Thesis Title	Optimization of Food Cans Corrugation by using Response Surface Methodology
Thesis Credits	12
Candidate	Mr. Rattharong Rotbunsongsri
Thesis Advisors	Asst. Prof. Dr. Pattaramon Jongpradist
	Asst. Prof. Dr. Thoatsanope Kamnerdtong
Program	Master of Engineering
Field of Study	Mechanical Engineering
Department	Mechanical Engineering
Faculty	Engineering
B.E.	2554

Abstract

Food can structures are usually designed as a cylindrical thin shell which can resist relatively low bending actions comparing to its membrane strain energy. Loading conditions in the manufacturing process which can damage the food cans are bucklings due to vacuum pressure and compressive axial load. Corrugations on the can body are designed to stiffen the can body against vacuum load. However, they cause decrease in the axial load capacity of the can. Therefore, the corrugation must be designed to effectively withstand the occurred loadings. In the present work, finite element method is employed to simulate the behaviors of the food can failures under vacuum pressure and compressive axial load compared with the results from experiments. The finite element model is then used to analyze significant factors affecting the can structural performances. Response Surface Methodology using Central Composite Design is then performed to determine the second order polynomial to explain the relations between the two responses and the significant corrugation parameters. It was found that the corrugation depth, radius, and spacing, are correspondingly significant to the interested responses. When the obtained polynomial is used to optimize the corrugation design under working conditions, the container material can be reduced to the maximum of 12 percent while it can be used effectively.

Keywords: Food cans/ Cylindrical shell/ Buckling/ Finite element method/ Response surface methodology