

# Supplemental Document

## Actuators-2555454

“Dynamic response of a PVDF sensor embedded in a metal structure using ultrasonic additive manufacturing”

Mohid M. Khattak, Leon M. Headings, Marcelo J. Dapino

### Axial Impact Test:

The Al 6061 sample with embedded PVDF sensor was suspended from an aluminum frame using lightweight fishing lines to minimize the possibility of establishing bending modes in the sample. The fishing lines were tied in loops towards the edges of the sample and were secured at the bottom with tape to prevent sliding of the sample after impact. A strain gauge was attached at the center of the embedded sensor region and wires from both the sensor and the strain gauge were taped at the end and drawn away to eliminate unwanted stiffnesses. The strain gauge was connected to the oscilloscope via a Wheatstone bridge and signal conditioner for data acquisition. An impact hammer (PCB 086C02) with a 4.6 mm diameter plastic tip and 11.79 mV/N load sensitivity was used to strike the sample axially at its leading edge. We applied varying levels of force manually using the hammer, creating fluctuations in impulse magnitudes that were monitored using an oscilloscope to observe these changes. PVDF voltage, strain gauge, and impulse data were acquired for each test conducted for repeatability purposes. The setup can be seen in Fig. S1.

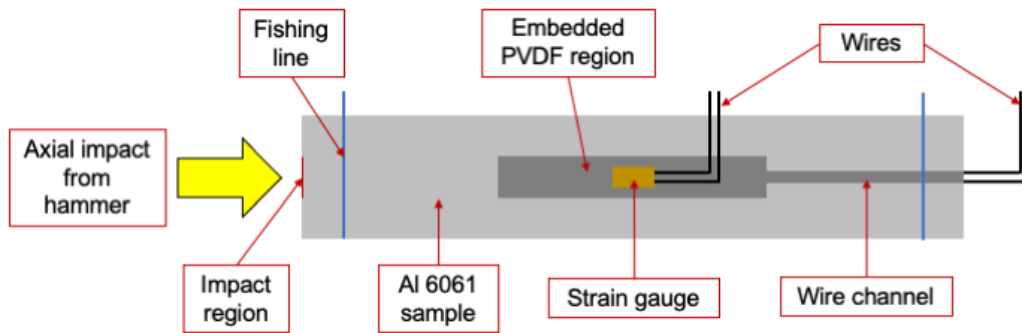


Fig. S1: Schematic top view of the axial impact test.