

Draft  
Minutes

ASC OP1 ASC OP/SC 1, Performance Based Optical Imperfections Task Force Draft Standard Meeting  
Sunday, October 8, 2006, 8:30 a.m. — 12 Noon  
Hyatt Regency Rochester, 125 East Main Street, Rochester, New York, USA 14604  
Loftus C. Carlson Room, Section B

<b>Present</b>	<b>Attendees (7 of 16)</b>	<b>Representing</b>
<input checked="" type="checkbox"/>	<b>Committee Members</b>	
<input checked="" type="checkbox"/>	David Aikens	Zygo Corporation
<input checked="" type="checkbox"/>	Gordon Boulton	JDSU Corporation
<input type="checkbox"/>	Andrei Brunfeld	Xyrtex
<input type="checkbox"/>	Benjamin Catching (Alternate)	JDSU Corporation
<input checked="" type="checkbox"/>	Walter Czajkowski	APOMA (Edmund Optics)
<input checked="" type="checkbox"/>	Frank Dombrowski	Gage-Line Technology, Inc. (by phone)
<input checked="" type="checkbox"/>	Marla Dowell	IEEE/LEOS (NIST)
<input checked="" type="checkbox"/>	Lincoln Endelman	SPIE, (Endelman Enterprises) (by phone)
<input type="checkbox"/>	Charles Gaugh	Davidson Optronics, Inc.
<input type="checkbox"/>	John Hamilton	Northrop Grumman
<input type="checkbox"/>	Hal Johnson	Harold Johnson Optical Lab
<input type="checkbox"/>	Rudolf Hartman	Retired
<input type="checkbox"/>	Michael Morrill	Lockheed Martin Space Systems Company
<input type="checkbox"/>	William Royall (by phone)	Eastman Kodak Company, Retired
<input checked="" type="checkbox"/>	Trey Turner	Research Electro-Optics, Inc.
<input type="checkbox"/>	Steve VanKerkhove	Corning Tropel
	<b>Observers (1)</b>	
<input checked="" type="checkbox"/>	Gene Kohlenberg	OEOSC

### Auditor's Summary of Meeting

The committee continued looking at the feasibility of combining the measurement method with the visibility method in the existing optical standard. The scope was revised and several sections were edited to see how the document would flow when both notations were included.

No progress could be reported on the project to evaluate the repeatability of the visual inspection method.

The results of the June ISO/TC 172/SC 1 meeting in Boulder, CO were reported.

Lessons learned from presenting recent training classes were shared with the task force.

The group agreed to meet in January during Photonics West.

### 1 Welcome and Introductions

G. Boulton opened the meeting at 8:42 a.m. Each person introduced him/herself to the group.

### 2 Adoption of Agenda

D. Aikens asked that an update to the class be added to the agenda. F. Dombrowski asked to add the ISO report back into the agenda. W. Royall moved that the draft agenda as modified adopted. D. Aikens seconded the motion. The motion carried unanimously.

### 3 Approval of the Saturday, June 25, 2006 ASC OP/SC 1, BSR/OEOSC-OP1.002, Optics and Electro-Optical Instruments – Optical Elements and Assemblies — Appearance Imperfections Draft Review Minutes

The minutes had been posted on the web site. The Task Force Leader asked if there were any additions or corrections to the minutes. F. Dombrowski noted that his initial needed to be corrected in the second paragraph on page two. G. Boulton had a question about the notation “AA, BB, CC.” D. Aikens suggested that the phrase “to represent smaller scratches” be added to the sentence. W. Royall moved that the minutes be approved and T. Turner seconded the motion. The motion carried unanimously.

#### 4 Report of Scratch and Dig Course

D. Aikens reported that he presented the course at **Optics East**. He made modifications to include new information about international standards and updated to recognize that the ANSI standard has been released. He suggested that he provide the secretary with the latest copy so that it could be placed on a restricted section of the web site for the committee to review. Some students are not comfortable with accumulation notation. Should probably do an introduction to that section with a chart to list the terms. D. Aikens had a heckler in front row who refused to cooperate. Everyone knew about him, but he still pulled down the class. SPIE had 16 students sign up for the course and 14 attended. It was the largest Optics East class thus far. Perhaps SPIE should drop the class from the Optics East.

F. Dombrowski asked if the task force members can get a copy of the updated handout. The secretary will put a copy up on the web site in a protected area so that task force members can access it.

D. Aikens said that the addition of definitions of notation will help students along with the inclusion of the answers to the quizzes.

D. Aikens has not seen any drawings, as yet, that reference OP1.002. The secretary said that only one copy of the standard has been purchased through ANSI to date. D. Aikens noted that a lot of draft copies have been distributed with the class.

