

APPLICATION NOTE

Measuring lacquer coatings on rough surfaces

Irregular surface structures, or “roughness” – as typically found on grey cast iron or sand-blasted steel – complicate the process of measuring the thickness of overlying paint layers. The unevenness of the substrate’s surface can cause large fluctuations in the measured values. This leads to uncertainties in the interpretation of the results and makes it difficult to monitor the coating process.

The underlying surface roughness always affects an overlying paint layer. However, it is difficult to make a quantitative assessment of the degree of interference because this depends on several parameters, such as the geometry of the roughness and the thickness of the lacquer. When measuring with a single-poled probe, measurement positions over roughness peaks or valleys may lead to different readings despite uniform paint thickness. The magnetic field lines are affected differently by the valleys and the peaks. In dual-poled probes this effect, and thus the influence of the roughness is significantly reduced – which consequently reduces the number of measurements required to assure an acceptable mean and standard deviation.

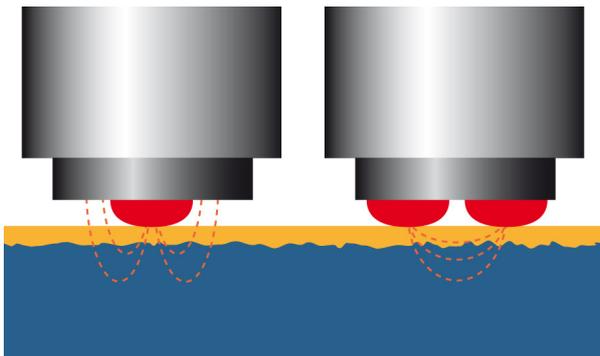


Fig. 1: Left: single-poled probe; right: dual-poled probe

The dual-poled probe V7FKB4 used in combination with one of the FISCHER FMP handheld instruments or with the table-top FISCHERSCOPE® MMS® PC2 (module PERMASCOPE®) is especially developed to accurately measure paint layers atop rough surfaces. Compared to those attained with single-poled probes, significantly lower coefficients of variation and higher repeatability precisions are achieved, as shown in Table 1.



Fig. 2: Measuring lacquer on a rough surface with the V7FKB4 probe

Measurement number	Standard probe (single-poled)		Probe V7FKB4 (dual-poled)	
	sample 1 even	sample 2 rough	sample 1 even	sample 2 rough
1	126.4	241.6	125.8	237.2
2	125.2	263.0	125.6	245.4
3	125.7	232.6	125.2	248.7
4	125.3	250.3	126.2	241.6
5	126.2	252.3	126.0	252.4
6	125.5	244.3	125.6	251.3
Mean value (µm)	125.71	247.35	125.71	246.11
Standard deviation (µm)	0.47	10.38	0.36	5.90
Coefficient of variation (%)	0.37	4.20	0.28	2.40

Tab. 1: Comparative measurements: single-poled standard probe vs. the dual-poled V7FKB4 probe, on even and rough surfaces

The measurement accuracy is very dependent on careful calibration. The V7FKB4 probe reduces not only the calibration effort on original pieces but also the number of measurements required to verify the results.

For precise measurement of paint layers on rough surfaces, the dual-poled magnetic induction probe V7FKB4 is ideal when used together with a device from the FMP family of handheld instruments or the FISCHERSCOPE® MMS® PC2. The expansion of the magnetic field lines between the two poles minimises the measurement variations induced by the roughness, providing the levels of precision and accuracy you have come to expect from FISCHER. For more information, contact your local FISCHER representative.