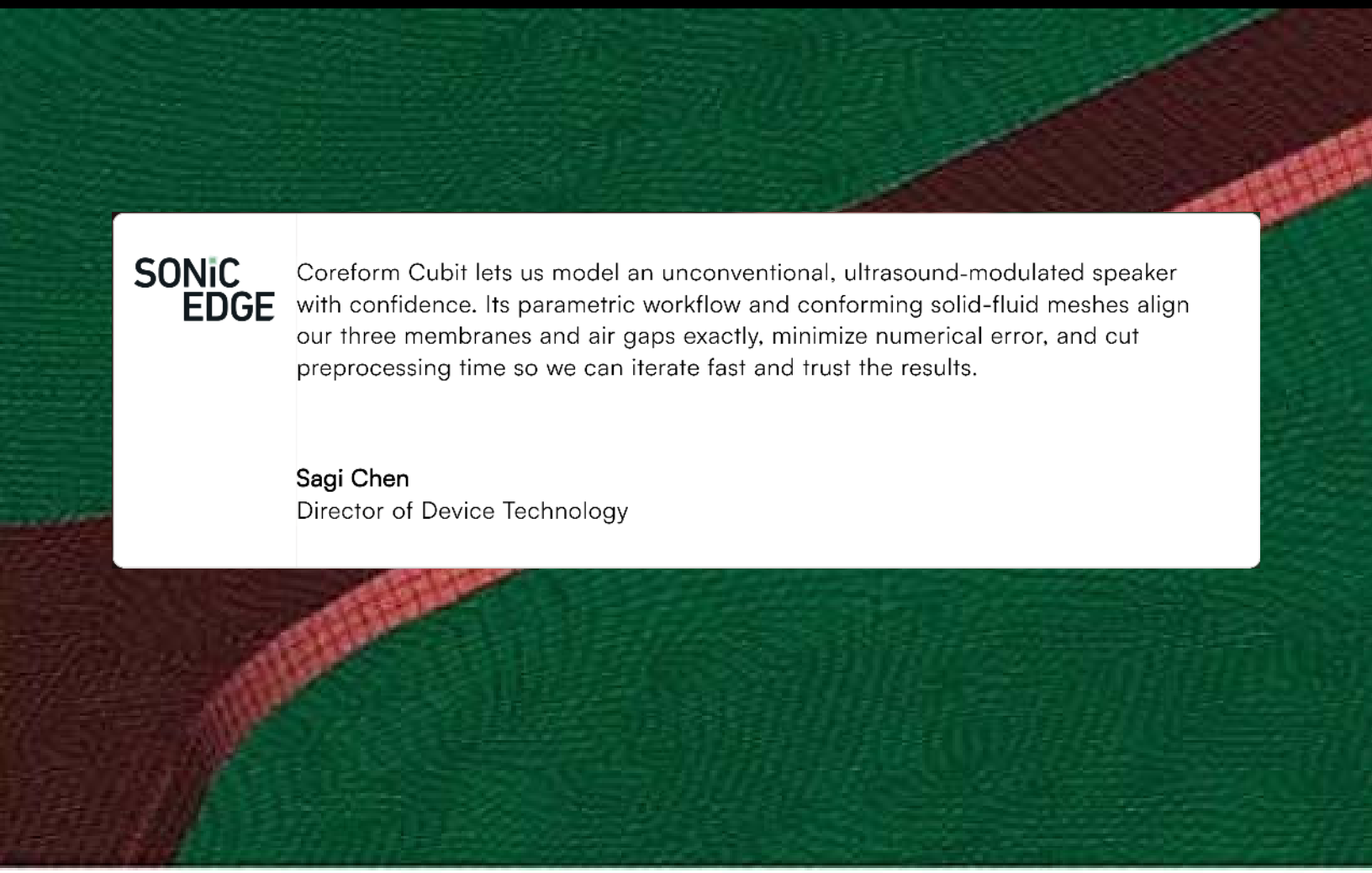
# Coreform Cubit Enables High-Fidelity Modeling of Advanced Acoustic Devices

SonicEdge, developer of a radically compact loudspeaker, relies on Coreform Cubit for accurate, precise, and repeatable meshing.



