THE DEVELOPMENT OF AN AUTOMATED DIMENSIONAL CALIBRATION SYSTEM TO VERIFY THE PERFORMANCE OF RADIAL GAUGES

Neil Sturrock[1], Stephen Banks[1], Bruce Maney[1]

[1] CSIRO, Australian Resources Research Centre (ARRC), Geomechanics and Geophysics Laboratory (GGL) Kensington, Western Australia

Correspondence: neil.sturrock@csiro.au

At CSIRO's Geomechanics and Geophysics Laboratory (GGL) [1], dedicated 'radial gauges' (linear measurement transducers) are used to measure the dynamic dimensional changes of cylindrical rock samples, while they are subjected to the extreme forces and pressures of geomechanical testing. Such gauges, as shown in Figure 1, are utilised to measure and help characterise the geomechanical properties of the test sample, as a result of its radial deformation during such tests. These gauges utilise the principle of an electrically balanced Wheatstone bridge of four resistive strain gauges – a common measurement principle adopted in the design of loadcells [2].

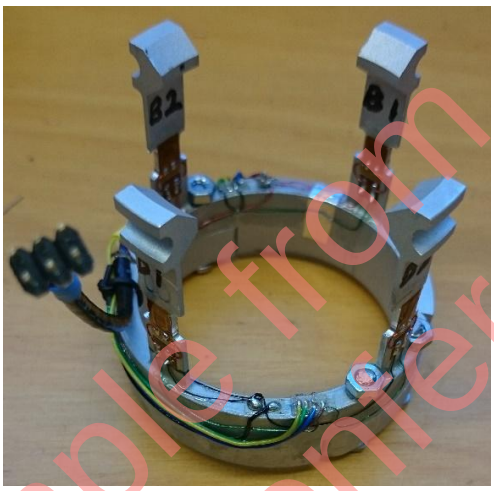

Figure 1: A four arm, two axis, twin bridge radial gauge (N. Sturrock, 2015)

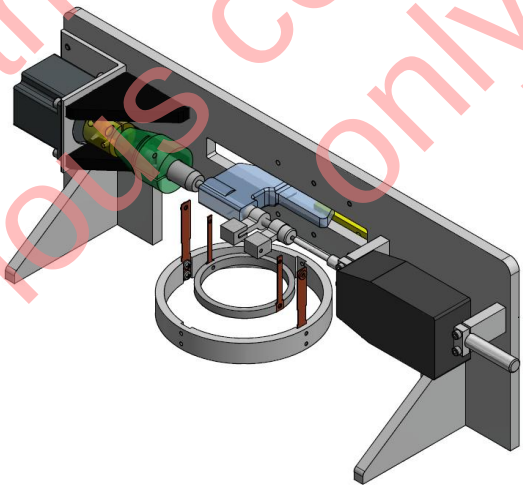

Figure 2: 3D model of the automated radial gauge calibration jig (B. Maney, 2018)

Up until September 2019, these transducers had been manually calibrated once or twice per a year by one or two technical staff within the GGL. With GGL's operational history dating back to 2001 and a growing inventory of thirty of these transducers, a new and improved dynamic automated calibration procedure [3] was proposed. Among the reasons for the proposal was to add value, alleviate the time required of technical staff of this highly repetitive and time-consuming task and ultimately improve the measurement quality. In summary, we describe our automated system shown in Figure 2 including the concerns addressed, advantages gained, and conclusions discovered.

References

[1] CSIRO, Geomechanics & Geophysics Laboratory, 2015, https://research.csiro.au/oilandgas/wp-content/uploads/sites/49/2015/10/CSIRO-Geomechanics-and-Geophysics-Laboratory-2015.pdf (accessed 02/02/2020)

[2] D. Trent, Load Cell and Strain Gauge Basics, 2017, https://www.800loadcel.com/load-cell-and-strain-gauge-basics.html (accessed 02/02/2020)

[3] National Register on Vocational Education and Training (VET) Australia MSL905006 - Create or modify automated calibration procedures (Release 1), 2018, https://training.gov.au/Training/Details/MSL905006 (accessed 02/02/2020)

Example from previous conference only