CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Manufacturing industry is the most fast-growing industry nowadays in the world as well as in Malaysia. According to the Department of Statistics Malaysia (2015), the growth index of industrial production in manufacturing ranked the top with 7.8%, mining (6.9%) and electricity (3.0%). Since so many competitors in the market, many manufacturers need to maximize the utilization of the machine and also the worker performance in order to compete in the market. Simulation is one of the most common used tools to analyze complex production system. The Oxford English Dictionary explain the term "simulation" as the skill of mimic the behaviour of system by means of analogous model, situation, or apparatus, in order to collect information more conveniently or to train personnel.

This research aims to build a pragmatic tool that called simulation model to eliminate the unnecessary running time and improve the efficiency in the production systems. Simulation model can act as the planner for the production system to move and follow the model that being built. It normally applied in the manufacturing industries as well as service industries like bank and hospital. By using simulation and refer to case study and also advanced templates, we can somehow figure out many solution. There is a variety of simulation models. Simulation is categorized as static simulation model, dynamic simulation model, deterministic simulation model, stochastic simulation model, continuous simulation model and discrete simulation model (Hailu et al., 2015)
Discrete-event simulation (DES) will be used in this research. It is suitable use to analyze the complex system in the manufacturing system which got a lot of changes in the process time for every workstation (Deng, X et al., 2015). In this research, simulation is applied inside the workstation; the process time for each workstation can be measured and evaluated. Then, simulation modelling will be proposed to make improvements on the process running time to increase the efficiency of the production system. Simulation has been broadly used since it can save money by using what-if analysis aside from building the real model.

1.2 BACKGROUND OF STUDY

Over the last few years, factories especially in the manufacturing industries have progressively focused on productivity and efficiency. This is a win-win strategy which may benefit between the factories and customers. Customer can buy the product at the cheaper price and factories can generate more profits by producing more units at once time. Due to the rapid growth population, getting more market demand for door frame as the number of housing areas keep increasing. But, company sometime cannot fulfill the requirements of customer order. Moreover, many homogenous company compete in the market. Customer normally will go for shorter lead times and fast delivery company. Company tries to make some improvements to enhance the production by buying the semi-conducted product to further process until finished product, adding new production line to assuage the inefficiency supply. All the existing method seems cause high cost and does not work out. Moreover, in the production line, there are three types of operating methods, automated, partially automated and manually. The partially automated is the most preferred in the industry. Every workstation consists of operator with the machine. The number of machine and process may be more than one. So, it is hard to assess the performance of the operator and machine. Therefore, it is recommended to use simulation to predict the problem.

Simulation is an indispensible pragmatic tool to solve many real-world problems (Banks, J., 1998). Simulation is a tool that can construct a model of current system or proposed system in order to figure out what is the factors affect the system or forecast the system future behaviour. Our aim is to replace the existing method with simulation
to solve the problem more efficiently. The correction can be done by eliminating the defects, speed up the machine runtime and fully utilizing the machine. With this, big amount of products can be produce at once time, reduce the mechanical stresses and in more high quality. Discrete-event simulation will be aimed in inspecting the bottlenecks, the queue size and allocation and machine breakdown interval.

According to observation and information given by the Production Executive, Mr. Alex She, the criterion that attained are the production line of door frame production consists of four different paths which are hinges for spot-weld, lockset installation, frame forming, spreader bar, all the parts from every path will be assembled, touch up and packing (Figure 3.2). The workstation design and layout of the machine and operator may affect the productivity, processing time and production cost (Saptari et al., 2011) are all the data that is very crucial in the Arena software. Production lines are very complex. The company must design the best production line with little time and produce quality product at lowest cost. Moreover, need to follow the market trend like changing from time to time according to customer needs.

The door frame company is a manufacturing company. Customers need to fill in the Purchase Order (PO) Form online or fill in manually and faxing to the company. Company is using the MTO (Make To Order) Policy which upon received the order from customers, then only the production line start to produce the relevant stock. It is because the door frame available in profiles and sizes. The operators need to set up the machine following customer order. So that, the production system needs to be have high flexibility to change according to the production capacity requirements. Hence, this research aims to evaluate the performance of the current production system and make improvements to increase the efficiency and productivity of the system.

1.3 STATEMENT OF THE PROBLEM

In this research, the company faced problems like receiving complaints for late delivery and defect return back by the customer. In the factories normally the machine is set up by the operator, the door framing plant faces problem like operators speed up the machines in order to produce more units. But, it causes a big issue because the