UNIVERSITI TEKNOLGI MARA

MODELLING OF AN ARRANGED-MICROSTRUCTURE INTERACTION AT SHORT CRACK TIP

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Final year project report submitted in partial fulfillment of the requirements for the degree of **Degree of Bachelor of Sciences (Hons.) Polymer Technology**

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AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

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ABSTRACT

The uses of airbag in vehicle manufacturing is widely used due to it is a safety device that protect the safety of the passenger. However, the behavior of microcrack which can contribute to the tear-off area and can lead to the failure at airbag housing poses a significant challenge. Rather than just focusing to the whole design of airbag housing, this study also focusing on the laser cut area that can contribute to the very high stress thus lead to the fracture failure at the airbag housing. Here, it describes the modeling of an arranged-microstructure interaction at the short crack tip which can be altered by identify the fracture failure that focusing on the laser cut area, as demonstrated by manipulating the behavior airbag housing with different length of the crack tip with high force same as the force at the inflator. By using the Finite Element Method (FEM), it can allow the resulting of the parameter which can contribute to the fracture failure that are strain rate, Von Mises stress, stress intensity factor, strain energy release rate (J-Integral) and the crack propagation rate of the airbag housing upon high stress applied. Increase in length of the crack tip exhibit to increase about 55.57% for the Von Mises stress and 27.57% for J-Integral value thus it will increase the value of stress intensity factor approximately 39.19%. Consequently, it also increases in Griffith value however decreasing in crack propagation rate. In conclusion, airbag housing with feasible length of the crack tip which is 2.4mm can lead to the acceptable tear off behavior that can considered reducing the failure at that area.

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