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# Proceeding

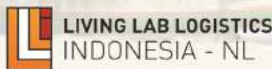
7<sup>th</sup> INTERNATIONAL SEMINAR ON INDUSTRIAL  
ENGINEERING AND MANAGEMENT (7<sup>th</sup> ISIEM)

with theme: *“Green Technology on Industrial Engineering,  
Information and Management”*

*Sanur Paradise Hotel, Bali, Indonesia  
March 11<sup>th</sup> – 13<sup>th</sup>, 2014*



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**Industrial Engineering Department**  
*Al Azhar University, Pasundan University, Trisakti University,  
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# PROCEEDING

The 7<sup>th</sup> International Seminar on Industrial Engineering and  
Management (7<sup>th</sup> ISIEM)

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## **Industrial Engineering Department of**

- Al Azhar University •Pasundan University•Trisakti University•
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# PREFACE

Dear Colleagues,

On behalf of the Organizing Committee, I am honored to welcome you to the 7<sup>th</sup> International Seminar on Industrial Engineering and Management (ISIEM). This seminar is organized by the Industrial Engineering Department from seven Universities, namely Trisakti, Esa Unggul, Atma Jaya Jakarta, Al Azhar Indonesia, Pasundan, Tarumanagara and Mahendradatta Universities. The purpose of this seminar is to provide an effective forum for distinguished invited speakers, academicians, engineers, professionals and practitioners coming from universities, research institutions, government agencies and industries to share or exchange their ideas, experience and recent progress in industrial engineering and management and other related fields in dealing with the dynamics and challenges of the 21<sup>st</sup> century. The seminar is also expected to foster networking, collaboration and joint efforts among the conference participants to advance the theory and practice as well as to identify major trends in Industrial Engineering and Management field.

The main theme of this seminar is “**Green Technology on Industrial Engineering, Information and Management**”. Under this theme, we will explore sustainable innovation in industrial technology, information, and management concerning global issues. We also discuss approaches to collect, manage, and use any information efficiently and effectively, thus the results will be able to upgrade industrial competitiveness and value in facing the global challenges in industrial environment.

This year we received 93 paper submissions from various universities, research centers, and its affiliations. The Technical Program Committee accepted 84 selected papers that will be presented in this seminar. The accepted papers are categorized into four groups; Supply Chain Management, Production System, Operation Research, Ergonomic, Industrial Management, Quality Engineering and Management, and Decision Support System and Artificial Intelligent. And finally, the success of this seminar is due to the hard efforts of many people who we gratefully acknowledge. We also thank the authors whose papers are presented, invited keynote speakers, and all parties that we are not able to mention here.

We hope you all will enjoy the three days of discussion through this seminar and enjoy the beauty of Bali Island. We hope to see you again next year, in the 8<sup>th</sup> International Seminar on Industrial Engineering and Management (ISIEM).

Bali, March 11<sup>th</sup>, 2014

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## DESIGN OF QUALITY PROCESS STANDARD BASED ISO 9001:2008 CLAUSE 7.5.1 FOR TRADITIONAL BATIK CAP INDUSTRY

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### ABSTRACT

Quality assurance for traditional batik industry is important to produce good quality batik consistently. Existing quality standards for batik such as Standar Nasional Indonesia (SNI) and Batikmark are more focused on testing and giving certificate for quality of the finished product. To maintain the product quality consistently, the process-based quality assurance will complement to the existing quality standards. This paper proposes the design of a process-based Quality Assurance System for batik cap industry based on ISO 9001:2008. Approach to the design/improvement of business processes is used to produce quality documents of clause 7.5.1 (product realization) that compliance to ISO 9001:2008.

**Keywords:** Batik Cap, ISO 9001:2008, Business Process Design.

## 1. INTRODUCTION

Batik is one way of making fabric. Batik can refer to two things. The first is the technique of fabric coloring using wax to prevent partly staining of the fabric. In the international literature, this technique is known as wax-resist dyeing. The second notion is the fabric or clothing made with these techniques, including the use of certain motives which have peculiarities. Batik Indonesia, as the overall engineering, technology, and development-related designs and culture, UNESCO has been designated a Masterpieces of the Oral and Intangible Heritage of Humanity since October 2, 2009 (UNESCO, 2012).

