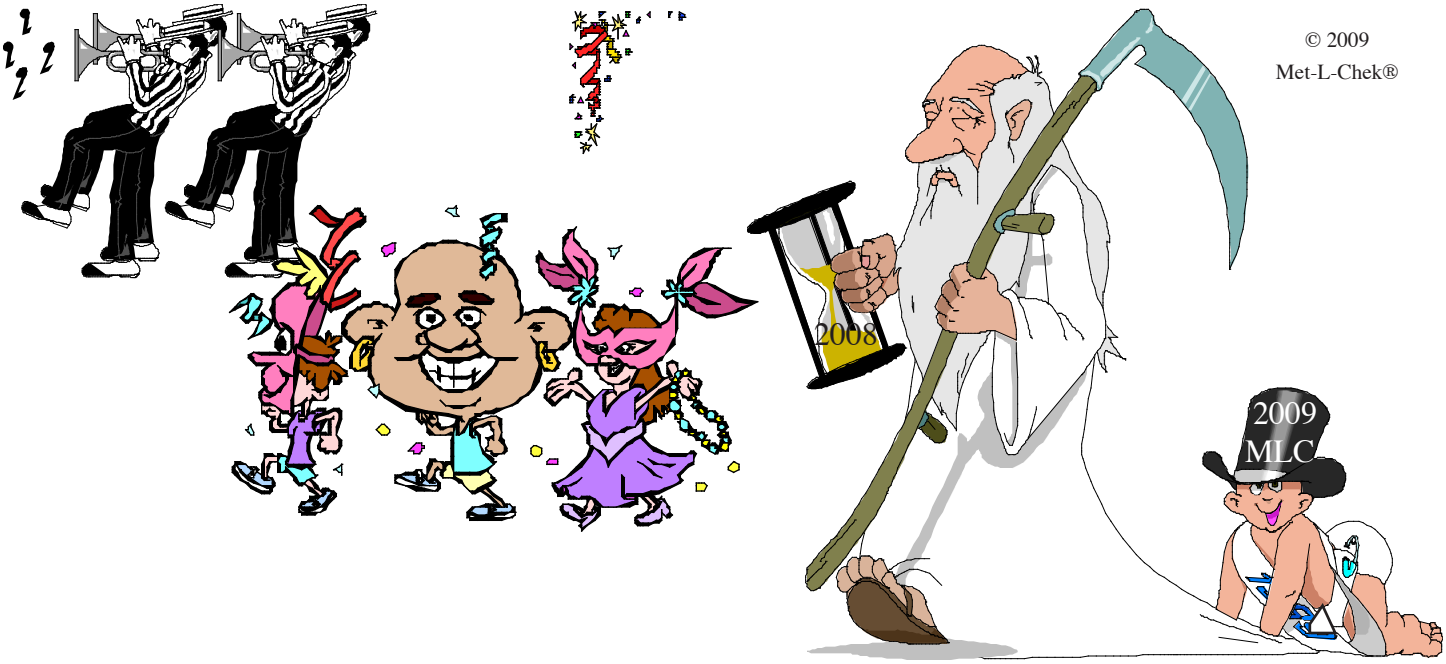


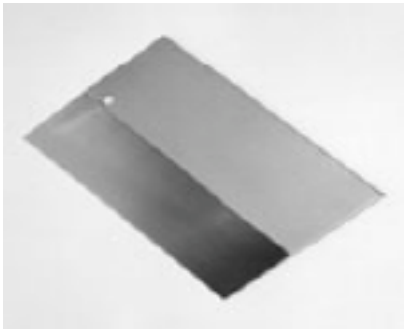
The January 2009 Penetrant Professor from Met-L-Chek®

STAR BURST PANELS
or
"those damn tam panels"

At the Fall meeting of ASNT in Charleston, South Carolina, George Hopman presented a talk in which he described tests that he had made to determine if the use of star burst crack panels, widely known as TAM panels or PSM panels, were able to determine if a penetrant system was "out of spec".

Ever since the TAM panel was designed at Pratt & Whitney, its use has been written into countless specifications, and sophisticated equipment has been designed to photograph and measure the indications produced on the panels.

