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A comparison of quality control methods for scratch detection on polished metal surfaces

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Abstract: Scratch detection and the location of the scratch on the surface is important in the quality control of multilayered, functional and polished surfaces. Visual examination in good lighting conditions has been previously used to detect scratches, but interest to see finer scratches and their location should consider use of the optical microscope, and compare it with other imaging methods at the same magnification. Stainless steel was polished, scratched and then one specific location analyzed at the same magnification for all methods to determine the level of scratch detection. Atomic force microscopy as the technique with a higher resolution was used to determine the mean depth of every scratch as a reference. An image was then taken with the different techniques and the number of visible scratches counted. Profilometry did not clearly identify scratches due to limitation of the 2 μm probe size. Light microscopy provided the fastest and most appropriate technique for quality control, detecting 70% of the scratches. Scanning electron microscopy only showed 35% of the scratches at the same magnification, but provides a good 2-D image of the scratch and the resulting metal pile-up.

Keywords: polished surfaces, scratch, scratch detection, microscopy, quality control

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