Current standards of quality used in batik companies are SNI and Batikmark which both focused on certification and testing of the final product quality. To maintain the product quality consistently, the quality standards set by SNI and the Batikmark should be complemented with quality assurance that oriented to business and production processes. This study focuses on the design standards of quality and process control system of batik cap based on quality standard of ISO 9001:2008.

ISO 9001:2008 is a process approach quality assurance. The structure explains the basic requirements of ISO 9001:2008 for quality management system ISO 9000 and

see how can be tailored to a particular business or profession so that the organization can become an ISO 9001:2008 compliant. The purpose of this study is to identify the processes that are critical to the realization of product quality standards batik and produce quality documents in accordance with clause 7.5.1 of ISO 9001:2008 (product realization).

## 2. THEORETICAL BACKGROUND

### 2.1. Batik Cap Production Process

Batik originated from the Javanese language "amba" meaning "writing" and the suffix "titik" means "small dots or to make dots", so that means writing or making batik dots on a fabric (Musman & Arini, 2011).

The process of batik cap making involves several phases (Florek, 2011): First, mencanting, the design phase where wax designs are smeared to the fabric. The batik cap is where the wax is applied using a copper stamp, called cap instead of being hand-drawn onto the fabric. The stamps are made in various designs and are applied to the fabric in a repetitive manner across the surface like block-printing (Figure 1). The wax is heated and stamped onto the fabric. The wax (malam in Javanese) is traditionally beeswax. It protects the selected, waxed areas of the fabric from being coloured in the dyeing process.



Figure 1. Stamping in Batik Cap

The second phase, mewarnai, involves the colouring process where the fabric is dyed. The waxed parts are protected from coloured during this process and remain dye-free. The dyed fabric, with wax still on is then dried and soaked in a bath of colour-fixing agent.

Next, the fabric is washed in warm water in order not to melt the wax. Finally, the wax is scraped off with a knife and the fabric is boiled (merebus) to remove any remaining wax (melorod). The waxing and dying process is repeated several times, with drying, colour-fixing and washing until each colour of the design is applied and the desired design is complete.

## 2.2. Quality Standard of ISO 9001:2008

ISO 9001:2008 is a process approach quality assurance. The quality management system is a process collection that consists of people, jobs, activities, tasks, notes, documents, forms, resources, regulations, reports, materials, equipment, tools and supplies - in other words, all the things needed to set up, control and improve the quality of products and services. In order for an organization to function effectively, interrelated processes must be identified

and managed properly. The systematic identification and management processes used within an organization (and in particular the interaction between the process) is referred to as 'process approach' (Tricker, 2010).

Clauses in ISO 9001:2008 structure (Fitzsimmons, 2008) are:

- a) Clause 4 - Quality Management Systems
- b) Clause 5 - Management Responsibility
- c) Clause 6 - Resource Management
- d) Clause 7 - Product Realization
- e) Clause 8 - Measurement, Analysis, and Improvement

ISO 9001:2008 is currently becoming an integrated quality management standards applicable to all organizations, both producing products and services. The basic process in ISO 9001:2008 can be seen in Figure 2.

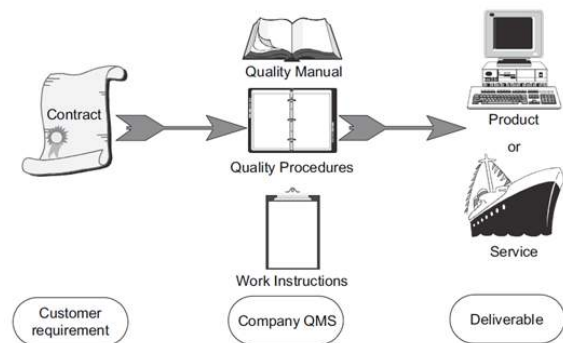


Figure 2. Basic process in ISO 9001:2008 (Tricker, 2010)

Standard Operating Procedure (SOP) is a guide that explains in detail how a process should be implemented. Designing a good SOP begins by describing the purpose of the work or process, including information, regulations or standards used in the SOP process, and the scope of SOP. It shows sequential procedures to be followed. It is divided into several sections, for example, possible interference, required equipment, qualified personnel, and security considerations. Finally, It is described all QA activities and quality control according to the procedure as well as a list of references cited (FEMA, 1999).

### 3. DESIGN OF QUALITY PROCESS STANDARD FOR BATIK CAP PRODUCTION

SOPs and work instructions are quality documents resulted from the design of quality process standard. Model used to design the quality documents can be viewed in Figure 3.

