Nomenclature	Binder content ($\%_{wt.}$)	Grain size
6UF	6	Ultrafine
10UF	10	Ultrafine
15UF	15	Ultrafine
9F	9	Fine
11M	11	Medium
15M	15	Medium
10C	10	Coarse

Table 1. Nomenclature, binder content and grain size of investigated cemented carbides grades.

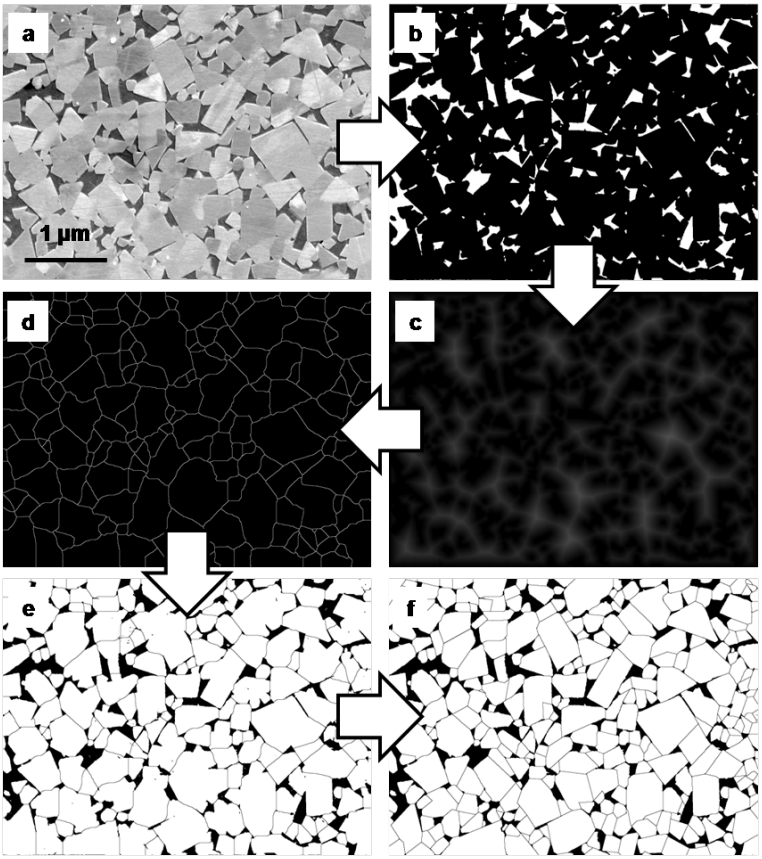

Figure 1. Schematic representation of the image processing methodology used to assess the grain size of investigated materials. Presented micrographs correspond to: (a) the initial FESEM micrograph, (b) the binarization of the original image followed by (c) a EDM algorithm, (d) a Find Maxima operation and (e) a OR operation between the binarized original image (Figure 1d) and the micrograph resulting from the Find Maxima operation (Figure 1d), and (f) the final processed and manually corrected image.

Nomenclature	LI d_{WC} (µm)	IA – A d_{WC} (µm)	IA – B d_{WC} (µm)	IA – A Circularity
6UF	0.4 ± 0.21	0.39 ± 0.22	0.56 ± 0.25	0.69 ± 0.07
10UF	0.39 ± 0.19	0.42 ± 0.20	0.49 ± 0.21	0.67 ± 0.11
15UF	0.47 ± 0.22	0.46 ± 0.24	0.55 ± 0.27	0.68 ± 0.10
9F	0.77 ± 0.78	0.78 ± 0.47	0.97 ± 0.62	0.70 ± 0.11
11M	1.12 ± 0.71	1.29 ± 0.58	1.55 ± 0.76	0.70 ± 0.12
15M	1.15 ± 0.92	1.08 ± 0.59	1.29 ± 0.71	0.71 ± 0.08
10C	2.45 ± 1.37	2.39 ± 1.15	2.67 ± 1.40	0.72 ± 0.11

Table 2. Average grain size determined for investigated cemented carbides grades following the linear intercept and image analysis methods. Information on the circularity values obtained with the IA – A process is also included.

