TELEDYNE

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Z-TRAK EXPRESS 1K5 SERIES

Factory Calibrated, Compact 3D Profile Sensors

FEATURES

- 5 KH scan speed at max Z-range
- 1,536 points/profile
- Up to 1,700 mm field-of-view
- Up to 675 mm Z-range
- Out-of-the box, real-time measurements in micrometers
- Embedded profile enhancement at max profile rate handles factory conditions
- Powered by Z-Trak 3D Apps Studio software tools for in-line measurements and inspection
- Eye-safe red or blue lasers
- Compact IP67 housing for harsh operating environments
- Free bundled software:
  - Z-Trak 3D Apps Studio SDK
  - Sherlock™ for rapid application deployment
  - Sapera™ LT SDK for scan and control
  - 3rd party software support for 3D image processing

Z-Trak Express 1K5

Cost-effective 3D Laser Profilers for In-Line 3D Measurement and Inspection Applications

The Z-Trak™ Express 1K5 series delivers high-speed 3D inspection with a maximum profile rate of 5,000 profiles per second at the maximum measurement range, with real-time processing capabilities. Designed for cost-sensitive, in-line 3D measurement and inspection, it is ideal for a wide range of industries, including secondary battery production, automotive, lumber inspection, factory automation, and logistics.

Featuring a 1,700 mm horizontal field-of-view, the Z-Trak Express 1K5 enables precise measurement and inspection of wide body objects such as wooden planks, road surfaces, pallets, and automotive body parts, using a single sensor. It also supports the integration of multiple sensors in various topologies to enable complex measurement and inspection tasks such as measuring the thickness of moving parts, continuous 360° inspection, and extending the horizontal field-of-view, all without sacrificing the Z-resolution. To simplify deployment complexity and costs, the Z-Trak Express 1K5 enables multiple sensors to be synchronized using a data cable and supports content-based triggering.

Z-Trak Express 1K5 comes bundled with:

- Z-Trak 3D Apps Studio — a license for a powerful suite of software tools for in-line measurement and inspection
- Z-Expert — a graphical configuration utility
- Sherlock™8 - a field proven rapid deployment platform for machine vision, enabling seamless communication with PLCs and other devices via industry standard communication protocols such as TCP/IP, MODBUS®, ProfiNet® and more

All Z-Trak profiles are deployment ready, delivering micrometer level measurements without the need for in-field calibration. To accommodate objects of varying sizes, shapes, colors, finishes, and material compositions, Z-Trak Express 1K5 includes real-time, user programmable profile enhancement functions, two-point HDR, and models with eye-safe red or blue lasers. Like all Z-Trak laser profilers, Z-Trak Express 1K5 performs on-board processing without compromising the profile rate.

Z-Trak 3D Apps Studio, designed specifically for the Z-Trak family of laser profilers, offers a suite of application specific software tools for measuring and inspecting flat, extruded, machined, folded, and molded parts. It features a comprehensive set of tools for process optimization, reflection elimination, positioning, guidance, and defect detection on both flat and curved surfaces. Additionally, it supports surface analysis for flatness and parallelism and includes specialized tools such as V-groove and BGA inspection, along with roto-translation functions for 6-degree-of-freedom, streamlining even the most complex 3D measurement tasks.

Z-TRAK 3D APPS STUDIO EXAMPLES

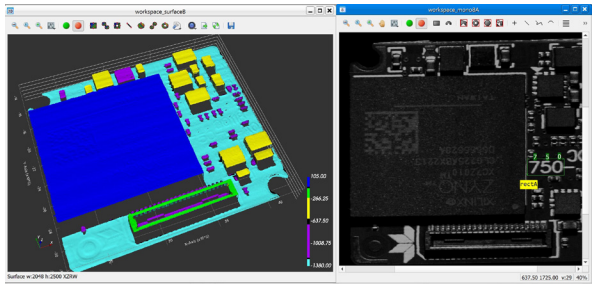
Application: PCB inspection

Tasks:

- Identify parts based on the position and height data
- Read character strings from PCB silk screened text

Challenges:

- Remove un-wanted reflections from sections
- Dynamic height thresholding to identify components
- Extract and read characters from the silk screen