# Background

SonicEdge develops cutting-edge acoustic technologies that use ultrasound modulation to produce clear, efficient sound from thin, extremely lightweight speakers. The company's research and design teams continually explore new transducer configurations to enhance sound quality and reduce manufacturing complexity. Because each prototype involves multiple interacting membranes and air cavities, accurate modeling is essential to predict real-world performance before committing to costly fabrication. In this example, the device comprises three membranes: a bottom membrane that generates ultrasound, a middle ground-plane membrane, and a top membrane that demodulates the ultrasonic carrier into audible sound. The SonicEdge approach reimagines traditional acoustic transduction, allowing lightweight, energy-efficient, and thin speakers for a new generation of consumer and industrial applications.

# Problem

The SonicEdge design team needed to simulate a multi-membrane speaker in which several thin, vibrating layers couple through air gaps. The device geometry involved extremely small features and close tolerances, making it difficult to achieve conforming solid-fluid meshes that aligned precisely across all interfaces. Accurate simulations demand robust, parametric geometry, high-quality conforming meshes so that interfaces between membranes and air align perfectly, and seamless multiphysics hand-off to downstream solvers. Because small inaccuracies at the interfaces can lead to numerical instabilities or degraded performance predictions, SonicEdge needed a preprocessing environment capable of generating precise, repeatable meshes that could be easily updated for rapid design iteration.

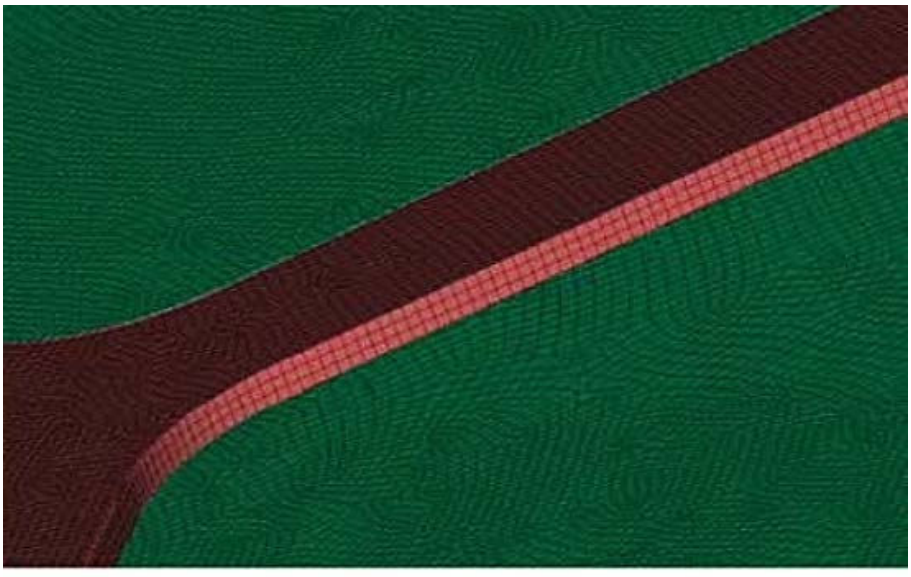


*Figure 7. Interfaces between membranes and air, shown here, must be carefully represented by high-quality conforming meshes. Coreform Cubit hex meshing software creates meshes of the quality and precision needed for high-fidelity results.*

# Solution

SonicEdge selected Coreform Cubit to provide the flexibility and precision required for this tightly coupled structural-acoustic system.

Key capabilities that made the difference:

- Fully parametric modeling of the stacked-membrane geometry and internal cavities, enabling quick variation studies across dimensions and materials.
- Automatic generation of high-quality, conforming meshes for coupled solid—fluid domains, critical for accurate interface physics and stable simulations.
- Precisely matched interfaces between membranes and air volumes to minimize numerical error at contact boundaries.

The resulting models seamlessly integrated with SonicEdge's acoustic and structural solvers, enabling robust multiphysics simulations that accurately reflected coupling between membranes and air domains. This workflow reduced meshing and setup time from days to hours and supported rapid evaluation of numerous design modifications. Together, these capabilities allowed SonicEdge to explore many design variants quickly, test new material combinations, and validate complex interactions between membranes and air gaps with accuracy and speed.

