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FROM SIMULATION TO SPRING SATISFACTION

In this article, Drew Jelgerhuis, Business Development Manager, Medical, at Scherdel Medtech North America, discusses the power of simulation to enhance a drug delivery device design project, including faster development times and reduced costs.

Development engineers are constantly trying to understand how their design will perform under various conditions, environments and applications. Simultaneously, project managers are trying to reduce the project's time to market and cut costs to beat the competition. Serving both these aims, simulation services are a great tool with which to test and evaluate designs and thus improve time to market and reduce overall costs before even making a prototype.

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Scherdel Medtec is committed to providing the best engineering for your medical device components. The company's simulation services include statics/dynamics, fatigue, metal forming, fluid dynamics, temperature, electromagnetics, multiphysics, optimisation, mechanical engineering and injection moulding (Figure 1). In addition to these simulation services, Scherdel supplements this analysis with a wide range of physical testing.

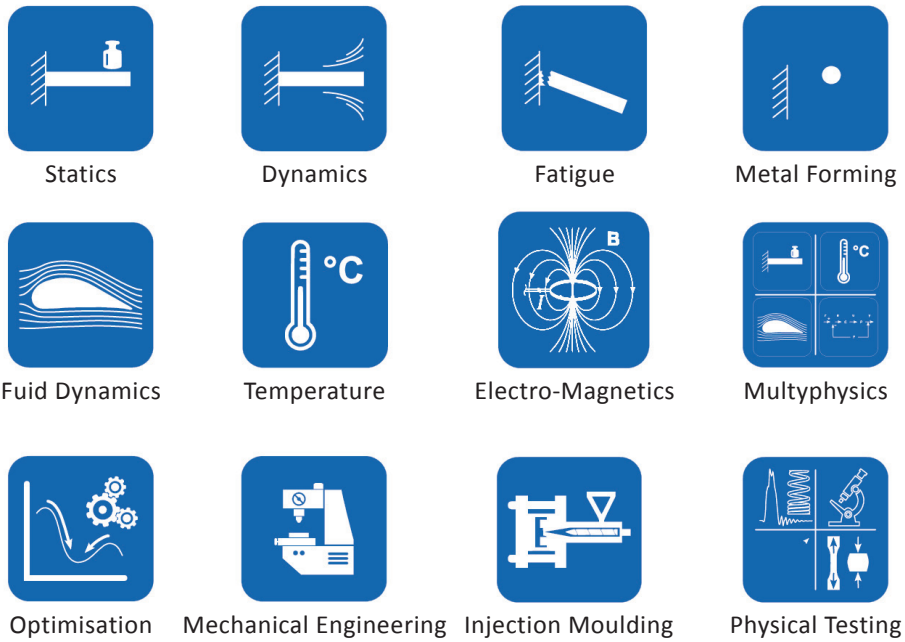

Figure 1: Scherdel's simulation capabilities.

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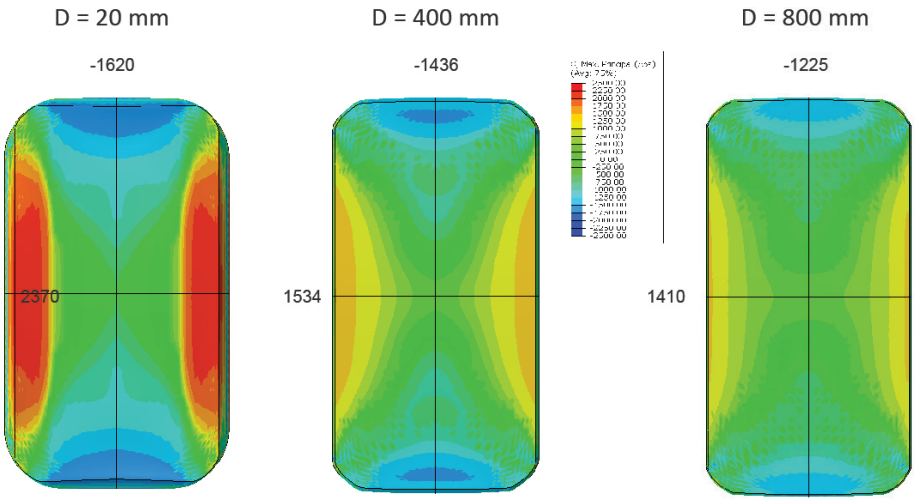

Figure 2: Simulating variation of a wire roller's diameter.

