SPiES
The Art of Packaging

CASE STUDY 1

Optimisation of Fracture Properties Based on FEM Calculation

INITIAL SITUATION

For more secure closure, fins were applied on the lid of ice cream packaging, facilitating its insertion onto the ice box to ensure more secure locking of the lid onto the container edge when fully snapped into position.

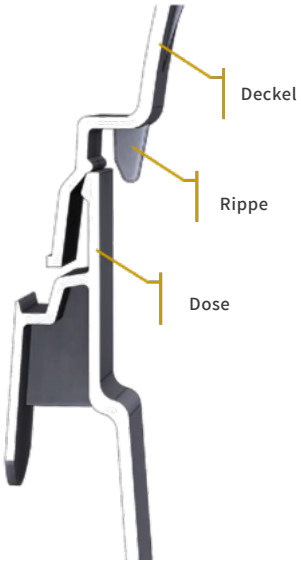
During production, deformation of the fins and subsequent fractures were a recurring problem. There was a risk that the fins would drop into the ice box and its contents.

INDUSTRY

Dairy products

STRATEGY/REASON

Undesired deformations and fractures



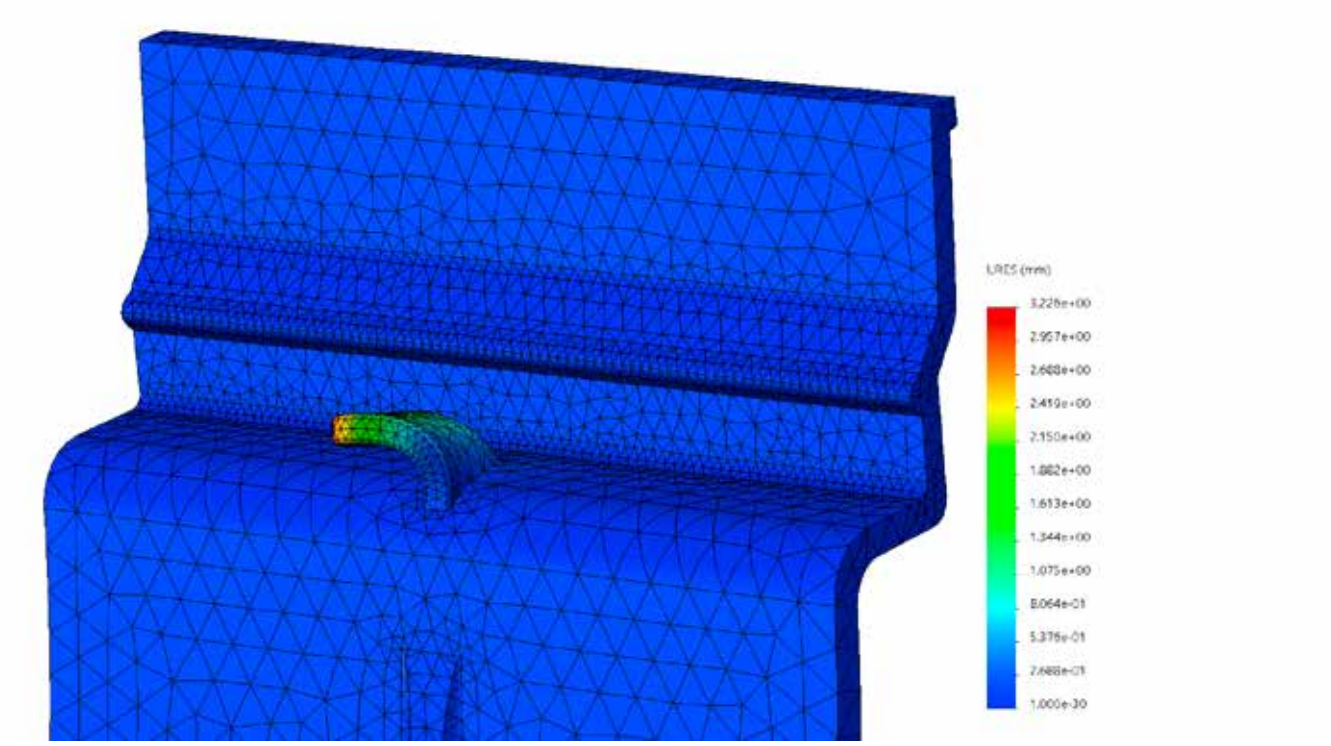
TASK SETTING

Optimise the design of the supporting fins/insertion aids on the lid in order to avoid deformation and fractures.

