Draft
Minutes
ASC OP1 ASC OP/SC 1, Performance Based Optical Imperfections Task Force Draft Standard Meeting
Sunday, June 25, 2006, 8:30 a.m. — 12 Noon
Research Electro-Optics, Inc. 5505 Airport Blvd, Boulder, CO 80301

Present	Attendees (8 of 16)	
☒	**Committee Members**	**Representing**
☒	David Aikens	Zygo Corporation
☒	Gordon Boultbee	JDSU Corporation
☐	Andrei Brunfeld	Xyrtex
☒	Benjamin Catching (Alternate)	JDSU Corporation
☒	Walter Czajkowski	APOMA (Edmund Optics)
☒	Frank Dombrowski	Gage-Line Technology, Inc. (by phone)
☒	Marla Dowell	IEEE/LEOS (NIST)
☒	Lincoln Endelman	SPIE, (Endelman Enterprises)
☐	Charles Gaugh	Davidson Optronics, Inc.
☐	John Hamilton	Northrop Grumman
☐	Hal Johnson	Harold Johnson Optical Lab
☐	Rudolf Hartman	Retired
☐	Michael Morrill	Lockheed Martin Space Systems Company
☐	William Royall (by phone)	Eastman Kodak Company, Retired
☒	Trey Turner	Research Electro-Optics, Inc.
☐	Steve VanKerkhove	Corning Tropel
	Observers (1)	
☒	Gene Kohlenberg	OEOSC

Auditor's Summary of Meeting

During this meeting the task force explored different approaches for including a dimensional optical imperfection notation in the existing OP1.002 standard that covers optical appearance imperfections. After an extensive discussion, an outline for the combined standard was chosen. The task force also discussed how they could move an optical imperfection gage study along more rapidly along with a broader round-robin study of optical imperfection evaluation accuracy.

1 Welcome and Introductions

G. Boultbee opened the meeting at 8:50 a.m. Each person introduced him/herself to the group.

2 Adoption of Agenda

D. Aikens moved that the draft agenda revision 1 be adopted. W. Czajkowski seconded the motion. The motion carried unanimously.

3 Approval of the Saturday, January 21,2006 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. M. Dowell moved that the minutes be approved and L. Endelman seconded the motion. The motion carried unanimously.

4 Status of BSR/OEOSC-OP1.002

The Secretary reported that the standard has been approved and the PDF version is now available on the ANSI web site. He printed 100 copies of the standard and stapled 20 for the course that D. Aikens taught in May. D. Aikens gave out five copies. The other copies will be stapled and mailed to the students from the SPIE courses.

D. Aikens asked if there has been a response from J. Salerno concerning military acceptance of OP1.002. G. Kohlenberg said that J. Salerno has a copy of the standard, which he gave to his optics experts, and would attempt to give a response in a timely manner. G. Boultbee said that the previous minutes stated that D. Aikens and J. Hamilton were willing to visit J. Salerno if a visit would help speed the decision on military acceptance.

L. Endelman asked what would happen if J. Salerno would suggest changes to the standard. G. Boultbee said that the task force would consider suggested changes that could be included in a revision of the approved standard. D. Aikens said that J. Salerno could be invited to an ASC OP meeting to discuss possible changes.

J. Dombrowski offered to participate in a visit to J. Salerno. G. Boultbee replied that J. Hamilton would be a good representative because he is from a large aero-space company.

5 Report of Gage Study

J. Hamilton was unable to attend this meeting. G. Boultbee asked if there was any progress. G. Kohlenberg stated that J. Hamilton called him to say that he would try to call in for the meeting.

D. Aikens noted that he gets questions about the gage study so that the students of the scratch and dig class want to know how repeatable the process is. He said that the task force needs to recognize that there is a serious need for the result of the study. Zygo is willing to participate in a gage study, but cannot lead it. G. Boultbee said that he has a statistician who could evaluate the data if that would help move the study to its conclusion.

D. Aikens noted that J. Hamilton did a very good study; he had cut up samples obtained from Brysen and relabeled them so that operators could do blind evaluations of Brysen artifacts compared to other Brysen artifacts.

6 A multiple company round-robin comparison of imperfection samples

C. Gaugh said that he could not attend this meeting, but hoped to be able to go to Boston if there is a meeting there.

D. Aikens suggested that the task force should organize an ASC OP member round robin test of prepared samples similar to what J. Hamilton had done for his gage study. OP could send a Brysen set of artifacts and a set of “unknown” artifacts to participating companies, who could them evaluate the unknowns using the Brysen set, and whatever the company normally used to evaluate product, whether it be Brysen references, the Kodak paddle, Davidson references, or whatever they normally use.

G. Boultbee volunteered to be a team leader to help move the study along. He would work with J. Hamilton and C. Gaugh. D. Aikens agreed to participate in a conference call if G. Boultbee would set one up.

