tanjung, Kresnayana Yahya, Siana Halim	1-10
New Product Development Method Trends and Future Research Muhammad Shodiq Abdul Khannan, Alva Edi Tontowi, Muhammad Kusumawan Herliansyah, Andi Sudiarso	11-24
Multi-Objective Optimization of Machining Parameters for Multi-Pass CNC Turning to Minimize Carbon Emissions, Energy, Noise and Cost Bening Maulina Fittamami, Eko Pujiyanto, Yusuf Priyandari	O <b>T</b> 0.4
Developing a Group Model Building Causal Loop Diagram to Understand Millennial Generation Trust in Twitter as Early Warning System for Natural Disaster	25-34
Hilya Mudrika Arini, Nurul Lathifah, Fina Ananda	35-46
Modeling the Multi-channel Section in the Supply Chain System using the Multiserver Queue Analogy Petrus Setya Murdapa	47-54
A Mathematical Model for Solving Distribution System Problem by Considering Odd-Even Vehicle License Plate Rule	
Andika Dwi Nugraha, Winarno, Aulia Fashanah Hadining	55-64
The Unrelated Parallel Machine Scheduling with a Dependent Time Setup using Ant Colony Optimization Algorithm	
Farida Pulansari, Triyono Dwi Retno M.	65-74
Genetic Algorithm with Cluster-first Route-second to Solve the Capacitated Vehicle Routing Problem with Time Windows	
Karina Aginta Putri, Nur Layli Rachmawati, Mirna Lusiani, Anak Agung Ngurah Perwira Redi	75-82