

## C5-CS Series

### High Speed 3D Compact Sensors with Ultra HD Resolution

- 3D Sensor Heads based on Laser Triangulation
- Profile Resolution up to 4096 Points / Profile
- Profile Speed up to 25 kHz
- Integrated High Precision 3D Profile Algorithms
- Enhanced 3D Imaging with HDR-3D Technology
- Ruggedized Enclosure (IP67)
- GigE Vision and GenICam Compliant
- Flexible Trigger Interface
- Sophisticated 3D Scan Features like Autostart, Automatic AOI-Tracking, Multiple AOIs, etc.



# C5-CS Series

## High Speed 3D Imaging with Ultra High Resolution

C5 compact sensors (C5-CS) scan objects by means of the laser triangulation method. This occurs through a projected laser line that migrates along the surface. By scanning the laser line, the 3D profile of the object is captured in the sensor image.

Through an internal processing of the line images performed by different evaluation algorithms, the C5-CS generates the 3D scan data. Using state-of-the-art FPGA technology, the C5 sensors can operate at profile speeds of up to 25 kHz, independently of the chosen algorithm.

C5 compact sensors are available with resolutions starting from 1600 points per profile up to a 4K Ultra HD version with 4096 points per profile. The C5-CS models enable measurement ranges of up to 1015 mm (width) and 800 mm (height).

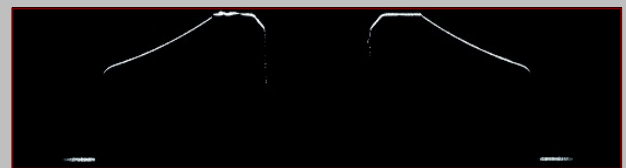
A special effort was made to enhance the industrial capabilities of the enclosures. This is why the C5-CS series has a ruggedized design with protection class IP67. To assure a reliable power supply and data transfer, all cable connections are equipped with M12 tensile- and tear-resistant connectors.

Apart from that, all other characteristics of our CX series have been adopted. Therefore, the C5 compact sensors feature a Gigabit Ethernet interface and comply with the GigE-Vision standard. In combination with the GenICam standard, the configuration of the new 3D sensors is easily done by Plug n' Play.

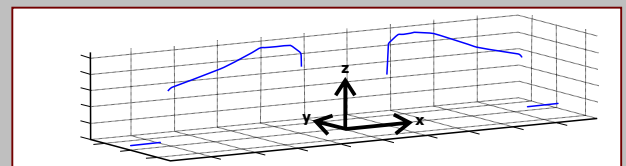
### 3D Measurement by Means of Laser Triangulation



The C5-CS Sensor records the Shape of the Laser Line.



Captured Laser Line in the Sensor Image

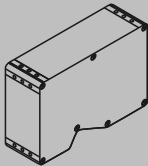
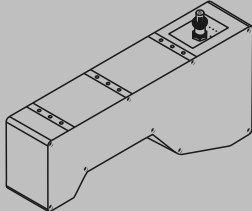
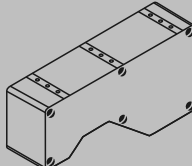
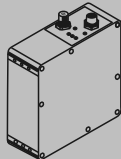
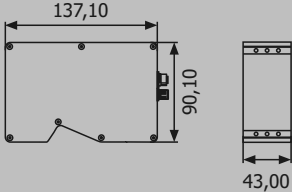
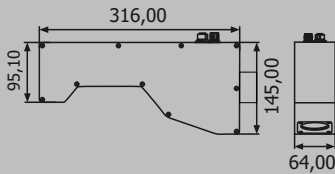
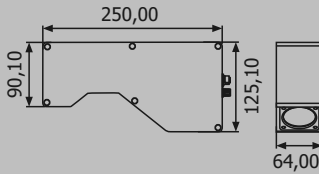
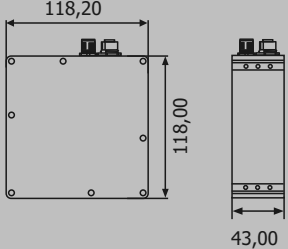


