

Pressure Sensing Strip for Rapid Aerodynamic Testing

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A pressure sensing strip is being developed in order to measure pressure profiles for rapid aerodynamic testing. It combines state of the art pressure sensing technology with integrated micro-fluidic pressure signal guidance in order to produce a non-intrusive pressure distribution measurement device. A patent is pending.

Currently low pressure profiles are primarily measured with pressure transducer arrays: A number of tubes lead from a pressure transducer array to corresponding measuring taps on the surface to be measured[¶]. Setting up such a system is time consuming and costly and on thin profiles or brittle materials it is not even an option (e.g. sails, glass). Alternatively, non-intrusive pressure sensitive paints can be utilized, but they lack as far as sensitivity, accuracy and reproducibility is concerned.

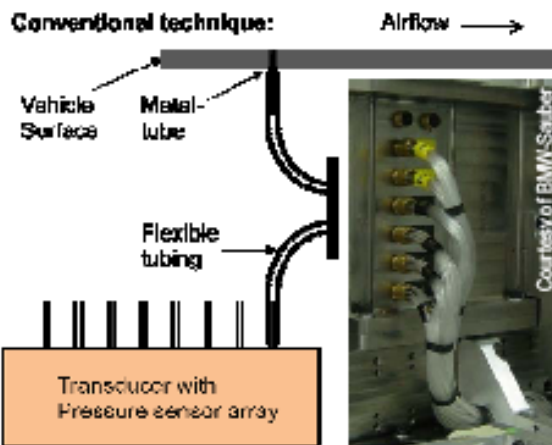


Figure 1: Comparison between conventional and CSEM PS strip

The pressure sensing strip allows measuring pressure profiles non-intrusively without impeding sensitivity. The device can directly and easily be placed onto the surface to be measured. It combines state of the art pressure sensing technology (piezo-resistive sensors) with integrated microfluidic pressure signal guidance. A film with integrated micro-channels guides pressure signals from an arbitrary point on the surface to the sensor, which is placed away from sensitive pressure measurement locations not obstructing the fluid flow.

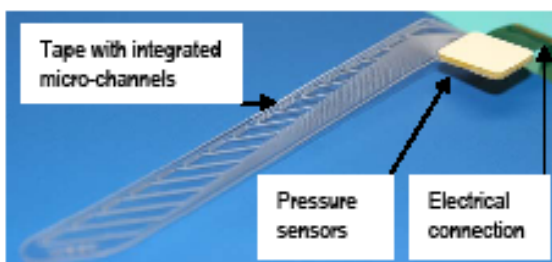


Figure 2: Pressure sensing strip

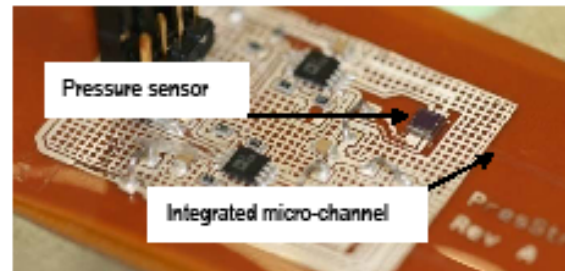


Figure 3: Pressure sensor on flexible PCB manufactured at Epigem

Wire-less data transmission can be utilized in order to further increase system flexibility such as mounting the entire device on a rotating blade (e.g. wind turbine).

Potential markets can particularly be found in R&D testing environments (e.g. wind tunnels) in following industries:

- Automotive
- Aerospace
- Wind turbines
- Urban goods
- Watercrafts
- HVAC

Table 1: Targeted specs

Pressure range	6000	Pa
Pressure accuracy	30	Pa
Pressure resolution	3	Pa
Strip thickness (at measuring points)	< 0.8	mm
Strip length	20 to 500	mm
Temperature range	0 to 60	°C
Measuring speed per sensor	300	Hz

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¶ Race Car Aerodynamics, Joseph Katz