

# **PROFILE ALIGNMENT SOFTWARE**

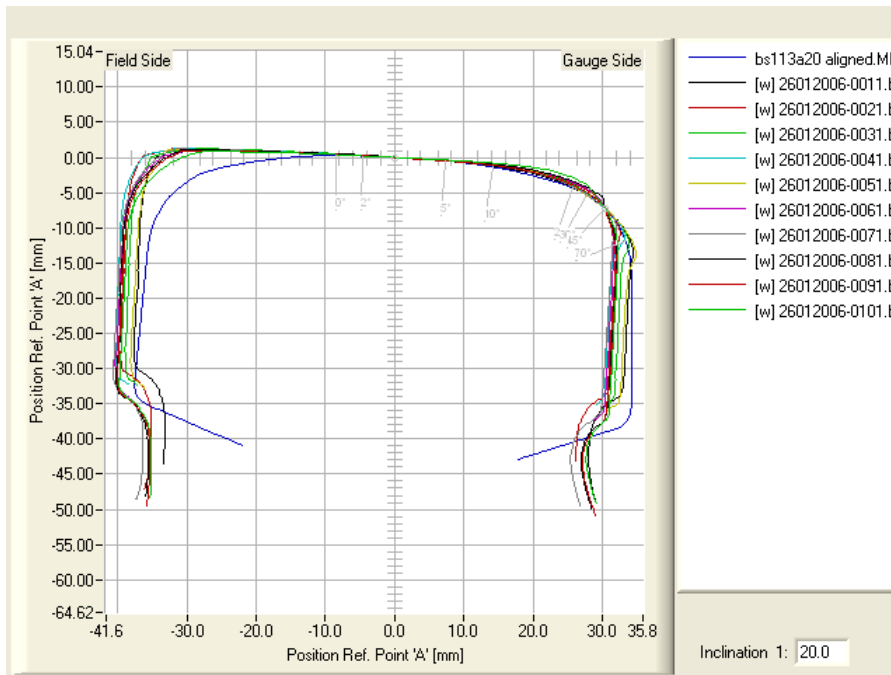
## **from Railmeasurement**

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**DOCUMENT NUMBER**

Railmeasurement

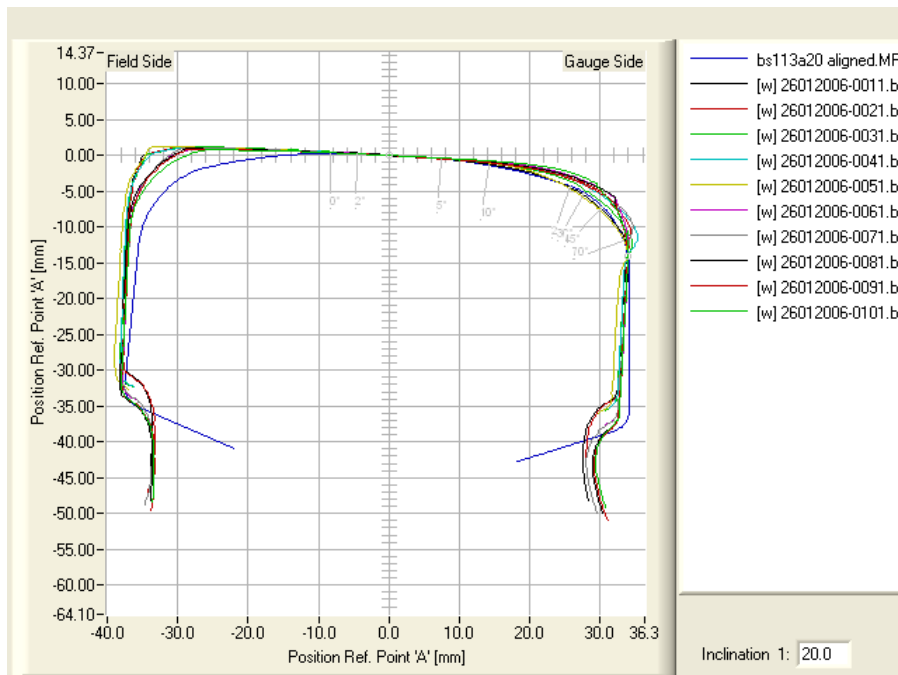


Features

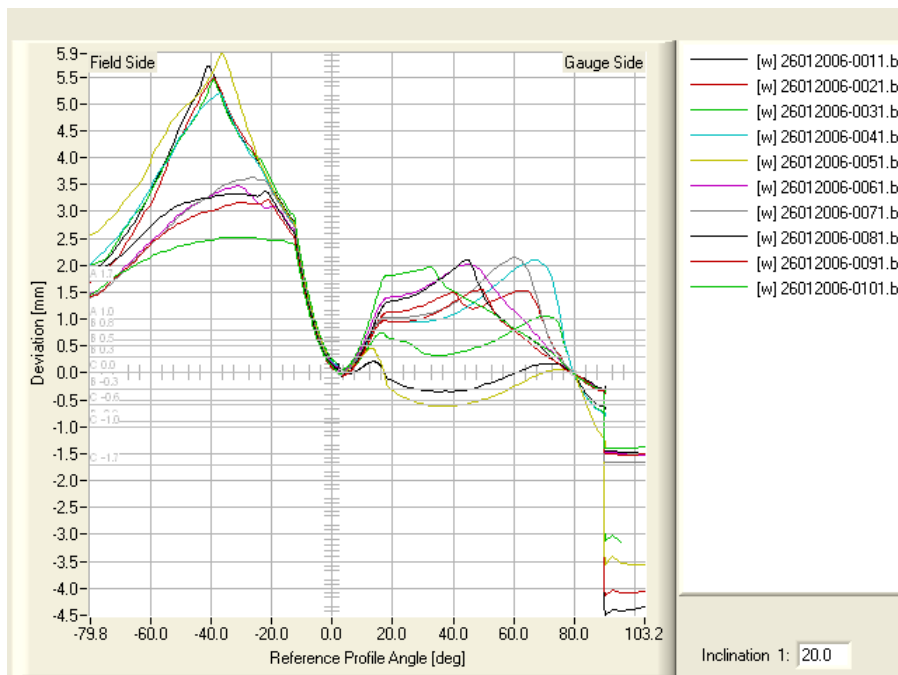
- 1) Up to 10 measurements can be read into the software, aligned automatically and the residuals found likewise automatically. Residuals are plotted relative to the "real" tangent angle.
- 2) Profiles are aligned automatically, in the manner selected, as the files are read in e.g. the 10 profiles shown below are aligned as they are read in: this operation (selection of files, then click) takes the time it takes to select the files.
