SavvyInspector™

SIF-4 Technical Specification

The SavvyInspector™ model SIF-4 provides software assisted scratch/dig evaluation of flat optical surfaces, eliminating the subjectivity of human surface quality inspection. The instrument is designed specifically to reproduce the conditions of an in-reflection visual inspection described in Appendix C of MIL-PRF-13830B, "General specification governing the manufacture, assembly, and inspection of optical components for fire control instruments." The factory calibrated inspection head of the SavvyInspector™ uses invariant illumination and detection optics and propriety analysis software, allowing objective, repeatable, and recordable evaluation of scratch/dig surface quality.

Product Description

SavvyInspector™ SIF-4 is a complete flat-optics inspection system consisting of:

- A custom LED-based illumination assembly.
- A detection assembly with lensing and a digital high-resolution camera.
- A manual z-stage for focusing to different part thicknesses.
- A 100 mm manual x-y stage platform with rails for part holding and positioning.
- Light baffles, base-stand assembly, and cabling.
- A stand-alone computer with propriety SavvyInspectior™ analysis software.

System Operation

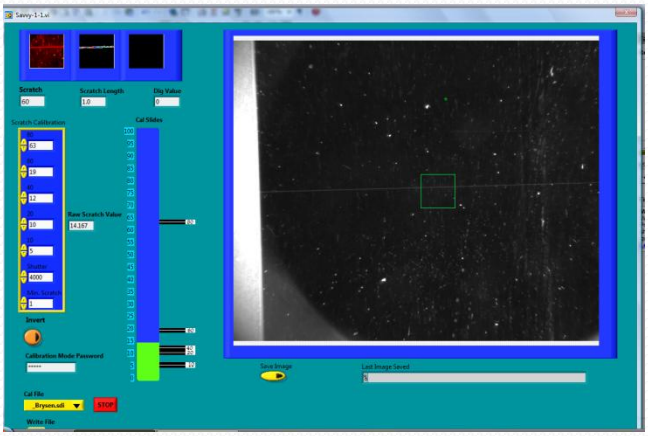
A typical inspection involves a visual scan of the surface using a high-intensity fiber lamp, to generate a quick surface map of imperfections that are to be evaluated. When mapping the surface, a qualified inspector can also record the scratch lengths to be to be used for accumulation. The part is then loaded into the SavvyInspector™ and each defect is evaluated based on the selected calibration standard. Defect images can be stored if desired. The operator then enters the values of the surface imperfections onto the surface map or into the SavvyAccumulator™, a free-ware spreadsheet also provided with the instrument, which reports whether the part passes or fails the surface quality inspection. The accumulator page can be printed or saved into the same location as the defect images for future review.

The SavvyInspector™ operator interface is designed for easy factory-floor operation. Inspection mode allows the operator to perform a surface quality scratch or dig evaluation based on a pre-recorded calibration file. There are no knobs to turn, keys to press, or adjustments required; the operator simply uses the manual x-y stage to locate the desired defect on the real-time viewing screen, and read the scratch/dig value off the screen in real-time. The resultant image file can be stored for later review or printed to be included in an inspection report.

Instrument Calibration

The SavvyInspector™ software comes from the factory with calibration files based on all the most common and respected comparison standards manufactured by Brysen Optical, Davidson Optronics, and Jenoptik. Savvy Optics Corp has worked with these comparison standard manufacturers to develop these calibration files. Sets of calibration artifacts have been sequestered in order to guarantee instrument to instrument agreement during the manufacture of each SavvyInspector™ .If the user needs a scratch inspection done to a standard which is not in the factory calibrations library, a custom calibration file can be created. The tool owner just enters the password protected calibration mode, presents the SavvyInspector™ with the desired comparison artifact, and enters the measured visibility into the appropriate data field for that scratch number. The calibration data can then be saved and accessed from the inspection mode. No changes can be made to factory calibration data.

Screen shot of calibration mode



Scratch/Dig Standards Supported

- MIL-PRF-13830B
- MIL-C-675C
- ANSI/OEOSC OP1.002:2009 Visibility Method

Lambda photometrics
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Feature	Specification	Comment
Inspection Head	Fixed illumination and detection simulating reflection inspection for surface quality per MIL-PRF-13830B	Inspection setup is identical to that of MIL-C-675C and the visibility method described in ANSI/OEOSC OP1.002:2009
Camera Field of View	8 by 10 mm, zoomable	Allows rapid location of imperfections
Inspection Area	One mm square in center FOV	Allows isolation of specific imperfection for evaluation
Stage	Manual x, y slide stage with >100mm travel	
Part Holder	Two movable rails with >1mm edge recession. Can be set up for square or round parts from 10 mm to 80 mm	Allows multiple, small parts to be set up for inspection. Custom part holders available on request
Test surface reflectivity	Reflectivity calibration is possible for reflective, transmissive, or partly reflective parts.	Reflectivity calibration can only be performed in the password protected calibration mode.
Test surface shape	Plano	Designed for flat parts, but very long radius parts can also be inspected
Reported Values	Scratch number- 10, 20, 40, 60, 80 Dig value – continuous from 5 to 70	Per MIL-PRF-13830B and ANSI/OEOSC OP1.002, visibility method
Comparison standards	Factory calibrated to Brysen, Davidson comparison artifacts, as well as various plastic inspection paddles	Customer can generate and save calibration files for any artifact set
Instrument repeatability	> 95% repeatability of reported scratch or dig value	Presumes > 20 measurements of a clean surface in a proper environment of a stationary part
Instrument reproduceability	> 90% reproduceability of reported scratch or dig value	Presumes the clean part is removed, replaced and repositioned to the same location > 20 times