tool:in

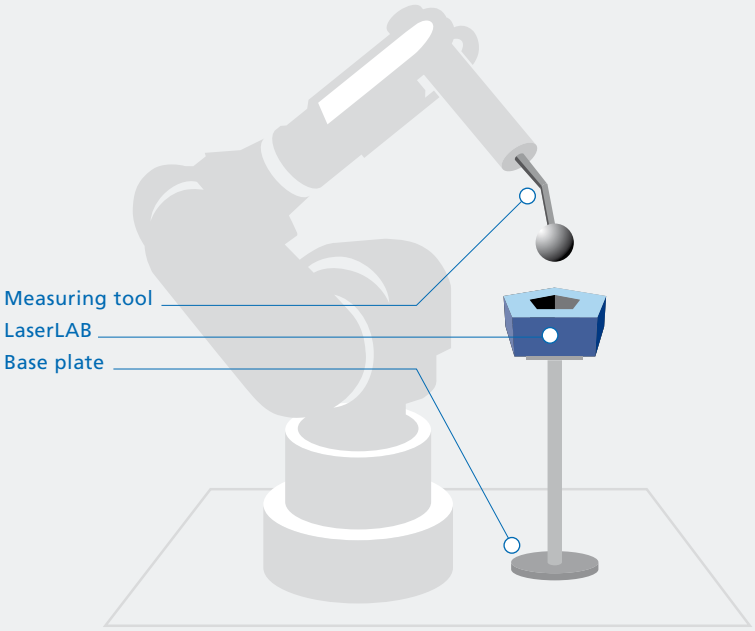
WIEST AG
KALIBRIERSYSTEME

Tool measurement with tool:in

What will you do if the electrode holder of your robot does not weld exactly any more, the grab grabs into empty space or your robot cuts ovals instead of circles? The solution: Use LaserLAB with tool:in!

Whether during the initial operation of new robot programmes, maintenance work of robot tools or a crash – with LaserLAB and tool:in you will get the real geometrical dimensions of the robot tool with regard to the flange coordinate system, the so called Tool-Transformation.

If tool measurement in 3 dimensions is sufficient, use the measuring ball or the measuring bone. However, if in addition you need the orientation of the tool then measurement with the measuring triangle or the measuring quadruple is advised. One thing is certain: No matter which measuring tool is decided, you will always get exact results!



Your Advantage

:: Measurement during initial operation and maintenance

:: 3D- and 6D-measurements possible

:: Measurement of movement direction

:: Direct measurement of TCP

:: Exact joining with robots possible

:: Indirect grab measurement

:: Automated measurement

:: Easy and safe operation

:: Comprehensible due to measurement report

:: No teach-in repetition in case of tool crash

:: Measurement duration < 15 min

:: Long downtimes will be avoided!

:: Improvement of plant availability!

How it is done

Fix LaserLAB to the base plate in the robot cell and attach the measuring tool to the robot. Now run a teach-in measuring programme with the robot. The measuring ball(s) will be moved, one after the other, into the visibility area of the sensor and will be measured automatically.

As soon as all balls have been measured you can transfer the newly calculated tool data into the robot control by pushing a button.

Compatibility

:: ABB
:: Comau
:: Kuka
:: Mitsubishi
:: Motoman
:: Stäubli

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SUCCESS BY VERSATILITY – APPLICATIONS

Initial operation

Before your robot will be used for the first time, carry out a geometric tool measurement with tool:in. The advantage of this: Repeated manual teach-in of the off-line generated room points will not be necessary any more or only to a small extent. Even in case of complicated automation tasks with robots, like milling, joining or deburring, geometric measurement with tool:in has proved itself in practice.

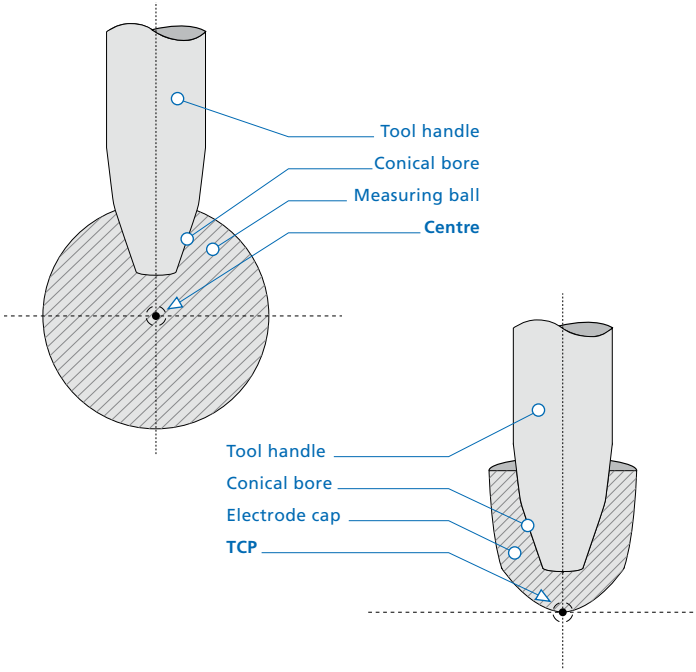
Maintenance

If a tool crash has occurred or a regular maintenance has to be carried out, LaserLAB helps you in combination with tool:in. It determines exactly the change of the tool. The upgraded tool data guarantee maintaining the room points by the robot. Whether you want to measure a welding torch, a laser beam, an adhesive nozzle or water jet nozzle: With LaserLAB and tool:in you can quickly measure by yourself and receive exact measuring data!