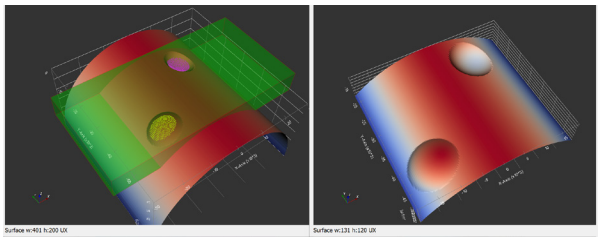
Application: Pipe inspection

Tasks:

- Inspect surfaces of extruded pipes
- Identify dents and bumps meeting specified criteria

Challenges:

- Combine data from multiple sensors in a ring layout
- Remove un-wanted reflections from specific sections



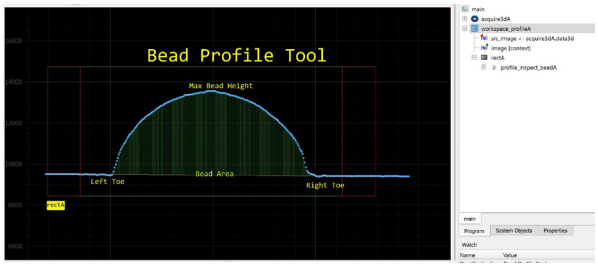
Application: Glue bead inspection

Tasks:

- Inspect profile of a bead for shape and size
- Locate and measure critical bead dimensions
- Measure area/volume of the bead

Challenges:

- Acquire and combine 3D profiles from multiple sensors positioned at +/- 45° from the center
- Locate and correct tilt in the bead base



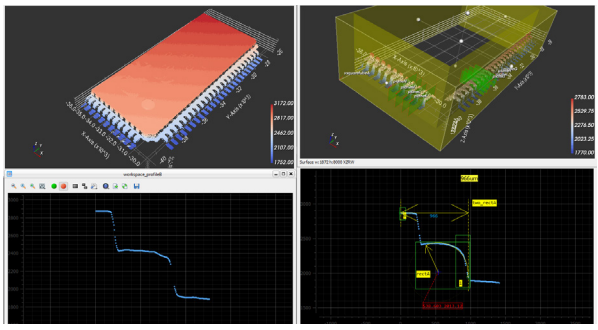
Application: Lead frame inspection

Tasks:

- Measure critical dimensions of microchip leads
- Identify missing or bent leads

Challenges:

- Minimize sensor count, while ensuring the highest resolution
- Remove/reduce effect of un-wanted reflections
- Minimize processing time

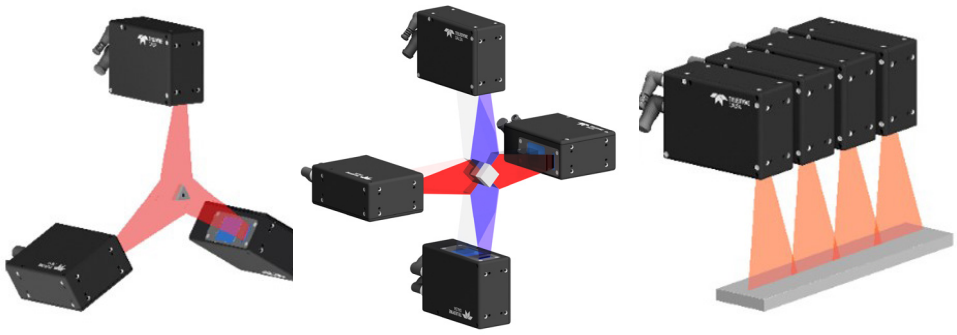


MULTI-SENSOR CONFIGURATION AND UNIFIED MEASUREMENT SPACE (UMS)

