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The effect of mako sharkskin on laminar flow separation[1] MICHAEL BRADSHAW, AMY LANG, The University of Alabama, PHILIP MOTTA, MARIA HABEGGER, The University of South Florida, ROBERT HUETER, Mote Marine Laboratory — Many animals possess effective performance enhancing mechanisms, such as the denticles found on the skin of the shortfin mako shark (*Isurus oxyrinchus).* The shortfin mako, one of the fastest sharks on the planet, is covered by small, tooth-like scales that vary in flexibility over the body. Previous biological findings have shown that the scales increase in flexibility from the leading to trailing edge over the pectoral fin as well as on various sections of the body. It is believed that the scale bristling may provide a mechanism for flow separation control that leads to decreased drag and increased maneuverability. This study involved testing a left pectoral fin of a shortfin mako shark as well as a cylinder with a sharkskin specimen applied circumferentially in a water tunnel facility under static, laminar conditions. Digital Particle Image Velocimetry (DPIV) was used to characterize the flow over the surfaces. Various Reynolds numbers were tested for both configurations, as well as several AOAs for the pectoral fin. The flow over the fin and cylinder were compared to a painted fin and a smooth PVC cylinder, respectively. The study found that the shark scales do, in fact, help to control flow separation. However, in order for the scales to bristle and trap the reversing flow, a certain magnitude of reversed flow and shear is required. This phenomenon seems to be most effective at near stall conditions and at higher Reynolds numbers.

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