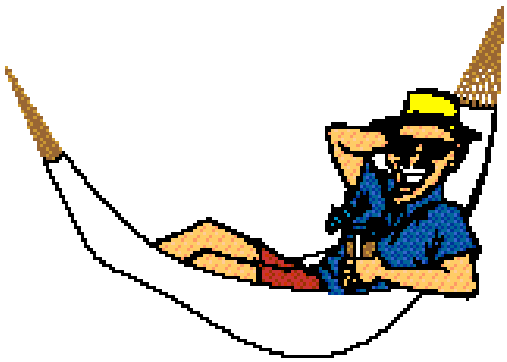
The Penetrant Professor from Met-L-Chek®



More Thoughts on POD's and Penetrant Inspection

Our recent article about penetrant POD brought this response from **Brian MacCracken**, now retired, but an important figure in the penetrant using community:

"I enjoyed this month's Pen Prof, as I usually do. However, I would like to add my two cents about POD's for FPI and if you want to quote me, feel free to do so. In fact, I am sure my opinion may stir up a hornets nest but since I am retired, I no longer have to be worried about being censored or politically correct.

In regards to last month's Pen Professor, I would first like to say that I was involved in POD's from the very beginning when POD's were just hitting the airline industry and that I was heavily involved with POD's for over 28 years. I went around the world performing POD's because my company was contractually required to do so. I was even involved in writing a specification for my company on the "how to" perform POD's for FPI". As you can see, I am very experienced, well versed and have a lot of knowledge when it comes to POD studies or evaluations for FPI. With all this being said, all I want to say is, ***"POD's for FPI are the biggest façade that there ever was".*** It truly is a joke and can be scary to think that engineering people use these so called POD numbers to sink their teeth into. Regardless of what this number comes out to be, people will apply this number as gospel. Now that they have a number, or POD, they can now answer the old proverbial question, ***"how small of a crack can I find?"*** I wish I had a dime for every time I was asked this question during my almost 41 years on the job. If I did, I could have retired earlier. I could go on and on with my opinion and the wisdom I have gained over so many years of doing countless POD studies, but I would likely have many people disputing my words, and it wouldn't be worth it. However, I can support and back up my claims and in fact, I have always wanted to write a paper and entitle it, "***The façade of POD's for Fluorescent Penetrant"***. I think if I had done this paper, there would be a lot of people who would show up and thank me for speaking out, and then there will be the ones that would still argue that these POD numbers are real numbers and are the true probability and detectability of the FPI process.

As I stated before, feel free to quote me in your next Pen Prof.or just file it all away."

We thank Brian for his input on this and we are sure he is not alone in his view.

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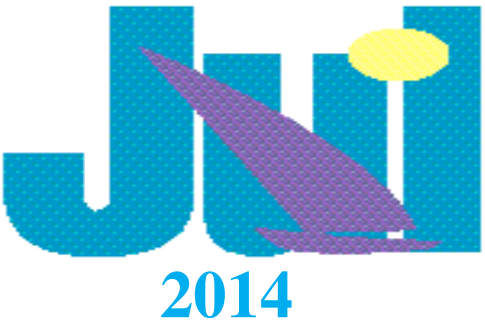

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Penetrant Brightness Measurement

Recently a question arose concerning the measurement of penetrant brightness, as required by **ASTM E-1417.** This is a subject that has been discussed, off and on, for many, many years. I remember one discussion that I had with **Grover Hardy**, in which he opined that the measurements were ***useless***. Back then I had been involved, along with **Sam Robinson** in some actual tests, the results of which are worth showing.

These tests took place some 20 years ago and were designed to illustrate the results obtained from using the different brightness measuring instruments that are specified in **ASTM E-1135**.

The first such tests were made by Sam at Allison, in which he measured the brightness of four penetrants using both the **S-291** and the **Turner** fluorometers. Sam used four samples of each of the four penetrants. When the results of these tests were made, statistical evaluations were made to determine if the two fluorometers produced equivalent results. The answers were that the fluorometers did not produce statistically equivalent results.

Sam then went to the Air Force materials laboratory where he ran 80 tests using all three of the approved fluorometers, the **S-291**, **Coleman,** and **Turner**. The results were analyzed as follows:

Turner vs. S-291
Coleman vs. S-291
Turner vs. Coleman

None of these comparisons were statistically significant.

Then, at **Met-L-Chek** we made 410 tests using both the **S-291** and the **Coleman**. None of the results were statistically significant.

To complete the tests, 65 tests were made at **Met-L-Chek** for heat fade, using the **S-291** and the **Coleman**.

Of these, 8% showed the same results, 52% showed **Coleman** results higher than the **S-291**, 25% showed **S-291** results higher than the **Coleman,** and 15% showed an increase in brightness with the **Coleman** and a decrease in brightness with the **S-291**

The results were not statistically the same, with t=9.225, and significance=0.069

So much for history. There are basic reasons why brightness measurements may be superfluous. Among these are the following:

No test has ever been made that would correlate the brightness of the filter paper sample with the brightness of an actual defect indication.

The wave length and intensity of the UV used in the various fluorometers is unknown.
The wave length of the visible light (brightness) is also unknown and the sensor characteristics are also unknown.

Variations in operator techniques have never been identified or their effects measured.

We know of no working penetrant system that has failed the system performance test because of a perceived drop in penetrant brightness.

The Penetrant Professor