# Drag Reduction for Compressor Flows

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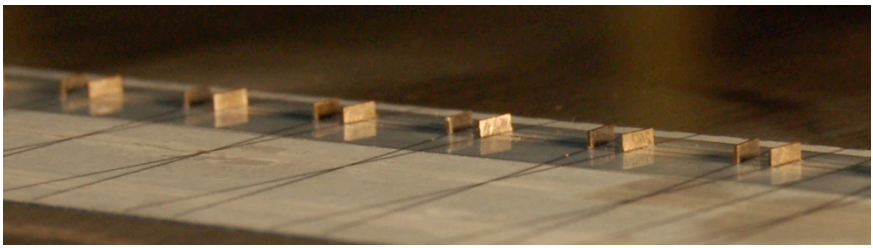
Previous work at KTH has demonstrated the effectiveness of Miniature Vortex Generators (MVGs) for drag reduction in canonical flows through delayed transition onset. These devices have been found to suppress the growth of several types of unsteady disturbances across a range of flow speeds and disturbance frequencies, admitting the possibility of employing this control strategy in a more realistic scenario. In MOTSTRÖM, we build upon this knowledge to seek new methods for decreasing aerodynamic losses in compressor flows for increased aircraft engine efficiency. In flows through compressor parts, a more extreme set of operating conditions compared with well-controlled laboratory experiments is coupled with non-zero pressure gradients, so that any surface-mounted flow control elements must be both physically robust and able to function across a potentially wide range of flow conditions. Thus, one of the challenges in MOTSTRÖM is to demonstrate that laminar flow control methods designed to operate in well-defined flows can be extended to an operational environment. To do so, new forms of passive surface devices qualitatively similar to MVGs (pictured) will be developed and tested in adverse and favourable pressure gradients. As the experiments progress, the prototypical flat plate will be replaced with a wing profile and continue to tests through a cascade. By collaborating with industrial partners, we will raise the technology readiness level of a concept that has thus far been developed in the laboratory.



*MOTSTRÖM-Motståndsminskning för strömningsytor i kompressor

Shahinfar, S., Sattarzadeh, S. S., Fransson, J. H. M. & Talamelli, A. Revival of Classical Vortex Generators Now for Transition Delay. Phys. Rev. Lett. 109, 074501, 2012.