

July 29, 2005

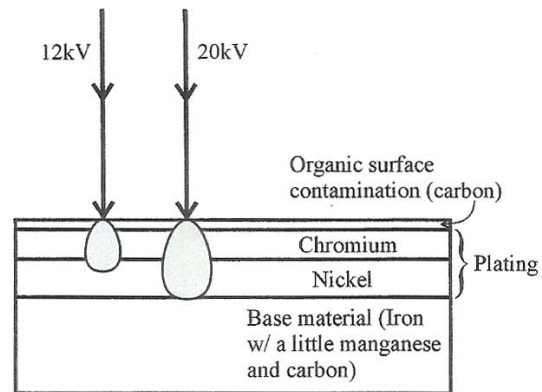
To Whom It May Concern:

This letter addresses the results of energy-dispersive x-ray spectroscopy (EDS) analysis I performed on October 29, 2004 on a handgun of type Walther P38, stamped AC over 43, with Serial number 1, black grips, nickel/chrome with gold trigger and parts.

The technique of EDS involves directing an accelerated electron beam toward a sample and analyzing the energy of the x-rays produced by the sample as a result of this electron bombardment. Every element has its own characteristic spectrum of x-ray energies and so this technique provides a method of determining the elemental composition of a sample. The system used is a EDAX Phoenix model EDS manufactured in 2002 attached to an FEI Company XL30 FEG model environmental scanning electron microscope (ESEM), also manufactured in 2002. The ESEM produces the electron beam and the EDS receives and analyzes the x-rays. Both systems are maintained, calibrated and serviced under a maintenance contract with FEI Company.

A significant conclusion I can make is based on two EDS spectrum files, one of which has "Untitled: 1" in the first line and in the second line, the label "Plating, back of spoke area" marked out and hand-labeled by me as "Middle of Barrel - JLS". The other also has "Untitled: 1" in the first line and no label at all. Both of these spectra are obtained from the same plated area in the middle of the barrel. The difference between the two is that one is obtained with an electron beam accelerating voltage of 20kV and the other with 12kV. Which is which can be seen in the third line down from the top of the page.

The effect of increasing the accelerating voltage from 12kV to 20kV is to generate elemental information from a deeper part of the sample being analyzed. This is illustrated in the figure to the right. The higher energy 20kV electrons will penetrate more deeply into the part than the 12 kV electrons, thus generating signal from the deeper-lying portion of the sample, as indicated by the shaded features in the figure. The fact that we see a larger atomic percentage of nickel (Ni) relative to the concentration of chromium (Cr) when using 20kV as opposed to 12 kV is strong evidence that there is an underlying Ni layer with a Cr layer deposited on top of this, as



illustrated in the figure. This also is what one would expect for a Cr-plated steel part. Cr does not adhere well to steel and so there is an intervening Ni adhesion layer used, that does adhere to the steel and in turn to which the Cr will adhere. The point being that this does appear to be a legitimate chrome electro-plated part. It is not silver or chrome paint.

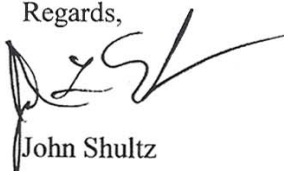
The spectrum labeled "Block" is from the internal, unplated block and simply shows that the steel is composed of iron with a small amount of manganese and carbon included. The high concentration of carbon showing in the analysis is due in part to the fact that there is a surface layer of organic contamination, probably a lubricant or protectant oil. In principle, this information could be used to determine the particular alloy of steel used in the construction.

The slide release spectra (12kV vs. 20kV) again indicate a layered structure, this time of gold (Au) on Ni on steel. (More Au relative to Ni and iron (Fe) in the 12 kV spectrum than in the 20kV spectrum.) The glancing angle slide release spectra confirm the top layer (excluding surface contamination) is Au.

I can't draw any conclusions regarding the reddish residue (2 SEM images and 2 EDS spectra) other than to comment that the bulk is almost certainly organic in nature. The "crust" is primarily iron oxide, while the underlying material has a more complex elemental composition. This could be lubricant or protectant oil or something biogenic in origin. Analysis by x-ray photoelectron spectroscopy (XPS) could shed light on this material. I have access to XPS, but do not have much experience in organic analysis using the technique. One might also consider using gas chromatography mass spectroscopy (GC-MS). This is a relatively commonly available technique, although I do not have this technique available in my lab.

I hope this helps you in your investigation.

Regards,



John Shultz

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