

# 4Di InSpec® AT Cell

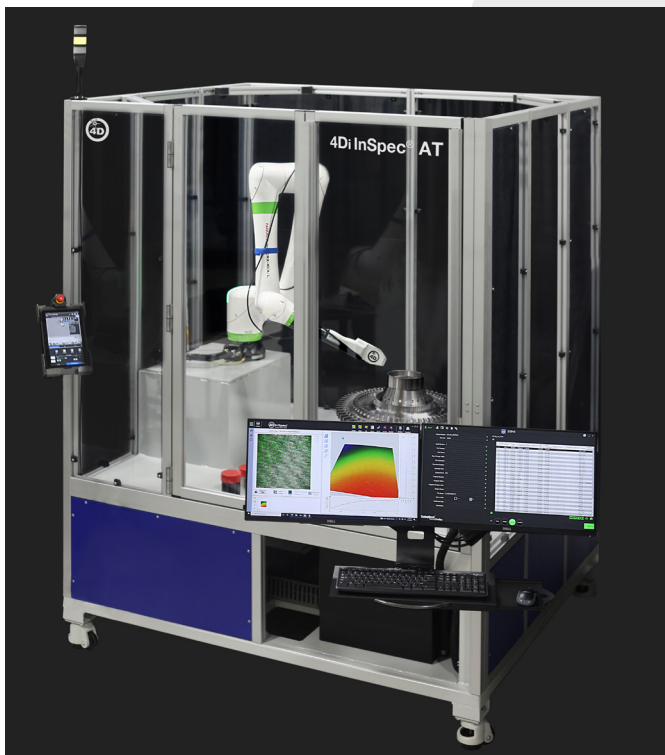
## Automated defect and feature inspection for aviation manufacturing

The 4Di InSpec AT is a high-throughput, high resolution defect and feature inspection solution. The automated system can measure dozens of edge break features, chamfers, and radii in minutes rather than days, vastly improving throughput and driving down inspection costs.

The system consists of a non-contact 4D InSpec or 4D InSpec XL surface gage, integrated with a choice of collaborative robots, optional rotary table, and safety cell for rapid production inspection.

### Rapid Measurement—Anywhere on a Part

The 4Di InSpec AT is a turnkey cell for quality control of aerospace components such as turbine blades and rotors, air foils, high pressure compressor blades, blisks, and dovetails. The high resolution system measures in any orientation, on curved surfaces, over large and complex geometries, and in tight spaces or blind locations.



Optional fold mirrors enable the optical InSpec gage to measure the insides of shafts, between gear teeth and fir tree roots, and in other tight spaces.

The 4Di InSpec AT instantly produces high resolution, 3D measurement results, with far more information than other methods. An inspector can immediately see both an image of the feature and easy-to-read statistics. User-friendly measurement automation software flags any out-of-spec measurements and automatically remeasures the locations.

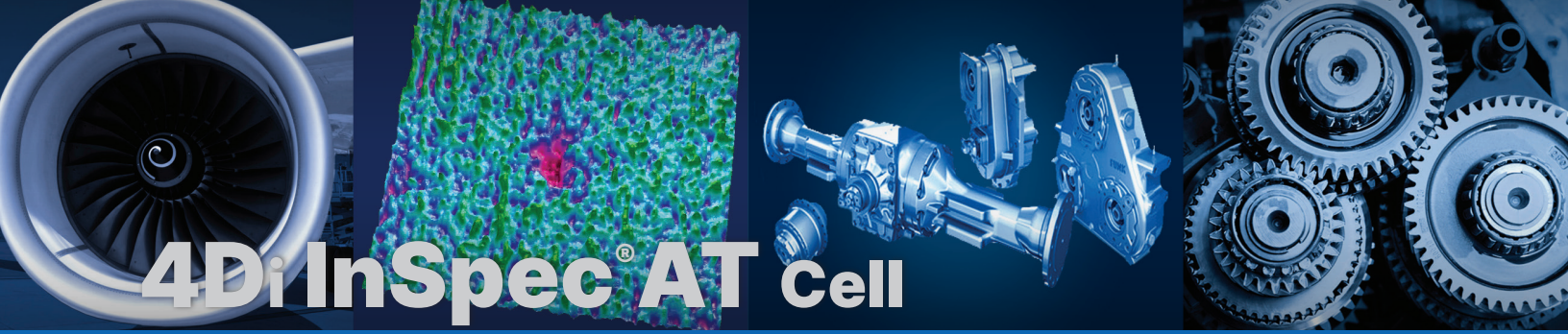
### Increase Inspection Throughput

The system's fully-enclosed Fanuc robot and optional rotary table enable extremely rapid, repetitive measurements. Numerous safety features and a Software Automation Package enables safe, reliable, flexible operation.

