



LONGITUDINAL SEALS IN PACKAGES - Experimental Testing and Numerical Parameter Studies

Magnus Nilsson

Presentation

Autumn of 2005

Report

will be published as
report TVSM-5134

Supervisors

Kent Persson, *Ph.D.*
Div. of Structural Mechanics

Esfil Andreasson, *M.Sc.*
Tetra Pak R&D AB

The work is performed at

Div. of Structural Mechanics,
Lund Institute of Technology,
Lund University

In cooperation with

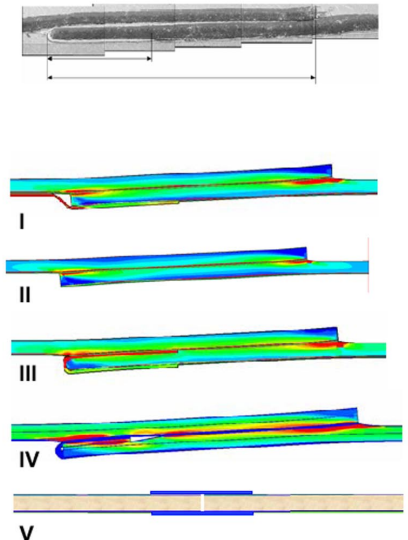
Tetra Pak R&D AB

Background

To develop packages for new applications, the mechanical behavior of the seals is crucial for the overall package performance. A better knowledge of the mechanical performance of seals from various seal techniques, (I-IV below) and the parameters involved are needed to produce stronger seals. Longitudinal overlap, strip dimensions and choice of material are among others interesting parameters. To determine the advantages and disadvantages of each seal technique, various setups have to be studied both numerically using ABAQUS as well as experimentally in the laboratory, for example:

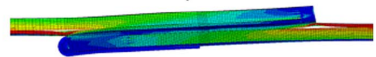
- I strip
- II no strip
- III folded strip
- IV skiving
- V tight, edge to edge

A new optimal seal setup may be found that in order to verify the FE-model, can be implemented in a real case (Drop tests with 1 L Tetra Brik packages). A developed three-dimensional material model for paper, 3DM, can be used to implement the delamination phenomenon into ABAQUS. The main objective of the project is to define FE-models of seals with verified material parameters implemented in ABAQUS with the aim of predicting the strength of the various seal techniques.



$$\sigma_y = -\frac{1}{\det F^*} F_{\alpha}^* \bar{T}_{\alpha} F_{\beta}^{*\prime} \quad E_{ij}^* = \frac{1}{2} (F_{\alpha}^{*\prime} F_{\beta}^* - \delta_{ij})$$

3DM implemented



Project description

- Mechanical testing of longitudinal seal overlaps and techniques with various materials.
- Numerical parametric study of the parameters in the seal FE-model by use of the finite element program ABAQUS.
- Verification of the FE-model with the mechanical testing.



LUND
UNIVERSITY