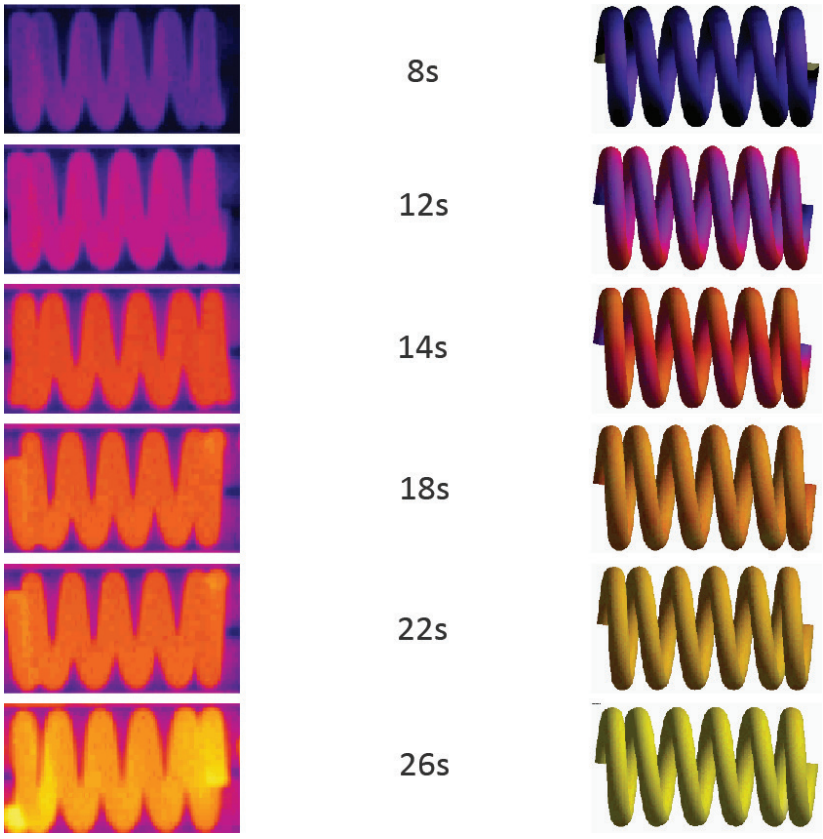

Figure 3: Simulation showing yellow/purple conduction.

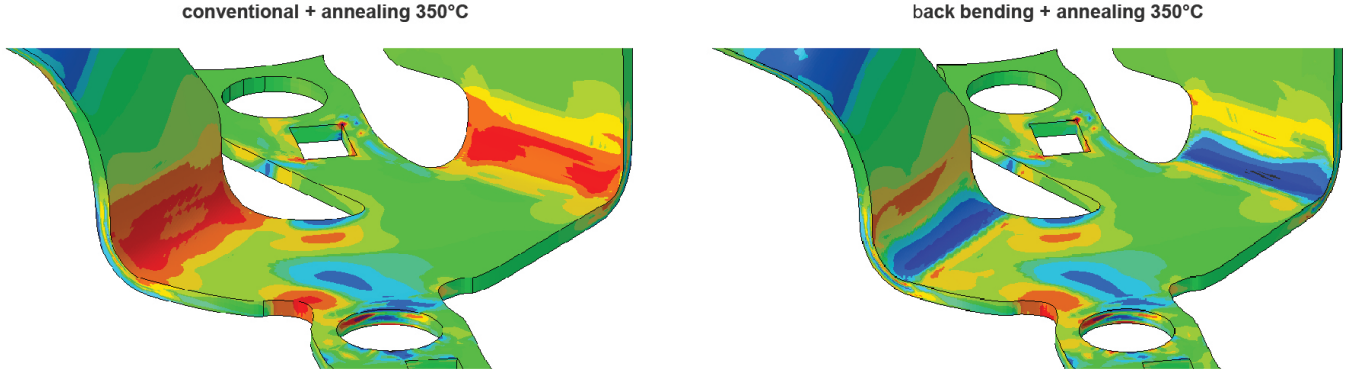

Figure 4: Annealing dispersion using temperature simulation.