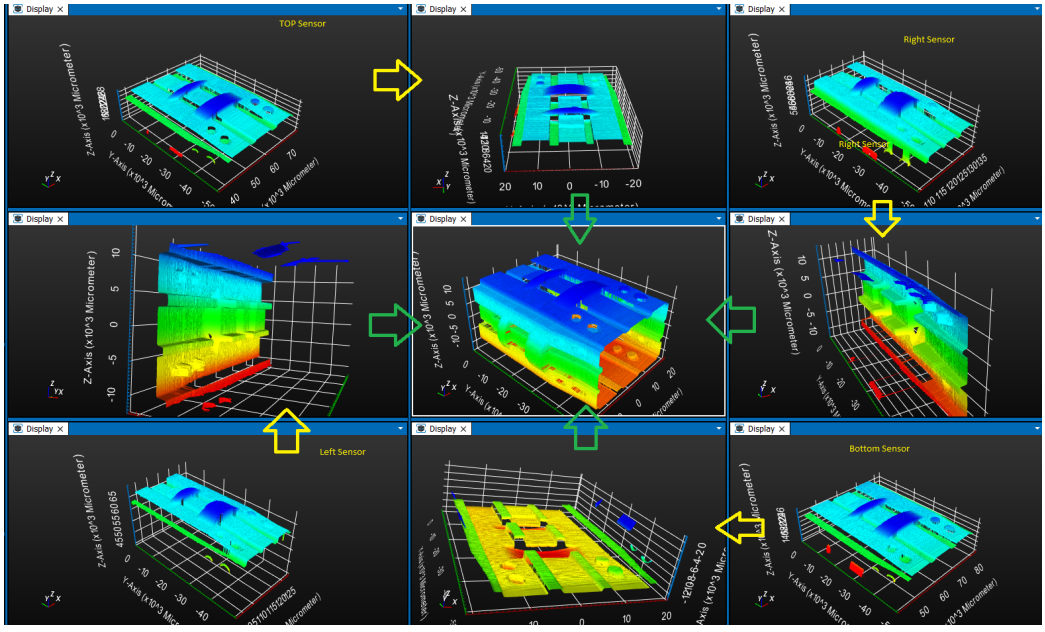
3D inspection applications requiring 360° views, precise thickness measurement, and an extended horizontal field of view, without sacrificing the z-resolution or removing occlusions, often require the combination of multiple profile sensors.

By combining and synchronizing multiple Z-Trak LP sensors, a Unified Measurement Space (UMS) can be created, allowing applications to interpret 3D measurements from the point of view of the entire system, rather than individual sensors. This unified approach delivers more consistent, accurate and manageable object measurements.

For added flexibility, the Z-Trak LP architecture supports the integration of models with different measurement ranges and laser colors, enabling tailored solutions for complex inspection scenarios.



Z-TRAK UNIFIED MEASUREMENT SPACE



Z-EXPERT
360° View Using Four Synchronized Z-Trak Sensors

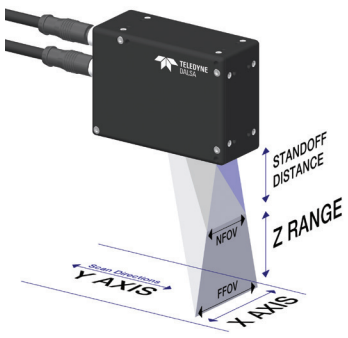
SPECIFICATIONS[1]

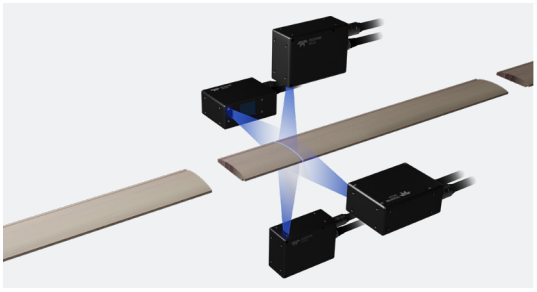
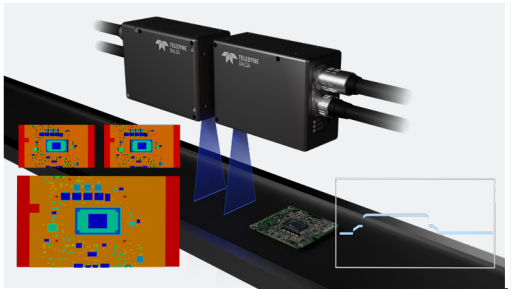
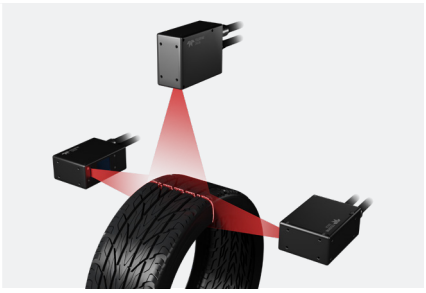
Function	Description
Scanning Rate	• Full AOI: 5K profiles/sec
Connectors	• 1 x M12 17-pin: Controls • 1 x M12 8-pin X-Coded: Data Ethernet port