- 3) Real "tangent" angles are shown on the profile plots (if selected).
- 4) Changing to a different alignment prescription is also simple: from the alignment in the panel above (reference points A and B<sub>2</sub> in the grinding Euronorm, prEN13231-3) to that shown below (reference points A and B<sub>1</sub>) took less than 5 seconds.

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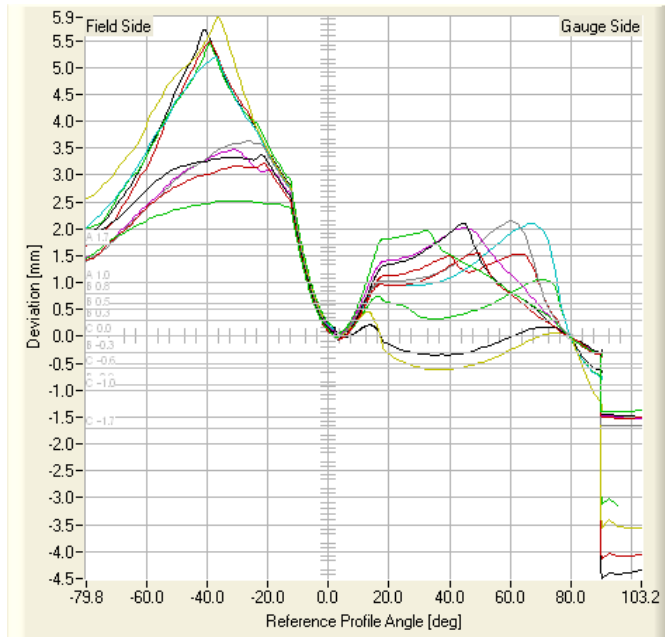


5) From the panel above to the “deviations” (or “residuals”) shown below takes also less than 5 seconds.

