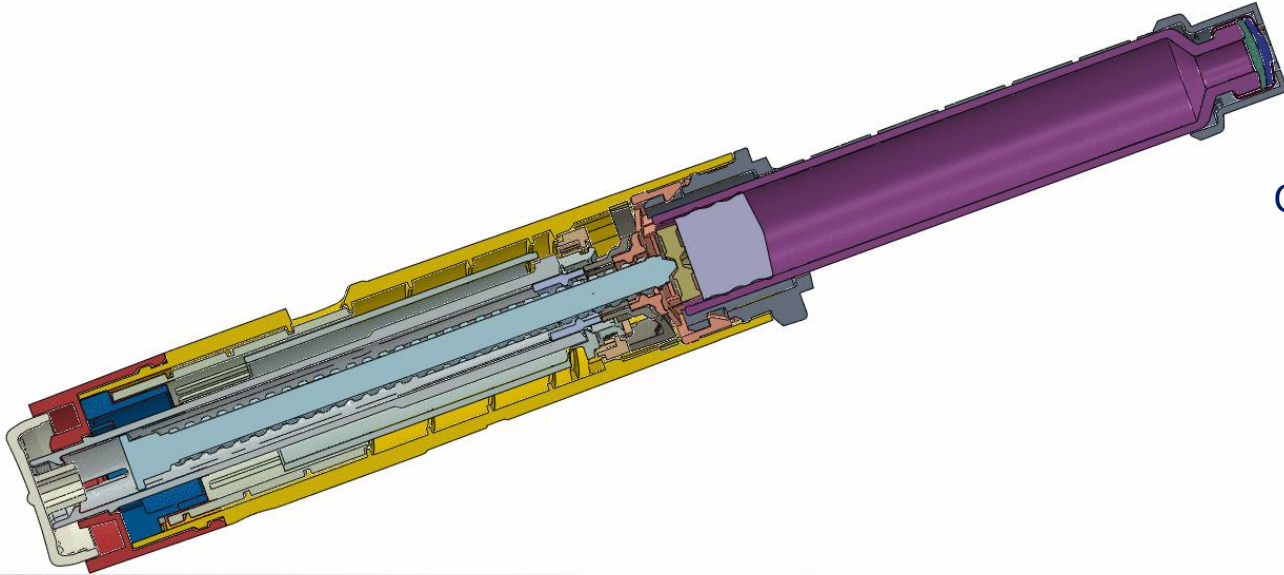


Virtual Development

How simulation-driven development
reduces lead time in Novo Nordisk

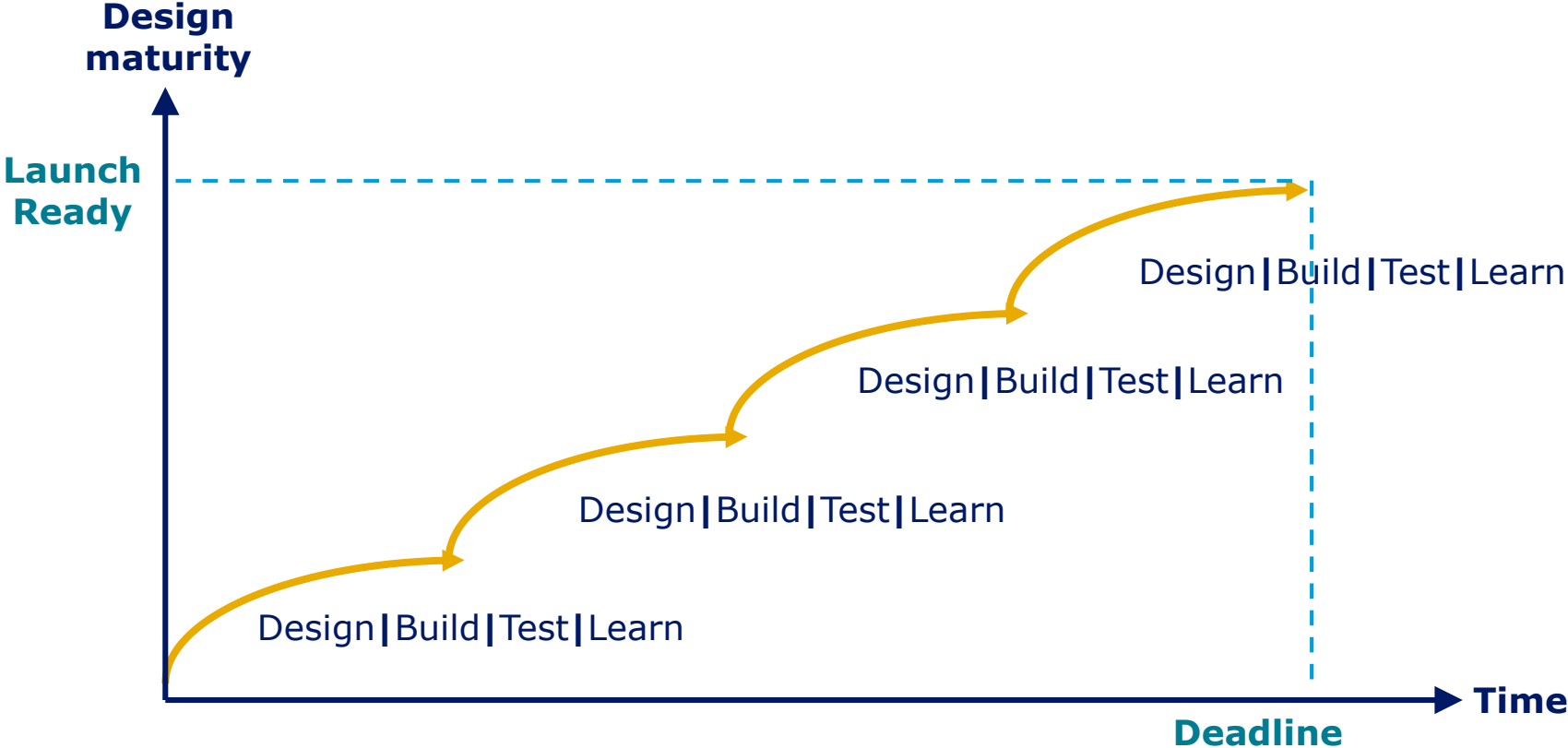


Søren Mikkelsen
Corporate Vice President
Device Development

Challenge: Increasingly complex devices, with extreme focus on safety, to be developed faster



Product development consists of many design iterations, each of which improve the maturity of the design



BUILD & TEST: Virtual and physical prototyping plays an increasingly important role in device development

