

# Mitutoyo

Mitutoyo *Quality*

## Coordinate Measuring Machine for Large Structures **Laser Tracking System**

SpaceTrac Series

COORDINATE  
MEASURING MACHINES



Go above and beyond.

# *SpaceTrac*

## **SERIES** Coordinate Measuring Machine for Large Structures (Laser Tracking System)

High-accuracy and reliability with a wide variety of applications, a new standard for multi-functional coordinate measuring machines.

The SpaceTrac Series, which is active in a wide variety of measuring situations, for example, measurement of large structures such as aircraft, positioning of conveyor lines and machines, measurement of medical instrument movements, emits a laser beam from a measuring head to a Spherically Mounted Retroreflector (SMR) to accurately determine the workpiece coordinates (X, Y, Z) from the reflected beam. This is a multi-functional coordinate measuring machine representing a new standard, demonstrating high accuracy and reliability in a portable compact package.

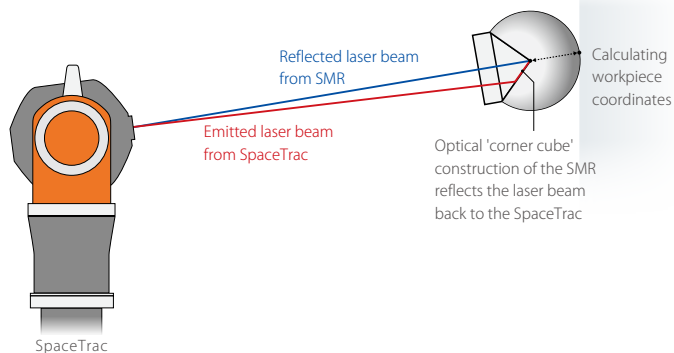






## Principle of measurement

The SpaceTrac Series determines the 3D coordinates of the center of a Spherically Mounted Retroreflector (SMR) that is moved around in contact with the critical surfaces of the object to be measured by emitting a laser beam from a measuring head towards the SMR, and receiving the reflected laser beam passing back along the same path. From this data the surface coordinates of the object are computed. A fast feedback loop operating at 3,000 times/second enables the measuring head to automatically track the SMR wherever it is moved within its line of sight.



CASE

01

Machine  
tools

Allowing stable and accurate measurements even for large and long structural workpieces

## Straightness measurement of double-column machine tools



Measuring straightness inside the vertical surface of large and long structural workpieces can be done without using a straightness gage (master gage) for reference. Also, an error map of a machine can be accurately created, making it possible to check for distortion or deformation in assemblies and double-column structures.