3D Scan Enhancements	• Filters:
	  • programmable median
	  • user defined convolution
	• Horizontal and vertical flip
	• Unified Measurement Space
	• Reflectance equalization

Multi-Sensor Sync	• Single low-cost wiring using off-the-shelf network switches • Multi-sensor grouping • Configuration wizard to ease timing setup
Lasers	• Red: 660 nm 2M or 3R • Blue: 405 nm 2M or 3R
Reflectance Management	• Time integration • Laser power control: Automatic or manual • Gain control • Average reflectance
Output Format	• Individual profile, range map and 3D point cloud • Depth (Z), Lateral (X), Reflectance (R) or Laser Peak Width (W) • GenICam 3.0 (SFNC 2.3) compatible 3D Data output formats compatible with • Calibrated Z; Rectified Z, Calibrated ZR/ZR+W • Native values and world units (microns/mm/inch) • 16-bit mono (1D line-scan mode) • Area-scan mono mode
Temperature	**Storage:** • -40° C to +80° C (-4° F to +176° F) temperature • 20% to 80% non-condensing relative humidity • Operating: • 10° C (50° F) to 50° C (122° F) • Relative Humidity: up to 90% (non-condensing)
System Requirements	• 1, 2.5 or 5 Gigabit Ethernet • 4 GB or higher system memory
I/O	• 2 opto-isolated input • Configurable as a trigger input or as a start/stop trigger • 2 opto-isolated output
Encoder Input	• Quadrature (AB) shaft-encoder inputs • RS422/TTL • Up to 5 MHz (20M tick rate) • Backlash compensation

Function	Description
Scan Control	**Profile Trigger** • Encoder input, Internal timer/counter **Fixed Scan** • External input; Software; Timer/counter **Variable Scan** • Part in place; Start/Stop pulse
Unified Measurement Space	• Intuitive GUI for rapid setup • 2 or more sensors • Supports multiple sensors in side-by- side, circular and in-line configurations • Combine red and blue laser models • Supports models with different measurement ranges
Power Supply	• PoE via 8-pin X-code circular connector (optional) • Separate power via 12M 17-pin connector • +12V to 36VDC +/-10% with surge protection
Enclosure	• Machined aluminum • IP67 • 4 x mounting holes
Software	• Microsoft® Windows® 11 (64-bit) compatible • Linux 64-bit: • Ubuntu/Debian, RHEL/CentOS/Fedora, SLES/ openSUSE • Kernel: 2.6.32 or higher • Fully supported by Teledyne DALSA's software packages (bundled free): • Free Software • Sherlock 8.3x • Application development using C++ and Microsoft .Net (C++, C# or Visual Basic) • Sapera LT 9.x (or higher) • Linux: Teledyne DALSA GevAPI Framework (SDK) ver. 2.40 or higher • 3rd party software: • MVTec® Halcon® • NI® Max/Labview® • Cognex® VisionPro®
Markings	• FCC Class B, CE, ICE • ROHS, China RoHS



SPECIFICATIONS[1] (Continued)

Models	1K5-0040-B2	1K5-0100-B2	1K5-0180-R2	1K5-0675-R3
Z-Range (mm)	40	100	180	675
Profile Rate	5KHz	5KHz	5KHz	5KHz
Stand-off (mm)	79.5	245	598	725
Data Interface	1-GigE	1-GigE	1-GigE	1-GigE
Z-Res (NFOV-FFOV) (µm)	08.6-11.4	18.7-25.0	52.3-64.7	191.6-343.9
NFOV-FFOV (mm)	83-109	153-204	366-452	959-1720
X-Res (NFOV-FFOV) (µm)	57-75	105-140	251-310	657-1179
Repeatability (NFOV-FFOV) (µm)	1.0-1.5	3.0-4.0	6.0-20.0	10.0-30.0
Linearity	<0.02%	<0.02%	<0.02%	<0.02%
Laser (nm)	405	405	660	660
Case size	T20	T30	T40	T40

1. Subject to change without prior notice
2. ±2σ
3. Contact Teledyne DALSA for other laser options

Housing Type	Size (L x H x W) (mm)
T10	165 x 97 x 49
T20	116 x 83 x 49
T30	177 x 83 x 49
T40	380 x 83 x 49

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Revision Date: 2025 07 24