2010

- ~500 structural simulations pr. year
- ~200 injection moulding simulations pr. year
- Single part analyses

- ~100 3D-printed parts pr. month



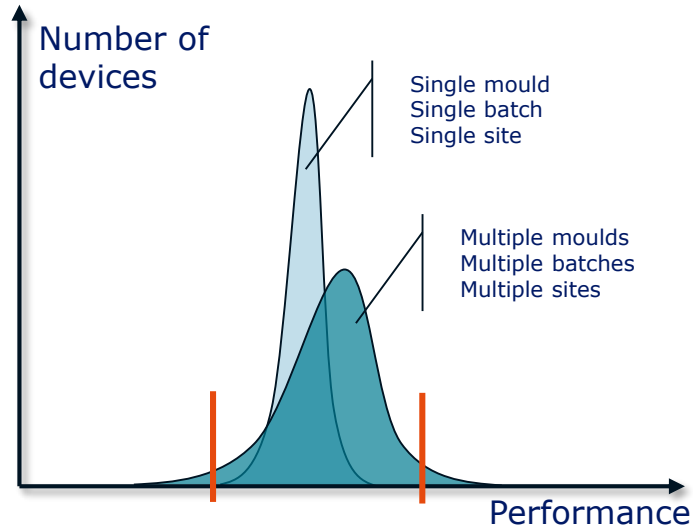
2017

- ~2000 structural simulations pr. year
- ~700 injection moulding simulations pr. year
- Full assembly analyses

- ~800 3D-printed parts pr. month

Physical testing has improved dramatically, but has limitations in terms of accuracy and speed