Quality Standard of batik cap should be identified first and along with ISO 9001:2008 clause 7.5.1 requirements, will result in process standard required by the company. Current process is reviewed and enriched by some best practices in resulting quality standard of batik cap. Business process needed to produce batik cap will be identified. Finally, SOP and work instructions are designed based on ISO 9001:2008 clause 7.5.1 and procedures requirements.

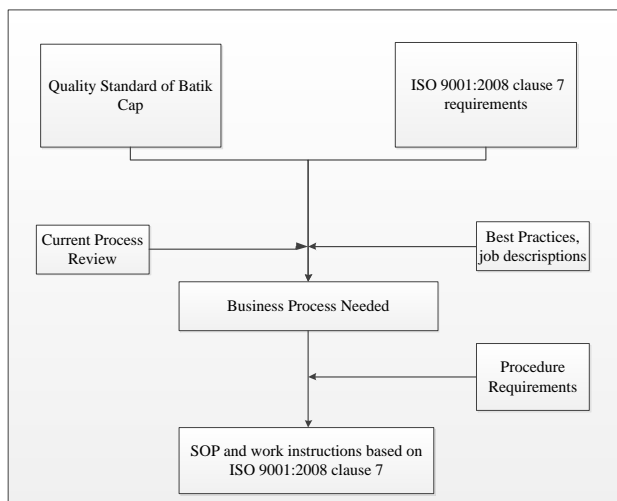


Figure 3. Model of quality process standard design for batik cap

#### 3.1. Business Process Requirements

The batik cap production process in some companies is implemented according to the general custom made by each company, but there is no standard document and the monitoring of the production process. Core production process for batik cap and the desired quality standards of each process includes :

##### 1 . The stamping process

Quality criteria for the stamping process is the wax sticks to the cloth and dry, and the results of the stamping is even and clean according to the desired design.

##### 2 . Coloring process

The dyeing process is done from the brightest to the darkest color according to the color density of the desired design. The quality standard for coloring process is that the fabric can absorb dyes and colors according to the design evenly.

##### 3 . Pelorodan process (Cleaning)

*Pelorodan* process uses a chemical liquid to remove the wax that stick to the fabric, and then the cloth is washed and dried under the sun. *Pelorodan* quality standard is that the fabric is clean and free of wax, wax odorless, and not stiff because of wax.

Current evaluation process based on ISO Clause 7.5.1 (the production control and provision of services) can be viewed in Table 1 .

Table 1. Evaluation of current process based on ISO 9001:2008 Clause 7.5.1

ISO Clause 7.5.1 Production Control & Service Provision	Current Process of Batik Cap Product Realization
Organization should plan dan do production as well as provide service in control condition: a. The availability of product chacateristics information. b. The availability of work instructions as needed c. The use of appropriate tools and equipments.	Batik companies have not done controlling their production activities in standard: a. Product chacateristic information has not been provided for production guidance. b. Work instructions have not been available. c. Activity to calibrate the production equipment have not been done.

After the current process evaluation using quality standard of batik cap and ISO 9001:2008 standard, therefore quality standard design and business process document required consist of:

1. Production procedure of Batik Cap
2. Work instruction of Stamping and Stamp Storage
3. Work instruction of Coloring
4. Work instruction of *Pelorodan*, Cleaning, and Drying



## 5. Forms required by each process

**3.2. Design of Quality Documents for Batik Cap Production**

Batik production process procedure is designed to follow some steps: the production planning process, preparation of initial production, stamp-making process, the process of stamping on fabric, fabric coloring, *pelorodan*, cleaning and drying, quality inspection process, and process of monitoring, validation, and evaluation of the production process. In this paper, the discussion is restricted to procedure for the core production process, namely stamping, coloring, and *pelorodan*.

The Batik Production Process Procedure consists of components: Purpose, Scope, Exclusions, Definitions, Reference, Description of processes, Performance measures, Related Documents, and Attachments. Preview for the flow chart of process description (part of SOP) for the core production process can be seen in Appendix A.

In quality documents are specified performance measures, process criteria, equipment used, and the documents and records that are used. The goal is to achieve a set of quality criteria and continuous improvement processes to maintain consistency.

