

SCRATCH AND DIG INSPECTOR

SavvyInspector™ SIF-4E

Introduction

The SavvyInspector™ model SIF-4E is the new, high resolution version of our popular SIF-4 software assisted scratch/dig evaluation of flat optical surfaces. Both instruments are 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.

The SIF-4E uses a 1.4 megapixel camera and higher resolution to perform more precise measurements and grading on very small features. It is recommended for micro-optics, and for components that are specified to 20-10 or tighter.



Product Description

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

1. A custom LED-based illumination assembly.
2. A detection assembly with a digital megapixel camera.
3. A manual z-stage for focusing to different part thicknesses.
4. A manual, encoded 100 mm x-y stage platform with rails for part holding and positioning.
5. Light baffles, base-stand assembly, and cabling.
6. A stand-alone computer with proprietary SavvyInspector™ analysis software.

Scratch/Dig Standards Supported

MIL-PRF-13830B

MIL-C-675C

ANSI/OEOSC OP1.002:2009 Visibility Method

ISO 10110 general and coating imperfections (but not L-type imperfections)

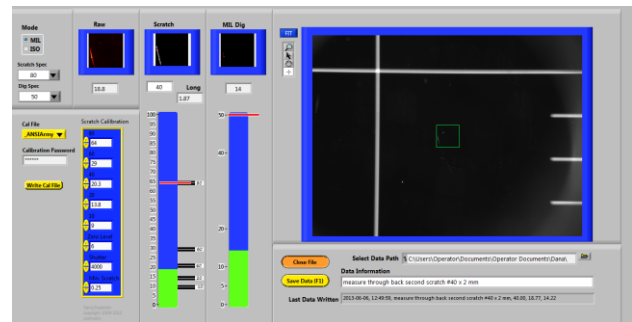
Instrument Calibration – Direct Traceability to the Army Calibration Standards

The SavvyInspector™ system comes from the factory with calibration files based on all the most common and respected comparison standards manufactured by FLIR/Brysen Optical, Davidson Optronics, and Jenoptik. Sets of these calibration artifacts have been sequestered in order to guarantee instrument to instrument agreement during the manufacture of each SavvyInspector™. Measurement files based on master scratch and dig limit standards at Picatinny Arsenal are also provided with every instrument. 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 in the password protected calibration mode.

Version 5 Software

The SavvyInspector™ operator interface in the new version 5 software is designed for easy factory-floor operation, while expanding its application in the role of “Master Inspector” for QA, QC and MRB decisions. The operator enters the inspection level required, and then uses the manual x-y stage to locate the desired defect on the real-time viewing screen. The software reports the scratch grade or dig value automatically. Scratch lengths are measured with the click of the mouse. The “always on” inspection mode and programmable grade bars allow the operator to get real-time feedback on whether a selected imperfection is acceptable or not with a simple visual interface. There is no subjectivity; the grade is reported and the grade bar turns red if the imperfection is greater than the specification. When a careful review and documentation of a surface is required, the version 5 software provides data management tools to properly collect and file screen shots

and inspection grades for each imperfection on a surface, including a summary log in CSV format for easy uploading into Excel or an inspection report. Accumulation rules can be applied using the SavvyAccumulator™ spreadsheet. Custom calibration files can be created for specific project or customer needs by the Quality Engineer as needed. The calibration data can then be saved and accessed from the inspection mode.



Screen shot of v5.5 inspection mode

Feature	Specification	Comment
Inspection Head	1.4 Megapixel camera and fixed illumination and simulating reflection inspection for surface quality per MIL-PRF-13830B	Inspection setup is identical to that of MIL-PRF-13830B Annex C, MIL-C-675C and the visibility method described in ANSI/OEOSC OP1.002:2009
Camera Field of View	9 x 12 mm, digitally zoomable	Allows rapid location of imperfections
Inspection Area X-Y Stages	One mm square in center FOV Manual encoded x, y slide stage with >100mm travel	Allows isolation of specific imperfection for evaluation Encoders read out distance moved since last mouse click allowing rapid evaluation of scratch length
Focus	Manual 70 mm Z-stage for focus. Depth of focus > 1 mm	Easily accommodates thick parts
Test surface reflectivity	System can measure coated or uncoated parts, filters, windows, splitters, cubes, and prisms.	Standard calibration files for metalized comparison standards are provided. Some custom calibrations or part fixturing may be required.
Test surface shape	Plano or mild concave surface	Designed for flat parts, but long radius concave parts can also be inspected
Reported Values	Scratch number- 10, 20, 40, 60, 80 Dig value – continuous from 5 to 70 ISO Grade – 0.025 to 0.63	Per MIL-PRF-13830B and ANSI/OEOSC OP1.002, visibility method ISO 10110-7 general and coating imperfections only
Comparison standards	Factory calibrated to FLIR/Bryson, 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 grade	Presumes > 20 measurements of a clean surface in a proper environment of a stationary part
Instrument reproducibility	> 90% reproducibility of reported scratch or dig value	Presumes the clean part is removed, replaced and repositioned to the same location > 20 times