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## Strain gauge measurements in hydraulic experiments: Chinese firecrackers versus industrial solutions

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Force measurements using load cells equipped with strain gauges are widely applied in hydraulic experimentation and field surveys. In our case, drag on 5 horizontal cylinders in cross-flows had to be measured directly in a hydraulic water flume. We tested different setups and came up with a two-load cell solution per cylinder as mechanically best way to fix the cylinders in the flume.

The costs for an amplifier system of industrial standard is in the order of magnitude of 10.000 Euro and for load cells around 500 Euro. For our multiple cylinder application, the costs of an industrial standard solution exceeded the budget and forced us to find alternatives. Chinese-made load cells cost only a few Euros each. We designed our own measuring system, consisting of an external analogue-digital converter and a microcontroller. A Python script was programmed to operate the microcontroller and analyse the data.

In the session, we will give an overview of the flume setup and the measuring system – including live operation. We will discuss the required calibration procedure for the load cells and data quality and give recommendations for further improvements.