The April 2012 Penetrant Professor from Met-L-Chek®

Penetrant Application & Sensitivity

How is the best way to apply penetrant, and does the method of application have any bearing on the sensitivity of the process? This is a question that arises from time to time. It is not a question about the sensitivity of the penetrant, which is an innate property of the material, but rather concerns the process of applying the penetrant. Commonly asked is whether it is better to leave a part immersed in the penetrant or whether it is better to dip the part and then let it drain. A similar question concerns whether pooling of penetrant on a part affects sensitivity or whether the ultra thin coating applied by electrostatic application is as efficient as dipping the part.

Penetrant sensitivity is established by qualification tests made at the Wright Patterson Air Force Base Materials Laboratory. The qualification process follows the details in SAE AMS 2644, which outline the individual processing steps involved. In this procedure, the test specimens are dipped into the penetrant and then drained for the dwell time. Does this imply that if parts are immersed during the dwell time that the sensitivity would be different? We know of no tests that have been made to determine this. There are two different points here. The one that we have been discussing has to do with whether there is a difference in sensitivity with different penetrant application methods or whether the part is drained or immersed for the dwell time, and the other is what the specification requires one to do when processing parts. We do not know if there is a scientific basis that would imply that the sensitivity is different for different application methods but in any case one must follow the applicable specification. In the case of **ASTM E-1417**, the following covers the point:

7.2.1 Rotate or otherwise move components, if required, during dwell to prevent pooling of the penetrant. For dwell times greater than two hours, the penetrant shall be reapplied as required to prevent drying. The component shall be immersed in penetrant, if that is the application method, for no longer than half the total dwell time.

We understand that **NADCAP** check lists include similar wording, and the point that should be made is that if one is to be audited, one must follow the wording of the specification.

One might ask why this is in the specification, and the answer might be that it has nothing to do with sensitivity, but from the perception that for post emulsifiable penetrants, the less penetrant that is on a part, the less consumption of emulsifier would be required, and for water washable penetrants, the less penetrant the easier and quicker it is to wash the part. And, of course, it reduces the consumption of penetrant. It is more of an issue of practicality in processing than penetrant sensitivity.

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