CASE

02

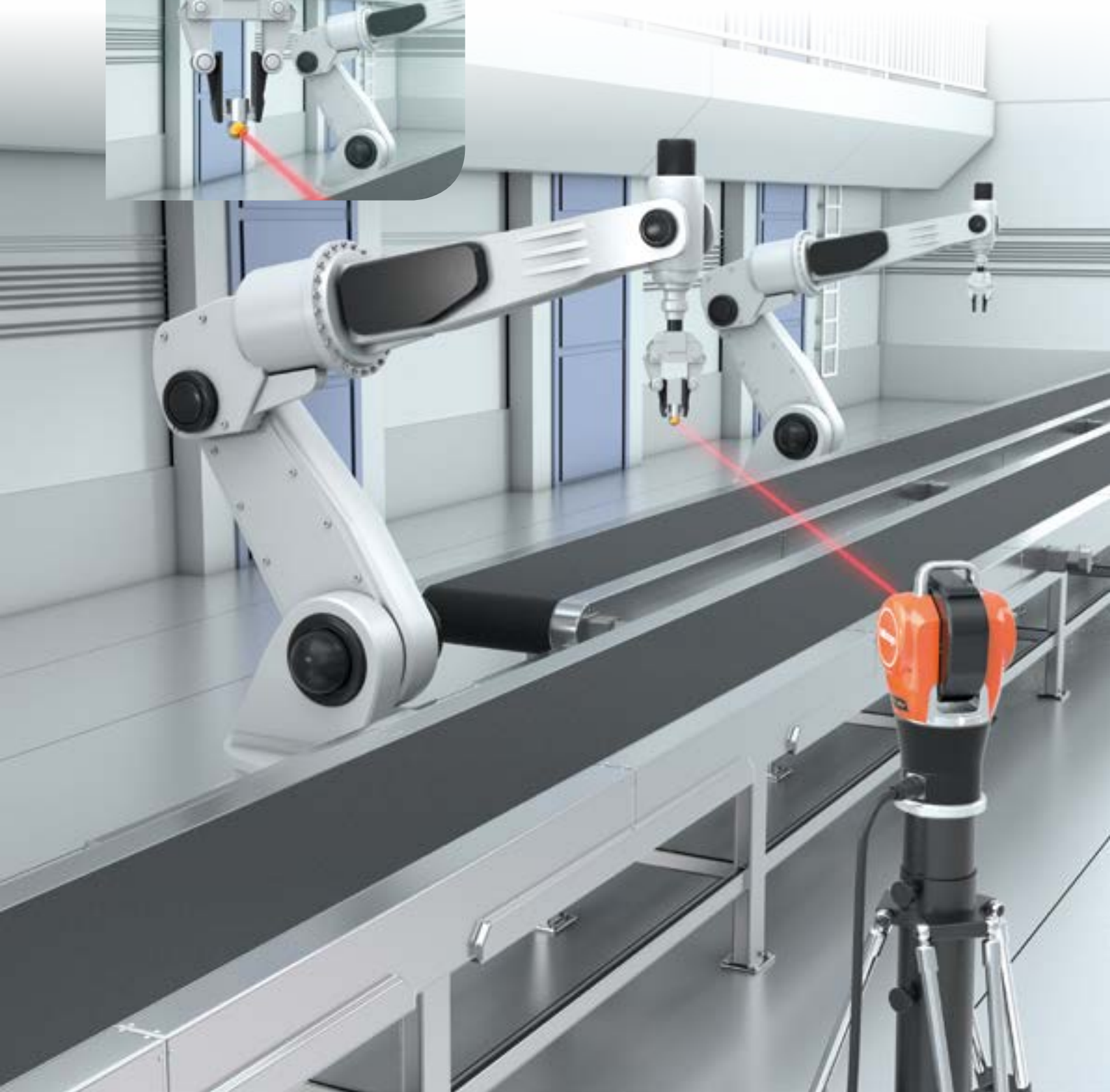
Robot

Three-dimensional measurement to check whether movements are as programmed

## Checking multi-axis robotic behavior



The three dimensional behavior of a robot arm can be tracked by mounting the SMR at the tip of the arm. Checking the robot's spatial conformance to programming in this way enables positioning accuracy to be tested with a view to improving reliability on the production line.



CASE  
03

Transport  
(Construction machines)

Improvement of work efficiency through rapid measurement of large construction machines

## Checking power-shovel arm bearings



Fine and precise motion is required in power shovel arms.

SpaceTrac enables easy and accurate measurement of the shaft bearing position on the joint that supports arm motion. Since travel time can be reduced without depending on a fixed measuring instrument, work efficiency is also improved.



## CASE

## 04

Energy

Optimizing power generation by high-accuracy measurements of vapor turbine casings

## Measuring thermal power generation casings



Accuracy to 0.1 mm is required for the inner diameter measurements of vapor turbine casings to obtain optimum efficiency of power generated by pressurization. SpaceTrac is compact and easy to set anywhere, thereby making rapid measurement possible. In addition to casing inner diameter, it is highly effective for measuring diameter and shaft direction distance.

## CASE

## 05

Advanced  
medical

Accurate measurement of inclining bed angle important for treatment

## Critical alignment of advanced medical apparatus



For corpuscular ray therapy apparatus, since millimeter accuracy is required for irradiating therapy zones, high accuracy is needed when setting the bed position and direction. SpaceTrac measures the real-time bed position precisely by attaching the SMR directly to the critical bed elements.

