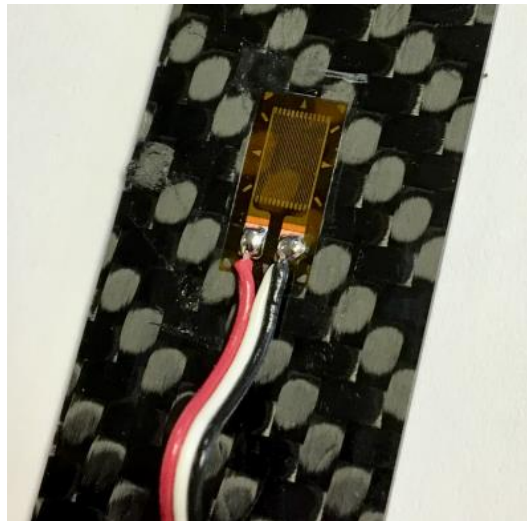


Strain gauging - dark art or simple science?

The relationship between stress and strain is the most fundamental aspect of mechanical testing. One of the primary means of measuring the strain is through the use of bonded strain gauges. Strain gauging is an ability that every test engineer should have in their toolbox and in theory, it should be a relatively easy tool to use. Simply stick the gauge to the specimen, solder on some lead wires and away you go. In reality, however, life is never that easy! Without knowing a few simple techniques, a world of heartache caused by detached gauges and broken terminals, stripped from the gauge by the lead wires, will quickly follow.



In order to successfully gauge a sample, a few key aspects need to be considered. Choosing the correct size gauge to fit on the specimen will improve the measurement of the strain. Alignment of the gauge is also critical; ensuring alignment along the straining axis. Misalignment of 2° can lead to an error in measurement of 15%. Having a larger gauge makes it easier to ensure accurate alignment. Careful consideration must also be given to the choice of adhesive, and the preparation of the sample before applying adhesive will significantly reduce the chances of a failed test.

Much consideration must go into these factors in order to achieve optimum results, as without a properly adhered gauge, you will not get accurate strain readings. Without proper guidance, this can seem like a dark art, but proper knowledge and experience can quickly change your luck. As they say, "the more you practise, the luckier you get."

A final tip...take great care with the positioning of the lead wires. Ensure that there is a proper stress relief in the wire so that there are no problems caused by a sudden, even slight tug of the wires, which can rip off the terminals and leave you with a useless gauge. There is no worse feeling than witnessing such a situation after spending a great deal of time and care ensuring that the gauges are properly bonded to the specimens!

Due to these challenges, strain gauging is generally too impractical and time consuming for routine testing, where modern extensometry is generally sufficiently accurate. However, there are a number of standard tests that do require strain gauging; usually for modulus determination (see below). There will also always be a need for bespoke testing, where more automated methods would not be applicable. As such, it is always crucial to keep strain gauging in your tool box and to ensure that you can do it well. R-TECH Materials staff have been fully trained in practical strain gauging techniques by Vishay Micro Measurements Group, and can offer this service to our clients where specified.

Examples of standard tests requiring strain gauging:

- BS EN ISO 14126 (Compression)
- ASTM D695 (Compression)
- prEN 2850 (Compression)
- SACMA SRM (Compression)
- BS EN ISO 14129 (In plane shear)
- ASTM D3518 (In plain shear),
- ASTM D3039 (test machine alignment check)