M. Dowell said that she had a person who has done similar round robins who could plan it. If she could get funding from OIDA (Optelectronics Industry Development Association), TIA (Telecommunication Industry Association) or some other organization to pay the NIST person's time. She said that TIA has a 25 page round robin procedure. She noted that if this is going to be a lot of work, then the study must be done properly.

F. Dombrowski asked if we would continue the external round robin if J. Hamilton's study is completed. G. Boultbee said that if J. Hamilton's study is statistically valid, then we would not repeat it.

7 Review of Revised OP1.002 Section 4

G. Boultbee asked that the review of OP1.002 Section 4 be moved before looking at the scope. He said that Section 4 was now called “Precision Optics” and he took issue with that title because he doesn't associate a 120 scratch with precision optics. Some of the paragraphs in the revised Section 4 are the same as in the appearance section. D. Aikens said that originally this information was going to be 3.10 an inspection method, but the notation is different, so changes would have to be made in the notation section if this approach were taken. If it becomes section 4, then it becomes an easier task, even though some portions of the earlier paragraphs would have to be repeated. He agreed that it would be a better document if the task force integrated the different kinds of notations and integrated the different inspection methods. After thinking more about the issues, he saw that Section 4 approach would also take considerable work.

D. Aikens noted that the task force would have to review Sections 3.1 – 3.9 to see if they are consistent to the new 3.10. G. Boultbee identified Section 3.2 as “Notation of Imperfection Tolerances”. The task force could make Section 3.2.1 “Visual Comparison” and 3.2.2 could be “Objective Measurements”. Then the material from Section 3.4 on would pertain to both.

G. Boultbee then asked a specific question concerning precision testing. He asked if the task force was going to recommend limiting imperfection identification to just the scratch letter designations as is done for appearance identification, or would the task force consider using a microscope to subdivide the identification to half scratch, etc. D. Aikens recommended that the task force continue the practice of “binning” because there probably would be less conflict. It is much easier to say that a scratch falls between a 40 or 50 than to say that it is a 41. M. Dowell agreed that the uncertainty of the measurement is of a level that distinguishing between a 41 or a 42 would be difficult. Binning would be more representative of the precision of the process.

D. Aikens asked who the potential user of this standard would be. He presumed that the laser community would be interested in scratch width for damage purposes.

D. Aikens noted that there are some users who want to use the air force alpha notation, but that standard is also going out of existence.

M. Dowell suggested that there should be some guidance in the standard as to when the visual and the objective methods be used.

G. Boultbee recessed the meeting at 9:53 a.m., and resumed at 10:06

F. Dombrowski told the task force that his company is now getting requests for white line targets on plastic. G. Boultbee added that companies also use chrome lines on glass and black lines on plastic.

D. Aikens reviewed the options for specifying objective measurement of optical surface imperfections. If the task force wants to provide an inexpensive implementation of a scratch width based performance standard; then the accumulation rules would be abandoned, the users would be allowed to write a width notation such as AA, BB, CC; visual inspection would be allowed; and a notation would be provided to indicate whether physical measurement is required.

D. Aikens noted B. Catching's idea saying that if you want accumulation then use one notation, if you want to use the other, then there would be no accumulation.

F. Dombrowski said that at his company if an inspector can see the imperfection by eye, then they measure the width with a microscope. If it cannot be seen, then the imperfection is ignored.

G. Boultbee said that he would like to try to outline the revised OP1.002.

3.1 does not need to changed.

He proposed to make the following outline change.

3.2 Notation of Imperfection Tolerances (L. Endelman suggested that this be changed to "Drawing notation for acceptable imperfection tolerances".)

(Lead in)

3.2.1 ~~Visual~~ Appearance Comparison Specification~~method~~ (existing 3.2.1 text)

3.2.1.1 existing

3.2.1.2 existing

3.2.2 ~~Objective~~ Dimensional Imperfection Specification~~Measurement Method~~ (Marla Dowell asked if it could be called dimensional instead of objective. F. Dombrowski said that his company uses the terms "subjective" and "actual")

(4.2)

4.2.1 (scratches)

4.2.2 (Digs)

3.3 Area (no change)

3.4 Scratches

3.4.1 Scratch visibility vs. scratch # (same)

3.4.2 Scratch width vs. scratch letter (new)

3.4.3 old 3.4.2, change "visibility" to "allowable" in title. Text unchanged. (L. Endelman suggested that "acceptable" be used.)

3.4.4.1 (Old 3.4.3) plus 3.4.4.2 for scratch letters See 4.2.1.2

3.4.5 (old 3.4.4) except "scratch # of 20 or scratch letter of C…"

3.4.6 Coating scratches (similar to old 3.4.5)

B. Catching suggested that last line of 3.9.1.5 needs to be reviewed. G. Boultbee said that it will have to be revisited. L. Endelman asked if this paragraph is even needed. D. Aikens said that this is an example of how nuances have changed over the past 40 years.