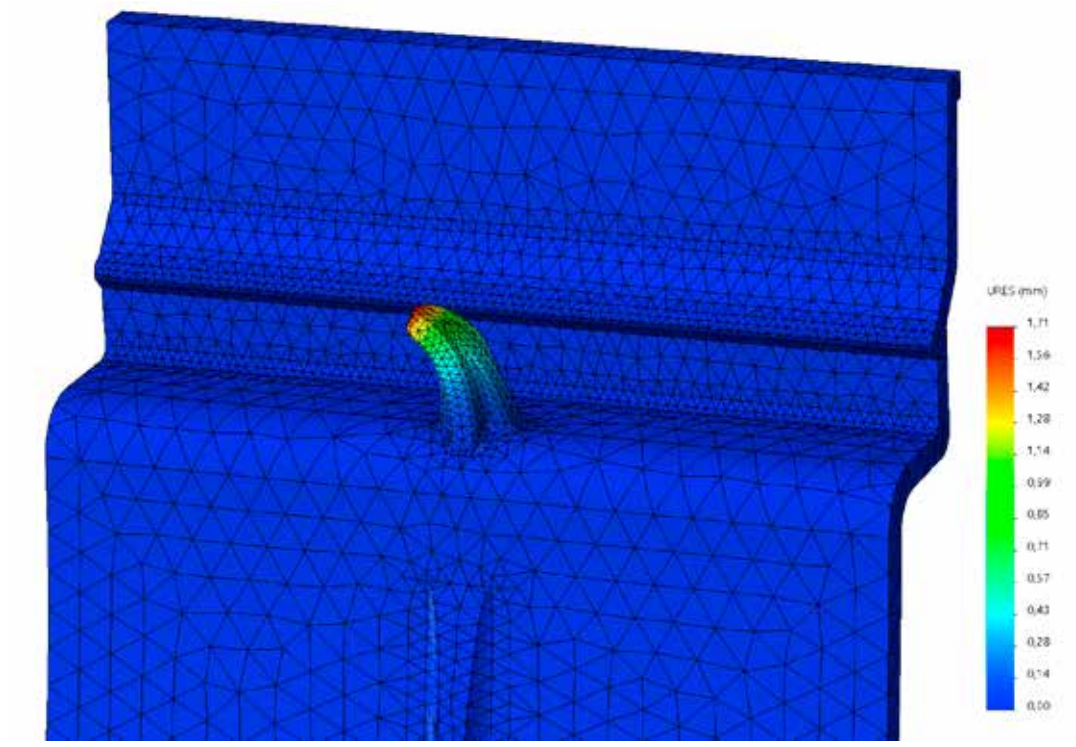
REALISATION

In order to find a quick and optimal solution for this task, we performed a computer aided strength calculation (Finite Elements Method, abbreviated FEM).

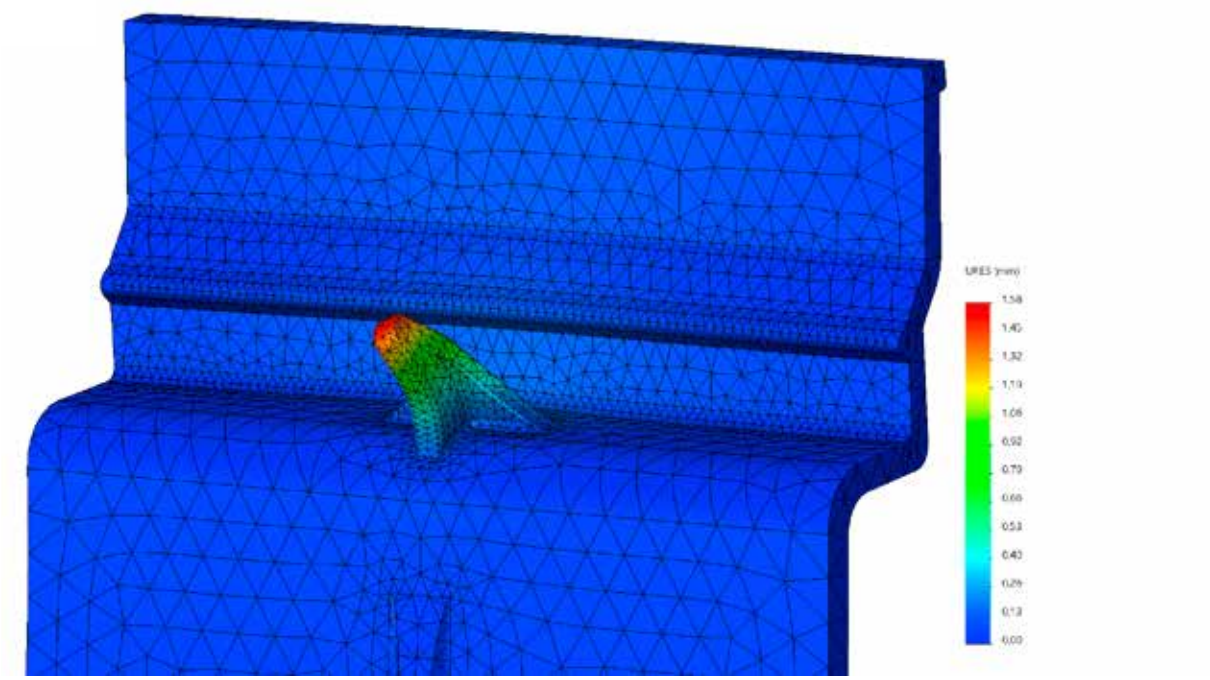
This enabled the simulation of different potential solutions beforehand and the comparison of the resulting deformation and fracture properties. Through several optimisation steps, the design was changed until a minimum load situation was achieved. The theoretically optimal solution was then implemented into the series tool.



Magnified illustration of the deformation result in the initial situation



Result of the first optimisation step



Result of the final optimisation step

RESULT

In the simulation, the mechanical load on the fins was reduced by the optimised design. The greatly reduced stress loads and deformation of the fins would significantly enhance fracture properties. The theoretical findings were verified by 100 % in the practical implementation. Th-rough extensive load and fall tests at the customer‘s site, the calculated improvements were fully confirmed.

CUSTOMER BENEFIT

Utilising FEM calculations, the optimal solution was obtained based on different variants. The solution did not necessitate expensive tool alterations.
The implementation time was reduced in comparison with traditional practical trial and error tool optimisation.

Our customer has been provided with an optimal solution within a short implementation period with minimum alteration costs. Product safety within the filling and logistic process was significantly increased.

RESULT
Improvements in

- **fracture properties**
- **implementation time**
- **product safety**