Determination of the Silver Content of Silver Plated or Blanched Silver Alloys

For finishing purposes silverware is often plated or blanched. In the plating process, a pure silver coating is applied to a silver/copper alloy. This produces an attractive, white satin sheen. Blanching achieves the same effect by chemically removing copper from the topmost layer of the silver/copper alloy. The result of both methods is a veneer of much higher silver content than the substrate, which complicates the determination of the fineness, and therefore, of the value of the silverware.

The only foolproof method for correctly determining the silver content of silver-plated or blanched silver/copper alloys is to test the base material directly, for example, by grinding or sawing down into it, since non-destructive standard analysis with X-ray fluorescence (XRF) shows erroneously high silver content due to the increased concentrations at the surface.

Using a measuring application which looks for a silver coating atop a silver/copper alloy, FISCHER X-ray fluorescence instruments allow for the non-destructive determination of both the thickness of the silver coating as well as the fineness of the base material. This works accurately for silver-plated items because the silver content in the plating is consistent. However, with blanching the silver content decreases steadily as the distance from the surface increases which makes the determination much more difficult.

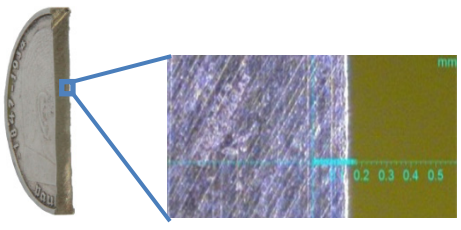

Figure 1: Blanched silver coin and enlarged image of the cross-section. The coin was cut in half to gather a depth-dependant profile for verification.

The blanched silver coin shown in Fig.1 was made from a 625 silver alloy (i.e. 62.5% nominal silver content).

A simple material analysis using XRF would show a silver content of 85%, a value significantly greater than the nominal silver content.

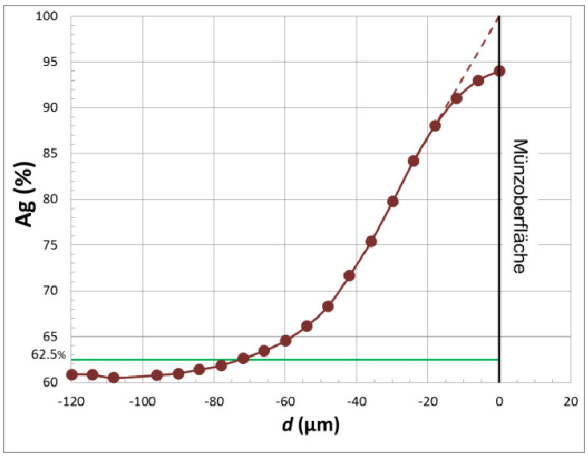

Figure 2: Depth dependant silver content of a halved coin. The nominal silver content is 62.5%. The measurement was verified using a FISCHERSCOPE® X-RAY XDV®-µ instrument with high local resolution.

Fig. 2 shows how the silver content increases as a function of the closeness to the coin surface, where the silver concentration approaches 100%. Using the FISCHERSCOPE® X-RAY XAN® 220 and an application created specifically for the measurement of blanched silver, “silver on silver/copper”, a concentration of 61.4% is obtained, which is very close to the nominal silver content. To verify the results, this coin was then cut in half, allowing direct measurements in the cross-section using an XDV-µ instrument with an extremely small spot size due to a focusing optics.

Using specialised applications with the FISCHERSCOPE® X-RAY XAN® 220 makes it possible to determine the fineness of the substrate and the thickness of the covering layers of *both* silver-plated and blanched silverware – quickly, accurately and non-destructively. Your local FISCHER representative will be glad to answer additional questions you may have.