

**ANALYZING FAILURES TIME IN AUTOMATIC PACKAGING
OPERATION (SMS SVBMX-XX) OF CORN EXTRUDATE
USING STATISTICAL DISTRIBUTION MODELS**

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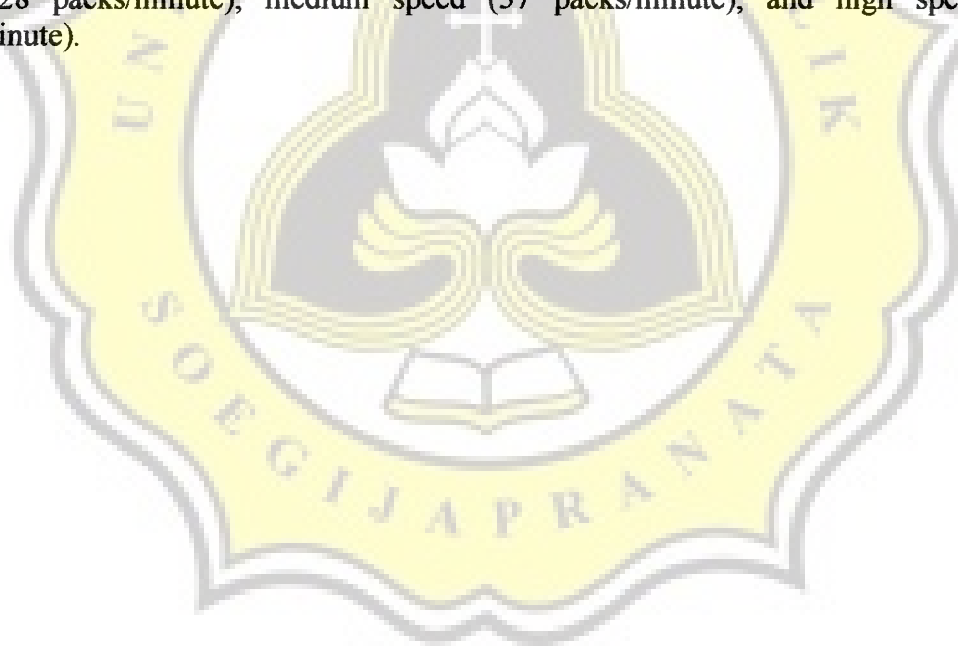
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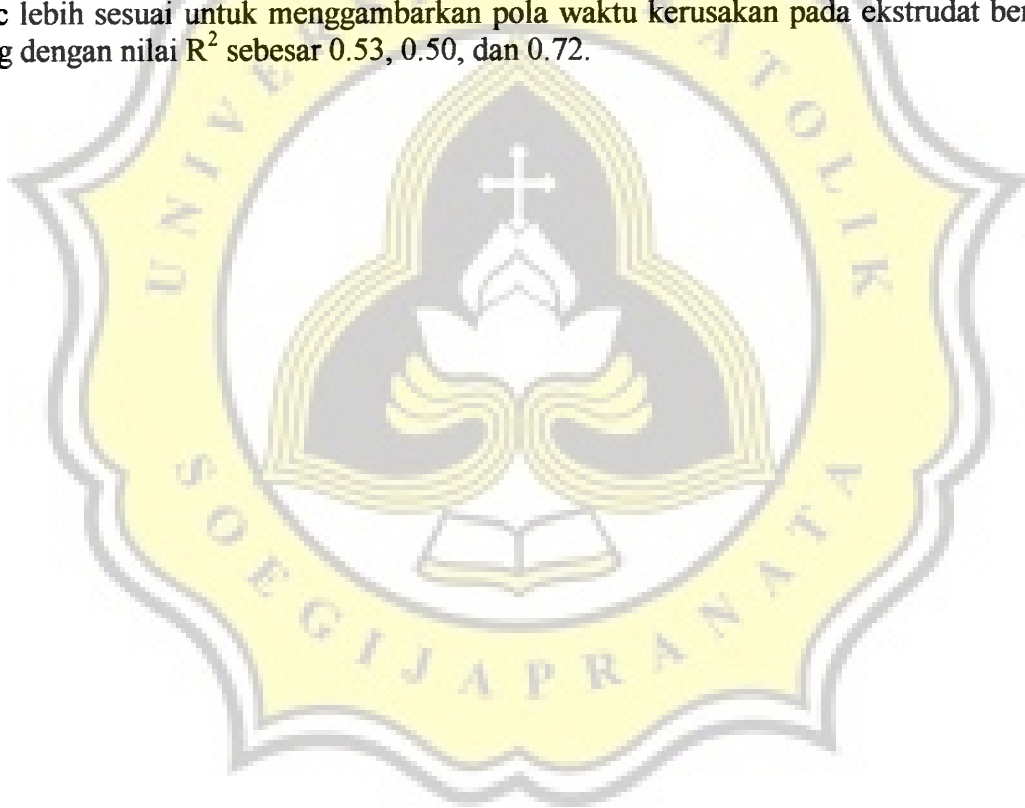
SUMMARY

