New industrial application for revolutionary forensic metal fingerprinting technique

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Groundbreaking research into fingerprint detection developed at the University of Leicester now has an industrial application, thanks to a new invention by the scientist who developed the technique.

Dr John Bond's method of identifying fingerprints on brass bullet-casings, even after they have been wiped clean, was based on the minuscule amounts of corrosion which can be caused by sweat. First announced in 2008, this breakthrough was cited as one of the technologies 'most likely to change the world' by a panel of experts for BBC Focus magazine and was included in Time magazine's list of '50 best inventions of the year'.

Now, working with scientists in the University of Leicester Department of Chemistry, Dr Bond has applied the same technique to industry by developing a simple, handheld device which can measure corrosion on machine parts. Corrosion leads to wear and tear and needs to be carefully monitored so that worn parts are replaced at the appropriate time so this invention should prove a boon to the manufacturing sector.

"This is a new, quick, cheap and easy way of measuring the extent of corrosion on copper and copper based alloys, such as brass," explains Dr Bond, who is an Honorary Research Fellow in the University's Forensic Research Centre and Scientific Support Manager at Northamptonshire Police.

"It works by exploiting the discovery we made during the fingerprint

research – that the corrosion on brass forms something called a 'Schottky barrier' – and we use this to see how much the metal has corroded.

"Such measurements can already be made but this is quick, cheap and easy and can be performed 'in the field' as it works off a nine-volt battery."

Dr Bond said: "Measuring corrosion of metal such as brass is important to ensure that machinery does not operate outside its safe limits.

"This could be anything from checking that a water pipe will not burst open to ensuring that the metal on an airplane is not corroded. This could lead, for instance, to the wheels falling off a jet. Having a corrosion measurement means for copper and alloys such as brass that is quick portable and cheap enables metals to be tested in situ with no prior set up of a corrosion measuring device.

"Also, rather than simply saying that the brass is corroding (as a technique such as weighing the brass would) this technique enables the type of corrosion to be determined (i.e. copper oxide or zinc oxide corrosion). As to which one it is gives clues as to how severe the corrosion is.

"This can be done already with something like X-ray photoelectron Spectroscopy (XPS) but that is lab based and very expensive to use. Our technique works off a 9-volt battery. In that sense, it won't tell you any more than XPS can, it is just quicker, cheaper and easier.

"A common use of brass in industry is heat exchangers as brass is a good conductor of heat. If these are water based, then seeing how the water is corroding the brass is useful. Also, you simply need to be able to touch the brass with a probe, there is no other setting up required. It's as easy as taking your temperature with a thermometer."

There is much research on inhibiting the corrosion of brass because of its use in heat exchangers and industrial pipe work, this technique enables the degree of corrosion to be easily measured.

A description of the prototype device has been published in the journal *Review of Scientific Instruments*. Dr Bond and his colleagues are now looking for a company which could exploit the invention and place it on the market.

Provided by University of Leicester