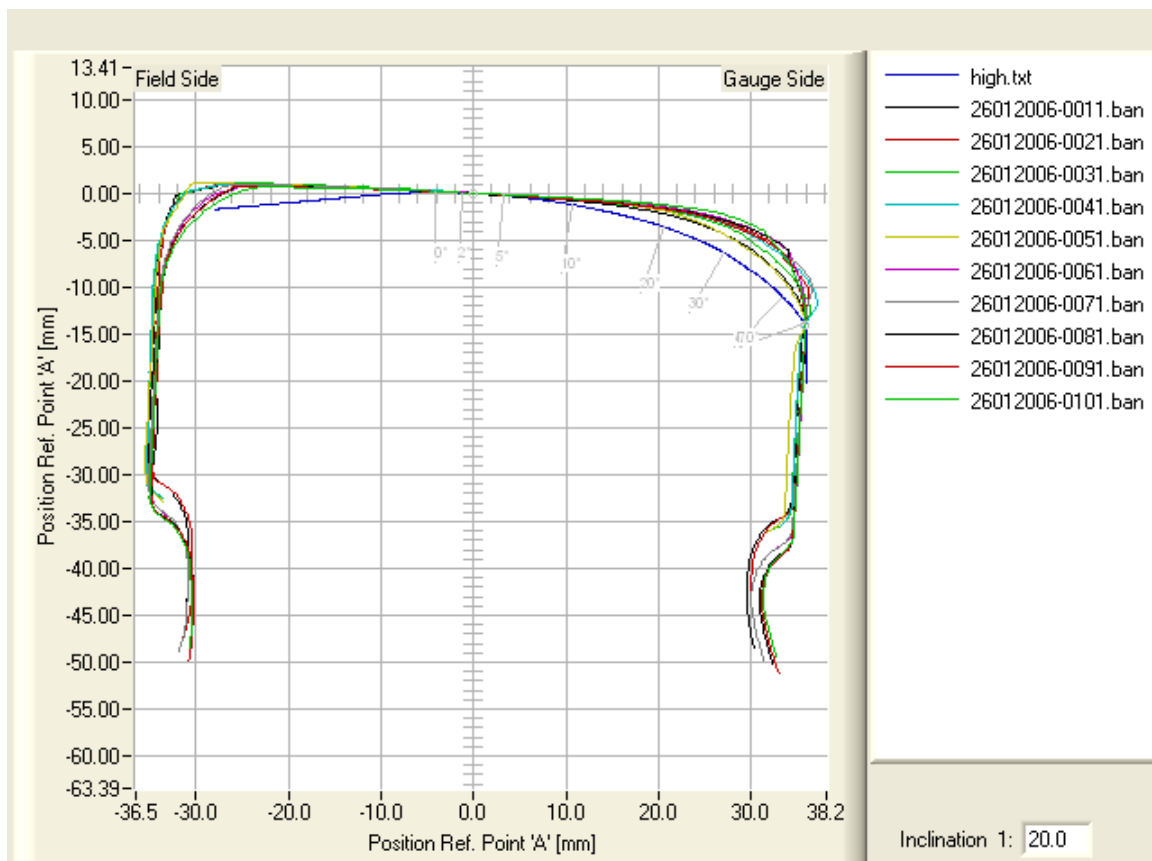


6) The complete “panel” can be copied for pasting in a document or simply the graph (below).

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- 7) Tolerance lines can be inserted in the residual graph, as illustrated above.
- 8) The alignment algorithms include those in prEN 13231-3 (as above) and alignment at the lower field and gauge corners of the reference.

