

Draft Minutes

ASC OP TF 7 –Committee for Optics and Electro-Optical Instruments – Laser Applications

Sunday, February 8th, 2015 16:00-17:30 PST
Nob Hill Room
Intercontinental Hotel
888 Howard St. San Francisco, CA
(In conjunction with Photonics West)

1. Welcome and Introductions

D. Howland convened the meeting at 16:02 with introductions. In attendance were D. Howland, T. Turner, M. Thomas, J. Chung, L. Mechold, J. Aranberg, A. Krisiloff, M. Dowell, L. Hanssen, P. Augino, and D. Palmari.

2. Adopt the Agenda J. Aranberg moved that we accept the agenda, modified to have the correct time and date. D. Palmari seconded the motion, and it passed.

3. Minutes from the previous meeting J. Aranberg observed that Andrius' name was spelled incorrectly. M. Thomas moved we accept the minutes as modified, J. Aranberg seconded and the motion carried.

4. Group Discussions

- a. Issues with existing standards
- b. Publish a new US standard for Lasers
- c. Convert International to US standards
- d. Advise TAG on ISO standards

T. Turner opened the discussion with a quick analysis of the existing damage threshold standard, ISO 21254, and that it does not currently meet the needs of the American laser community. He asked the question, should we try to repair it, or begin from a clean piece of paper to create our own standard. J. Aranberg, who was an author of the original version of the standard, described the standards evolution, and that in many ways, as a result of negotiations at the SC, the standard became fundamentally flawed. He felt we would be better served by developing our own version for the needs of the American industry, and potentially offer that as an International Draft at a later date.

J. Aranberg suggested that there were some clear areas where we could make a new damage threshold standard which can be more current, since the existing ISO 21254 is based on the state of the art at the time, but is no longer a good functional test for damage threshold. If we want to start from scratch, how would we decide what to do and how to do it?

J. Aranberg felt that we need to get the input from the user community so we can better understand what kinds of standards are needed for laser damage in the US. J. Chung said that the current standards seem to be working in that we are able to use the number to baseline our coating performance, and we

are able to maintain our coating performance using the existing numbers. M Thomas expressed some concern that, perhaps, we could do better. For example, if we are over-specifying the damage threshold to be sure to meet the requirements, but we could be accepting much lower performance coatings, we are rejecting more coating runs unnecessarily. Or are we using these damage threshold tests to catch blunders in the coating runs, rather than to actually control imperfection?

J. Aranberg observed that using unrealistic damage threshold specifications with lots of margin can drive the cost up and hamper your supply, especially for industrial lasers for manufacturing. In his mind, what the industry needs depends on the application. But for high-performance applications, we need a method of testing “flight components” over 100% of their area, and determine the defect distribution and a probability of initiation across the part. This will allow lifetime predictions versus fluence. Clearly this is very different from a small spot test on a witness sample.

M. Thomas said that for NIF they are actually raster-scan the entire clear aperture of the part to identify where the defects are, and evaluate the total surface.

J. Aranberg also reminded the committee that another key issue is that you can’t measure any of the area of even a witness sample correctly if you are measuring with a Gaussian beam and evaluating it based on the peak of the Gaussian.

M. Thomas explained that what Spica is doing for NIF is over-laying the Gaussian beams so that they overlap at the 90% peak, so they are sort of a “bumpy top-hat” made from a raster-scanned Gaussian.

All of this basically talks only to pulsed power damage. High average power (CW) lasers are a bigger problem, which is totally different. With the availability of new kW class fiber lasers, we are seeing all sorts of new applications, and we need to consider how to address these. That is not to talk about wavelength diversity as well.

D. Aikens observed that what seems to be missing is a map of what kinds of tests need to exist. Given the axes of % area, pulse duty cycle, wavelength and pulse length we can imagine a broad range of testing that needs to be done. J. Aranberg said that if you could cover 1.064 pulsed, that is most of what we’ve been talking about, and we might be able to address that point and extend the coverage over other applications. T. Turner said that if we had a test method that addressed the intrinsic damage as well as the statistical damage probability there could be quite a few lasers and applications that that would cover. Perhaps if we started with the NIF specification, that could cover quite a bit of this domain?

UV may be a very different set of problems, and we will want to get a different group of people on-board to get into that. Still, getting our first standard down could give us some leverage to talk to the UV community to try and extend that approach into their applications.

J. Aranberg suggested that we get some kind of paper or announcement to get some interest going.

Action Item: D. Howland, J Aranberg and M Thomas to figure out how to survey the industry and report back.

Action item: M. Thomas will contact LLNL and confirm we can distribute it.

Action item: D. Howland will get a copy of the NIF standard to distribute.

Action item: J. Aranberg will propose a scope and title for a new standard

Action item: J. Aranberg will draft initial standard

5. Time and place for next meeting

D Howland suggested brownbag meeting at DSS as an outreach to get more people interested. H. Johnson proposed we have a teleconference on Tuesday May 12th at 11:00 EDT. M. Thomas seconded and the motion carried.

6. Adjourn

J Aranberg moved we adjourn. H. Johnson seconded and the motion carried. The meeting was adjourned at 17:40.