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Design Of Time Estimation System In Manufacturing Products On Cnc Machinery With Process Approach

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Article Info

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ABSTRACT

This research was conducted at the Industrial Service Unit of the University of Muhammadiyah Surakarta, which is a Service Unit engaged in the machinery industry, with a Make To Order-based production system. The current state of product completion time orders are made based on estimates only. In this study, a decision support system was designed to calculate product time estimates, change manual calculations or estimates with computer calculations. The calculation refers to product specifications and cutting tools used, where these two things are used to calculate the length of a machining process. In addition, the machine load, the time to order raw materials, the availability of working drawings, and the efficiency of the machine used are also considered. Based on the results of the implementation in the case of the RAGUM-TI product, the completion time was 6331.28 minutes or 106 hours, and the product could be completed in 16.5 days with 80% machine efficiency and 8 hours of work per day. With the decision support system produced in this study, it can increase the speed and accuracy of the estimation process by the company.

Keywords:
CNC, time estimation, computer technology, product

INTRODUCTION

Advances in information technology have led to a shift in the use of technology from a simple level to a more modern one. In companies, especially in the industrial sector that requires precise and accurate information, information systems are needed in company activities. With an information system that is in accordance with the company's operational system, all activities within the company will be carried out effectively and efficiently. The computer as a data processing tool in addition to other functions so that it can produce output or output that is useful for the company's operational system[1]. By running a computer-based information system, the incoming data will be processed by the program that is run, in the form of the required information that is precise, accurate and easy to access.

The need for information in a company that is often a problem is information about when a product can be completed. Of course, this problem cannot be left alone because it will disrupt the planning of existing activities, in other words, a new schedule of activities will be needed[2].

Time is a unique resource[3]. Time is divided into four categories, namely: Creative time is the time used for planning. Preparation time is the time used to prepare activities. Productive time is the time actually used to do work. Exploitation time is the time taken for correspondence and reporting[4]. Cycle time is the completion time of one unit of production since the raw materials began to be processed at the work place concerned [5].

An intermittent flow process (job shop) has the characteristic of producing in batches or groups of similar goods at intermittent time intervals. In this case, equipment and labor are

organized or organized in work centers according to similar types of skills or equipment. A product or job will flow only through the work centers where it is needed. So, the flow of raw materials to the final product does not have a definite pattern. One of the main characteristics of an intermittent process is that the same equipment and work skills are grouped in one area (area), which is known as the process layout form. In contrast, line flow is known as shape known as product layout because the various processes, equipment,[6].

A make-to-order based industry is an industry that waits for an order to be received from a customer before starting to manufacture goods[7]. Job shops are companies that will produce only on the basis of orders that enter the company[8]. Thus, companies like this will only produce if there are orders that enter the company concerned. If there are no orders at all into the company, then theoretically these companies will not produce, there is no production activity in the company concerned.[9]. In addition to production activities within this kind of company, which depend on the presence or absence of incoming orders, the design of the shape, size, color, and components of the product will be adjusted to the tastes of the order giver, customer or consumer.

METHOD

The primary data needed are product or component name data, raw material name data, tool name data and the current ordering system.