Examples of performance measure is defined as follows :

- a. Process : Monitoring of Production Processes
- b. Performance indicators : compliance of the production process with work instructions or procedures : 100 %
- c. Media Measurement: Process monitoring Form
- d. Measurement Method: Checking the compliance of the realization process with work instructions or procedures.
- e. Measurement Frequency : Every day

Contents in work instruction include some examples as follows:

Example of process, process criteria, equipment, documents and records for one step in the stamping process is as follows:

- a. Step: The operator do stamping on fabric

- b. Equipment used: stamp, furnace stove, and the pan or stamping pedestal.
- c. Criteria: 1. Stamp and wax has been hot, 2. Adjust pointer as a point to connect stamp pattern, 3. Stamp is pressed and kept staying for about a minute or so in order to wax perfectly sticked, 4. Results of stamp pattern should be neat, clean and straight, perfect wax stick and dry.
- d. Documents: work instructions of stamping and Stamp Storage.
- e. Recording documents used are Production Process Monitoring form and stamp form.

Example of process, process criteria, equipment, documents and records for one step in the coloring process is as follows:

- a. Step: The operator do mordanting process on fabric that is soaking the fabric by using certain substances so that fabric fiber can absorb dyes well.
- b. Equipment used: soaking tub, gloves.
- c. Criteria: 1. A tank of 5-8 liters water with normal temperature, 2. A dose of 100 mg soap, 3. The fabric is damp so that it has a good color absorption.
- d. Documents: work instructions of Coloring.
- e. Recording document used is Production Process Monitoring form.

Example of process, process criteria, equipment, documents and records for one step in the *pelorodan* process is as follows:

- a. Step: The operator do removing wax process from the fabric, in the way: 1. The fabric is dyed to the first tank, so that waxy substance can be detached from the fabric, 2. The fabric is then moved to the second tank for another cleaning process, and 3. Candle dregs are placed into third tank so as not to hinder the process of *pelorodan*.
- b. Equipment used: Three pieces of steel tank: The first tank containing waterglass solution, the second tank containing a solution of soda ash, and the third tank for dropping candles, furnaces and stoves, smooth wooden stick, and gloves.
- c. Criteria: 1. The first tank consists of: Waterglass 0.5 kg dissolved into 50 L of water with a temperature of 150<sup>0</sup>-180<sup>0</sup>

C, 2. The second tank containing 240 ml of soda ash is dissolved into 50 L of water with a temperature of 150<sup>o</sup>-180<sup>o</sup> C, 3 . The fabric must be clean and free of wax.

- d. Documents: work instructions of Coloring.
- e. Recording document used is Production Process Monitoring form.

#### 4. RESULT AND DISCUSSION

The proposed business process design includes several changes, namely :

- a. Provide the form recording of the production process.
- b. The presence of monitoring process to ensure that the production process runs consistently.
- c. The evaluation of processes and products every 2 weeks, this is done to ensure the compatibility between planned and actual production.
- d. Includes the Plan-Do - Check - Action in the production process. This is done to control the process so that the result of this process is consistent in accordance with company standards.
- e. The existence of arrangements for storage of perishable stamps.

However, the implementation of quality systems often appears obstacles encountered. These constraints are:

- a. Awareness of the importance of the quality management system is still lacking in Batik companies.
- a. Batik companies did not have the process documents filing system, so that document is sometimes hard to find as well as standard process used to carry out the process. Generally the quality and consistency of all the processes that run depend on the presence of the Director of the company.

Batik companies need to be met in accordance with the ISO 9001:2008 standard in this case spesifik to clause 7.5.1. These requirements are :

- a. The business processes are documented in the form of SOPs or work instructions for every production

process, so that the processes run consistently although done by different operators, this is done to avoid any variance due to differences in the treatment of the operator.

- b. Recordings of each process must be kept and maintained for further improvement, to ensure that companies do continuous process improvement.
- c. Company has a target and product quality requirements. Goal setting and product quality requirements must be made to ensure the quality of products produced. Quality objectives and requirements of product are the things you want to achieve in the fulfillment of customer satisfaction.
- d. Companies should establish the flow of the product realization process, documenting the process flow into a flow diagram and communicate the stages of product realization processes to all positions in the company in order to understand the positions throughout the process and avoid misunderstandings and misscommunication on the handling of the product.
- e. Provide employees training as a quality management system that provides knowledge for all parties in batik companies. This is done in order to know and understand the company's quality management system according to ISO 9001:2008 and encourage companies to implement a quality management system in order to provide the quality assurance of the products to achieve customer satisfaction.
- f. Encourage commitment and self-awareness of all parties in batik companies on the importance of quality management system to ensure the quality of the product. Commitment and self-awareness should be initiated by the head of the company and communicated to the parts below that will encourage each party to carry out the process in accordance with established standards.
- g. The need for socialization regarding the use of SOPs, work instructions and forms as documents of the company. It is intended that all parties in the company understand and are able to

implement the product realization process.

