

An Avoidance of Short Circuits for Fryer Machine in Salleh Food Industries

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Abstract: A Semi-auto fryer machine is widely used for deep frying foodstuffs in small industries such as at salleh food industry in Batu Pahat. However, these machines are often stopped frying process due to the oil has splashed out into the Combustion Control Unit (CCU) and have an adverse impact on the frying operation becomes delayed. The improvement is needed to execute the CCU to avoid a short circuit continuously occurs. The experimental research method was chosen as the research method. Researchers have succeeded with different types of material insulation from the spillover of cooking oil. The results of this study revealed that the compressed fiber gasket material called compressed fiber sheet aramid-carbon is an appropriate material to prevent the cooking oil splashing out from the frying pan. For further addition, researchers have been designed a box using steel material to recover the solenoid valve and installed two units of fan ventilation to reduce heat temperature degrees. Thus, the CCU will function with long-life duration without frequently exchange on solenoid valve unit.

Key words: Semi-auto fryer machine, frying food stuff, combustion control unit, machine operational capabilities, cooking oil, fiber gasket material, compressed fiber sheet aramid-carbon

INTRODUCTION

Semi-auto fryer machine is also known as a new technology innovation design. According to the experts who have been able to control the fryer machine were save a lot of time to produce large quantities of food stuff frying and increase the productivity (Rossell, 2001). The modern commercial fryer boasts improved energy efficiency due in part to better heat transfer systems. Gas fryers heat up more quickly and very higher of cooking temperature rather than electric fryers. Gas fryers can be powered by either natural gas or propane, both of which are generally less expensive energy resources than electricity. Therefore, the gas power came more popular in floor model fryers. The fryer machine is the main asset for food stuff manufacturing company and made as a role of production as shown in Fig. 1.

Literature review: Semi-auto fryer machine is also known as a new technology innovation design. According to the experts who have been able to control the fryer machine was save a lot of time to produce large quantities of food stuff frying and increase the productivity. The environmental also important for the factors that should be added to the situational for instant the temperature always change every time (Saleh and Ndubisi, 2006).

Semi-auto fryer machine a cooking process where as the water containing in food stuff is immersed into edible



Fig. 1: Semi-auto fryer machine

oils or fats at temperatures between 140-180°C. In the first phase, within a few seconds, a thin crust forms that the structure crucially affects the deep-frying process and the quality of the food with regards to fat absorption and crispness. Fats and oils have a high heat capacity, whereby enabling heat transfer at temperatures far above of the boiling point of water. Due to the evaporation in the boundary zone between food and oil, the water bound in the food is gradually transported onto the boundary layer.



Fig. 2: Solenoid valve



Fig. 3: Solenoid valve placement

The statement of problem: Usually in an early stage of frying food stuff processing was found that the cooking oil and water mixed been splashed out. It has an impact on the CCU and the frying process to be stopped. Then spraying the flames of burning gas has stopped running cause the frying process to a stand still. So, it also causes the short circuit and it will automatically stop the whole frying process. The damaged component is called solenoid valve as shown in Fig. 2. If there is a breakdown, then it should be replaced with waste costs. In Fig. 3 shows the solenoid valve placement in the place of its placing on and connection as well. In the other views, the environmental also important for the factors that should be added to the situational for an instant the temperature always change every time. Therefore, productivity has been influenced.

Semi-auto fryer machine is a food stuff cooking process whereas the water containing in food stuff is immersed into edible oils or fats at temperatures between 140-180°C. In the first phase, within a few seconds, a thin crust forms that the structure crucially affects the deep-frying process and the quality of frying food with regards to fat absorption and crispness. Fats and oils have a high heat capacity, whereby enabling heat transfer at temperatures far above of the boiling point of water.

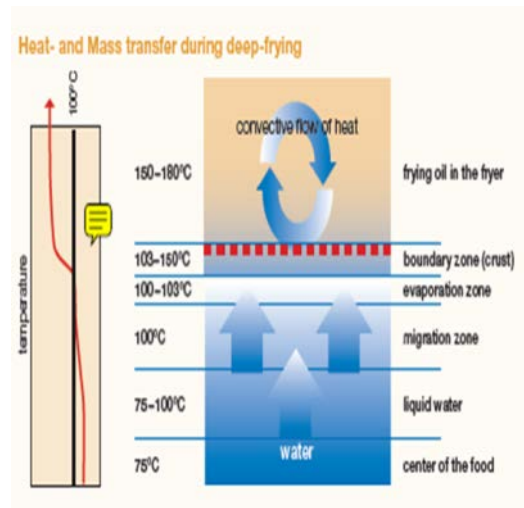


Fig. 4: Heat and mass transfer during deep fryer

Due to the evaporation in the boundary zone between food and oil, the water bound in the food is gradually transported onto the boundary layer. This process is illustrated in Fig. 4.