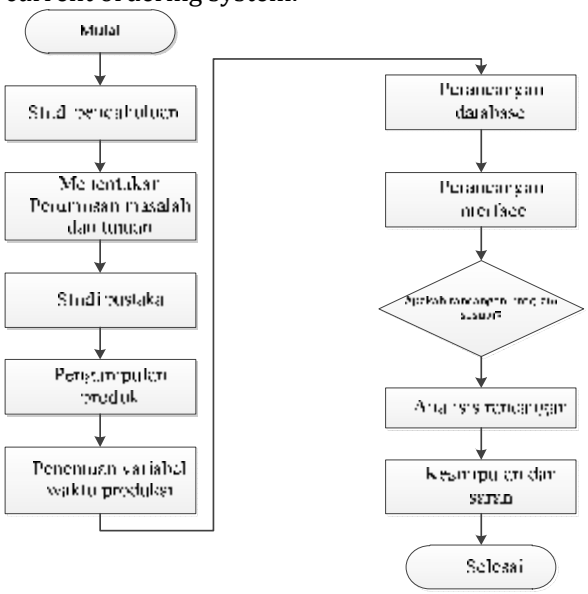

Figure 1. Problem Solving Framework

Formulation is used so that a problem has a real purpose. In addition, it can determine the model to be used. Create a system framework. Determination of the boundaries used to limit the problem so that it does not expand and then determine the objectives to be achieved in the research. The data collection used, where the data taken is data in the form of drawings of components or parts which are then collected and modeled; materials used; machining time (setup time, operation time).

In database design, the first step is to design the input table, the tool type table, then design the product data table. From the table they are related so that it is expected that there will be a time estimation database. In designing the interface, a data flow diagram is made so that it makes it easier to design. The interface contains a menu consisting of input, product data, material data used, and the type of tool used. As for the interface design itself using Visual Basic 6.0. Program trials are used to validate. The validation of a program is re-examined to detect whether there are errors in the model and if it needs to be modified. This analysis is used to determine the performance under study.

RESULTS AND DISCUSSION

The description of the condition of the existing system in general, both input, process and output in accordance with the data flow-based design method obtained is described as follows:

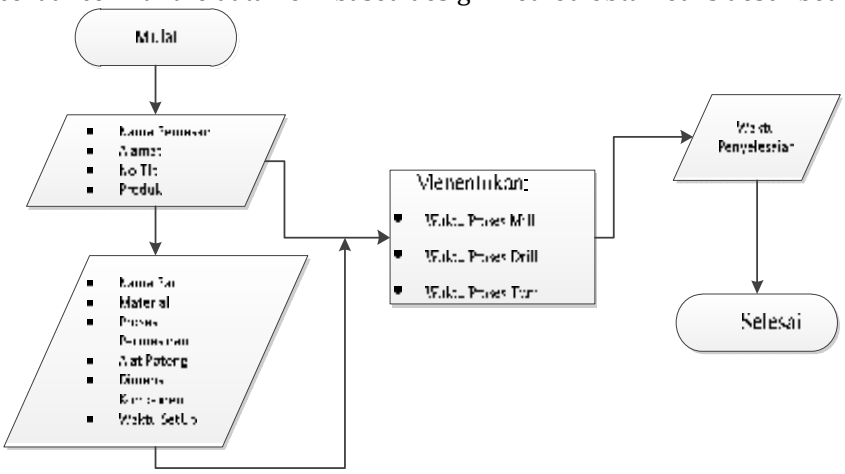

Figure 2. General Product Manufacturing Timing System

From the results of the analysis, the flow diagram is as follows:

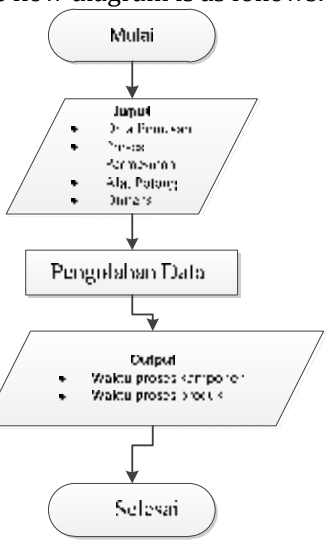

Figure 3. Production System Flow Diagram

The attributes contained in the customer database consist of: customer code, name, address, telephone number, product.