### Maximize Process Yield and Quality

The 4D InSpec AT Cell accurately captures complex feature dimensions, enabling more precise part disposition. Rapid measurement reduces inspection queuing times, while the ability to measure at more locations in the same time frame ensures part quality.

- High-speed, Automated, Non-Contact Measurement of Aerospace Components
- Edge Break, Radii, Chamfers, and More
- Vastly Increase Inspection Throughput
- Improve Process Quality and Yield
- Measure Large Components and Complex Geometries
- Automatic Remeasure Out-of-Spec Locations
- Easy to Implement and Operate
- Password-protected Production Mode

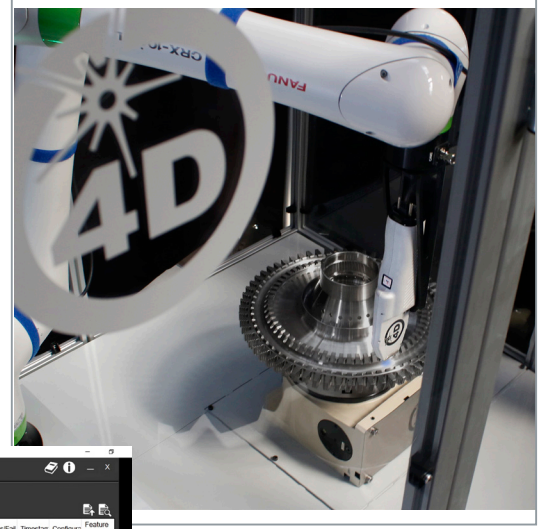


# Specifications

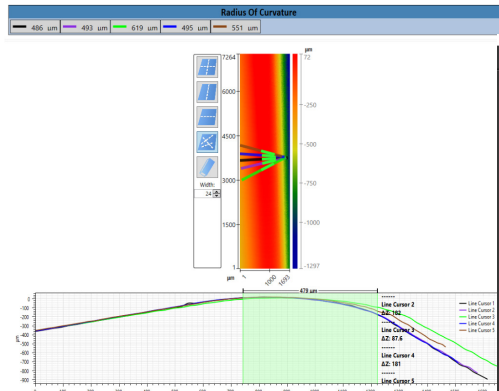
<b>Description</b>	<b>4Di InSpec AT</b>
<b>Measurement</b>	
<b>Sensor</b>	Automated, instantaneous, non-contact 3D surface measurement
<b>Measurable Heights</b>	4D InSpec: defects and features 0.0002-0.1 in (5 μm-2.5 mm) 4D InSpec XL: defects and features 0.0003-0.33 in (7 μm-8.5 mm)
<b>Field of View</b>	4D InSpec: 0.3 × 0.3 in (7.7 × 7.7 mm) 4D InSpec XL: 0.6 × 0.6 in (15.2 × 15.2 mm)
<b>Standoff Distance</b>	1.4 in (35 mm)
<b>Mounting</b>	Inline with robotic arm; 4D InSpec or workpiece can be mounted on robot (see Max Load Capacity)
<b>Automation</b>	
<b>Robot</b>	Fanuc CRX 5iA or CRX 10iA/L 6-axis collaborative robot
<b>Max Reach</b>	CRX 5iA: 39.1 in (99.4 cm) ; CRX 10iA/L: 55.8 in (141.8 cm)
<b>Max Load Capacity</b>	CRX 5iA: 11 lb (5 kg); CRX 10iA/L: 22 lb (10 kg) Rotary Table: 770 lb (349.3 kg)
<b>Optional Work Tables</b>	24 × 36 in (610 × 813mm) rectangular table or 36 in (813 mm) diameter rotary table
<b>Software</b>	4D InSpec measurement software, measurement automation software
<b>Safety</b>	Safety enclosure, collision force sensors
<b>Electrical/Mechanical</b>	
<b>Power Requirements</b>	20A robot plus sensor, 100-240 VAC, 50-60 Hz
<b>Dimensions</b>	1500 cm W x 1800 cm D x 2420 cm H (59.1 in W x 70.9 in D x 95.4 in H)
<b>Weight</b>	Configuration-dependent; ~ 1500 lbs (680.4 kg) robot plus sensor
<b>Operating Temperature</b>	4D InSpec and 4D InSpec XL: 50-105° F (10-40.6° C) Robot: 32-113° F (0-45° C)
<b>Operating Humidity</b>	< 98% non-condensing
<b>Shock resistance</b>	150G (1*10 <sup>-8</sup> /kg/s <sup>2</sup> )
<b>Warranty</b>	4D InSpec/4D InSpec XL: One year, limited