MATERIALS AND METHODS

The experimental research was selected as a method to perform in this research (Saunders *et al.*, 2009). Experiment tends to be used in the exploratory setting for experimental research. According to Takim, normally, laboratory-based experiments are demanding of facilities and department's expensive support is extremely needed. Some phenomena are deemed too complex to be adequately studied under experimental conditions, the generality of results produced may be limited and the results may not reflect the realities of the case under investigations based on Stone (1978) and McQueen and Knussen (2002).

RESULTS AND DISCUSSION

The result of this research is found that the selection of materials as a material protection of oil and water splashing into the CCU are identified. Furthermore, the heat temperature data was collected to overcome the heat surrounding of CCU. It aims to reduce the temperature around the CCU and provides long lasting of the solenoid valve. Therefore, there are two results in this research.

Results for experimental of gasket: Based on the long-term durability tests have demonstrated that the gasket material has more excellent heat resistance compared to other types as in Table 1. The result had shows comparison from three types of gaskets, on the performance of the material quality.

Table 1: Experimental of gasket

Types of gasket			
Types	Quality	Material	Results
Carbon	Excellent	Carbon fiber	Successful
Graphite	High	Graphite filter	Moderate
Ceramic	High	Ceramic press	Moderate



Fig. 5: Compressed fiber sheet aramid-graphite

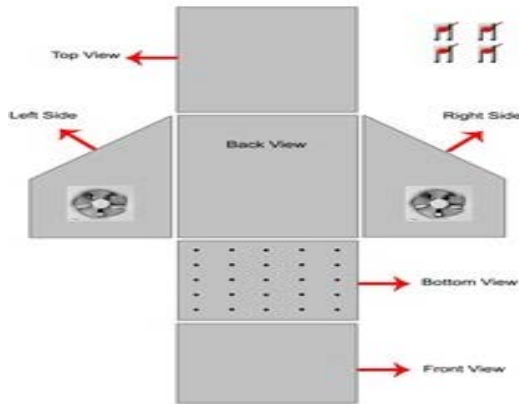


Fig. 6: Protection cover layout

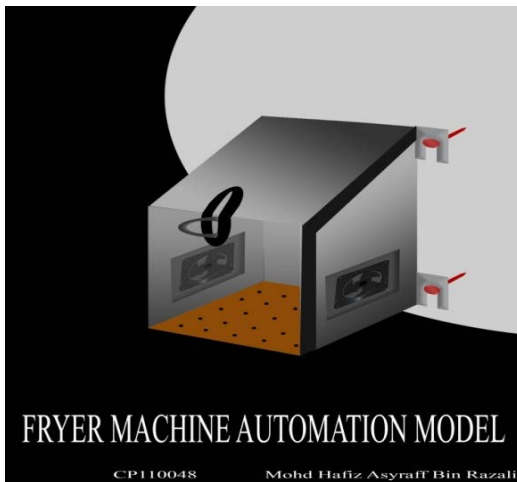


Fig. 7: Protection

Table 2: Temperature level and reliability of gasket

Implementation dates	Temperature in protector design	Reliability of gasket
September (1/9/14-10/9/14)	17.0°C	Excellent
September (11/9/14-22/9/14)	18.9°C	High
September (23/9/14-30/9/14)	18.3°C	Excellent
September (23/9/14-30/9/14)	20.6°C	Good
October (11/10/14-22/10/14)	21.3°C	Good
October (23/10/14-31/10/14)	20.4°C	Good
November (1/11/14-10/11/14)	16.9°C	Excellent
November (11/11/14-22/11/14)	18.7°C	High
November (23/11/14-30/11/14)	19.4°C	High
December (1/12/14-10/12/14)	21.0°C	Good

The physical successful material is gasket named compressed fiber sheet aramid-graphite shows in Fig. 5. The sheet has excellent temperature resistance, durable and is sealant 100% compressed asbestos.

Result for protection hot temperature in CCU : The protection cover has been designed to recover the CCU in order to avoid overheating of surrounding environment. The combination of full square shape was combined with the semi-triangle shape. This selected design is shown in Fig. 6. The protection cover has been completely installed to recover the CCU as an additional prevention to be any splashes of cooking oil (Gupta *et al.*, 2004) from the frying oil as in Fig. 7.

The temperature inside the CCU was measured using the digital thermometer tools to read the temperature level. Therefore, data collected was done the month of September and end of December, 2014 (Table 2).

CONCLUSION

This study focuses on an action to avoid a short circuit in the CCU where it comes from food fried of oil and water splashes in salleh food industry. Furthermore, the temperature of the surroundings has also been influenced the warmth on the CCU. Whereas, the experimental research method has been exactly chosen in addressing the issues (Noor, 2011). The experiment in selecting the appropriate material to avoid splashes was successfully is compressed fiber sheet aramid-carbon material as avoidance of breakdown to the CCU that cause food frying process will be stopped.

Also, the temperature surrounding the top CCU has successfully controlled with the under the minimum level of up to 16.7°C. The most of effective shape designs are also had their role to apply for it. Therefore, it's depending on the situational for reacting.

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