

Draft Minutes
 ASC OP/TF 3 Optics and Electro-Optical Instruments – Optical Elements and Assemblies – Wavefront Standard
 Sunday, January 25, 2009
 1:30 p.m. – 5:00 p.m.
 Fairmont Hotel, California Room
 170 South Market Street
 San Jose, CA 95113

Attending

| <input checked="" type="checkbox"/> | Committee Members (15 of 22 w/2 alt.) | Representing (Parent Organization) |
|-------------------------------------|--|---|
| <input checked="" type="checkbox"/> | David Aikens | Savvy Optics Corp. |
| <input checked="" type="checkbox"/> | Gordon Boulton (Alternate) | JDSU |
| <input type="checkbox"/> | Andre Brunfeld | Xyratex |
| <input checked="" type="checkbox"/> | Benjamin Catching | JDSU |
| <input checked="" type="checkbox"/> | Walter Czajkowski | APOMA (Edmund Optics) |
| <input checked="" type="checkbox"/> | Jessica DeGroote Nelson (by phone) (Alternate) | Optimax Systems, Inc. |
| <input checked="" type="checkbox"/> | Marla Dowell | IEEE/LEOS |
| <input checked="" type="checkbox"/> | Marla Dowell | NIST |
| <input checked="" type="checkbox"/> | Lincoln Endelman | SPIE (Endelman Enterprises) |
| <input checked="" type="checkbox"/> | Chris Evans | Zygo Corporation |
| <input checked="" type="checkbox"/> | Ulph Griesmann | OSA (NIST) |
| <input checked="" type="checkbox"/> | Krishna Gupta (Alterante) | Zygo Corporation |
| <input type="checkbox"/> | John M. Hamilton | Northrop Grumman Corporation |
| <input checked="" type="checkbox"/> | Hal Johnson | Harold Johnson Optical Lab |
| <input checked="" type="checkbox"/> | Allen Krisiloff | Triptar Lens Company, Inc. |
| <input type="checkbox"/> | Gene Martin | Individual |
| <input checked="" type="checkbox"/> | Stephen Martinek | 4D Technology |
| <input type="checkbox"/> | Jonathan McGuire | Northrop Grumman Laser Systems |
| <input checked="" type="checkbox"/> | Wayne McKinney (Alternate) | Lawrence Berkeley National Lab |
| <input checked="" type="checkbox"/> | Rick Plympton | Optimax Systems, Inc. |
| <input type="checkbox"/> | William Royall | Eastman Kodak Company (Retired) |
| <input checked="" type="checkbox"/> | Peter Z. Takacs (by phone) | Brookhaven National Lab |
| <input type="checkbox"/> | Trey Turner | Research Electro-Optics, Inc. |
| <input checked="" type="checkbox"/> | Ray Williamson | Ray Williamson Consulting |
| <input type="checkbox"/> | Dr. Valeriy V. Yashchuk | Lawrence Berkeley National Lab |
| Observers (4) | | |
| <input checked="" type="checkbox"/> | Lahsen Assoufid | Argonne National Laboratory |
| <input checked="" type="checkbox"/> | Donna Howland | Northrop Grumman Aerospace Systems |
| <input checked="" type="checkbox"/> | Gene Kohlenberg | OEOSC |
| <input checked="" type="checkbox"/> | Bruce Netherton | Lockheed Martin Space Systems |
| <input type="checkbox"/> | Steven VanKerkhove | Corning Tropol |

Auditor's Summary of Meeting

Two draft standards were examined at this meeting: OP1.004 – **statistical methods for measuring wavefronts and surfaces** and OP1.005 – **deterministic methods for measuring wavefronts and surfaces**. New versions of the drafts will be written based upon the technical discussions during this meeting. The Task Force will meet again in Rochester, NY in May 2009.