Do you want to measure a welding torch, a laser beam, an adhesive nozzle or a water jet nozzle?
The solution: Use the "Ball"!

TCP-measurement (3D) with a measuring ball

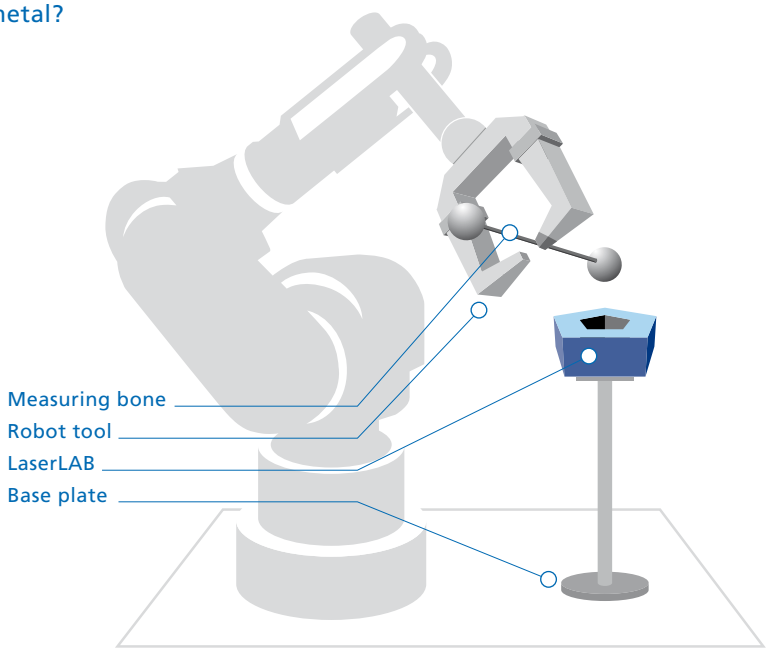
The trick of the 3D TCP-measurement (Tool Centre Point) is, that the centre of the ball is placed into the robot-TCP. This will be realised for different tools with suitable adapters.



Your robot ought to weld exactly but misses the sheet metal?
The solution: Use the "Bone"!

TCP-measurement (3D) with the measuring bone

In narrow spot-welding electrode holders the counter electrode prevents direct TCP-measurement as it presents a disturbing edge. The solution is the rotation symmetrical measuring bone with two balls, which will be fitted to the electrode arm. tool:in now measures, one after the other, the two balls of the measuring bone. The TCP will be calculated from the centre of gravity of the two balls.



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You want to mill, screw or join with robots?
The solution: Use the “Triangle”!

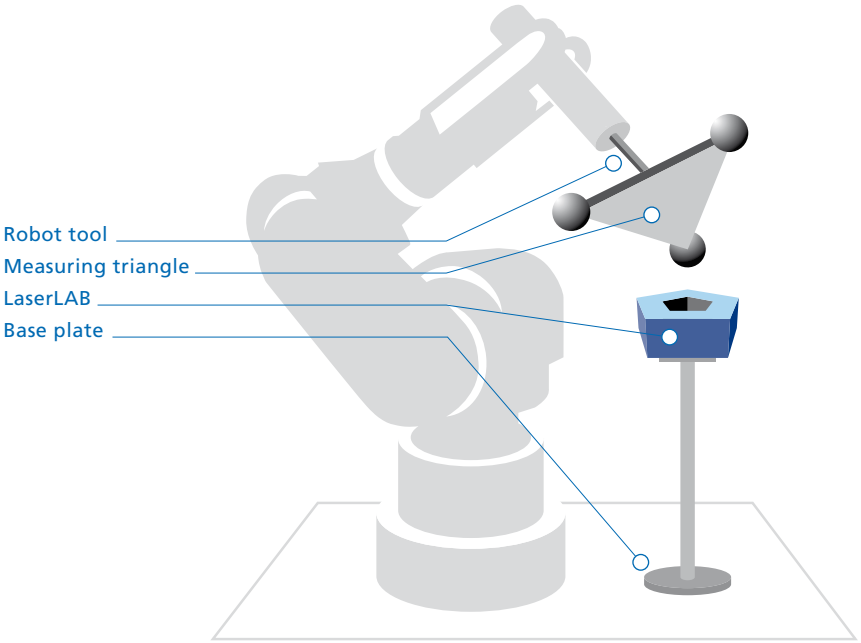
Measurement of the movement direction (6D) with the measuring triangle

Tools, e.g. milling tools, screwdriver or water jet cutters have a defined movement direction. This will be measured exactly with the measuring triangle that has been assembled perpendicular to the movement direction.

