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28, 29 October 2014, Bandar Lampung, Indonesia

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Bandar Lampung University, Indonesia

In coorporation with :

THE UNIVERSITY OF KITAKYUSHU

3rd ICETD 2014

The Third International Conference On Engineering And Technology Development

28 -29 October2014
Bandar Lampung University (UBL)
Lampung, Indonesia

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PREFACE

The Activities of the International Conference is in line and very appropriate with the vision and mission of Bandar Lampung University (UBL) to promote training and education as well as research in these areas.

On behalf of the Second International Conference on Engineering and Technology Development (3rd ICETD 2014) organizing committee, we are very pleased with the very good response especially from the keynote speaker and from the participans. It is noteworthy to point out that about 80 technical papers were received for this conference.

The participants of the conference come from many well known universities, among others : University Kebangsaan Malaysia – Malaysia, IEEE – Indonesia, Institut Teknologi sepuluh November – Indonesia, Surya Institute – Indonesia, International Islamic University – Malaysia, STMIK Mitra Lampung – lampung, Bandung Institut of Technology – Bandung, Lecture of The Malahayati University, B2TP – BPPT Researcher – lampung, University of Kitakyushu – Japan, Gadjah Mada University – Indonesia, Universitas Malahayati – Lampung, Lampung University – lampung,

I would like to express my deepest gratitude to the International Advisory Board members, sponsor and also to all keynote speakers and all participants. I am also gratefull to all organizing committee and all of the reviewers who contribute to the high standard of the conference. Also I would like to express my deepest gratitude to the Rector of Bandar Lampung University (UBL) who give us endless support to these activities, so that the conference can be administrated on time

Bandar Lampung, 22 October 2014

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Holonic Manufacturing System: Current Development and Future Applications

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Abstract

Holonic Manufacturing Systems (HMS) provides a flexible architecture to the changes and uncertainties of the manufacturing conditions. HMS has developed to meet the needs of consumers who are adapted to the capability of the company.

This paper explains holon and holonic manufacturing system, analyzing the needs of the manufacturing system at the upcoming conditions, summarizes the current development of HMS and estimates HMS ability for dealing with the needs of a manufacturing system that will come.

1. Introduction

Problems resulting complex manufacturing systems are becoming increasingly difficult to control and predict. Manufacturing systems supposedly able to solve complex issues such as meeting the needs of the production process, the integration of the entire cast of the manufacturing system, the uncertainty of customer demand, as well as the changing needs of consumers that can not be predicted. HMS is expected to solve the problems of an increasingly complex manufacturing systems because of the many changes and uncertainties.

2. Holon and Holonic Manufacturing System

The following describes holon and holonic manufacturing system (HMS) to be used in manufacturing.

2.1 Holon

Holon is a building block manufacturing system which has the property of autonomous and cooperative. Autonomous nature of holon allows holon work independently without waiting for orders from the existing level of holons above it. Cooperative nature of holon allows holon to cooperate with other holons. Holonic concept developed by philosopher Athur Koestler to explain biological systems and social change (Botti and Giret, 2008). The latter comes from the Greece "Holos" which means a big part and suffix "on" which means a small part. Koestler observed that organisms and social life requires interaction with other entities to survive. Any organization composed of small parts and be a big part of running a particular function. Koestler exemplifies that single cell systems on living creatures will interact to form a large part of which is called the network. Holon can form organizations (holarchy) which is able to solve complex problems. In the arrangement of the holarchy, dynamically create holons and change holarchy structure.

Every holon in HMS form each community based on a common purpose. To process an order for a product, the holon form a composite called holarchy. According to Botti and Giret architecture (2008), the latter composed in PROSE (Product-Resource-Order-Staff). PROSE is a type of holon which is commonly used in manufacturing systems. These latter types are capable of responsible and capable of interacting with its environment. The basic architecture of the holon specified into three kinds, namely order holon, product holon and resource holon.

- Order holon is responsible for completing the order in accordance with the time and product specifications have been determined.
- Resource holon is a resource in the manufacturing system whose job is to run the manufacturing activity.
- Product holon is a production process information to fulfill the order.

