

Technical Specification – Motorized System

SCRATCH AND DIG INSPECTOR

SavvyInspector® SIF-4M

Introduction

The SavvyInspector® model SIF-4M is the motorized version of our popular SIF-4 software assisted scratch-dig system for flat optical surfaces. Joystick controlled motorized x, y and z stages make measurements fast and efficient for high volume parts.

All instruments are designed specifically to reproduce the conditions of an in-reflection visual inspection as described in ANSI/OEOSC OP1.002 “Appearance Imperfections,” Appendix C of MIL-PRF-13830B, “General specification governing the manufacture, assembly, and inspection of optical components for fire control instruments,” and in Annex A.3 of ISO 14997, the metrology standard for the new visibility notation of ISO 10110. The factory calibrated inspection head of the SavvyInspector® uses invariant illumination and detection optics and proprietary analysis software, allowing objective, repeatable, and recordable evaluation of scratch-dig surface quality.

Product Description

SavvyInspector™ SIF-4M 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 joystick controlled motorized 100 mm x-y stage platform with rails for part holding and positioning.
4. A motorized z-stage for focusing to different part thicknesses.
5. Light baffles, base-stand assembly, and cabling.
6. A stand-alone computer with proprietary SavvyInspector® analysis software.



Full part mapping for inspection documentation and review is also supported, and the “autoscan” feature allows unmanned scanning and documentation of the entire optical surface in a composite map of tiled images of the entire surface inspected. Optional “autoinspect” and “autoreport” features allow automated inspection and documentation to your specified requirements.

Scratch/Dig Standards Supported

MIL-PRF-13830B

MIL-C-675C

ANSI/OEOSC OP1.002 Visibility Method

ISO 10110 -7/ISO 14997 Visibility Method

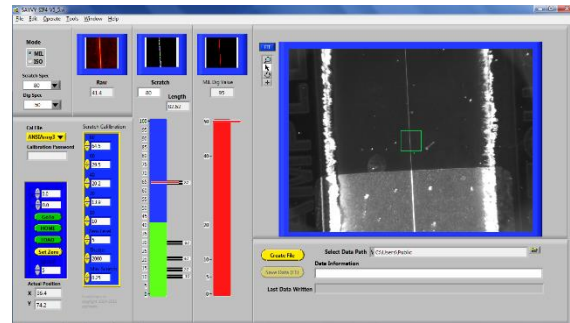
Instrument Calibration – Direct Traceability to the Army Calibration Standards

The SavvyInspector® system comes from the factory with calibration files based on master scratch and dig limit standards at Picatinny Arsenal, as well as the respected Brysen, Davidson, Edmund and Thor Labs comparison standards. It is the only Army traceable scratch and dig measurement system.

SavvyInspector® Software

The SavvyInspector® SIF-4M operator interface 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, enters part geometry and size, and then uses the joystick to scan the surface for imperfections using the real-time viewing screen. The “autoscan” feature creates indexed image files for the entire surface, documenting the condition of the optic and allowing the operator to identify regions on the part which require further review. The coordinates can be entered and the system returns to the desired location with the push of a button. The software reports the scratch grade or dig value automatically. There is no subjectivity; the grade is reported and the grade bar turns red if the imperfection is greater than the specification. A screen shot of each imperfection can be stored, and the location and type of imperfection are automatically added to the surface

map and CSV data file for offline review. Accumulation rules can be applied using the SavvyAccumulator™ spreadsheet, or the SavvyInspector® can do it for you. Optional automation software with customized inspection rules can be used to consistently and completely inspect and document entire components to your requirements.



Screen shot of v6.4 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 both ANSI/OEOSC OP1.002:2009 and ISO 10110-7:2017 and ISO 14997:2017
Camera Field of View	9 x 12 mm, digitally zoomable	Allows rapid location of imperfections
Inspection Area	One mm square in center FOV	Allows isolation of specific imperfection for evaluation
X-Y Stages	Five speed, motorized, joystick controlled x, y stage with >90mm travel	Motor control buttons allow the user to automatically travel to home and load positions, or any x, y location
Focus	Motorized, joystick controlled 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 most prisms.	Standard calibration files for transmissive and 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 with the optional tip/tilt plate
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, ANSI/OEOSC OP1.002, visibility method and ISO 10110-7/ISO 14997 visibility method
Comparison standards	Factory calibrated to FLIR/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 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