

Examensarbete vid Byggnadsmekanik



FRACTURE MECHANICS FOR A HEAT EXCHANGER GASKET

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Rapport

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Fracture Mechanics for a Heat Exchanger Gasket

A plate heat exchanger consists of a number of thin, corrugated plates with openings for the two heat exchanging fluids. The plates are put together with rubber gaskets for sealing of the plates and for making the flow of fluids efficient.

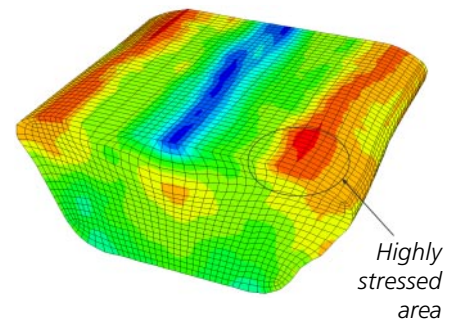
Background

In a plate heat exchanger, the material of the gasket and the plate, along with the geometric shape of the gasket and the plate are critical factors for the performance of the heat exchanger. In order to improve the sealing characteristics and also reduce time needed for the construction process, Alfa Laval has started to use finite element analysis as a tool in development of new designs and for modification of existing products.

Due to high pressures and temperatures, the gaskets sometimes tend to crack and cause problems for the customers. Hence, at Alfa Laval there is an interest in understanding the mechanisms concerning rupture of the rubber gaskets.

Objective

The objective of this master thesis is to describe the mechanisms behind



Part of the compressed gasket.

rupture of rubber gaskets related to the plate heat exchanger. This also involves a study of the mechanisms of extrusion of pressurized and heated rubber into a gap.

The main purpose is to evaluate fracture models suitable for FE-applications and investigate the parameters that governs fracture in rubber gaskets. Another purpose, related to the extrusion of rubber, is to evaluate if modifications to the existing gasket and plate geometry can improve fracture resistance.

A summary of previous work in this field will constitute a large part of the thesis and give a basis for Alfa Laval in the development of FE-procedures for fracture mechanics of rubber.

The FE-simulations will initially be focused on simple 2-D geometries using the software ABAQUS/Standard and ABAQUS/Explicit.