G. Kohlenberg reported that John Salerno, from the military had replied that he only got one comment back when he distributed the standard to his associates. That comment referred to the illustrations, saying that they were not very useful, but there was nothing technically wrong with the standard. G. Kohlenberg assumes that he will be contacted within a year by someone who has the task of entering OP1.002 into the military database. D. Aikens said that he has gotten quite a few comments back from students who appreciate the illustrations of the scratch types.

L. Endelman asked if there is a mechanism so that an instructor can reply to the comments submitted by the students. D. Aikens replied that SPIE provides copies of the student comments purely for instructor information. D. Aikens was more concerned about word-of-mouth comments circulating in the optics community, which may discourage others from attending the classes.

#### 5 Update on ISO Standards

ISO/TC 172 SC 1 and SC 9 met in Boulder, CO in June. D. Aikens said that the US had a good delegation and was able to make some important changes to international standards. The US is the leader for the revision of **Optics and photonics – Preparation of drawings for optical elements and systems – Part 8: Surface texture**. Peter Takacs will be responsible for the draft document.

D. Aikens reported that Lionel Baker, author of **ISO/WI 10110-07 : Optics and optical instruments – Preparation of drawings for optical elements and systems – Part 07: Localized imperfection tolerances**, agreed to the removal of the Giot method from the ISO standard. This method is not documented and cannot be duplicated. G. Boulbee was the one who suggested that **Method II** be abandoned.

D. Aikens said that the next document to tackle is ISO 14997:2003 **Optics and optical instruments – Test methods for surface imperfections of optical elements**, which needs some serious rework. It will be up for periodic review in 2008.

#### 6 Report of Gage Study and a multiple company round-robin comparison of imperfection samples

G. Boulbee said that he was not able to contact J. Hamilton or C. Gaugh. G. Boulbee reviewed decisions from previous meetings. C. Gaugh had suggested that OP start a new gage study using real artifacts and Davidson reference standards. J. Hamilton had used Brysen reject samples, which were rejected for something other than brightness, as optical samples and had operators compare them to Brysen artifacts. T. Turner asked if the Hamilton test used operators just from Northrop Grumman as opposed to a multiple-company round robin. G. Boulbee confirmed that the Hamilton test was conducted within Northrop Grumman.

#### 7 Review of Revised OP1.002

F. Dombrowski said that he was confused about the current work. He thought that OP1.002 was released as an ANSI standard, but he saw these revisions to it. G. Boulbee said the ANSI/OEOSC OP1.002-2006 is released. The current work is for a future revision of that standard. The revised document will include an alternate approach to scratch and dig designation that is based on **MIL-C-4897A Military Specification Coating, Single or Multilayer, Interference: Durability Requirements for, 8 September 1980** and **MIL-F-48616 Military Specification Filter (Coatings), Infrared Interference: General Specifications for, 29 July 1977**, which used letter designations for scratches and digs. The letter designation corresponds to scratch width. F. Dombrowski asked when this revision would be released. D. Aikens said that documents are reviewed every five years. G. Kohlenberg said that it can be released as soon as the task force has

completed it and obtained ANSI approval. D. Aikens reviewed that the task force had considered writing a new standard that looked much like OP1.002 except that the other notation would be incorporated, before deciding to combine both notations in one document. G. Kohlenberg reminded the group that whichever approach is chosen, he needs the scope soon so that he can start the ANSI paper work.

While looking at the draft assembled by the secretary, G. Boulton said that he understood that the section on accumulation would be for either approach.

W. Royall said that he couldn't tell which version to review. He asked that the document version be added to the header so that it would appear on each page.

G. Boulton suggested that the task force look at some quick changes first. The task force looked at the scope and discussed how to incorporate both notations. The changes and additions to the document were recorded in the file while the committee observed the document projected on the wall. The agreed upon edits appear in the document titled **BSR/OEOSC OP1.002 XXXX 10-8-06**.

The scope was modified to "This standard establishes uniform practices for stating, interpreting, and inspecting surface imperfections for transmissive and reflective optical elements and assemblies. This standard provides two alternative notations for specifying surface imperfections. A numerical notation indicates the allowable visibility of surface imperfections under specific viewing conditions. An alphabetic notation indicates the allowable size of surface imperfections. It is the responsibility of the optical engineer to choose which notation to use. This standard does not address the impact of imperfections on element or system performance."

After some discussion T. Turner moved that section 1.4 which was added at the January meeting be removed because the information is now contained in the scope. F. Dombrowski seconded the motion. The motion carried unanimously.