The measuring balls on the equilateral triangle will be measured one after the other. The centre of gravity and surface normal will be calculated from the three measurements. The centre of gravity represents the TCP and the surface normal the movement direction of the robot tool.

The TCP can be moved user-defined along the movement direction by entering an offset value. With tool:in you will be able to manage several displacements along the movement direction and attribute each to one tool.

This procedure can be used very well for joining processes in order to determine the position and the penetration direction of bores.



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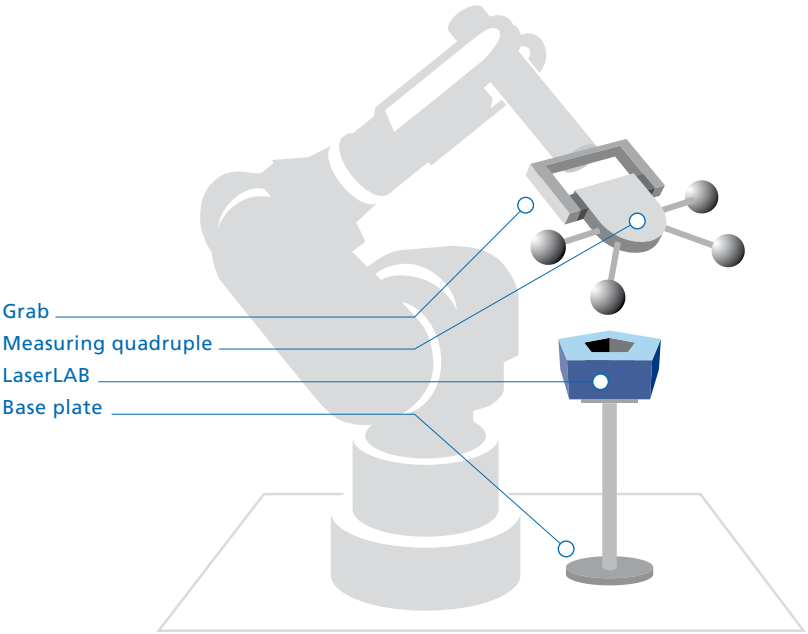
Has your grab become de-adjusted? Can it not grab the component any more? The solution: Use the “quadruple”. Measure “indirectly” – that gives you directly a better result!

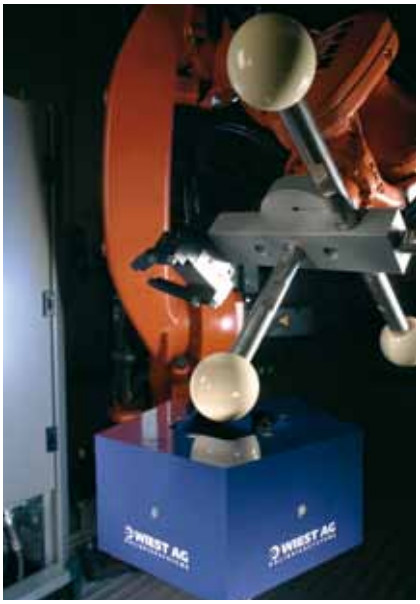
Measurement of a grab (6D) with the measuring quadruple

The LaserLAB works very tricky with tool:in, if you want to measure a grab, e.g. after a mechanical change: Here, instead of the grab, the grabbed measuring quadruple is measured and this supplies the unknown transformation from the component to the flange coordinate system of the robot. This can be transmitted into the robot control so that the robot automatically moves to the correct working points.

Your advantage: You measure the grabbed component and with this every inaccuracy of the grab that can occur between the flange and the component! Teach-in repetition will be dropped completely!

The procedure is not only suitable for handling applications but also for any application that requires an exact determination of the position and orientation, e.g. measuring robots.





THE PROCEDURE IN DETAIL

A measuring quadruple is a rigid device with four measuring balls that can be grabbed by a grab. The measuring quadruple will be grabbed likewise the component. The measuring balls of the quadruple will be measured successively. The measured ball coordinates are then the actual values of the ball positions.

The numerical values of the nominal values of the ball positions will now be entered. They can be taken from different sources:

:: Design data (absolute coordinates)
:: Measurement by a superior measuring system, e.g. in the measuring room (absolute coordinates)
:: Measurement with LaserLAB and robot (relative coordinates)

The required transformation into the flange coordinate system will be determined by correlating the measured actual values with the known nominal values.

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