ANSYS

Case Study

# Increasing Engineering Productivity through Smart Deployment of Simulation

When confronted with increasing product complexity and the need to stay competitive in a fast-paced and highly regulated market, Oticon made the strategic choice to democratize the use of simulation across its organization. As a result, 75 percent of the work traditionally done by experts is now delegated to designers, freeing the time of engineers to quickly create more innovative and reliable products.


An aging population and higher life expectancy are increasing the prevalence of hearing problems across the globe. This trend, combined with increased access to care, makes the hearing aid market attractive to medical device manufacturers but points to the potential for increased competition in the years to come. In this sector, the company that brings more-advanced products to market in less time, without incurring additional costs late in the development cycle, stays ahead of the competition.

By optimizing the opportunity for success with engineering simulation, innovative products and processes can get to market more quickly while complying with strict medical regulations. This ultimately saves money and time — two components critical for success in today's fast-moving markets. However, many companies today deploy their engineering resources late in the development process to address design and manufacturing problems prior to product rollout. This emphasis on risk mitigation comes at a price: vital engineering resources become focused on fixing design problems rather than designing products that better meet customer needs and critical design requirements the first time.

Oticon, the William Demant Business Unit that manufactures hearing aids, realized the value of engineering simulation and leveraged it to design and validate key components of this device. However, the company quickly recognized that to become a true global leader in innovation and stay ahead of the competition, it needed to apply simulation not just to key parts of the hearing aid, but to all the components interacting in the product. This required a scalable, systems-level approach to design with senior management buy-in to re-allocate engineering resources and a customized simulation workflow.

How did Oticon accomplish its goals without significant investments in retraining staff or hiring new computer-aided engineering (CAE) experts? Oticon took advantage of the ANSYS® Application Customization Toolkit (ACT), a development tool that leverages a common language to configure and customize the simulation user interface, simulation workflow and solver extensions.

Oticon scaled its product development process across the engineering staff and was able to efficiently design the entire hearing aid system virtually, employing true Simulation-Driven Product Development™.

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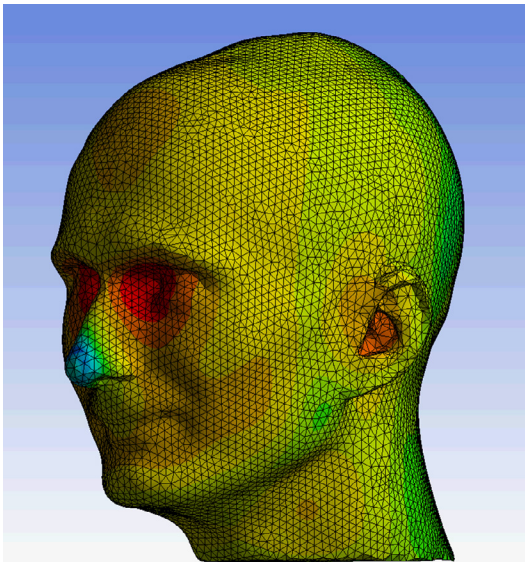

## Revamping the Development Process

Developing a successful solution required changes to the tools that Oticon used, the people involved and its product development process. The implementation was achieved in three steps:

1. Executive support for the systematic deployment of simulation in the early stages of the design process
2. Workflow customization to increase CAE accessibility to design engineers with little to no formal CAE training or experience
3. Validation of a computer model that accurately predicts the performance of the entire hearing aid system

## Computer Model Validation

Oticon's CAE experts developed advanced computer based models of critical hearing aid components such as the receiver suspensions and microphone inlets. To increase engineering productivity, the staff configured these models and its CAE system to include proprietary best practices such as material properties and a unique acoustic design. These numerical models were extensively authenticated and became an accepted tool for validating designs prior to the final prototyping/testing phase of the product development process.

## Executive Support

Adjusting the product development process to rely more heavily on simulation use in the design phase was a major change for Oticon. It involved expanding the responsibilities of people outside of the simulation group (designers) and additional investments in software, hardware and training. This evolution would not have been possible without a strong support and oversight by Oticon senior management.

Three elements were crucial in gaining senior management support:

- Demonstrating that engineering simulation was able to accurately predict the behavior of prototypes
- Illustrating the alignment of the simulation deployment plans with company business initiatives
- Proving that engineering simulation could be successfully deployed to non-expert users without significant addition of engineering resources

## Workflow Customization - Bringing Simulation to Non-Expert Users and Designers

The designers at Oticon were familiar with the device and its components as well as specific physics related to the operation of the devices, but they had limited CAE knowledge.

To enable the designers to effectively use simulation, Oticon used ACT to develop specific pre- and post-processing features that simplify the creation of models for microphones and receivers. Organizational best practices and advanced acoustic capabilities were also integrated into a designer-friendly workflow. The workflow leveraged design language commonly used within Oticon and walked the designers through the process of simulating device performance.

**Increasing Engineering Productivity through Smart Deployment of Simulation**

Using ACT, Oticon was able to make advanced simulation technology accessible to designers not traditionally exposed to simulation by integrating the company's product development best practices directly into the ANSYS user interface. As a result, 75 percent of design validation work traditionally performed by the simulation experts is now done by designers, freeing CAE experts to focus on:

1. Exploring design trade-offs early in the product development process by extending engineering simulation models from components and subsystems to system-level models
2. Improving product integrity by evaluating the sensitivity of device performance to changes in key variables
3. Deepening their understanding of potential failure modes and its causes by using simulation to perform design failure mode and effect analysis

Oticon simulation specialist Martin Larsen explains, "ACT objects are much more self-explaining than traditional command language objects. By making complex physics, such as acoustics and frequency dependent material mechanical models accessible to non-expert simulation users in an application specific environment, ACT enables Oticon's designers to perform design validations within ANSYS."

**Becoming a Global Leader in Innovation**

The successful deployment of simulation to CAE novices was a significant step forward for Oticon, extending its capabilities to innovate while delivering the highest quality products in the shortest possible time. By redirecting activities previously reserved for simulation experts to designers, Oticon freed valuable CAE expert's time, opening the door to more effective engineering towards:

- Becoming a global leader in innovation by evaluating more design options
- Creating a more reliable product
- Reducing cost and time to market by minimizing late-process trouble shooting tasks and ensuring on-time delivery

The key behind Oticon's move to deploy systems-level simulation to designers is ACT. With this tool, Oticon was able to make advanced physics accessible to designers and integrate the company's best practices directly into the ANSYS interface.

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