General holon architecture has been formulated by Christensen (1994) in the research entitled "Holonic Manufacturing Systems: Initial architecture and Standards Direction" which consists of several building blocks. The building blocks are divided into two main parts: the physical processing and information processing spare parts. Physical processing is divided into two parts: the physical processing functions and physical control. Physical hardware processing is a role for manufacturing execution systems and physical control is a controller that oversees manufacturing operations such as NC, CNC, and PLC.

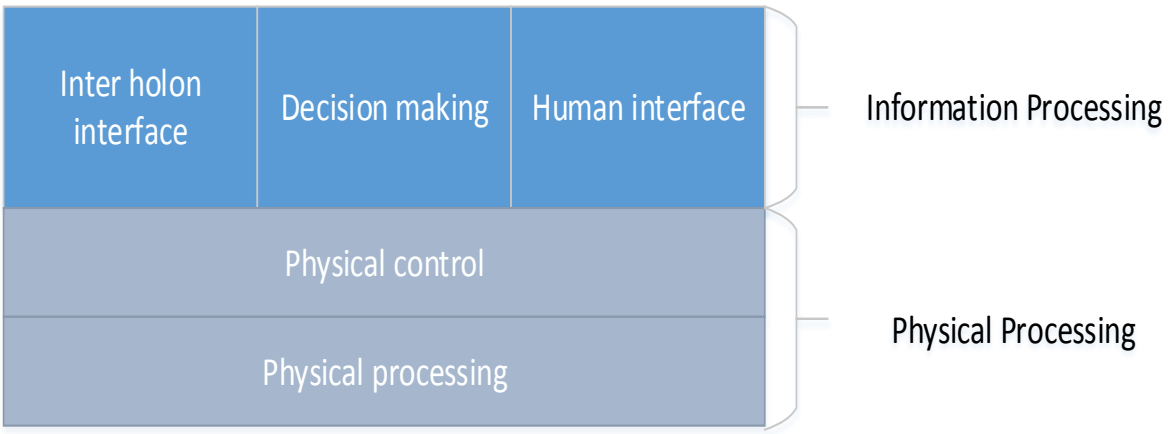

Figure **1 Architecture Holon (Botti and Giret, 2008))**

Information processing part is divided into three functions, namely, inter holon interfaces, decision making, and human interfaces. Inter holon interface serves to communicate and interact with other holon. Decision making holon serves to make the decision. Meanwhile, human interface holon serves for giving the order (input operation commands) and output commands to humans.

2.2 Holonic Manufacturing System

Holonic Manufacturing System (HMS) is based on the characteristics of the holon is capable of making their own decisions, in collaboration with other holon, and able to make decisions on complex manufacturing problems. HMS concept application in manufacturing systems is motivated by the instability of the manufacturing system of company-owned manufacturing facilities and consumer demand uncertainty (Botti & Giret, 2008). In addition, global competition is increasing, consumers want innovation and the speed at which the company is requested to create efficiency and flexibility.

Holonic Manufacturing System (HMS) is a set of holon to form a holarchy (composite) and integrate the overall manufacturing activity (Botti and Giret, 2008). HMS based holonic concept consists of three types, namely, the order holon, product holon and resource holon (Botti and Giret, 2008). Communication between the holon when depicted in the block diagram is as follows:

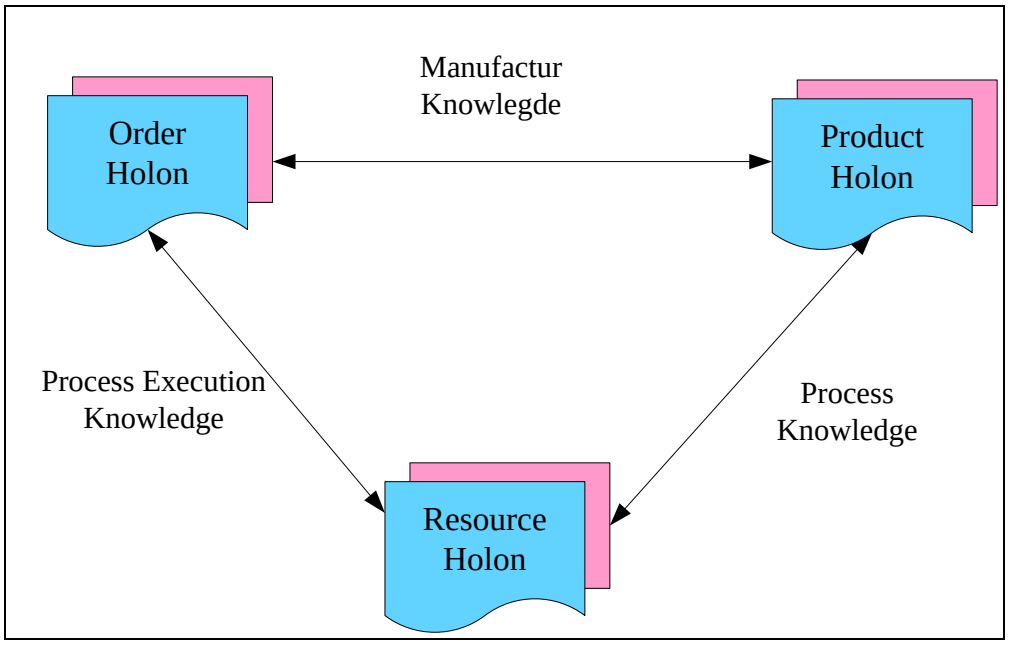

Figure 2 Holonic Manufacturing System (Botti and Giret, 2008))

HMS structure are classified based on duties and interactions of each holon. Some important properties possessed HMS is as follows

- Autonomy: the ability holon to create and execute their own plans.
- Cooperation: holon ability to form a cooperative relationship to develop and execute the plan.

Strength HMS (holarchy) is capable of forming a complex with the construction of the system resource usage efficiency, have high toughness face disruption, and can adapt in the face of environmental change.

3 Analysis the needs of the manufacturing system

Increasingly rapid pace of industrial development in line with the development and use of technology is increasing. Speed requires the use of appropriate methods of manufacturing systems. Method of manufacturing systems that have been implemented at this time, not necessarily to be implemented to meet the needs of future manufacturing systems. Therefore, it is necessary to evaluate and develop the existing manufacturing concepts.

3.1 The needs of the manufacturing system

Manufacturing industry has developed continuously. The development is influenced by the paradigm of the consumer market was initially influenced by the producers turned into producers affected by consumer demand diverse. These changes allow the consumer to choose, have low loyalty to the brand, and want a better service.

These changes have consequences for the manufacturing industry make shorter product life cycle, reduce time to market, increase product variety, improve product quality and services (such as warranties), and will certainly increase the cost of the investment. Thus, it will increase the complexity and constant changes to the product where the customer wants a product to suit their tastes are diverse and manufacturers want to produce products at a unit cost as low as possible.

3.2 Relationship Between Holonic Manufacturing System and the Needs of Manufacturing System

Continuous change of the manufacturing system must be balanced with the application of new technologies that meet their individual needs. HMS is a new methodology that can be applied by the manufacturing industry to cope with uncertainty and change constantly. Here is the relationship between the capabilities of the holon to the needs of the manufacturing system:

- Holon architecture – The production process at the company consists of human resources, materials, machines, as well as the management, where the entity is required between the vision and mission to achieve goals. Physical manufacturing resources like man, machine, material can be played by multiple holon in the HMS. Holon architecture allows communication between manufacturing entities occur. So that the management can easily detect the needs of its manufacturing system. The ability of the holon architecture can reflect the needs of the manufacturing of the importance of information flow and communication between entities.
- Autonomy - each holon in the HMS has the ability to decide its own decisions without waiting for orders. It is possible to use in dealing with problems of uncertainty and constant change within the manufacturing system. Thus, the level of service the company to the consumer will be better.
- Cooperation - holon ability to form a cooperative relationship to develop and execute the plan. These properties allow holon to interact flexibly with other holon.

