Issues to discuss wrt OP1.002 revision

The section on measured scratch width should not be called Precision Optics. Allowable scratch widths as large as 120 microns certainly would not be considered "precision."

We should simply have two evaluation criteria: "visual appearance"; and "scratch width" or "objective measurement."

- The first method follows the MIL-PRF-13830B methodology.
- The second method follows MIL-C-48497A and MIL-F-48616 and ISO 10110-7 for long scratches (>2 mm).

The foreword of the standard should be revised to indicate this, as opposed to an introduction to a section. See following straw man on a following page. Perhaps we should discuss rewording the reworded 1.1 Scope paragraph as well.

If we reorganize the standard describe the two notation systems first, many, if not most, of the paragraphs on scratch and dig accumulations (3.4.1- 3.4.4, 3.5.1-3.5.3, 4.2.1.1-4.2.1.3, 4.2.2.1-4.2.2.3 do not need to be repeated. They apply in either case: visual appearance or objective measurement.

Possible methods for evaluating scratch width

- At 1X against a "standard artifact"
    - Chrome lines on glass. Line widths correspond to scratch letters.
    - Black lines on clear plastic. Line widths correspond to scratch letters.
    - Etched lines on glass. Line widths correspond to scratch letters.
- With magnification
    - Iron oxide (transparent) lines on reticle. Line widths correspond to scratch letters. If the maximum width of a scratch is less than the width of the reticle line placed over it, the scratch letter is equal to or less than that scratch letter.
    - Reticle scale with equally spaced lines. Not practical for scratches unless reticle is magnified.
    - Microscope with X-Y stage with readout and crosshair reticle.
    - Machine vision system with appropriate software for determining size of artifacts

Do we in all cases say if a scratch is wider than a given scratch letter then it is given the next higher scratch letter for the purposes of evaluation, or does it depend on the inspection method? For example, does it apply if you are evaluating at 1X against a standard artifact, but not if you are measuring actual scratch width with a magnifying method? Say, for example, you have D-C spec. and you measure the width of the scratches precisely and determine you have several that are 39 microns wide. But since they are not exactly 40 microns wide they would not be considered maximum size scratches when the accumulation rules (maximum combined length) are applied, unless you say any scratch wider than a C (20 microns) is considered a D for the purposes of applying the accumulation rules.

Both evaluation criteria (visual appearance or scratch width) need to address the situation of non-visually transmitting optics. For the visual appearance method, we should legitimize the half-aluminized scratch standards made by both Brysen and Davidson. See suggested wording on a following page.
For the scratch width approach presumably clear glass lines on evaporated chrome, clear lines on black plastic, or etched lines that have been over-coated with chrome would be appropriate.

We should provide direction on dealing with concentration of scratches when the total area of the part is less than a 6.35 mm diameter circular area.

We should We should provide direction on dealing with concentration of digs when the total area of the part is less than a 20 mm diameter circular area.

We should clarify what we mean by "chip width" in 3.6.1.4 with a drawing, since in many cases by our definition and usage a chip's "width" could be longer than its "length."

Straw man for a revised Foreword:

This national standard establishes two uniform practices for stating, interpreting, and inspecting appearance imperfections for transmissive and reflective optical elements and assemblies. The first does this by presenting the nomenclature and inspection methods of MIL-O-13830 ~~as a national standard~~. This approach maintains methods for evaluating the appearance of these imperfections using guidelines and scales that have been used in the US and other countries for more than half a century, while attempting to eliminate much of the ambiguity and obsolete nomenclature of the MIL-O-13830 standard and its successor documents. The US Army Comparison Standard required to evaluate optical samples using this approach is referenced in clause 3.2.1 and its footnote.

The second approach is based on the measurement of scratch width and uses the common nomenclature of MIL-C-48497A and MIL-F-48616 for stating requirements and allowances. [More to come when we are finished.]

~~This standard is to be followed by an additional standard covering the functional effects of these imperfections and the methods of specifying and evaluating them.~~

Neither approach purports to address the possible functional affects of surface imperfections on system performance.

NOTE: THIS STRAW MAN DOES NOT SHOW EVERY WORD THAT WAS DELETED OR CHANGED FROM THE FOREWORD AS IT IS NOW IN OP1.002. COMMITTEE MEMBERS SHOULD READ BOTH TO GET THE FULL DETAILS OF THE SUGESTED CHANGES.

Suggested wording for use of the half-aluminized visual comparison standards:

"When inspecting non-visually transmitting optics a half-aluminized version of the Comparison Standard should be used."

This could be added to footnote 1 or be added to 3.9.2.