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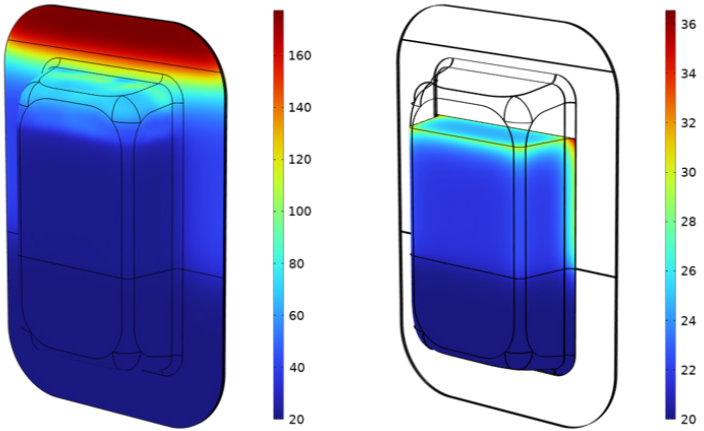
Mathematical model to understand a heat sealing process

Aktiv Pharma Group



Mathematical model development to understand how to prevent unwanted heating.

Expertise and domain knowledge

- Drug delivery
- Product design
- Mathematical modelling
- Knowledge transfer

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health delivered

Our client asked:

- How hot does the biologic inside a packet get when the packet is heat sealed during a filling process?
- Can we develop a mathematical model to characterise heat transfer and mitigate the biologic heating?

The project story:

- Our client wanted to expand the range of drugs that can be delivered by their device to include temperature sensitive biologics
- It was crucial to understand whether the process used to heat seal the packaging, heated the drug enough to degrade it
- Sagentia Innovation made initial estimates to identify the key heat transfer mechanisms in the process
- These were used to inform the set-up of a numerical simulation of the heat-sealing process in COMSOL
- The model demonstrated excellent agreement with validation data provided by the client, providing a high degree of confidence in the model outputs

Results: deliverables and outcomes

The model was able to:

- Identify radiative heating as the major source of heating in the drug
- Inform options proposed by Sagentia Innovation for reducing the radiative heating without compromising the heat-sealing process
- Calculate an upper limit for the temperature the drug experiences in the current process

Sagentia Innovation also provided a knowledge transfer session to deliver the model to the client. The client will be able to evaluate the impact of future design changes on drug heating.

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