Display of 3D Data in a Vision Software

### C5-CS Features

 Calibrated	 Advanced Evaluation Algorithms	 Chunk Data
 Multiple Feature Output	 GEV Events & Paket Resend	 HDR-3D

## Enclosure Types

Model 1	Model 2	Model 3	Model 4
			
			

# C5-CS Series

## Model Overview with Specifications

General Specifications				Specification Description			
Profile Speed	Up to 25000 Hz (Depending on the Model)						
Profile Resolution	Up to 4096 Points / Profile (Depending on the Model)						
Interface	GigE Vision / GenICam						
Dynamic Range	90 dB (with HDR-3D)						
Connectors	M12						
Protection Class	IP67						
Laser Safety Class	2M, 3R, 3B						
Sensor Algorithm	MAX, TRSH, COG, FIR-PEAK						
Digital I/Os	Opto-Isolated Inputs (2x) / Outputs (2x), Laser Safety, Trigger, Encoder (RS422)						
Power Supply	10 - 24V DC						
PC Requirements	Gigabit Ethernet NIC						
Software Application Environments	Configuration Tool CX-Explorer, GenICam API, CVB, NI-IMAQ, HALCON, MIL, VisionPro, MATLAB, EyeVision, GOM, etc.						
Model Name	X-FOV [mm]	Z-Range [mm]	Working Distance [mm]				
C5-2040CS30-12	12	6	51.5	5.5	0.14	2048	Model 4
C5-1600CS23-30	30	40	106	19	0.7	1600	Model 1
C5-2040CS23-38	38	40	106	19	0.7	2048	Model 1
C5-1600CS23-49	49	40	106	31	1.2	1600	Model 1
C5-2040CS23-63	63	40	106	31	1.2	2048	Model 1
C5-3360CS39-67	67	15	172	20	0.5	3360	Model 3
C5-1600CS23-78	78	40	106	49	1.9	1600	Model 1
C5-4090CS39-82	82	15	172	20	0.5	4096	Model 3
C5-2040CS23-100	100	40	106	49	1.9	2048	Model 1
C5-4090CS39-145	145	15	172	35	0.9	4096	Model 3
C5-3360CS30-150	150	200	400	44	1.4	3360	Model 2
C5-4090CS30-182	182	250	400	44	1.4	4096	Model 2
C5-3360CS30-236	236	300	400	70	2.2	3360	Model 2
C5-3360CS19-248	248	500	700	74	3.5	3360	Model 2
C5-1600CS30-260	260	300	400	163	5.1	1600	Model 2
C5-4090CS30-288	288	300	400	70	2.2	4096	Model 2
C5-4090CS19-302	302	500	700	74	3.5	4096	Model 2
C5-2040CS30-330	330	300	400	161	5.0	2048	Model 2
C5-3360CS18-402	402	800	744	120	6.0	3360	Model 2
C5-3360CS30-406	406	300	400	121	3.8	3360	Model 2
C5-4090CS18-490	490	800	744	120	6.0	4096	Model 2
C5-4090CS30-495	495	300	400	121	3.8	4096	Model 2
C5-1600CS19-500	500	500	700	313	15.0	1600	Model 2
C5-2040CS19-640	640	500	700	313	15.0	2048	Model 2
C5-3360CS18-691	691	800	744	206	10.4	3360	Model 2
C5-1600CS18-795	795	800	744	497	25.1	1600	Model 2
C5-4090CS18-842	842	800	744	206	10.4	4096	Model 2
C5-2040CS18-1015	1015	800	744	496	25.1	2048	Model 2

# C5-CS Series

## Examples of Typical Applications

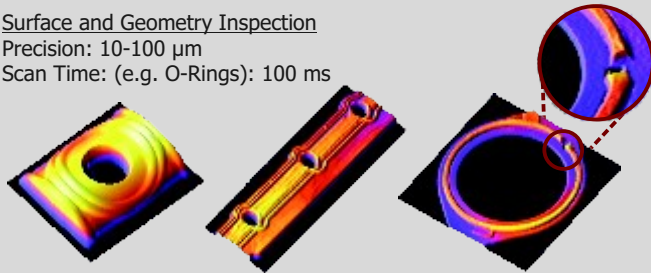
### Inspection of Elastomer Parts

(e.g. Radial Shaft Seals, Gaskets, Tyres)