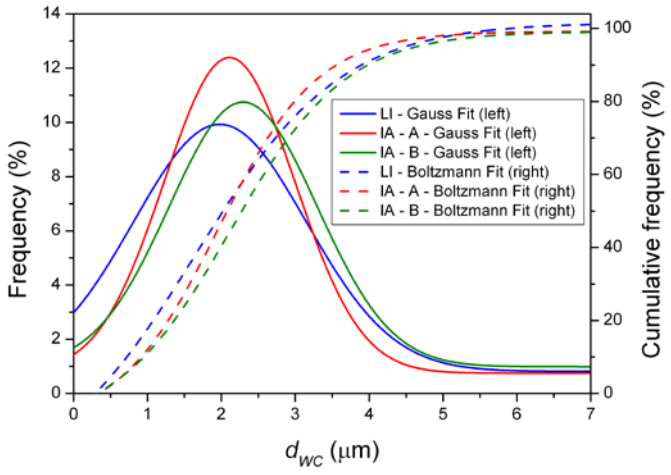

Figure 2. Comparison of the relative and cumulative distributions determined following the linear interception and image analysis studied methods for the investigated 11M hardmetal grade.

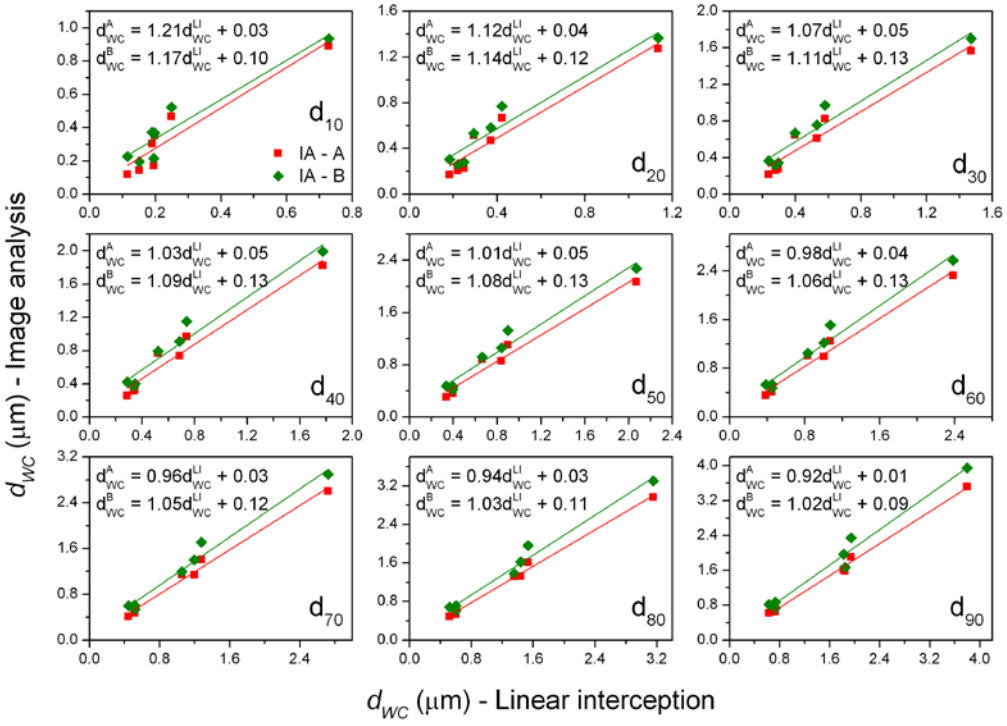

Figure 3. Comparison between grain size values deduced from the cumulative distributions corresponding to the linear interception and image analysis techniques for different cumulative distribution percentages.

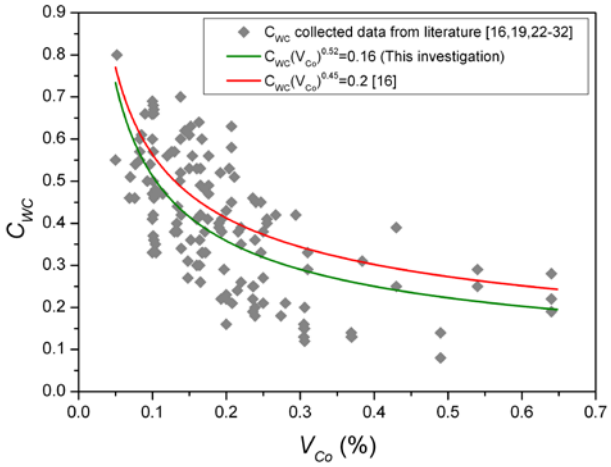

Figure 4. Contiguity dependence on the binder volume content (data collection from literature [17,20,23–33]). Full lines correspond to the best fitting curves proposed in pervious works (red line) [1,17] and in this investigation (green line).