4D InSpec and 4D InSpec XL Surface Gages



The 4Di InSpec AT cell rapidly measures features such as edge breaks and chamfers, including difficult to reach or blind locations.



Automatic feature finding, 2D traces and 3D plots make it easy to analyze chamfers, edge blend, radii, and more.

Feature #	Name	Type	Parameter	Nominal	Measured	Low Tolerance	High Tolerance	Deviation	Error	Pass/Fail	Trended	Config	Feature Detection
01	Top Rn	Round	Edge B.	0.0180	0.0188	0.0180	0.0180	0.0008	0.0008	Fail	413.20	FT Top	
02	Intenst	Round	Edge B.	0.0090	0.0063	0.0080	0.0100	0.0063	0.0000	Pass	413.20	FT Top	
03	OD Fns	Round	Edge B.	0.0150	0.0175	0.0150	0.0000	0.0175	0.0000	Pass	413.20	OD_Pt	
04	OD Sec	Round	Edge B.	0.0135	0.0240	0.0100	0.0000	0.0240	0.0000	Pass	413.20	OD_Se	
05	OD Co	Chamber	Chamfe	0.0100	0.0068	0.0050	0.0150	0.0068	0.0000	Pass	413.20	OD_In	
06	OD Top	Chamber	Center	0.0200	0.0062	0.0100	0.0300	0.0062	0.0000	Pass	413.20	OD_to	
07	Top Rn	Round	Edge B.	0.0140	0.0193	0.0100	0.0180	0.0193	0.0113	Fail	413.20	FT Top	
08	Internal	Round	Edge B.	0.0090	0.0072	0.0080	0.0100	0.0072	0.0000	Pass	413.20	FT Top	
09	OD Fns	Round	Edge B.	0.0150	0.0177	0.0100	0.0000	0.0177	0.0000	Pass	413.20	OD_Pt	
10	OD Sec	Round	Edge B.	0.0135	0.0239	0.0100	0.0000	0.0239	0.0000	Pass	413.20	OD_Se	
11	OD Co	Chamber	Chamfe	0.0100	0.0066	0.0050	0.0150	0.0066	0.0000	Pass	413.20	OD_In	
12	OD Top	Chamber	Center	0.0200	0.0063	0.0100	0.0300	0.0063	0.0000	Pass	413.20	OD_to	
13	Top Rn	Round	Edge B.	0.0140	0.0197	0.0100	0.0180	0.0197	0.0117	Fail	413.20	FT Top	
14	Internal	Round	Edge B.	0.0090	0.0068	0.0080	0.0100	0.0068	0.0000	Pass	413.20	FT Top	
15	OD Fns	Round	Edge B.	0.0150	0.0176	0.0100	0.0000	0.0176	0.0000	Pass	413.20	OD_Pt	
16	OD Sec	Round	Edge B.	0.0135	0.0246	0.0100	0.0000	0.0246	0.0000	Pass	413.20	OD_Se	
17	OD Co	Chamber	Chamfe	0.0100	0.0061	0.0050	0.0150	0.0061	0.0000	Pass	413.20	OD_In	
18	OD Top	Chamber	Center	0.0200	0.0063	0.0100	0.0300	0.0063	0.0000	Pass	413.20	OD_to	

Software enables automatic re-measurement at failed locations.

**4D Technology**  
An Onto Innovation Subsidiary

Patents US 7777895, 7489408 and US 7230717. Others pending. 4D InSpec is a registered trademark of 4D Technology Corp. This material is based upon work supported by the National Science Foundation under Grant No. 1556049. 4D Technology is an Onto Innovation Subsidiary. All specifications subject to change without notice. 2023.07.12 © 4D Technology Corporation

