

ABSTRACT

The cracker dough kneading tool is an auxiliary tool that serves to knead the dough to make crackers. The tool used at the work station is a custom ordered machine that has indications of development that is not optimal so that the machine cannot stir the dough effectively because there is still air content in the dough so that the dough must be ground manually by workers. As a result, the process at the work station is inefficient because there is a repeating of the dough milling process. Before the dough is manually ground by hand, it needs to be removed from the kneading machine. The dough is removed from the kneading machine by tilting the stirring tub so that the dough is removed through the bottom of the machine. When removing the dough, the machine operator must lower or even squat down so that the dough can be removed properly even though there is still dough residue on the machine. Because the dough is removed through the bottom so that it requires the dough weighing 60 kg to be lifted to the table, in this process an assessment is needed using (*Rapid Upper Limb Assessment*) RULA and (*Rapid Entire Body Assessment*) REBA worksheet to determine the ergonomic level and risk of *Musculoskeletal Disorders* (MSDs) on workers.

After analyzing the existing conditions using (*Rapid Upper Limb Assessment*) RULA Worksheet and (*Rapid Entire Body Assessment*) REBA Worksheet, a value (*Rapid Upper Limb Assessment*) of RULA was obtained of 7 which means that it is necessary to investigate and apply changes, in addition to that, a value (*Rapid Entire Body Assessment*) reba 11 is obtained which means it has a high level of risk so that changes need to be applied, and there are complaints or disturbances in the joints or muscles due to the position of the worker that is not ergonomic. The non-ergonomic position has the possibility of causing complaints commonly called *Musculoskeletal Disorder* (MSDs). Therefore, it is necessary to design a proposed dough kneading tool using the *Ergonomic Function Deployment* (EFD) method by calculating the value (*Rapid Entire Body Assessment*) REBA, (*Rapid Upper Limb Assessment*) RULA, and productivity.

The design of the dough kneading tool uses *an ergonomic function deployment* (EFD) approach because this study aims to design a more ergonomic

tool based on *the ergonomic needs* of the user or *users*. The dimensions of the tool to be designed are adjusted to the operator's posture and use anthropometric data references for Indonesian adult men to obtain an ergonomic position. The design of the dough mixer is based on 10 principles of ergonomics and also the principle of ENASE (Effective, Comfortable, Safe, Healthy, Efficient). The research process began with a direct observation process at Barokah SMEs and conducted direct interviews with related speakers, namely the owners of Barokah SMEs and operators of existing stirring machines. Analysis using the REBA and RULA methods is carried out by giving an angle to the operator's work attitude or posture when using the dough stirrer, then identification and assigning values based on the angle that has been given to the operator's work posture or attitude. The REBA analysis is carried out because the operator uses all parts of his body to carry out the process of lifting the dough so that the REBA method can be done quickly to assess the posture of the work attitude from the neck, back, arms, wrists, to the operator's feet. In addition, the analysis was also carried out using the RULA method because during the operator's process of manually grinding the dough on the table, the operator's work attitude involved part of the upper body, namely the hands, wrists, shoulders, to the angle of inclination of the head. Then an analysis of the productivity calculation was also carried out, the calculation was carried out to prove that using the proposed machine there are several processes in the work station that can be reduced so that the dough stirring process can be done faster to increase productivity.

After analysis, a RULA value of 3 and REBA of 2 was obtained, which means that the design of the proposed stirring tool is proven to be in accordance with the anthropometric data used so that it can be more ergonomic and comfortable to use by the machine operator, and the proposed stirring tool also has an increase in the stirring capacity to 70 kg and there is a reduced process so that it can cut the dough stirring time, which is 7 minutes faster for each *batches* or 3 hours faster per day.

Keywords— Cracker Dough Kneading Tools, 10 Principles of Ergonomics, ENASE Ergonomic Function Deployment, Musculoskeletal Disorders (MSDs).