



**STREET  
SHARK**



**THE EFFICIENCY  
OF NATURE**

SANDWICH LIGHTWEIGHT  
CONSTRUCTION WITH  
BIONIC SURFACES



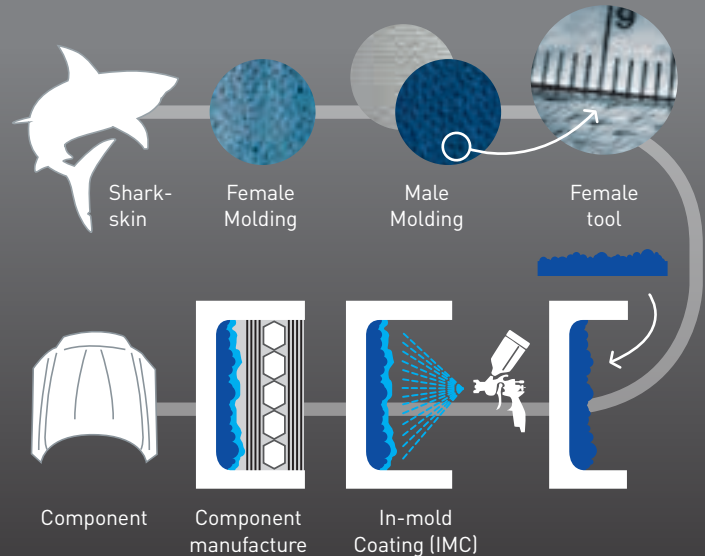


## Nature Sets a Perfect Example

FRIMO, along with its cooperative partners Eschmann Textures, Huntsman, Rühl Puromer and dstyle, has produced a bionic vehicle surface proven to reduce drag. The skin of a mako shark, well-known as a fast and skillful swimmer, served as inspiration to find a way to utilize the aerodynamic advantages industrially, which ultimately lead to the development of the Street Shark. Thanks to innovative polyurethane composites and the corresponding tool and systems technologies, economic manufacturing on a series production scale is now possible. This solution is particularly optimal for applications where both lightweight construction and functional decorative surfaces are required.

**3** INNOVATION AWARDS:  
2 SPE AWARDS &  
1 JEC AWARD

## Street Shark – From the Idea to Serial Production



# THE STREET SHARK 4.0

## Three-dimensional and Multifunctional Sandwich Design



The latest development, the Street Shark 4.0, is a spoiler on a Corvette from cooperation partner Callaway. This was a rather complex three-dimensional component choice. With its special profile and the resulting differing air velocities on the upper and undersides, the spoiler increases contact pressure for the vehicle on the road. This effect is further intensified by applying the shark skin texture to certain areas of the spoiler.

The focus is the innovative sandwich design, a three-dimensional, PU-foamed core with a density of 80 - 150 kg/m<sup>3</sup>. Even during the manufacturing process of the lightweight core, it is possible to integrate additional functions, such as fixation points or electronic elements. Once the three-dimensional core is produced, the RTM process follows. The first step is to insert the lower layer of the preform made from reinforced fibers (carbon, glass, natural) into a RTM tool. After that, the molded foam core and then the upper fiber layer are inserted. Then the RTM tool is closed and a special low-viscosity polyurethane-based matrix system is injected. The low viscosity enables rapid entry into the tool, and the start and duration of the hardening process can be adjusted fairly precisely in terms of time (snap cure). Depending on the component size, the process operates with an internal pressure of 5 - 7 bar and relatively low exothermy (max. reaction temperature below 100 °C). Nevertheless, the material is thoroughly suitable for surface coating in KTL systems with a glass transition temperature (TG) of over 200 °C.

Due to the described parameters, the process demands a relatively low investment and is optimally suited to combine lightweight sandwich design with decorative and functional surfaces. The foam core will not be damaged and the use of ceramic tool inserts is also possible. To transfer the bionic surface onto the sandwich component, a negative impression of real shark skin was initially produced and then

transferred to the tool surface by cooperation partner Eschmann Textures. The shark skin texture for the Street Shark is applied to the component by in-mold coating (IMC). Self-healing surfaces are also possible.





# STREET SHARK



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