Table 1. Customers

Name Field	Type	Size
Customer Code	Text	5
Name	Text	20
Address	Text	20
No phone	Text	20
Product	Text	15

In the main menu there are several menu bar options, namely:

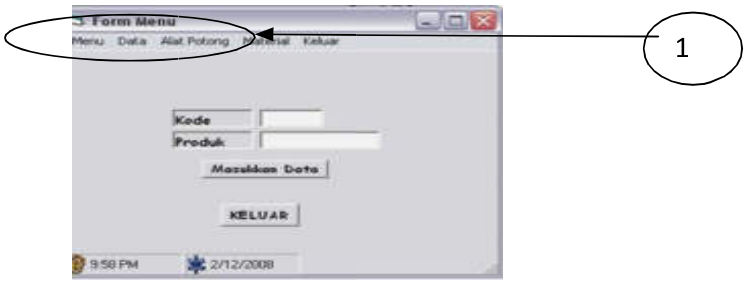

Figure 4. Main Menu Image

The overall output time is like the following picture:

Figure 5. Time estimation results

Discussion

This system can process data quickly and efficiently so that it can make it easier to know the length of the process and provide information for people who need it. For the process in the scheduling section that has not been automated, so to find out the machine load is still manual input because this application only displays the last date of ordering. In the manual process in this application there is no automated calculation so it uses manual input for manual processing.

Because this program uses the Visual Basic programming language, once compiled, the program can be run directly without having to use the Visual Basic software program by double clicking on the program file, as shown in the following figure:

Figure 6. Main Menu

After the program is run, the next step is to enter the name of the product to be estimated, then press the “ENTER DATA” command which will call the process form. After the process form is displayed, the next step is to enter data according to the characteristics of the product. Where the data entered include: the name of the component of the product, the number of components, the type of material. The next step is to enter the machining process data. The data are in the form of: cutting tools used, component dimensions. If the time for the completion of the ordered product has been known and agreed upon, then the next process is to enter data from the customer by pressing the "ORDER" command. If the customer does not receive a message, click the "EXIT" command.

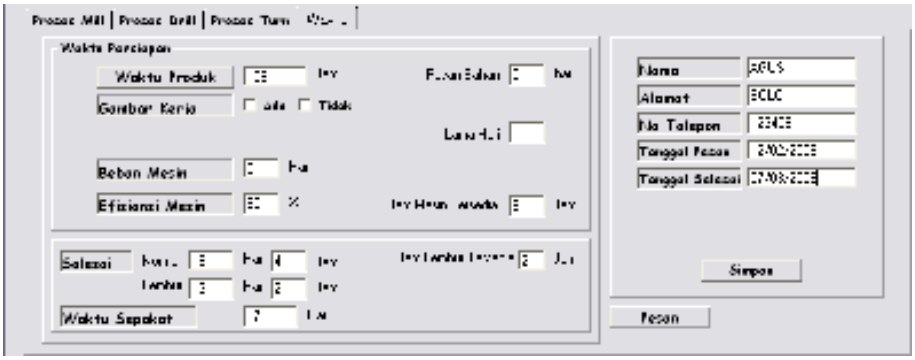

Figure 7. Order Form

To determine the accuracy of the calculation of a program, verification is carried out where the calculations are carried out manually, then compared with the calculations in the program.

From the calculations using the program that has been made, the time required is 16.5 days, when compared with the fact that the time needed to make the product is longer about 20 days because the manual process in the program is still an assumption, namely for one component it takes a manual processing time of 60 minutes. Meanwhile, many of these vise products use manual processes, which take more than 60 minutes per component.

CONCLUSION

Based on the research that has been done and the discussion of the problem, it can be concluded that: This research has resulted in an information system for decision support, especially time estimation. The system in calculating the machining process has been automated, so the time required for receiving orders is faster and more accurate. In this study, to process RAGUM products, the required machining time was 16.5 days with 8 hours of work per day and 80% machine efficiency. Where the calculation verification at the company takes about 20 days longer because in the manual process the calculation program has not been automated. By using the visual basic program, the interface made is friendly. Where the interface makes it easy for users to enter data. So there is no need for special skills to run the program. From the design of the program the user can obtain information on the last date of the order and the time required for a machining process.

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