4 Current Development of Holonic Manufacturing System

The developments of the HMS since 1990 and until now are summarized in Table 1. From the results of the literature review, the authors used HMS manufacturing system to schedule manufacturing system (Sousa and Ramos, 1998; Borangiu, et. al., 2009), control manufacturing system (Shin and Cho, 2001; Silva, et. al, 2012; Jana, et. al., 2013; Ounnar, et. al., 2013; Jovanovic, 2014), optimize cost (Lun and Chen, 2000; Hsieh, 2009; Hsieh and Chiang, 2011), design flexible manufacturing system (Lun and Chen, 2000), and solve the problem of the distribution of the product (Cardin and Castagna, 2009)

Table 1 Literature Review of Holonic Manufacturing System

NO	Author (year of publication)	Title	Summary
1	Paulo Sousa and Carlos Ramos (1998)	A Dynamic Scheduling Holon for Manufacturing Orders	Holonic architecture used for dynamic scheduling in manufacturing systems. Negotiations between the holon is represented by a protocol based on the contract net protocol on each holon. The purpose of this study is to make

NO	Author (year of publication)	Title	Summary
			scheduling is often changed by using the architecture and the properties owned by the holon.
2.	M. Lun and F. F. Chen (2000)	Holonic Concept Based Methodology for Part Routeing on Flexible Manufacturing Systems	Designing a flexible manufacturing system to achieve good productivity and cheap. This study develops a framework of computer-based simulation FMS scheduling and control systems using the holonic concept. This framework can maintain the stability and flexibility to accommodate system disorders, increase throughput, reducing part-time flow and inventory of goods in process, and the balance workload among workstations.
3.	Junho Shin and Hyunbo Cho (2001)	Planning and Sequencing Heuristics for Feature-Based Control of Holonic Machining Equipment	Aiming to develop a control architecture Holonic Manufacturing Unit (HMU) to build the Holonic Manufacturing System (HMSs) architecture which shows some of the production plan and sequence heuristics for the control of manufacturing systems
4.	M. K. Tiwari and Samrat Mondal (2002)	Application of an Autonomous Agent Network to Support the Architecture of a Holonic Manufacturing System	To reduce the lead time of new products that will be sold in the market, manufacturing systems must be able to adapt to change and able to innovate in new product design and modification process efficiently. The nature of the holon is autonomous, adaptive, cognitive, cooperative and can be used to guide changes in manufacturing systems.
5.	Theodor Borangiu, Pascal Gilbert, Nick-Andrei Ivanescu, Andrei Rosu (2009)	An Implementing Framework for Holonic Manufacturing Control with Multiple Robot-Vision Stations	The purpose of this paper is to re-production planning and scheduling. This paper described holonic architecture in the agile job shop assembly and implement on the robot which is based on the dynamic simulation of material and transportation processes.
6.	Fu-Shiung Hsieh (2009)	Dynamic Composition of Holonic Processes to Satisfy Timing Constraints with Minimal Costs	Flexible architecture in Holonic Manufacturing System (HMS) can be used for planning and control of production processes. Holon can interact with other holon in a more complex system structure. The purpose of this study is to obtain the optimization process holon in the HMS to achieve production goals. The author uses the HPC (Holonic Processes Composition) to synthesize a process that has a low cost and is limited by the constraints of time, cost optimization is done by considering time Petri net models.
7.	Adriana Giret, and Vicente Botti (2009)	Engineering Holonic Manufacturing Systems	Manufacturing requirements that have many properties, making the modeling process more difficult and complex problems. This study discusses the ability of HMS in collaboration with the method of Multi Agent System (MAS) is a degenerate through Anemona software.