1. Welcome and Introductions

C. Evans opened the meeting at 1:32 p.m. with a round of introductions.

2. Adoption of Agenda

D. Aikens moved to adopt the draft agenda. H. Johnson seconded the motion, which carried unanimously.

3. Approval of draft minutes of the Tuesday, October 21, 2008 meeting

B. Catching moved that the draft minutes be accepted; R. Plympton seconded the motion; the motion carried unanimously.

4. Wavefront Standards

a) OP1.004 – statistical methods for measuring wavefronts and surfaces

P. Takacs discussed his draft of BSR/OEOSC OP1.004-090122. His talking points are in **OP1.004 discussion doc.pptx.pdf**. He also presented some PSD examples that he generated using Mathematica. These documents accompany the minutes on the optstd.org website.

D. Aikens suggested the OP use the same notation as used in ISO 10110-8, but OP1.004 should define slope.

D. Aikens said that since the Task Force hopes to offer this document as a draft for an international standard, it should be aware that ISO requires a definition to be only one sentence without any equations. The equations would go in the next section after definitions.

W. McKinney said that most surfaces are isotropic. Many practitioners rotate the 1D PSD and rotate it to get an r- θ PSD. This confuses the constants in front of the integrals. He asked if the technique should also be part of the standard. P. Takacs agreed that there could be a discussion concerning converting Cartesian data into r- θ data. This could be useful for those who want to do scattered light calculations. D. Aikens said that these are already defined in ISO 10110-8; however, these definitions may not be mathematically rigorous. If the optics industry does want radial and tangential profile PSDs because they are more intuitive, this standard could define them more mathematically rigorous.

C. Evans added that he has seen drawing specifications that limit the magnitude of a radial PSD and a circumferential PSD. He also has seen specifications that call for the average of two linear PSDs in orthogonal directions. The standard should either discourage these types of specifications, or define them in such a way that they can be understood.

S. Martinek said that the standard could define how the Cartesian and r- θ approaches, but the standard should not specify which is to be used.

P. Takacs said that he will continue working on the draft.

The Task Force recessed at 2:35 p.m. and reconvened at 2:43 p.m.

b) OP1.005 – deterministic methods for measuring wavefronts and surfaces

C. Evans prepared discussion notes (OP1005Discussion.pdf), which accompany these minutes on the optstd.org website.

D. Aikens suggested that section 4 should simply say, "Drawing notations shall be per ISO 10110-5 and ISO 10110-14. Where those standards do not provide adequate indications, the indications will be made in a note."

D. Aikens continued that the rest of the document should be grouped so that it would fit more easily into the ISO format.

Literature becomes Bibliography. Informative references are moved to the Bibliography, and normative references appear early in the standard.

L. Endelman suggested that "Expression of measurement results" should be "Test Results."

D. Aikens suggested that items 6 – 10 should be subheadings under section 5.

C. Evans then went through his draft to solicit comments on content. There was a discussion concerning the use of bandwidth in reference to section 3.5.

D. Aikens suggested that for section 3.7, "Slope," users could be told that they have to choose their own orthogonal set of polynomials to use when the optics has a rectangular aperture. The polynomial fit to the wavefront is smooth and can be used to compute slope.

C. Evans suggested that there be a separate discussion concerning slope measurement. R. Plympton said that J. Degroote Nelson would be available for that discussion.

D. Aikens suggested that **Note 2** in 3.8 be dropped.

The group agreed that this standard will assume that measurements are made normal to the wavefront.

The Task Force recessed at 4:00 p.m. and reconvened at 4:12 p.m.

C. Evans discussed conformance in **Section 5** on pages 3 – 6 of **OP1005Discussion.pdf**. D. Aikens suggested that as a result of this discussion there is no default uncertainty. For commercial optics uncertainty is ignored. For high-quality optics, uncertainty is important. The decision rule for uncertainty should be moved to the Annex.

5. Time and Place for next OP/TF 3 Wavefront Meeting

R. Plympton moved that the next meeting be held in Rochester, NY; D. Aikens seconded the motion, which carried.

6. Adjournment

W. Czajkowski moved that the meeting be adjourned. R. Williamson seconded the motion. The meeting was adjourned at 5:02 p.m..