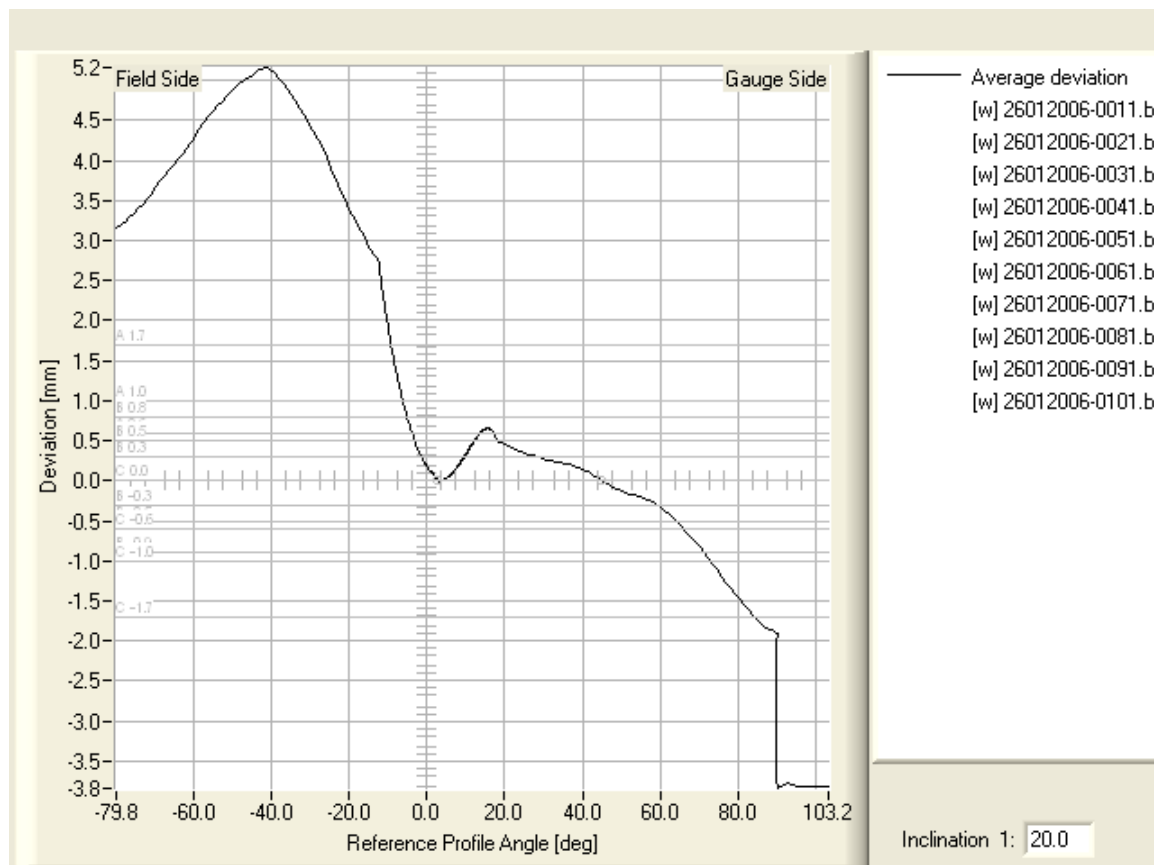


- 9) If a new reference profile is selected e.g. NR's ATH, above, all measurements are aligned automatically with the new reference: reading in the new reference and getting the above graph took less than 30 seconds (most of the time being finding an appropriate reference).

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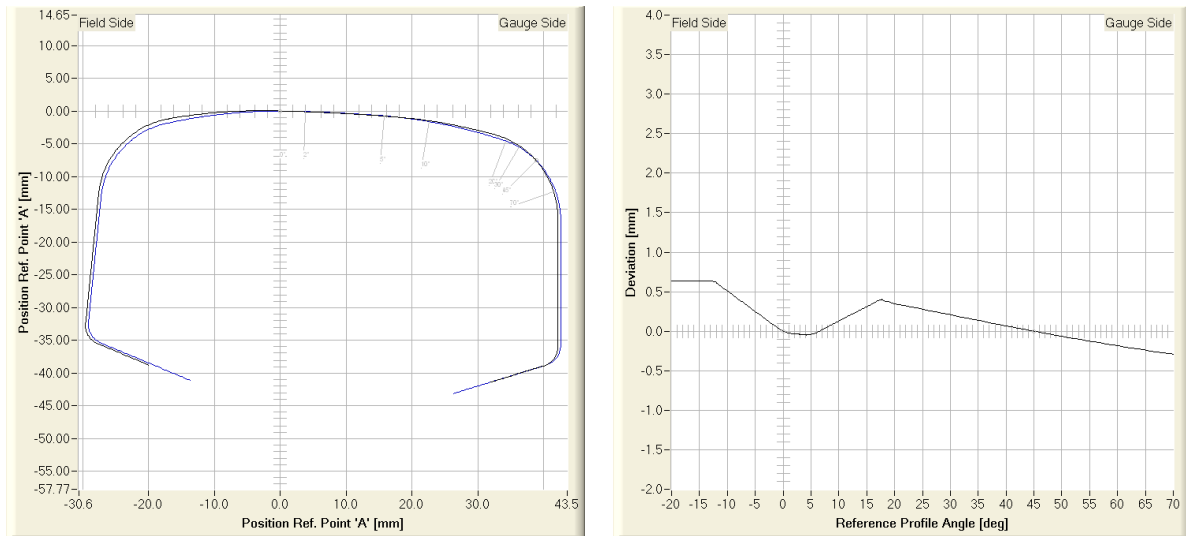
- 10) The grid, axis scaling etc are all selected from the "Edit" pull-down menu (as are other options such as calculation of differences between profiles and change of alignment points).
- 11) It is possible to average the deviation for several measurements. This is shown below for the 10 files that are used in the above graphs. (In this case the average is not "sensible" since some profiles are high rails, some low rails and some are in straight. However, this simply illustrates the point.
  - It has taken 7 minutes to load the software, import the reference profile, import the 10 measurements, calculate the deviation, calculate the average, copy the graph to this document and write the above point.



