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Measurements to Rusted Steel Surfaces

We teach that the smoothest surfaces give the best measurement results in terms of accuracy and repeatability. With a mirror like target, a single reading in one location gives an accurate distance measure.... There are many common materials that are textured, not smooth at all. In this note, we show that distance measurements can be made to rough textured surfaces by scanning along the surface and averaging the measurement data.

EXAMPLE

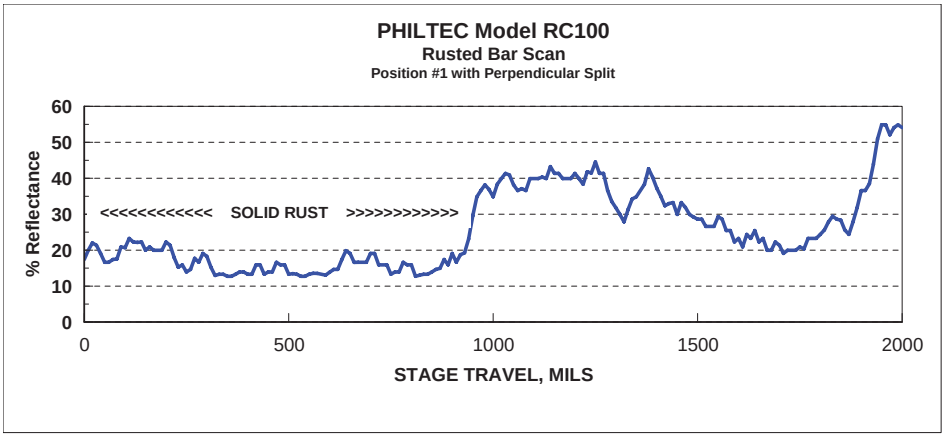
Two Philtec sensors, reflectance compensated models RC100 and RC171, were used to measure distance to this 53 mm wide rusted steel bar. The sensors were scanned along the six paths shown.

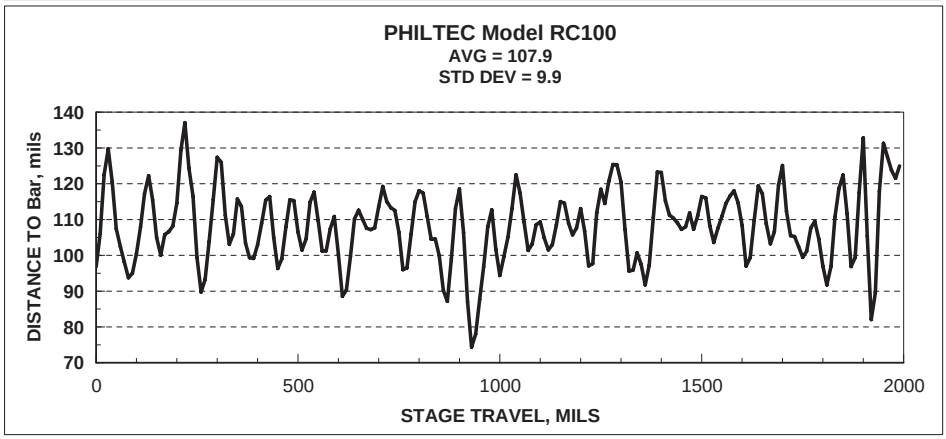
The charts below show typical results for the sensor's reflectance output (top chart) and the sensor's distance output (bottom chart). The reflectivity of the rusted surface varies from 12% to 22%. Outside of the heavy rust band the reflectivity varied from 20% to 40%. The distance output shows a wide scatter of data, however there is no measurable difference between the data recorded in and out of the heavily rusted band; which means that ***Reflectance Compensation*** is working.

RESULTS

200 readings were recorded per scan. From these data, the standard deviations and the mean distances were calculated.

	RC100 mINCH	RC171 mINCH
Each Scan Std Dev	**6 - 10**	**9 - 17**
All Scans Mean Gap	**108** (2.7 mm)	**204** (5 mm)
All Scans Std Dev of Mean Gap	**1.2** (.03 mm)	**2.3** (.06 mm)





CONCLUSIONS

- Instantaneous distance measurements to rusted surfaces can vary by ±20% of actual mean value.
- Data averaging can yield a measurement accuracy of ±1% of the mean distance.