



LABORATORY REPORT

DATE: 24th OCTOBER 2011

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**SUBJECT: TESTING OF 104 METAL REPAIR PASTE
XF FOR OIL CONTAMINATED SURFACES**

Introduction

PES was asked to develop and test a material which would be suitable for application to prepared steel surfaces heavily contaminated with Oil. Following this meeting and further in house and face to face customer meetings, a material suitable for meeting the customers criteria was developed. The following pages of the report outline the final application and testing of the material.

Product Introduction

PES 104 Power Metal Paste XF (Extra Fast) is a two pack solvent free epoxy based repair material.

The product has been given fast curing characteristics and under extensive laboratory testing has

the following performance characteristics –

| | |
|-------------------------------------|----------------------------|
| Usable Life | 5 minutes (68°F) |
| Touch Dry | 15 minutes (68°F) |
| Hard Dry | 35minutes (68°F) |
| Appearance | Base BLACK Activator WHITE |
| Consistency | Paste |
| Application Method | Spatula or Applicator tool |
| Mixing Ratio | 1:1 |
| Shore Hardness | 80 |
| Shear Strength (N/mm ²) | 1988 psi |
| (DIN53283) | |
| Peel Strength | 426 psi |
| ISO 4578 | |

The testing was carried out on abrasive blast cleaned steel panels, which were then degreased and dried using the appropriate cleaner MEK acetone.

Testing Procedure and notes

To test the product under practical circumstances an appropriate oil was purchased from Crown Oils (Technical data sheet is available on request).

4 Mild steel plates were blast cleaned to SSPC-SP10, 2 mil profile and soaked in Transformer Oil



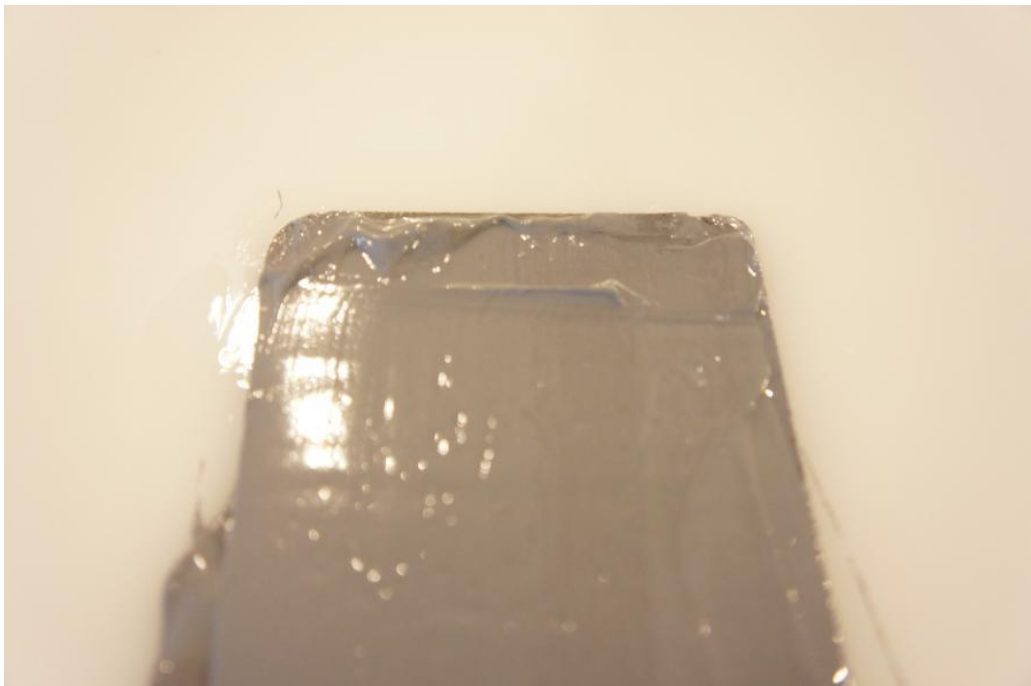
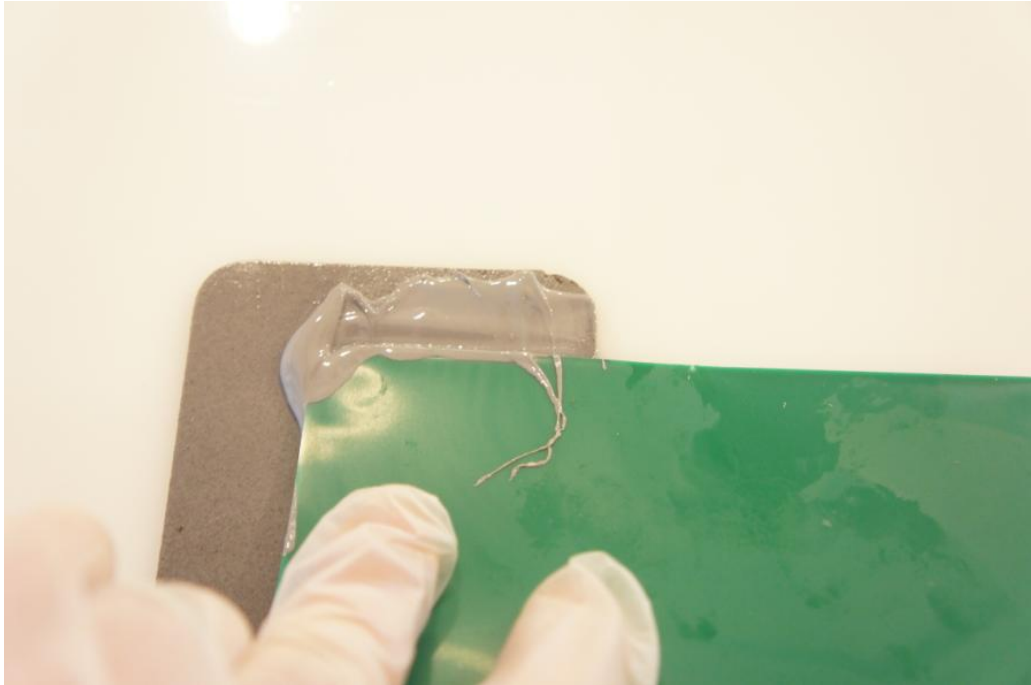
The plates were then taken out of the tub and placed on a mixing board, the plates were not wiped and as much oil as possible was retained on the surface of the steel plate