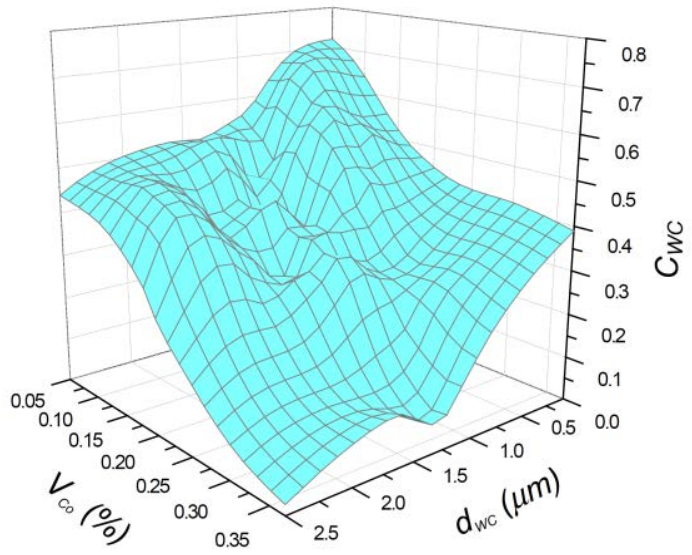

Figure 5. C_{WC} values plotted as a function of mean grain size and of the binder volume content V_{binder}, as independent variables.

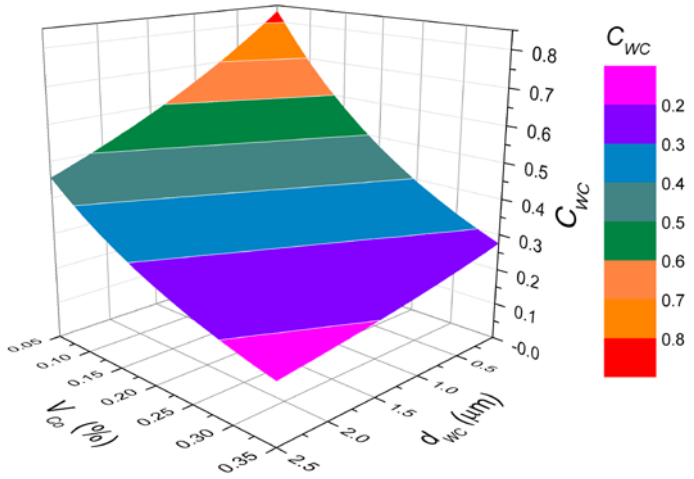

Figure 6. C_{WC} values plotted as a function of d_{WC} and V_{binder}, as independent variables according to best fitting parameters determined for Eq. (4).

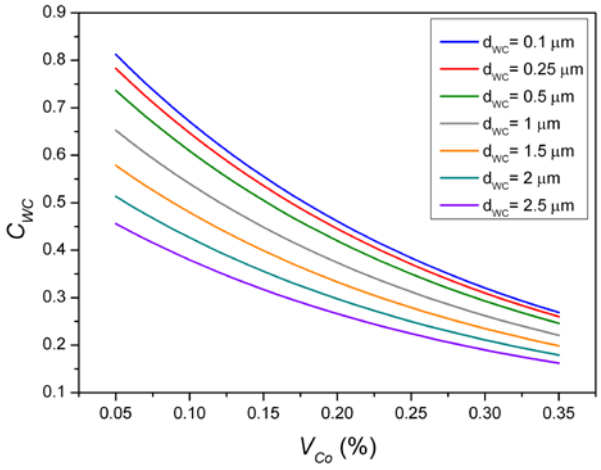

Figure 7. Contiguity as a function of the binder content for different mean grain size levels.

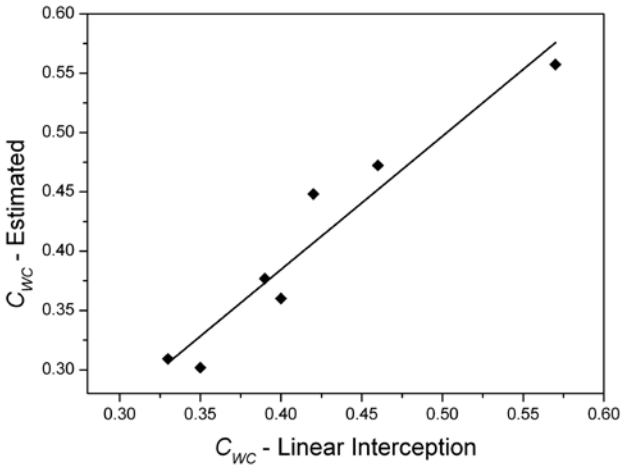

Figure 8. Linear dependence between the contiguity values experimentally determined following the linear interception technique and the values estimated according to the empirical proposed in Eq. (4).