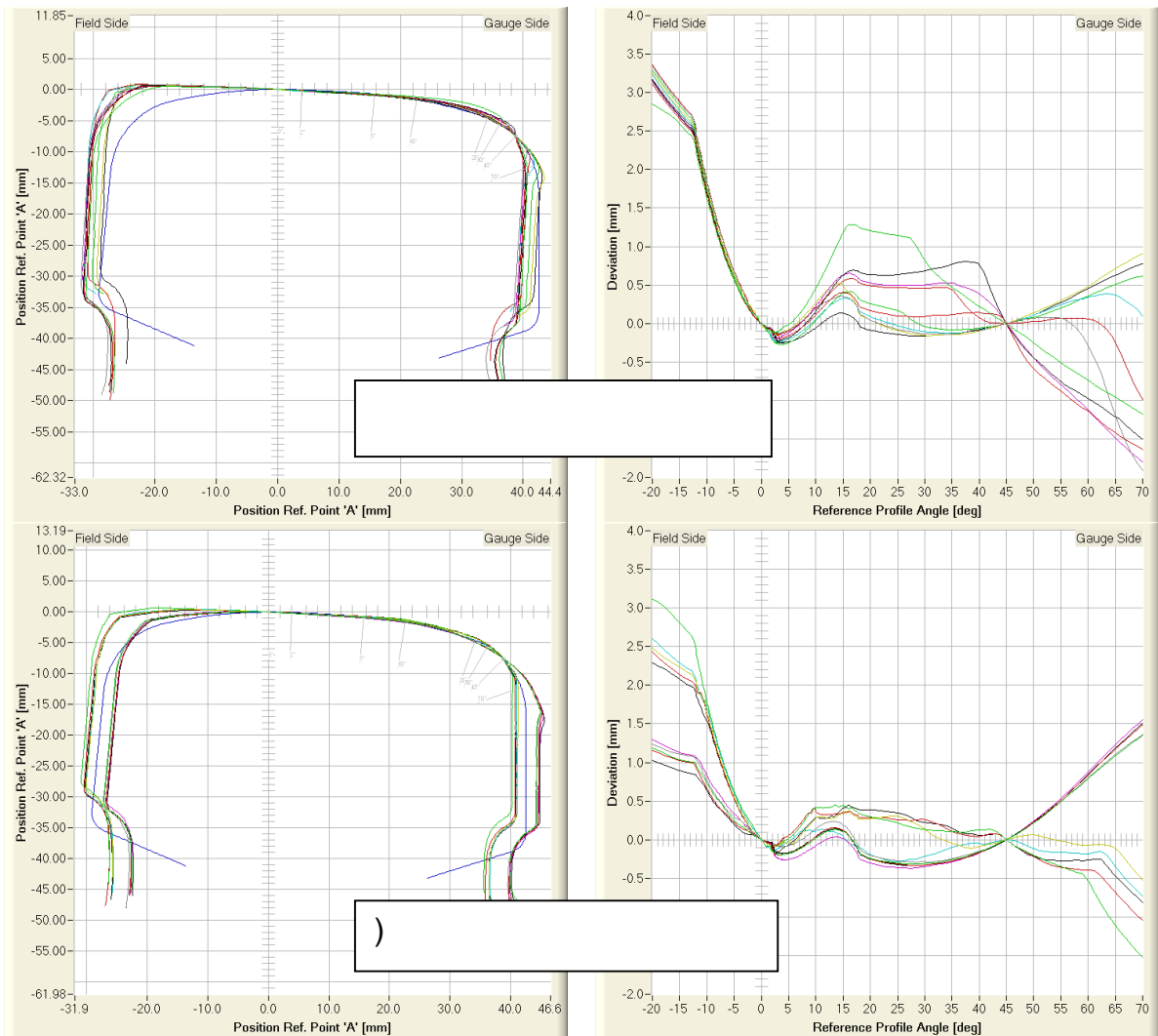
- 12) Similar features are available in the software to align wheel profiles.
- 13) Although the software is at present set up to use Miniprof measurements, it can essentially operate on any measurement that is in (x,y) coordinates or indeed in another file format if the format were known. Some minor software modifications might be necessary to use other file formats e.g. from measuring equipment on a grinding train.
- 14) An indication of the time taken for operations is that this document has taken an hour to produce from the time that I sat down at the computer, including import of the profiles, use of the Rail Profile Measurement software and setting up the file to which I am now writing.

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**Figure 1 Superposed crown profiles, 54E1 and 56E1 rail sections inclined at 1:20, and difference (54E1 c.f. 56E1)**



**Figure 2 Examples of superposition of profile measurements with a reference profile**