Limited sample size → Limited variation → False positive results

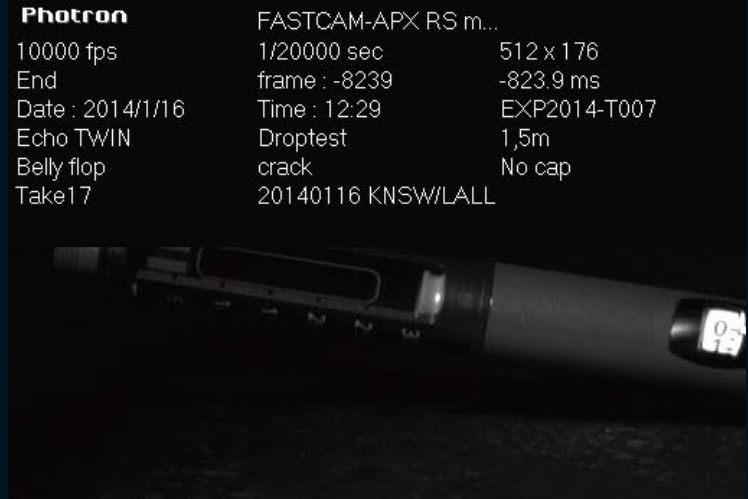
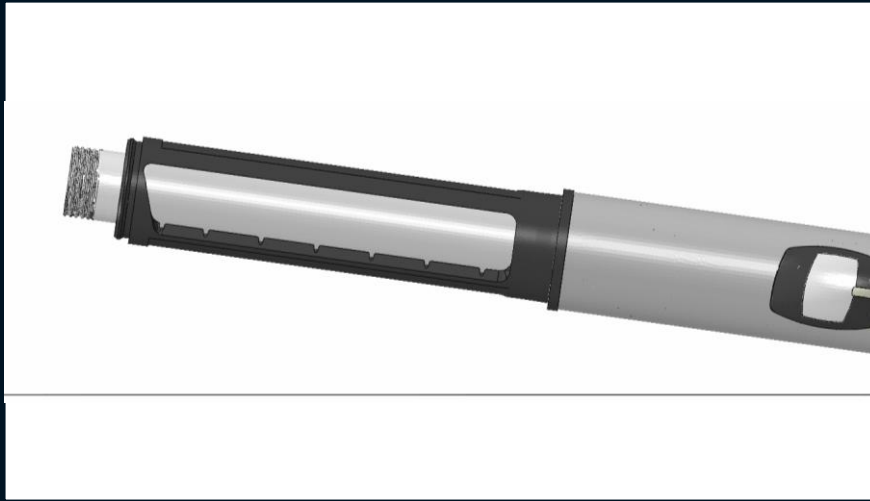


"We are currently spending 20% of our time finding solutions and 80% of our time verifying that the solutions work."
- Lead Engineer



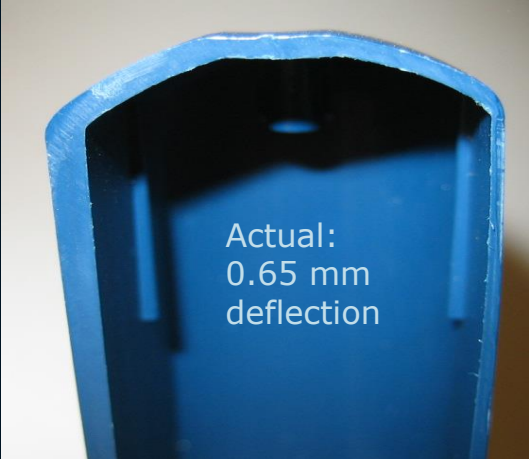
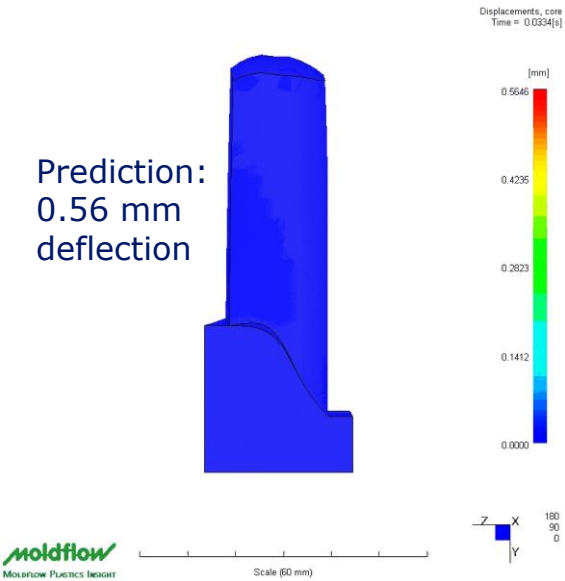
Virtual device models are used extensively to evaluate device performance