Scherdel's simulation team performs hundreds of simulation projects every year, and the number of these numerical simulation tasks continues to grow year on year as the value of the results they offer improves with the continual advancement in software, algorithms and engineering knowledge. Over the past five years, the company has increased its number of simulation projects by over 30% annually. This is, in part, due to the significant value that it provides but also due to the growing number of types of simulation that Scherdel can perform.

Taking a simple compression spring as an example, Scherdel can simulate the wire drawing process to determine the stress levels throughout the wire before even beginning to form it into a spring. Controlling the variables from the first process can help determine and improve the performance of the simulation after the final process. For example, by simulating the diameter of the wire roller, it is possible to understand the effects on the internal stress (Figure 2). This saves expensive and time-consuming experimenting.

Progressing into the coiling and conductive heating process, Scherdel can then determine and optimise the process for best results based on the specifications of the given spring (Figure 3). The next process may involve annealing, which Scherdel can simulate in its temperature simulation (Figure 4). Another process often used in the manufacture of springs is shot peening, where Scherdel's manufacturing simulation can provide analysis of the process to optimise it for distribution and wear reduction.

The process of precision stamping presents many opportunities to use simulation to test various methods of manufacturing processes to improve the robustness of a given component. One such example is elucidating the difference between processes and the improvement in critical bending areas.

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Another process that can be simulated for compression springs is stroke stress (Figure 5). This circumvents the need to make springs and test them over millions of cycles, and avoids the subsequent lab tests required to understand the stresses present.

The benefits that result from numerical simulation are as follows:

- Deviation between simulation and testing is less than 10%
- First-time-right prototypes are made a reality
- Simulation speeds up development times
- Simulation finds better solutions
- Simulation is always faster than trial and error with prototypes
- Simulation provides greater insight
- Simulation costs are investigations in fault prevention
- Co-ordinated use of simulation and testing is the fastest way to new products.

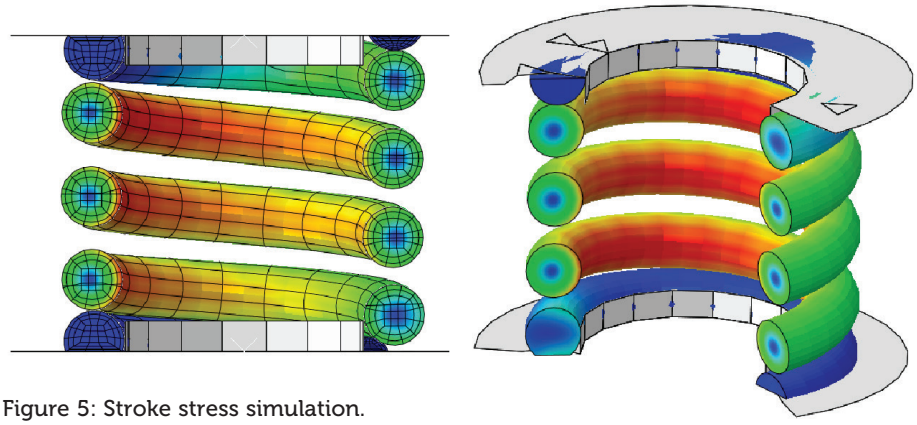

Figure 5: Stroke stress simulation.

Scherdel Medtec has world-class software, engineers and the experience to tackle design challenges and shorten development cycles while improving the quality of the product and saving prototype and testing money in the project's budget.

ABOUT THE AUTHOR

Drew Jelgerhuis is the Business Development Manager for Scherdel Medtec North America. With over 15 years of business development experience in the medical device sector, Mr Jelgerhuis leads the North American Medtec team growth in co-operation with the other global Medtec leaders. Mr Jelgerhuis holds a BS in Mechanical Engineering from Dordt University (IA, US) with a minor in Business Administration. He enjoys solving technical problems for customers by providing solutions for their medical device component requirements.

ABOUT THE COMPANY

Scherdel Medtec is part of the Scherdel Group. With about 5,800 employees at 32 locations worldwide, Scherdel Group is a leading, family-owned company in the field of metal forming, with core competence in the production of engineering springs, stamping parts and assemblies for the pharmaceutical and automotive industries.

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