However refined the panels and the ancillary equipment has become, little work has been done to actually test the efficacy of the panels, or to test their ability to actually do what the specifications require. George's paper gives the results of tests made to determine whether the panels are able to detect when a penetrant system is operated outside of the specification limits. The conclusions should be of great interest to penetrant system operators, auditors, and specification writers



In his paper George describes a group of tests made at an actual working industrial location on an operating penetrant line, and using the panels that he had on hand.. The results are those that were found using these particular panels, and may not be representative of what would be found with other panels. Never-the-less, the study is worth careful consideration. What George did was to design some conditions that violated the operating limits defined by the specification. And he did this by making the violations outrageous. He then tested the ability of the panel to determine whether the system performance was out of whack. In each of the tests, the "violated" panel results were compared to the same panel that had been processed in accordance to the applicable specification. Photos were carefully taken of the panels and then they were put side by side for comparison.

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For example, to test the effect of penetrant contamination, he added one percent nitric acid to a sample of the penetrant, mixed it, and then applied it to the panel, processed it and then photographed the results. The photo was then compared to a photo of the same panel that had been processed with uncontaminated penetrant. He reports that although the contaminated penetrant really looked gnarly, the panel indications showed no significant difference from the panel that was processed with regular penetrant.

He repeated this comparative process by adding 20% water to a water washable penetrant, and again was unable to show any significant difference with the panel.

He then tested the effect of dwell time, using 30 seconds dwell and 14 hour dwell, and could not see any difference from the standard processing.

He tried water wiping with 185 degree water and 33 degree water. Same results, no difference noted on the panels.

He over washed by washing at a 4 inch distance for 3 minutes, and finally he tried over drying for 30 minutes. There were also no differences noted.

George reported that in questions and discussions following his presentation, a representative of a panel manufacturer stated that ***" the PSM-5 or any TAM panel is incapable of demonstrating system degradation"*** .

The use of these panels is widespread and included in most current specifications. The method of using them has become ever more sophisticated, with fixtures and cameras designed to take very careful photos of the panels, insuring that the photos are exactly the same dimensions as the panels, and that the photos can be seen in the inspection booth under UV-A lighting. Along with this, auditors have become diligent in demanding that the panels be used and photographed with exactitude. Seemingly, lost in this demand for minutia, is the conclusion that George reached, namely, that the use of the panels does not detect many violations of the operation of the system. It is a modern case of noting that "***the emperor has no clothes***".

The text of George's presentation is to be published in a future issue of MATERIAL EVALUATION. We recommend strongly that you read it. As an operator of a penetrant line, it will tell you what confidence you can have in the test. As an author of specifications, it might provoke new thoughts about how to determine the condition of the penetrant line.

The Penetrant Professor

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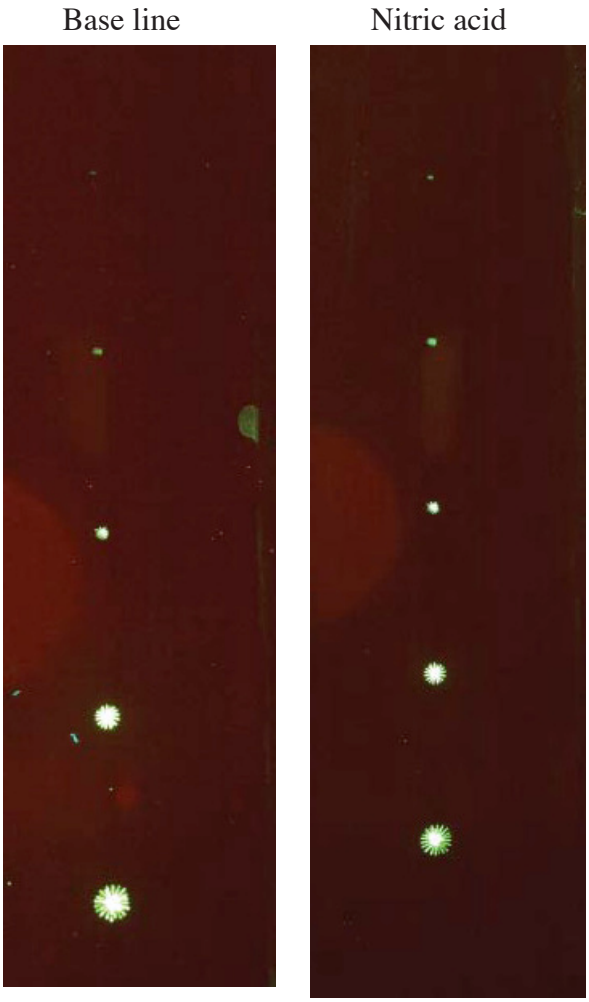

figure 1 from Georges' paper
base line compared to 1 % nitric acid contamination