Thermoformed-plastic package are used extensively for our daily life, especially for the food packaging. To minimize the cost, which is directly related to the mass of the package, the thickness is the most concern. Too thin of the wall thickness causes the collapse of the package when several parts are loading on top. This thesis applied finite-element analysis (FEA) for determining the thickness. The initial study selected a thermoformed tray with a square shape (124.5 x 124.5 x 28.5 mm, with the average wall thickness of 0.2 mm), made from polystyrene (PS), for investigation the deflection due to top loading – both experiment and FEA. The compared nine finite-element models (FEMs), they differed by constrain and static loading conditions. It was found that a FEM of the tray with four fixed corners at the base and distributed loading gave the most accurate result. The averaged vertical deflection, for the loading between 7.6 N and 38.0 N, gave the error of 3.49%; while the average of the absolute error was 5.02%. Further study, by using the obtained FEM, investigated various geometry and dimension influencing the top load strength of the package. This research introduced criterions for comparing the strength of the package; they were the ratios of i) force per mass (F/m), ii) force per capacity (F/V_C), iii) vertical deflection per mass (δ_z /m), and iv) vertical deflection per capacity (δ_z /V_C). A package with good strength would have the large values of F/m and F/V_C, and small values of δ_z /m and δ_z /V_C. The resulted studies tabulated a design guide which could help designers to design thermoformed products with better strength. For example the cylindrical shape has the best strength.

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