Failures that lead to product damage are an essential aspect in food manufacturing. In order to predict the distribution of failure time in packaging machine, mathematical models were used. Mathematical models were commonly used to predict the distribution of failure time in industrial processing. This study focus exclusively on the distribution of failure time in the operation of SMS SVBMX-XX automatic packaging machine. There are two objectives of this study : (1) to know the most suitable distribution model for describing failure time of extrudate packaging operation; (2) to find out the relationship between the shape of extrudate and the failure time at three different speeds of operation, i.e. 28 packs/minute; 37 packs/minute and 46 packs/minute. Data of failure time in packaging machine were tested against two distribution models, i.e. Log-logistic and Log-normal probability density functions. Curve fittings were done using the non-linear subroutine of the SPSS for Windows version 10.0. The fits between observation and predicted values were then judged based on the residual values. Comparison of residuals of the two models were done based on the values of coefficient determination (R^2). The best mathematical model for spherical and cylindrical extrudates was showed by Log-normal and Log-logistic distribution function, with R^2 values of 0.27, 0.43, 0.52 for spherical extrudate and 0.53, 0.50, 0.72 for cylindrical extrudate respectively for low speed (28 packs/minute), medium speed (37 packs/minute), and high speed (46 packs/minute).



RINGKASAN

Kegagalan proses produksi yang berakibat pada kerusakan produk pangan merupakan masalah utama dalam industri pangan. Pada umumnya, waktu kegagalan yang terjadi selama proses produksi dapat diprediksi dengan menggunakan model matematika. Tujuan dari penelitian ini adalah untuk mengetahui model matematika berbasis distribusi statistik yang paling sesuai untuk menggambarkan waktu kegagalan mesin pengemas (SMS SVBMX-XX) dan untuk mengevaluasi hubungan antara bentuk ekstrudat (bulat dan lonjong) terhadap waktu kegagalan mesin pengemas dengan tiga kecepatan berbeda (28 bungkus/menit; 37 bungkus/menit; 46 bungkus/menit). Persamaan Log-logistic dan Log-normal diaplikasikan untuk menguji data waktu kegagalan dengan bantuan program regresi non-linear. Nilai R^2 akan menentukan kesesuaian antara model matematika yang dipergunakan dengan waktu kegagalan. Dari hasil pengujian diketahui bahwa persamaan Log-normal lebih sesuai untuk menggambarkan pola waktu kerusakan pada ekstrudat bentuk bulat dengan nilai R^2 sebesar 0.27, 0.43, dan 0.52. Sedangkan persamaan Log-logistic lebih sesuai untuk menggambarkan pola waktu kerusakan pada ekstrudat bentuk lonjong dengan nilai R^2 sebesar 0.53, 0.50, dan 0.72.