G. Boulton suggested that the word "appearance" in 3.1 be deleted because the revised standard will cover more than appearance imperfections. After some additional discussion, the task force decided to move the items 3.1.7 and higher out of the General heading, so that **Area Imperfections** become 3.2. T. Turner suggested that the sections on types of imperfections would make more sense placed after the notation specification. so that the order would be

1. General,
2. Visual Imperfections,
3. Dimensional Imperfections,
4. Accumulation,
5. Other Imperfections.

D. Aikens suggested that the general topic be skipped and the task force should first look at **3.4 Notation of Imperfection Tolerances**, which will be renamed **Visibility Method for Specifying Scratch and Dig Imperfections**. The paragraph states "...hereinafter referred to as the Comparison Standard". should have the word "Visibility" added before "Comparison."

D. Aikens then suggested that **Area Imperfections** be moved so that it becomes 3.2, and clause 3.2.2 be moved to the new 3.2.1 position after removing the edge reference. **Polished Surfaces** then becomes the new 3.2.2, **Edge Imperfections** becomes 3.3, and the new 3.2.1 is copied into 3.3.1 with the appropriate change in wording.

W. Royall pointed out that in the new **3.4.1.2 Dig Notation**, the word "defects" should become "imperfections."

After struggling with the title of the new 3.4, G. Boulton suggested that it be "**Visibility Method for Specifying Scratch and Dig Imperfections**." T. Turner said that "notation" should be added to the title of 3.4.1. D. Aikens suggested that if the terms "long" and "round" were added to the definitions of "scratch" and "dig", then they could be eliminated from the title.

T. Turner pointed out that the current "scratch" definition would cause an oblong dig to be classified as a scratch. The term "significantly" was inserted in front of "longer" to avoid that problem.

T. Turner said that "Scratches" should replace "Long Imperfections" and "digs" should replace "round imperfections" in 3.4.1.3.4.

T. Turner asked why the pound sign prefixed the number 80 in 3.4.1.3.4. G. Boulton said that It is used to designate that the isolated number is a scratch number not a width.

F. Dombrowski suggested that the term "notation" should be added to sections 3.4.1.1 and .3.4.2.

W. Royall pointed out that in the situation when one has an extremely visible short scratch, there is no real visibility limit. If the diameter of the equivalent dig is in spec, then there is no visibility limit. He deals frequently with scratches that are short. If he evaluates it as a scratch, then he can reject it, but if he evaluates it as a dig, then it is acceptable. So he can make a rejectable scratch acceptable by grinding so that it is wide enough to be considered a dig. D. Aikens said that he thought T. Turner got the task force out of that dilemma by changing the scratch definition to indicate that a scratch is "significantly" longer than it is wide. D. Aikens asked if a 1 mm long, 20 μ wide imperfection would be visible enough to be rejectable. W. Royall said that if the scratch falls within the dig diameter, then he accepts it. The task force agreed to add the statement, "Scratches that are shorter than the allowable dig diameter are considered digs." to the scratch definition.

The task force then moved on to the new section 3.5. D. Aikens took time to write the introduction, while the rest worked on the new 3.5.2. The wording chosen was, “**Notation for Scratch and Dig Imperfections**. Surface imperfection tolerances may be indicated on the drawings by two letters, separated by a hyphen, e.g., F-F. The first letter refers to scratches (see 3.5.4) and the second letter refers to digs (see 3.5.5).”

D. Aikens then shared his Introduction: “In some applications, it is necessary to limit the actual size of the surface imperfections. In these cases, the dimensional method for specifying surface imperfections can be used. Although the use of a comparison standard for fast visual comparison is permitted, the dimensional specification applies to the actual size of the imperfections, not to their visibility.”

W. Royall pointed out that specify was used twice in the title of 3.5. Everyone agreed to word 3.5 to parallel 3.4.

G. Boulton noted that the sections that follow are accumulation rules; then digs and dig accumulation rules come next. He suggested that the scratch accumulation be moved up into 3.4.

D. Aikens then scanned through sections 3.5.4.1 through 3.5.4.4 and 3.5.5.1 through 3.5.5.3 and concluded that the information appears later, and can be deleted.

In section 3.6.2 W. Royall stated that the the diameter should reference the surface not the element in two places. The same is true for section 3.6.3.

At this point the task force agreed to stop work.

T. Turner asked to add an agenda item for the next meeting so that the task force could discuss alternate methods for visual comparison using magnification when the MIL specification method is insufficient. D. Aikens said that in the training classes, students frequently ask how they should use a loupe to inspect an optic. G. Boulton suggested that T. Turner may want to prepare material for the discussion to be distributed before the meeting.

#### **8 Time and Place of next OP 1 Meeting**

The Task Force agreed to meet next in San Jose, CA during Photonics West on January 20, 2007, 8:30 a.m. – noon.

#### **9 Adjourn**

D. Aikens moved that the meeting be adjourned; M. Dowell seconded the motion, which carried unanimously. The meeting adjourned at 12:25 p.m.