

Bionic Fluid Mechanics for Aerospace – Quiet, Efficient Structures and Surfaces

Company · Fields of Application · Development | As of: October 2026

ABOUT THE COMPANY

Scho & Müller GmbH is a mechanical engineering consultancy specialising in bionics, with its origins in engineering services. The focus is on fluid mechanics in areas including chemical reactors for mixing processes in pharmaceuticals, aviation, and water supply/cooling in buildings. The company combines fluid mechanics (fluid dynamics, aerodynamics and aeroacoustics) with biology and mechanical engineering, and today applies this knowledge and data in aerospace. Its partners include companies from industry, automation, energy and resource efficiency, and the defence sector. Products and systems must be developed and optimised so that they offer energy-efficient, resource-saving and resilient solutions in production, use and recycling.

Since April 2026, the company has been operating at its Schwalbach am Taunus site with a small team of 4 engineers with technical and biological backgrounds.

BIONICS IN AEROSPACE

In aerospace, even the smallest changes affect energy consumption, range, noise generation and system performance. Nature offers a toolbox for this that has been optimised over 3.8 billion years. Scho & Müller adapts the collected fluid-mechanical principles, for example on vortex formation, boundary layers, friction and flow guidance, to aerospace applications through its own R&D and in cooperation with companies.

The fields of application are primarily all systems in which something rotates or around which a fluid flows. Propellers and rotors for multicopters, fixed-wing aircraft and hybrid flight concepts, as well as fans, blowers and cooling systems. In addition, the structures are effective on general surfaces where friction or fluid contact plays a role, such as outer skins, ducts and pipes, or in cooling and conveying systems. The models are a selection of the most efficient structures from over 1 million biological studies and papers.



Fig. 1: Schematic representation of an owl wing illustrating the basic biomimetic principle. Not a representation of the actual state of development or the real rotor blade geometry.

In the following example, applied to bionic propellers for drones (UAVs), a direct comparison with conventional rotor blades shows a sound level reduction of almost 7 dB(A) across the entire frequency band (Fig. 2), with more than 10% better thrust or efficiency.

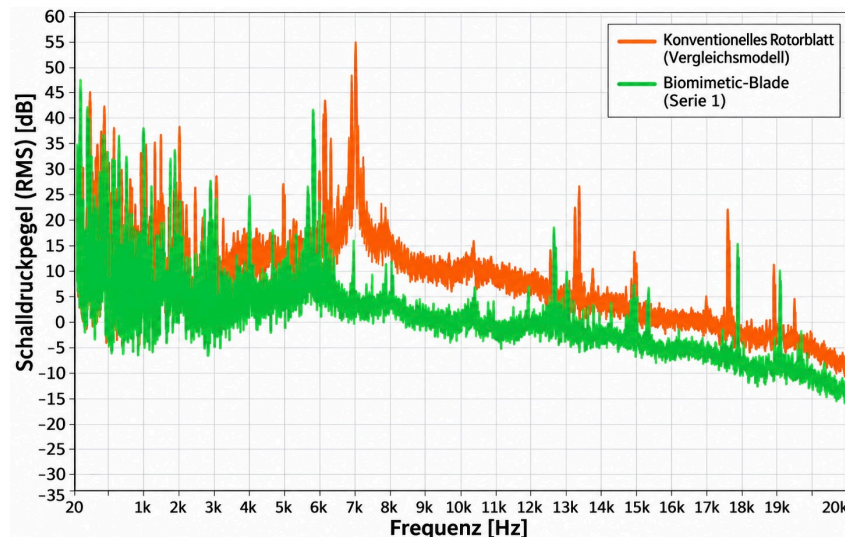


Fig. 2: Comparison of the frequency spectrum of a conventional rotor blade with the Biomimetic-Blade from the first prototype series

This is made possible by precise manufacturing. Scho & Müller produces coarse structures in the millimetre range as well as fine structures down to the micrometre range that only become visible under magnification. Fig. 3 shows a micro-serrated surface texture. The serration breaks up vortices at the trailing edge, thereby reducing noise generation. The surface structures guide the flow and increase efficiency.

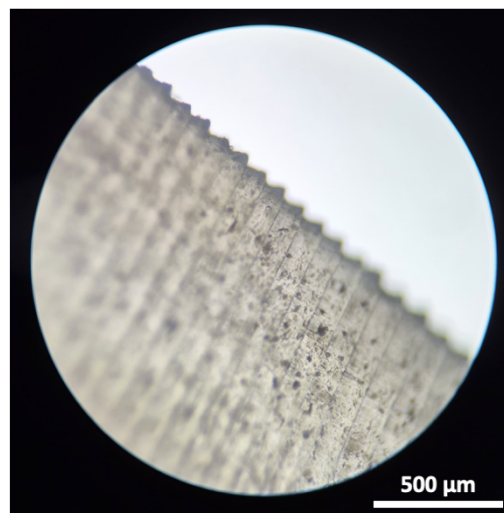


Fig. 3: Light microscope image of a blade edge (100x magnification) with a micro-serrated edge and fine surface texture. Scale: 500 µm.

This is just one example of more than ten structures that the company has already worked out for a technical application and is now making scalable for various applications on the basis of Reynolds numbers.

Development, design, prototype manufacturing and industrialisation take place in Germany. For large-scale series production, too, the aim is to work with manufacturers in Germany and Europe.

The team is happy to assist with specific use cases and collaborations!

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