NO	Author (year of publication)	Title	Summary
8.	Olivier Cardin, and Pierre Castagna (2009)	Using Online Simulation in Holonic Manufacturing Systems	Researchers conducted an online simulation for activities on the production floor based on the HMS. Using the structure of PROSA and staff holon to define entities in HMS. Online simulation shows habits and relationship of each holon to solve the problem of the distribution of the product.
9.	Fu-Shiung Hsieh, Chih Yi Chiang (2011)	Collaborative Composition of Processes in Holonic Manufacturing Systems	In addition to having the ability to address the issue of uncertainty and environmental changes, HMS can be combined with Petri Net is used to design and solve problems by minimizing the cost.
10.	R.M. Silva, J. Arakaki, F. Junqueira, D.J. Santos Filho, P.E. Miyagi (2012)	Modeling Of Active Holonic Control Systems for Intelligent Buildings	This study adopts a discrete event system and the nature of the holon to establish procedures of building control systems that takes into account the functional specification on normal and abnormal operation.
11.	Cristina, Octavian Morariu, Theodor Borangiu (2013)	Customer Order Management In Service Oriented Holonic Manufacturing	This research is to design and implement a Customer Order Management module (COM) based on the composition of the Service Oriented Architecture (SOA) in the context of HMS to solve the problems on the production floor in accordance with customer demand. Customers can monitor the extent to which the progress of the company's production activities.
12.	Tarun Kanti Jana, Bipradas Bairagi, Soumen Paul, Bijan Sarkar, Jyotirmoy (2013)	Dynamic Schedule Execution in an Agent Based Holonic Manufacturing System	The purpose of this study is to schedule the resource allocation dynamically many projects based on the concept of holonic agent. The aim of scheduling is to prioritize jobs and make resource allocation strategies.
13.	Fouzia Ounnar, Aziz Naamane, Patrick Pujo, Nacer Kouider M'Sirdi (2013)	Intelligent Control of Renewable Holonic Energy Systems	This study aims to establish centralized control using Holonic Energy Systems (HES) with multi-source and multi-users. Renewable energy is controlled by using the properties of holon, then the decision is designed with analytical hierarchy process (AHP).

NO	Author (year of publication)	Title	Summary
14.	K. Wang, S.H. Choi (2014)	A Holonic Approach to Fexible Fow Shop Scheduling under Stochastic Processing Times	This study aims to develop a flexible makespan for flow shop with uncertain time (stochastic) based on autonomous and cooperative nature of the holon.
15.	Marko Jovanovic, Samo Zupan, Marko Starbek, Ivan Prebil (2014)	Virtual Approach to Holonic Control of the Tyre-Manufacturing System	Tire company wants to compete in a modern market complex by changing their mode of production. Traditional tire company produces a slow response to the need for optimization of production system and has a low level in adapting to environmental changes. This study aims to provide control in manufacturing systems by analyzing, visualizing operations, managing the behavior of the manufacturing system which is based on the concept of virtual holonic control.

5 Future Applications of Holonic Manufacturing System

HMS is a new technology which is composed of autonomous cooperative building block. Holonic manufacturing system (HMS) has the potential to organize, develop, control and integrate the elements and changes in manufacturing systems. The complexity of human needs coupled with high uncertainty, forcing the system to act in a flexible manufacturing, fast and precise in taking any policy. Based on the identification of the needs of the manufacturing system on the discussion above, the Holonic Manufacturing System can be developed to solve the problems of manufacturing systems following:

5.1 Mass Customization

Tseng and Jiao (2001) defined mass customization as "producing goods and services to meet individual customer's needs with near mass production efficiency". To meet the needs of individuals / groups of consumers, it is necessary to know the desires of each consumer group, while achieving near mass production efficiency need to make products in large quantities (mass). This can be achieved by creating products that are uniform in large numbers until a certain stage of production, followed by the production process in accordance with the wishes of consumers. Consumer desires are always changing, therefore the necessary coordination between producers and consumers. The execution of uniform products can be done according to the nature of the holon is autonomous and coordination between producers and consumers to determine the desires of consumers is similar with the nature of the holon which is cooperation.

