

*Challenge 3* is a microphotograph (200x, taken in the KTA laboratory) of coal slag abrasive (Photograph 1). That fact that the Challenge is abrasive is clear in Photograph 2, taken at 20x. Coal slag is used in high pressure abrasive blast cleaning systems (typically 90 to 100 psi nozzle pressure) to clean surfaces in preparation for painting. In addition to removing corrosion, mill scale, and existing coatings, the abrasive creates a roughness or profile on the substrate to enhance the mechanical bonding of the newly applied coating film.

Coal slag is a by-product of coal fired electric power generation (boiler-bottom ash). It consists of hard, black, angular particles that are available in a variety of mesh sizes to create different surface profile depths. It is an expendable abrasive, meaning that it is used one time, and then discarded. SSPC Abrasive Specification No. 1 (SSPC-AB1), Mineral and Slag Abrasives, defines requirements for the selection and evaluation of a number of expendable abrasives, including coal slag. It is interesting to note that coal slag abrasives are the same granular material that is used in shingles and in seal coats applied to asphalt.

The surface profile created by abrasive blast cleaning can be measured in the field using the Keane-Tator Surface Profile comparator, Testex Press-O-Film Tape, or the Elcometer 123 Surface Profile Gage (depth micrometer). The Comparator consists of reference discs of varying profile depths that are visually compared with the surface under 5x magnification. The Testex Tape creates a precise replica of the profile on a special tape that is measured with a spring loaded micrometer. The tape serves as a permanent record of the surface profile achieved. The depth micrometer is a dial micrometer that is fitted with a spring loaded probe. The base of the instrument rests on the peaks of the surface profile while the pointed probe projects into the valleys. The instruments comply with ASTM D4417, Standard Test Methods for Field Measurement of Surface Profile of Blast Cleaned Steel.

The inspection instruments and the SSPC abrasive specification described above are available from KTA. The KTA laboratory also performs the various tests that are outlined in SSPC-AB1 for confirming the quality of the abrasive prior to use, and conducts extensive laboratory evaluations of abrasives. Testing includes toxic metal content, worker exposure evaluations, sieve analysis, conductivity, soluble salt analysis, productivity, embedment, cleaning quality, breakdown rate and others.