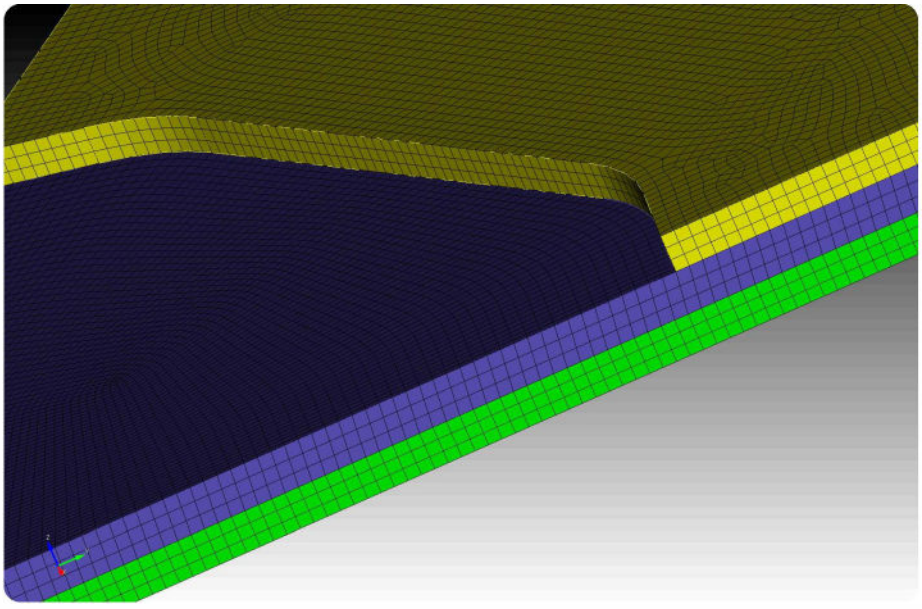


*Figure 1. Conforming mesh at membrane-air surfaces, created in Coreform Cubit.*

# Conclusion

By incorporating Coreform Cubit into its workflow, SonicEdge has established a robust foundation for high-fidelity simulation and accelerated product development. The ability to generate conforming, parametric meshes for complex acoustic assemblies enables SonicEdge to explore bold new concepts, validate designs earlier, and deliver innovative products with greater confidence and efficiency. By leveraging Cubit's superior meshing capabilities, SonicEdge pushes the boundaries of what is possible in compact, high-fidelity speaker design, transforming the future of audio, one perfectly meshed model at a time.

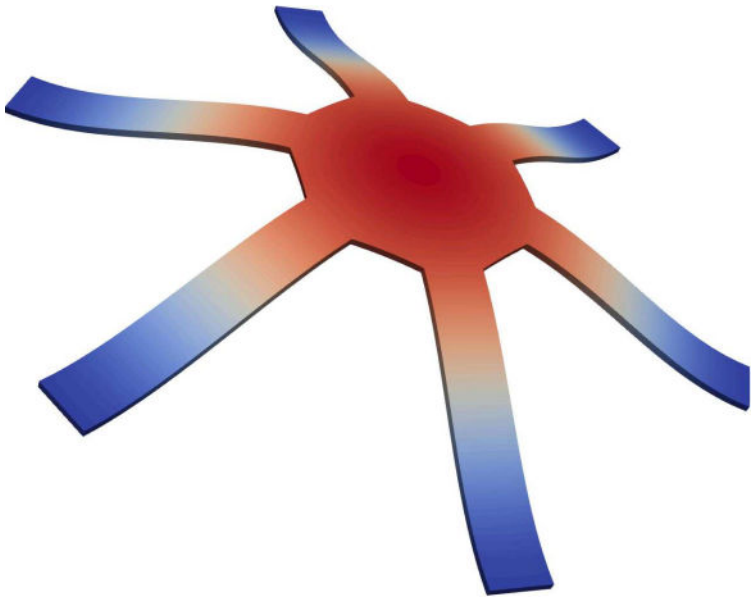


*Figure 3. Modal response of the three-part speaker model. Reliable simulation results require high quality mesh elements such as those produced in Coreform Cubit.*