5.2 Policy Deployment

Kendrick (1988) defined policy deployment is a process of developing plans, targets, controls and areas for improvement based on the previous level's policy and an assessment of the previous year's performance. To deploy a policy, managers require procedure to communicate, allocate resources, focus and align actions, and control corporate drift. Policy deployment is similar with cooperation of holon with the higher level of holon and controlling the process of policy deployment is comparable with controlling manufacturing system (Shin and Cho, 2001; Silva, et. al, 2012; Jana, et. al., 2013; Ounnar, et. al., 2013; Jovanovic, 2014). So, the idea of HMS can be used for policy deployment.

5.3 Online Integrated Supply chain management

Supply chain is a network between companies that work together to create and deliver the product to the end customer. To manage the flow of goods from upstream to downstream, the company set a goal of supply chain management is not only oriented to the company's internal, but also external companies. Supply chain activities closely related to the production process of inventory planning and control of a company.

Transformation speed of communication and information between manufacturing system affects how much the company's success in achieving its production goals. Here is an illustration of the process of the supply chain management of a company.

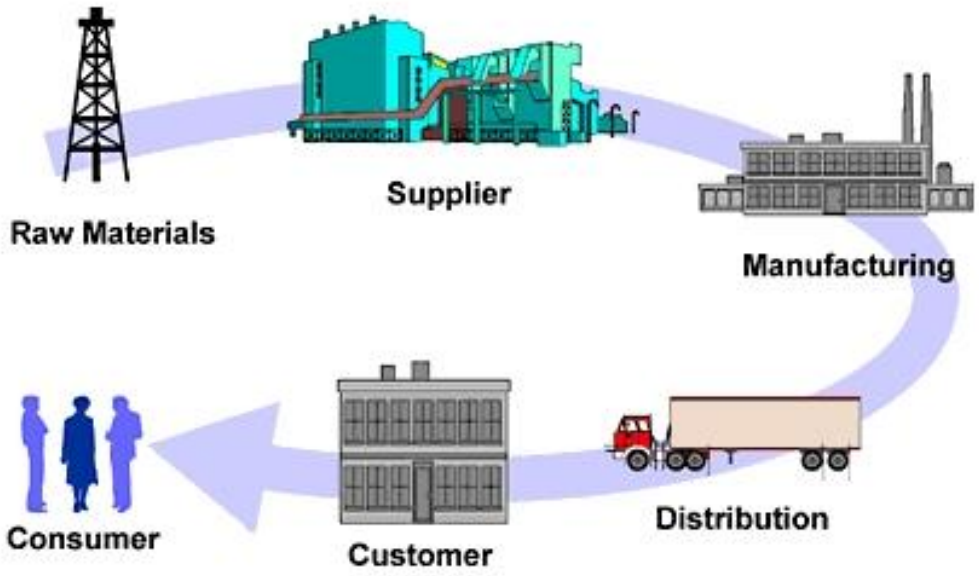

Figure 3 Example of Supply Chain Management

Manufacturing systems that affect not only the success of the system resources that are on the production floor, but also the resources that are outside the production system such as the management, marketing, financing, suppliers, and consumers. Needs of manufacturing systems to the phenomenon of right time, right place, right price and requires the company to be more flexible, precise and quick in dealing with the problem.

HMS can be used as the technology of manufacturing system integration between internal and external. HMS has the ability cooperative and autonomous. HMS can be used as an online integration to determine the status of enterprise manufacturing systems. Intergasi online on holonic can accelerate the response of management to manage the company's manufacturing system adjustments. In addition, online integration can also be used externally (suppliers) to supply raw materials to the company and the amount of time estimated to approach the real needs. Thus, with the integration of the supply chain based on the needs of the production floor and mirrored by the behavior of the holon, the company and external parties can easily find out the progress of the production system whether it is appropriate or not, whether or not material need, how much more resources needed, and so on. The online system as practiced by Morariu (2013) can be continuously monitored by both internal and external parties.

6 Conclusion

Holonic manufacturing system (HMS) that has been developed since 1990 has been used in manufacturing to schedule, control, optimize the cost and design of flexible manufacturing system.