Surface and Geometry Inspection

Precision: 10-100  $\mu\text{m}$

Scan Time: (e.g. O-Rings): 100 ms



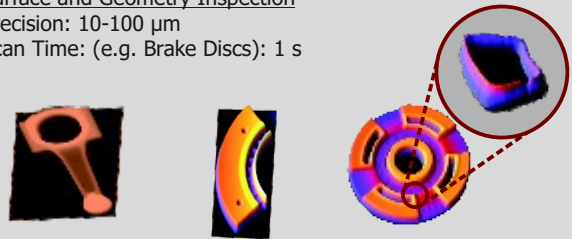
### Inspection of Metal Parts

(e.g. Brake Discs, Conrods, Pistons)

Surface and Geometry Inspection

Precision: 10-100  $\mu\text{m}$

Scan Time: (e.g. Brake Discs): 1 s



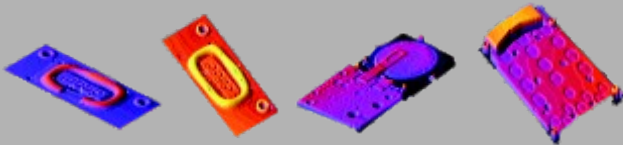
### In-Line Inspection in Assembly Lines

(e.g. Glue Beads, Rivets, Screws, PCBs, Batteries, Contacts)

Assembly Verification, Flatness & Geometry Inspection

Precision: 20  $\mu\text{m}$

Scan Time: <1 s



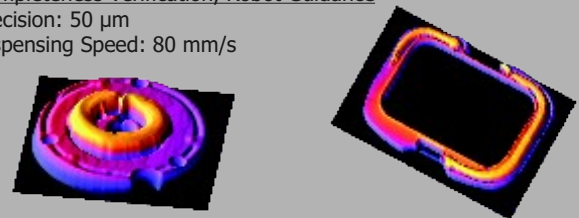
### Inspection of Adhesive and Sealing Beads

(e.g. Automotive Parts)

Online inspection During Dispensing, Volumetric Measurement, Completeness Verification, Robot Guidance

Precision: 50  $\mu\text{m}$

Dispensing Speed: 80 mm/s



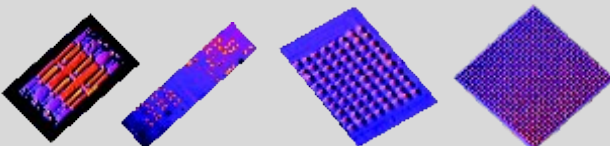
### Inspection of Electronic Components

(e.g. PCBs, BGAs, Connectors)

Inspection of Solder Paste, Assembly Verification, Coplanarity Inspection, Pin Inspection

Precision: 5  $\mu\text{m}$

Scan Speed (e.g. BGA): 300 mm/s



### Weld Seam Inspection

(e.g. Steel Blank Welding)

Surface and Geometry Inspection

Precision: 10  $\mu\text{m}$

Weld Speed: 250 mm/s



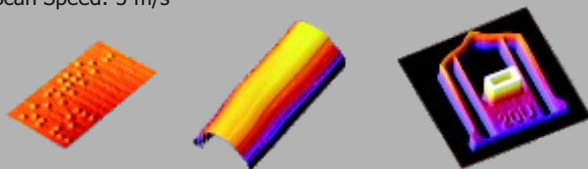
### Automatic Text Recognition

(e.g. Tyre Specification, Braille Characters)

OCR (Optical Character Recognition)

Precision: 10-100  $\mu\text{m}$

Scan Speed: 5 m/s



### Inspection of Wood Surfaces

(e.g. Plywood)

Surface Inspection, Detection of Branch Holes, Detection of Glue Stains, Texture inspection

Precision: 100  $\mu\text{m}$

Scan Speed: 250 m/min