Comparison of drop-testing: Simulation vs. high-speed camera

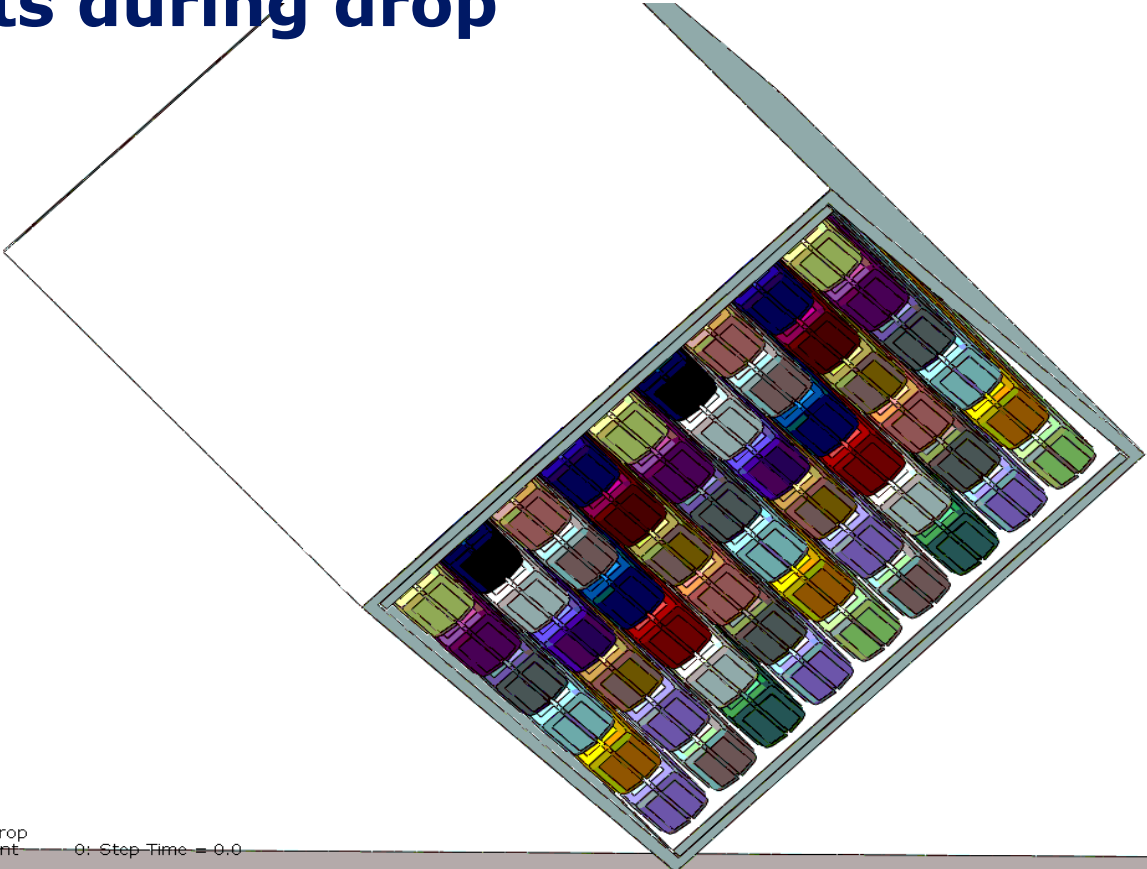


Injection Moulding Analyses predict manufacturing performance

Core in mould deflects during moulding: Simulation vs. actual



Predicting how packaging material protects products during drop



Step: Drop
Increment: 0: Step Time = 0.0

Deformed var: U Deformation Scale Factor: +1.000e+00



novo nordisk®

By 2025, virtual development will undergo dramatic changes, driven by the digital transformation

SPEED

Computing power will become a commodity



DEMOCRATISATION

All engineers will simulate, not just the experts.



INTEGRATION

Outputs from one type of simulation will serve as input for other simulations



AUTOMATISATION

The workflow for each simulation will be automated.



Thank you for listening!