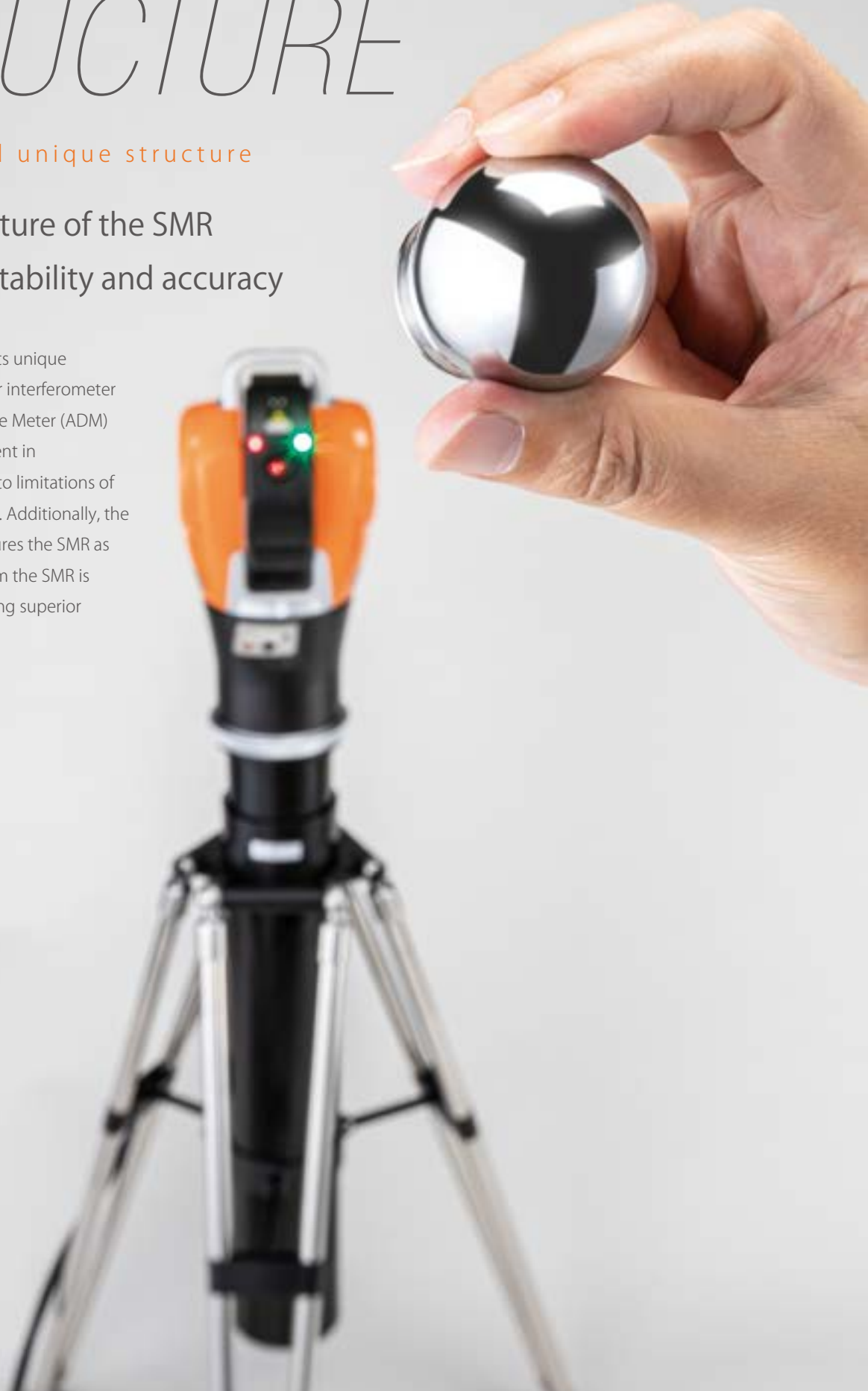


# STRUCTURE

— Advanced unique structure

Automatic capture of the SMR  
delivers high-stability and accuracy

The measuring head with its unique combination of He-Ne laser interferometer (IFM) and Absolute Distance Meter (ADM) eliminates the errors inherent in conventional systems due to limitations of mirrors and thermal effects. Additionally, the head automatically recaptures the SMR as soon as the laser beam from the SMR is interrupted, thereby realizing superior stability and accuracy.





## High accuracy

The SMR is practically unbreakable, and maintains its accuracy even if dropped onto a hard floor. The center accuracy is  $\pm 12.7 \mu\text{m}$  or less in the standard type,  $\pm 2.5 \mu\text{m}$  or less in the high-accuracy type. Three sizes are available: 1.5 inches, 0.875 inches, and 0.5 inches.