Based on the properties of holon (i.e., autonomy and cooperation), the architecture of the holon, (i.e., order holon, product holon and resource holon), and a composite of several holons called holarchy, the idea of HMS can be extended into mass customization, policy deployment and online integrated supply chain management.

References:

Babiceanu, Radu F., and F. Frank Chen, (2006).” Development and Applications Of Holonic Manufacturing Systems: A Survey”. Intelligent Manufacturing, 111-131.

Borangiu, T., Pascal G., and Andrei Rosu, (2009).” An Implementing Framework for Holonic Manufacturing Control with Multiple Robot-Vision Stations”. Engineering Application of Artificial Intelligent, 505-521.

Botti, V., and Giret, A. (2008). ANEMONA: A Multi Agent-Methodology for Holonic Manufacturing Systems. Spanyol: Springer.

Cardin, O., and Pierre C., (2009). “Using Online Simulation in Holonic Manufacturing Systems”. Engineering Application of Artificial Intelligent, 1025-1033.

Christensen, J. H., (1994), “Holonic Manufacturing Systems: Initial Architecture and Standards Directions”, First European Conference on Holonic Manufacturing Systems, Hannover, Germany, 1 December 1994.

Giret, A., and Vicente B., (2009). “Engineering Holonic Manufacturing Systems”. Computers in Industry, 428-440.

Hsieh, F. S., (2009). “Dynamic Composition of Holonic Processes to Satisfy Timing Constraints with Minimal Costs”. Engineering Application of Artificial Intelligent, 1117-1126.

Hsieh, F. S., and Chih, Y. C., (2011). “Collaborative Composition of Processes in Holonic Manufacturing Systems”. Computer in Industry, 51-64.

Hsieh, F., and Chiang, C. Y. (2011). "Collaborative Composition of Processes in Holonic Manufacturing Systems". *Computers in Industry* , 51-64.

Jana, T.K., Bipradas, B., Soumen, P., Bijan, S., and Jyotirmoy, (2013). “Dynamic Schedule Execution In An Agent Based Holonic Manufacturing System”. Journal of Manufacturing System, 601-806.

Jovanovic, M., Samo, Z., Marko, S., and Ivan, P., (2014). “Virtual Approach to Holonic Control of The Tyre-Manufacturing System”. Journal of Manufacturing System, 116-128.

Kendrick, J.J. (1988), “Managing quality: lighting UP quality”, Quality, Vol. 27 No. 6, pp. 16-20.

Lun, M., and Chen. (2000). “Holonic Concept Based Methodology for Part Routing on Flexible Manufacturing Systems”. Advanced Manufacturing Industry, 484-490.

Morariu, C., Octavian, M., and Theodor, B., (2013). “Customer Order Management In Service Oriented Holonic Manufacturing”. Computer in Industry, 1061-1072.

Ounar, F., Azis, N., Patrick, P., and Nacer, K., (2013). “Intelligent Control of Renewable Holonic Energy Systems”. Mediterranian Green Energy Forum, 465-472.

Shin, Junho, and Hyunbo C., (2001). “Planning and Sequencing Heuristic for Feature Based Control of Holonic Machining Equipment”. International Journal of Flexible Manufacturing Systems, 49-70.

Silva, R.M., (2012).” Modeling Of Active Holonic Control Systems For Intelligent Buildings”. Automation in Construction, 20-33.

Sousa, P., and Carlos R., (1998). “A Dynamic Scheduling Holon for Manufacturing Orders”. Journal of Intelligent Manufacture, 107-112.

Tiwari, M.K., and Samrat Mondal, (2002). “ Application an Autonomous Agent Network to Support the Architecture of a Holonic Manufacturing System”. Advanced Manufacturing of Technology, 931-942.

Tseng, M.M.; Jiao, J. (2001). *Mass Customization, in: Handbook of Industrial Engineering, Technology and Operation Management* (3rd ed.). New York, NY: Wiley.

