

The **CAT** is an extremely accurate instrument that can be used to measure rail for acoustics purposes and for Quality Assurance of rail grinding. It has the great attraction that it can be both used and carried by a single person: the equipment, when packed in a convenient box (supplied), weighs less than 15kg. There are few, if any, instruments that can measure extended sections of rail with similar accuracy and no others, to our knowledge, which can be used conveniently by a single person.

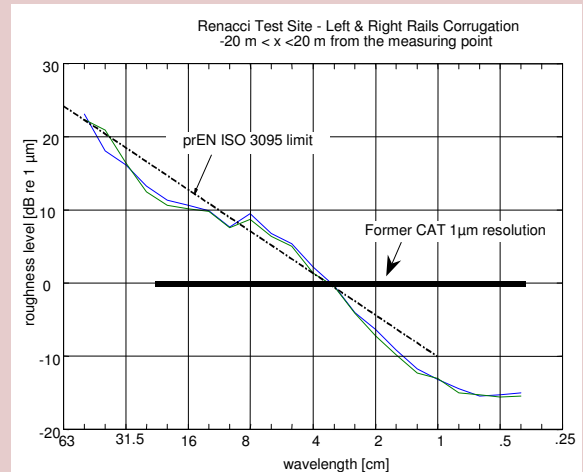


The CAT in use. An industry-standard notebook PC is used for data acquisition and analysis

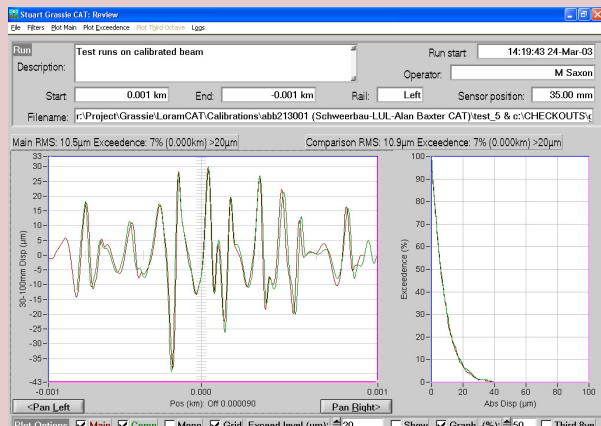
This instrument is the most recent development of a piece of equipment made originally at Cambridge University, England, in the 1970s for measuring corrugation. A further development was made in the late 1980s to make portable corrugation-measuring equipment for Australian National railways. This equipment is still used routinely on Australian railways. The first prototype of the present CAT was produced in 1997. Since then, examples of the present equipment have been used routinely and reliably for corrugation surveys, Quality Assurance work following grinding on all types of railway line, and for acoustics work.

The CAT is well suited to the measurement of rails to assess roughness in accordance with the recommendations of the provisional International Standard prEN ISO 3095. Indeed it far exceeds the requirements of this Standard insofar as hundreds of metres of rail can be measured continuously, accurately and quickly through a test site, rather than simply isolated lengths of about 1m. Such a continuous measurement permits kurtosis analysis to be used to determine whether individual 1m lengths of track are typical of a full test site.

Output from the CAT is available in several formats appropriate to both grinding and acoustics work: amplitude vs. distance, one-third octave band spectra and exceedences are amongst many standard functions. Examples of spectra of successive measurements of the same, extremely smooth, rail are shown below, demonstrating the CAT's excellent repeatability even at wavelengths of a few millimetres and amplitudes of less than a micron. These spectra are plotted relative to that given in prEN ISO 3095. The capabilities of the CAT far exceed the narrow requirements of this draft Standard.



Repeatability of CAT measurements



The CAT is calibrated against a traceable measurement of a reference rail

The CAT is hand operated, measuring a single rail at walking speed (2 to 5km/h). Extended sections of track – up to several kilometres long – can be measured in a single session with the practical limits being battery life and the endurance of the operator. New operators can quickly learn to measure rail to accuracies of better than 1 micron in the most important wavelength ranges.

As the data acquisition and analysis features are incorporated into a single software package, instant analysis of measurement data is available.

With relatively minor modifications, the portable CAT could also be used to measure circumferential wheel profiles, and *RailMeasurement* are happy to supply customised versions of the CAT if required for this or any other specialist application.