## 5. CONCLUSION

1. Quality criteria identified for batik cap production process are:
  - a. The stamping process  
Quality criteria for the stamping process is the wax sticks to the cloth and dry, and the results of the stamping is even and clean according to the desired design.
  - b. Coloring process  
The quality standard for coloring process is that the fabric can absorb dyes and colors according to the design evenly.
  - c. *Pelorodan* process (Cleaning)  
*Pelorodan* quality standard is that the fabric is clean and free of wax, wax odorless, and not stiff because of wax.
2. To achieve standard quality of batik cap, quality documents are designed:
  - a. Production procedure of Batik Cap
  - b. Work instruction of Stamping and Stamp Storage
  - c. Work instruction of Coloring
  - d. Work instruction of *Pelorodan*, Cleaning, and Drying
  - e. Form of product realization
  - f. Form of production process monitoring
  - g. Stamp form
3. Research can be proceed for fulfillment of batik quality criteria in more detail and for other clauses. Besides, the description of the process can be enriched by measuring the time of product realization, so that the process can be standardized with the time frame.

## 6. REFERENCES

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APPENDIX A

Production Process of Batik Cap		
Process	Process Description	Documents
<pre> graph TD     Start([Start]) --&gt; SO[Stamping Operator]     SO --- FS[Fabric Stamping]     FS --&gt; CO[Coloring Operator]     CO --- FC[Fabric Coloring]     FC --&gt; CLO[Cleaning Operator]     CLO --- FLC[Fabric Cleaning]     FLC --&gt; PM[Production Manager]     PM --- IVE[Inspecting, validating, and evaluating of production process]                     </pre>	<p>4.a. Stamping operator receives stamp and fabric that has been patterned from logistic department.</p> <p>4. b.1 The stamping operator doing the stamping process in accordance with Work Instructions of Stamping and Stamp Storage.</p> <p>4.b.2. Stamping process can be repeated after the coloring process, depending on the designs and motifs as well as the desired color.</p> <p>4.b.3. After the stamping process, the stamp is stored on the shelf that has been provided and maintained in accordance with Work Instructions stamping and Stamp Storage.</p> <p>4.c. The stamping operator then sends a stamped fabric to coloring operator.</p> <p>5.a. Coloring operator receives a stamped fabric from stamping department</p> <p>5.b.1. Coloring operator doing dyeing process in accordance with Work Instruction of Coloring. After the fabric is colored, the operator dries the fabric so the color appears.</p> <p>5.b.2. Coloring process can be repeated after the stamping process depends on the design and motifs as well as the desired color.</p> <p>5.c. Coloring operator then handed the fabric that has been dyed to <i>pelorodan</i>/cleaning operator.</p> <p>6.a. <i>Pelorodan</i>/cleaning operator receives a colored fabric from coloring department</p> <p>6.b. Cleaning operator doing clening and drying process in accordance with Work Instruction of <i>Pelorodan</i>, Cleaning, and Drying.</p> <p>6.c. Cleaning Operator then handed the fabric that has been cleaned to Quality Control operator.</p> <p>8.a. Production Manager monitors the production process and work tools, to examine the fit between the actual process and work instructions / procedures. The monitoring process is done on a daily basis and recorded in the form of production process monitoring.</p> <p>8.b. Production Manager validates the product by checking the results of the finished product. The validation process is performed every finished product resulting from the production process. The results of the validation of the finished product are recorded in the Form of Product Realization.</p> <p>8.c. Production Manager evaluates the results and the process of production. This evaluation is done every two weeks to ensure that the process and results of production are under the control of the company.</p>	<p>Work Instructions of Stamping and Stamp Storage</p> <p>Work Instructions of Coloring</p> <p>Work Instructions of <i>Pelorodan</i>, Cleaning, and Drying</p> <p>Form of Production Process Monitoring</p> <p>Form of Product Realization</p>

Phase