Wang, K., and S.H. Choi, (2014). “A Holonic Approach to Fexible Fow Shop Scheduling under Stochastic Processing Times”. Computers and Operation Research, 157-168.

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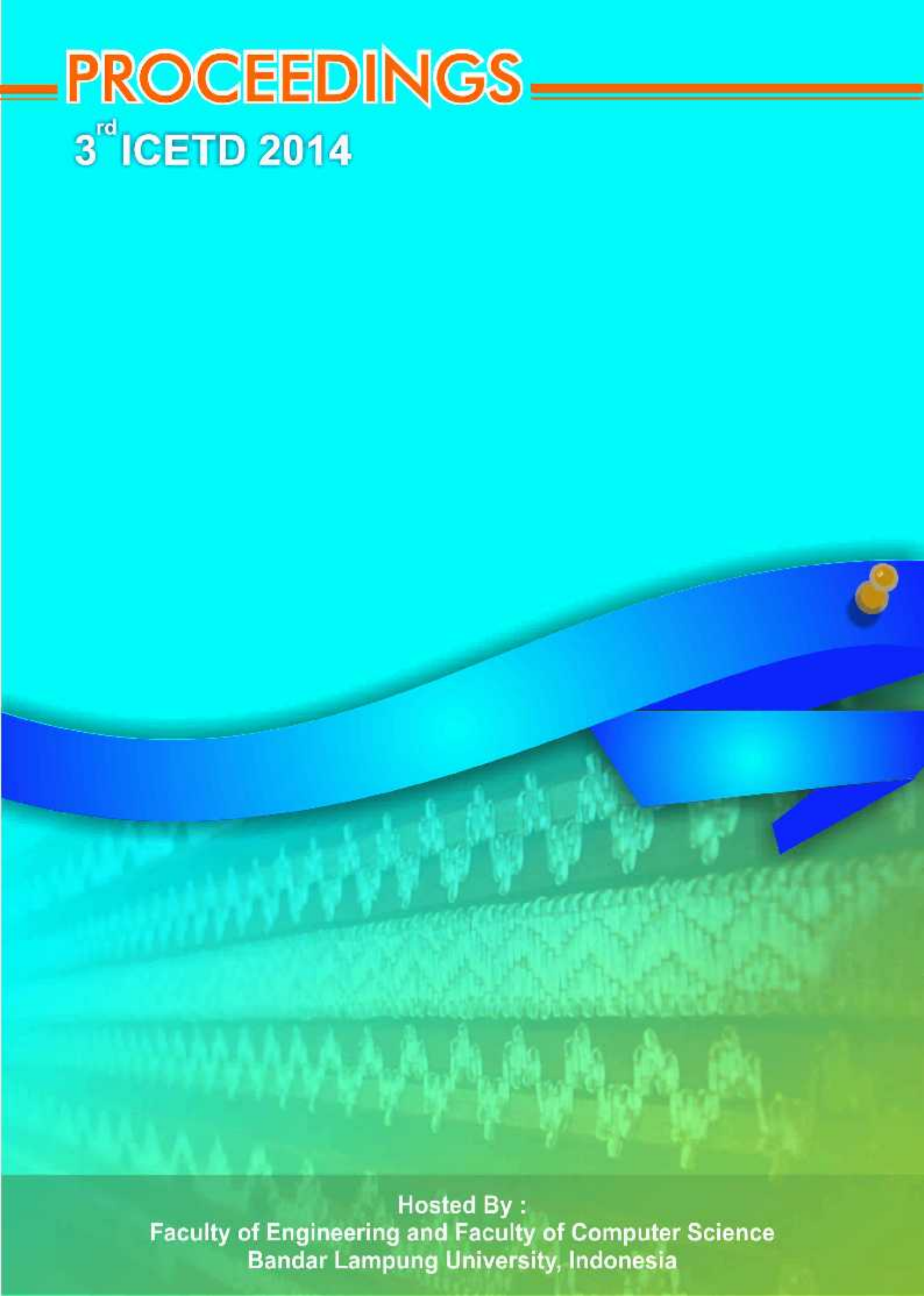

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