## Ultralight

The body of the high-accuracy tracker weighs only 8.2 kg, while the integrated type is 9.8 kg, which is light enough to carry with one hand. This makes for easy transfer and installation.



## Mobility

Wide measurement range is provided: 640° in the horizontal direction and 138° in the vertical direction.



# LINE-UP

— High accuracy or integrated

## Integrating the latest laser tracking technologies

In addition to performing measurements, SpaceTrac-AI can easily perform analyses, inspections, assembly, etc. There is also a integrated type SpaceTrac-AP/A, which entirely eliminates external controller. The SpaceTrac Series integrates the features of advanced laser tracking technologies.



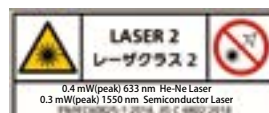
		High-accuracy type	Integrated type	
		SpaceTrac-AI	SpaceTrac-AP	SpaceTrac-A
Laser technology		IFM/ADM	ADM	
Measuring range	Azimuth range	640° (±320°)		
	Elevation range	-59° to +79°		
	Distance range (diameter)	40 m/100 m/160 m	100 m/160 m	100 m
Accuracy of a 3D coordinate*1 *2		±10 μm +5 μm/m	±15 μm +5 μm/m	
Angular accuracy		3.5 μm/m		
Distance accuracy*2	IFM	±0.5 μm/m	—	
	ADM	±10 μm or ±0.7 μm/m (whichever is greater)	±15 μm or 0.7 μm/m (whichever is greater)	
Mass		8.2 kg	9.8 kg	

\*1: A ScaleBar measurement in accordance with ASME B89.4.19-2006 \*2: Accuracy in MPE

### ■ Laser safety

Mitutoyo SpaceTrac Series use a low-power visible laser for measurement. The laser is a CLASS 2 EN/IEC60825-1 device. Warning and explanation labels, as shown right, are attached to the SpaceTrac Series as is appropriate.

SpaceTrac-AI



SpaceTrac-AP/A



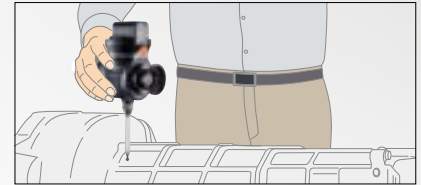


# OPTIONS



## vProbe (Hard probe for laser tracking)

Enables easy measurement of workpieces without having to reposition the tracker or obstacles that impede its line of sight.



## Useful accessories

### Enhanced usability, functionality, and measuring accuracy

Mitutoyo offers a hard probe that enables a workpiece to be measured easily without having to reposition the tracker or jig, a dedicated tripod for stable measurements, and various types of mount for the SMR.

#### Mounts for the SMR

A wide variety of mounts is available, such as the drift nest for monitoring the motion of a device or a part.



#### Dedicated tripod for tracker

Portable lightweight type. Height adjustment of approximately 400 mm is possible in the range of 1040 mm to 1450 mm.



# SOFTWARE

## Measurement and Analysis Software

### Easy measurement and analysis for beginners

PolyWorks|Inspector™ is software which directly captures measurement data from 3D measurement devices and calculates workpiece dimensions, evaluates complex surfaces and generates inspection reports.

This powerful 3D measurement software solution manages the whole process from product engineering through manufacturing to provide high operability and performance that improves productivity in measurement and inspection.



Note: PolyWorks® image, courtesy of InnovMetric Software.



**Whatever your challenges are,  
Mitutoyo supports you from start to finish.**

Mitutoyo is not only a manufacturer of top quality measuring products but one that also offers qualified support for the lifetime of the equipment, backed up by comprehensive services that ensure your staff can make the very best use of the investment.

Apart from the basics of calibration and repair, Mitutoyo offers product and metrology training, as well as IT support for the sophisticated software used in modern measuring technology. We can also design, build, test and deliver bespoke measuring solutions and even, if deemed cost-effective, take your critical measurement challenges in-house on a sub-contract basis.

Note: Product illustrations are without obligation. Product descriptions, in particular any and all technical specifications, are only binding when explicitly agreed upon.

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