The group then discussed alternative ways of arranging the material in the draft standard. D. Aikens said that if the appearance and performance topics were not going to be blended, then the document would have to be restructured. The current section 3 is the meat of the standard. If section 3 is modified to be appearance imperfections, and a new section 4 is written to cover other imperfections using a letter notation, the general material covering area imperfections (3.3), digs (3.5), edge imperfections (3.6) would need to be addressed for the "other" imperfections section. D. Aikens continued thinking out loud by suggesting that the "scratches" section and "dig" section could be placed in a new section called "specifications for scratch and dig visibility." M. Dowell offered the option of creating a section called "notation for appearance imperfection tolerances" and another section called "notation for dimensional imperfection tolerances." Then there would be a discussion concerning scratches in each section. D. Aikens said that if this approach is used then the other considerations would be "turned off" when a letter designation is placed on a drawing. Therefore, the restructuring that is shown above is probably the way to go.

Before continuing, D. Aikens asked the task force to take another look at the broad sections of the current standard. He noted that

3.2 is the notation specification;
3.3 is area (which says very little and needs to be reviewed);
3.4 is scratches in general;
3.5 is digs;
3.6 is edge;
3.7 is bubbles and inclusions;
3.8 is cement;
3.9 is inspection methods.

The items that would be different for the two notational methods are

- Notation
- Scratches
- Digs
- Bubbles
- Cement
- Inspection

It was noted that it would be difficult to inspect bubbles and cement imperfections using a microscope to determine the dimensions.

Continuing the examination of the structure of the document, D. Aikens noted that section 3.2 would have to be modified to include both notations; sections 3.4 and 3.5 would need to be changed slightly; 3.6, 3.7, and 3.8 would not be changed; 3.9 would describe the appearance and dimensional test methods. He said that the alternative would be to completely regroup the topics so that .scratches, digs and inspection could appear twice. The accumulation section could be added at the end. Section 3.3 could be used twice. M. Dowell said that 3.4.2 could contain the current information plus that which is in the new section 4.2.1.1.

At this point the task force looked at the problem of redundancy in the modified document. D. Aikens noted that the document must be structured with the user in mind. The user will first decide if he or she will use the traditional number notation, or switch to the new letter notation. The document should be divided accordingly. This means that some material will appear in both notation sections.

M. Dowell suggested that the document should have a decision tree included to help the user decide which notation to use. T. Turner agreed that the tree would be extremely useful. D. Aikens said that the decision would be whether the width of the scratch needs to be determined precisely to control the manufacturing process.

L. Endelman returned to the redundancy problem and asked if the second method could refer to sections in the first method. D. Aikens said that the second method could say "section X.X in the first method applies." The second section on accumulation could instruct the users that the accumulation rules still apply; however, they should substitute the scratch width corresponding to the scratch letter, for the scratch number.

Getting back to the structure of the document, D. Aikens suggested that section 3 could be "general requirements," which would be the current 3.1 and section 4 would be the current 3.2 – 3.9.

M. Dowell asked if notation material had to appear in the requirements section. If not, then the requirement section could apply to both notations. Then section 4 could be notation for appearance imperfections, and section 5 could be notation for dimensional imperfections. The requirements section could be a discussion about the difference between appearance vs. dimensional. There would be an inspection description in both sections.

There was a pause in the meeting to order the lunches. Then D. Aikens took another look at the structure of the combined standard. He proposed to leave the top level structure the same so that section 2 would be "terms and definitions" and section 3 would be "requirements." Section 3.1 would be "general," which would include everything that pertained to both notations. Section 3.2 would be the existing clauses 3.2 – 3.9. Section 3.3 would be the dimensional information that is currently section 4. Then the accumulation section could be put up in the "general" section. G. Boultbee replied that he was concerned with the accumulation rules because there would be a discussion about topics that had not been addressed yet. D. Aikens suggested that the accumulation rules become section 3.4 Then in sections 3.2 and 3.3 there could be a statement saying "for accumulation purposes X is used."

At the conclusion of the discussion, G. Boultbee listed the outline of the revised imperfection standard:

3.1 General Existing subs + area imperfections, edge imperfections, bubbles and inclusions, cement imperfections
3.2 Visual/Appearance imperfections
3.2.1 notation
3.3 dimensional (now 4)
3.4 accumulation (take 3.4.1 – 3.5.3)

8 Review Proposed Scope of Imperfection Performance Standard

L. Endelman said that he had nothing further to add at this meeting.

9 Replacement of ISO 10110-7 Method I notation

This topic was not discussed.

10 Time and Place of next OP 1 Meeting

The Task Force agreed to meet next in Rochester, NY during the OSA Annual Meeting on October 8.

11 Adjourn

D. Aikens moved that the meeting be adjourned; B. Catching seconded the motion, which carried unanimously. The meeting adjourned at 11:50 a.m.