PREFACE

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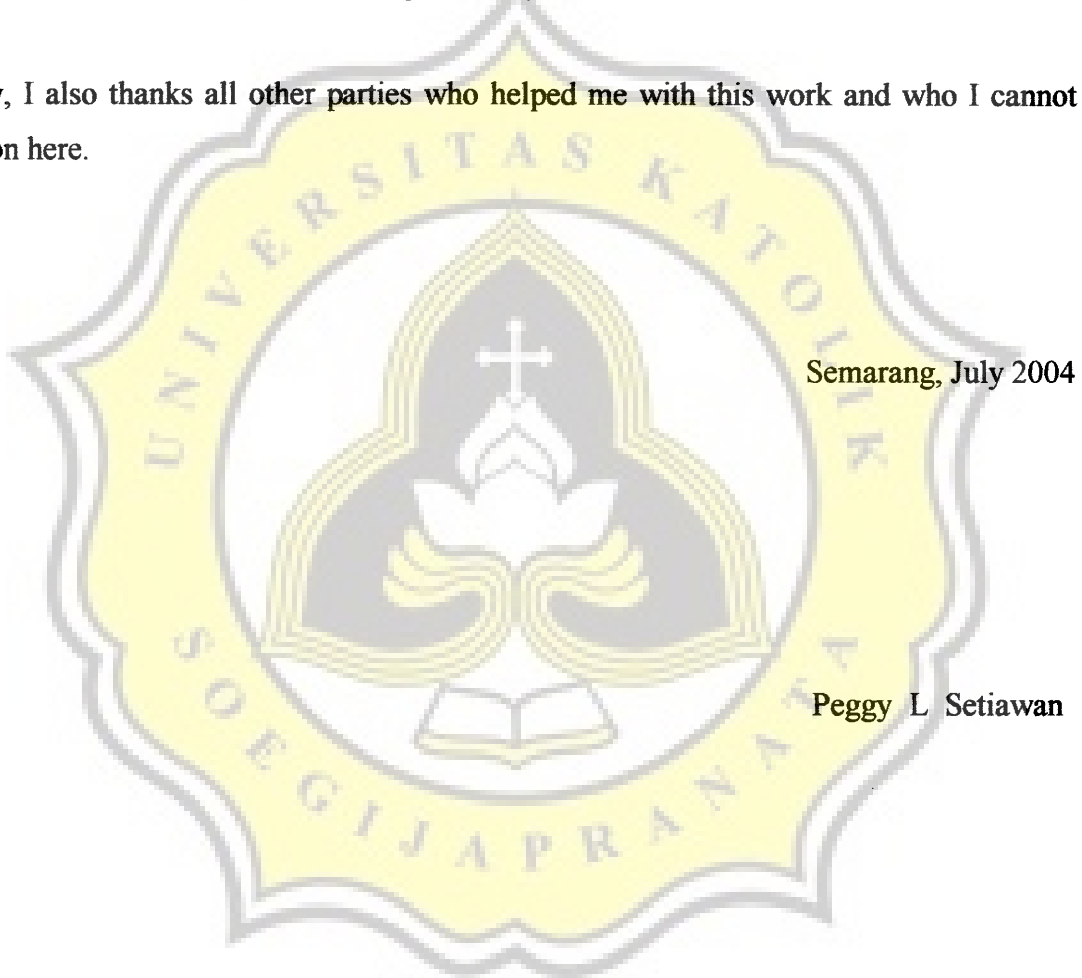
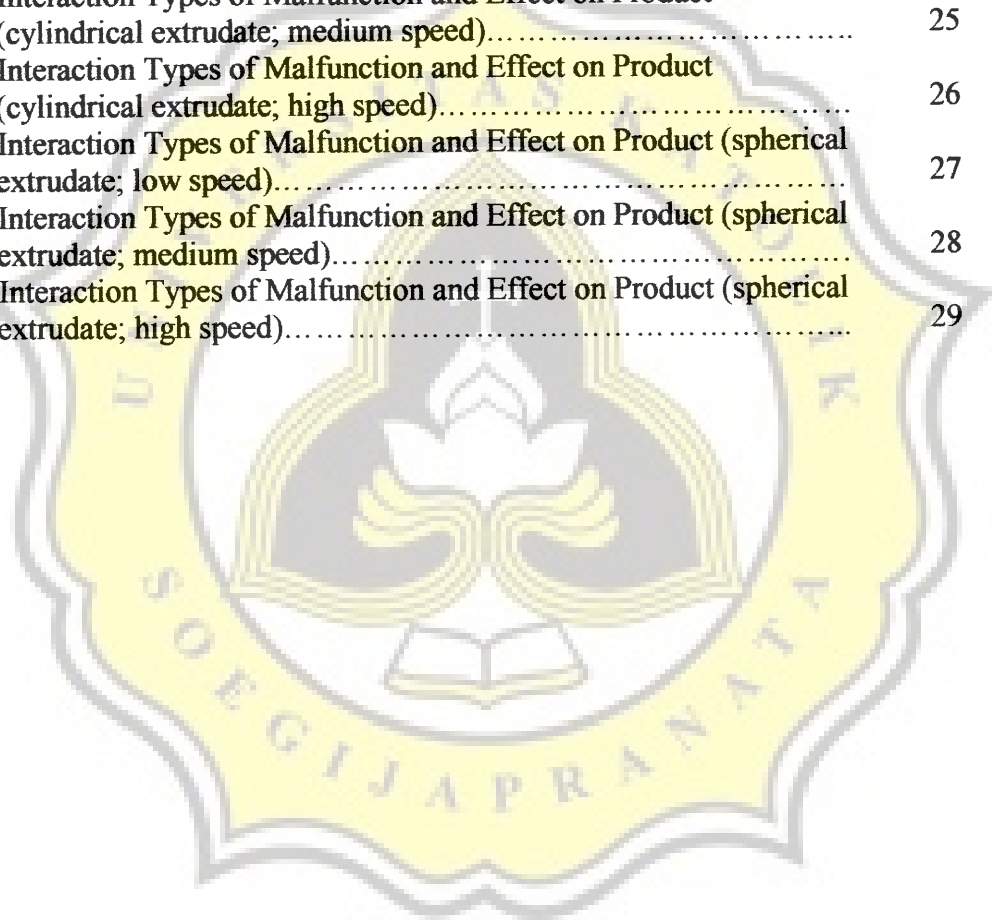


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