

The SLA “Vaned Disk”, or “Visk” manufactured by Solid Concepts is shown assembled with other scale-sized parts to simulate a through-flow quiet drag device in a wind tunnel at MIT.



MIT Engineers created CAD models of “Vaned Disks” which were manufactured by Solid Concepts utilizing SLA rapid prototyping technology.

Solid Concepts Provides SLA Parts for Wind Tunnel Testing of Novel Quiet Drag Concept for Aircraft

When MIT and NASA project teams needed critical models for wind tunnel testing to validate a “swirl tube” concept that would generate drag quietly to reduce aircraft noise on landing, they turned to Solid Concepts.

According to Darius Mobed with the Massachusetts Institute of Technology, “The swirl tube is a ducted set of stationary turning vanes with the potential to quietly generate drag levels necessary to aircraft on approach. While applications to this concept could range from current aircraft installations... to future aircraft designed with low-noise functionality – the model scale wind tunnel experiments conducted by MIT/ NASA in 2006 focused on the proof of concept of the simplest configuration, the swirl tube. A modular test model was designed and fabricated, the centerpieces for which were the interchangeable SLA ‘visks’ (vaned disks) fabricated by Solid Concepts.”

“ The success of the project was, without a doubt, due in part to the fantastic work and support of your team at Solid Concepts. From the beginning, representatives understood the requirements for detail and strength of our parts, assisting with proper material selection, finishing options, and budget to meet our needs.”

– Darius Mobed

The visks’ construction had to account for aerodynamic performance, compatibility with test facilities, construction material, and structural integrity. Mobed continued, “These visks played critical roles in the experiments; their material strengths were crucial to structural safety of the model while their surface finishes and build resolutions were important to aerodynamic and acoustic performance. The results from the experiments confirmed the hypothesis that swirling exhaust flows of such a device can indeed generate quiet drag.”

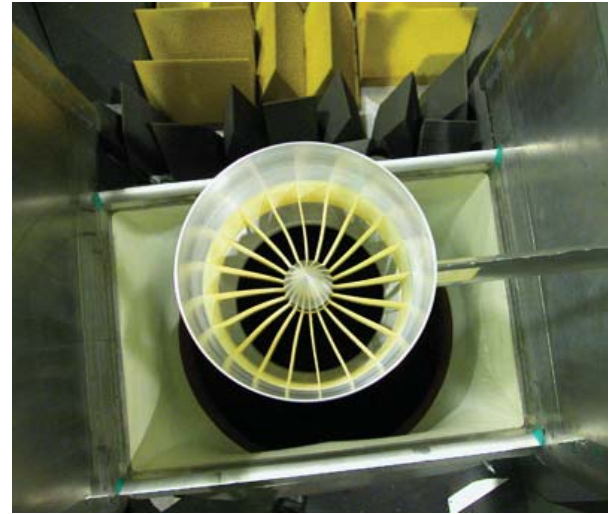
Funding was provided by the NASA Langley Research Center to experimentally assess the aero-acoustic behavior of swirling flows. To achieve this, the team at MIT chose a modular design that allowed nine different SLA “visks” to alternately be tested in a wind tunnel

assembly. The analysis performed after wind tunnel testing validated the hypothesis that swirling flows can generate drag quietly. Additionally, some aspects of the practical integration of swirl tubes into aircraft design were assessed. Integrating swirl vanes into the fan bypass/ mixing ducts of aircraft engines is suggested to generate effective drag at minimal weight cost, benefiting from increased mass flow through the device due to fan pumping.

All customers of Solid Concepts are provided with a dedicated Project Engineer to help specify the right technology and materials for the application being addressed. For the MIT/ NASA Swirl Tube, the involvement of the Project Engineer proved to be invaluable. As stated by Mobed “The success of the project was, without a doubt, due in part to the fantastic work and support of your team at Solid Concepts. From the beginning, representatives understood the requirements for detail and strength of our parts, assisting with proper material selection, finishing options, and budget to meet our needs. Not only was your team’s commitment to excellence apparent in the quality of part production, the customer support we received was truly exceptional.”

Solid Concepts Inc.

Solid Concepts Inc. is a supplier of rapid prototyping and direct digital manufacturing (DDM) services. The RP and DDM technologies employed by Solid Concepts allow for low-volume production of plastic, urethane, and metal components directly from design data, resulting in significant time and cost savings. ISO 9001:2000 certified. Learn more about Solid Concepts at www.solidconcepts.com.



One of nine variants of the SLA Vaned Disk, or Visk, shown undergoing aero-acoustic wind tunnel tests at the NASA Langley Research Center.