A small amount of the 104 Power Metal Paste XF base and activator were placed on a mixing board and mixed according to the instructions



Once mixed to the required consistency the material was applied to each flooded steel plate. The material was pressed onto the surface and then scraped down to ensure a uniform covering over the test panel.



While the product was applied down the surface of the plate observations were made to see if the product was dragged away from the steel surface. It was confirmed that the mixed material stayed in place and did not de-laminate from the oil soaked surface.

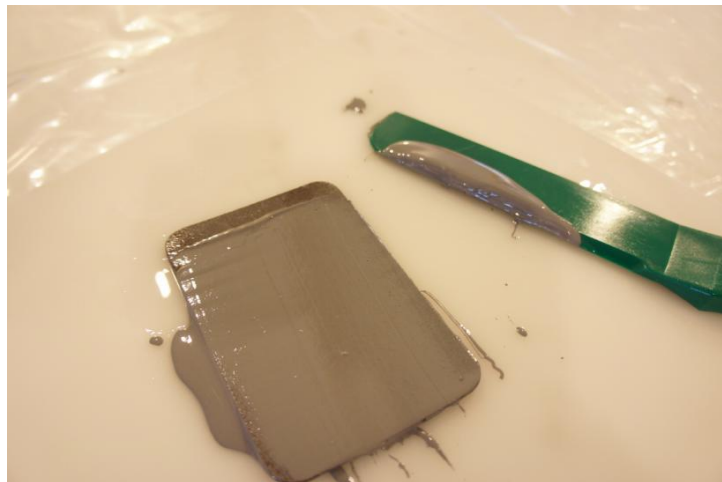
After 5 minutes, part of the applied material was scraped from the surface to see if the oil had been taken in by the material. Observations confirmed that the oil had soaked into the material rather than cause a barrier between the steel and the mixed product.

After this observation a series of tests were performed on the material where a spatula was dragged across the surface of the applied material four times. The original WFT of the material was measured as 60 mils. During each pass a thin layer of material was taken away from the surface. Observations were taken and confirmed that none of the mixed product was pulled away from the surface of the steel plate. The final WFT of the material was measured as 8 mils.



1st Pass of the spatula (Above)

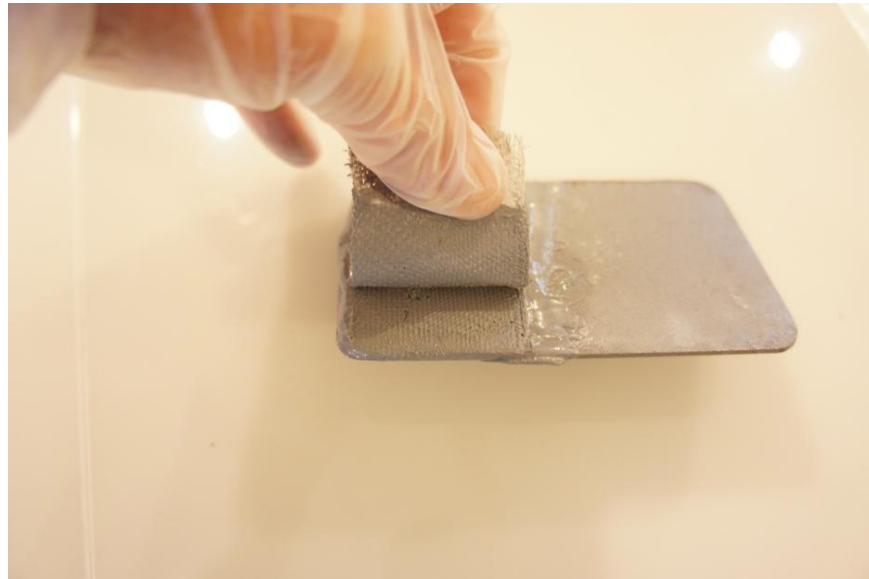
4th Pass of the spatula (Below)



After these tests were carried out another layer of material was applied to the surface of the plate with a strip of tape incorporated into the sample.

The plates were allowed to cure at an ambient temperature of 68°F.

Once cured a simple pull off adhesion test was carried out on each of the plates. Observations confirmed that the bond between the material and tape failed. The bond between the material and oil soaked steel plate did not fail. Maximum pull off pressure was measured at 1065 psi.



Conclusion

After extensive testing in our laboratory we would recommend the application of PES 104 Power Metal Paste XF for a field trial.

The material has more than exceeded performance standards set out prior to this laboratory report.