...wenn die µ's Mühe machen...

"QuickCheck-T" (Ball Tetrahedron)
Made in Germany

QuickCheck-T is a system for very rapid geometrical accuracy checking of CMMs. It is based on the measurement of a ball tetrahedron and the evaluation in an application which facilitates the analysis and presentation of the results of the check.

The **QuickCheck-T** concept requires the measurement of a calibrated ball tetrahedron. Such Tetrahedrons are available for different sizes of CMMs, for tactile as well as multi-sensor CMMs and also for tomography systems.

The measurement and evaluation required for one machine inspection with **QuickCheck-T** requires only less than 10 minutes.
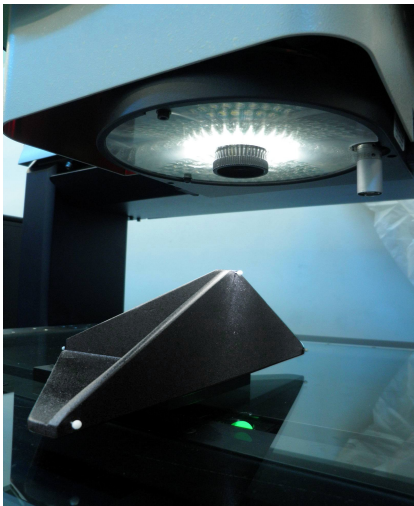
Optical Application
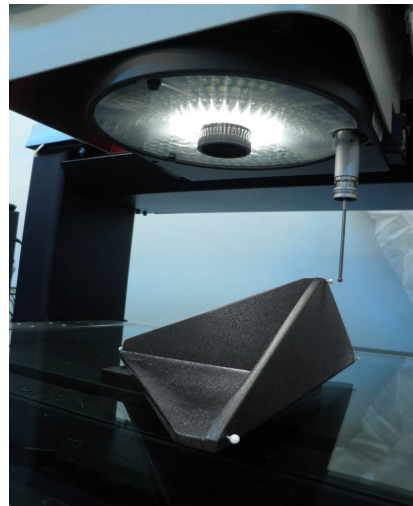
Tactile Application

Tetrahedrons with rod structure are largely insensitive to bending of their rods, due to the construction with the balls on the centre line of the rods (only cosine errors).

Plate design is used for multi sensor tetrahedrons with 3 mm balls. This is because otherwise the edge connectors were too large in relation to the rods and because these tetrahedrons are non-equilateral (back light illumination).

The balls of the multi sensor tetrahedrons receive a special treatment to make their 3 mm balls suited for video-autofocus.

Side lengths of standard tetrahedrons are from 200 mm to 1000 mm. Default sizes of miniature plate tetrahedrons are according to the adjacent sketch.

All tetrahedrons come with a transport box and with a spreadsheet for the analysis of length measurement errors, scale factors, squareness errors, and result presentation (long term behaviour of the CMM in graphical form).

standard dimensions:
x = 240 mm
y = 140 mm
z = 80 mm (or 62.5 mm)
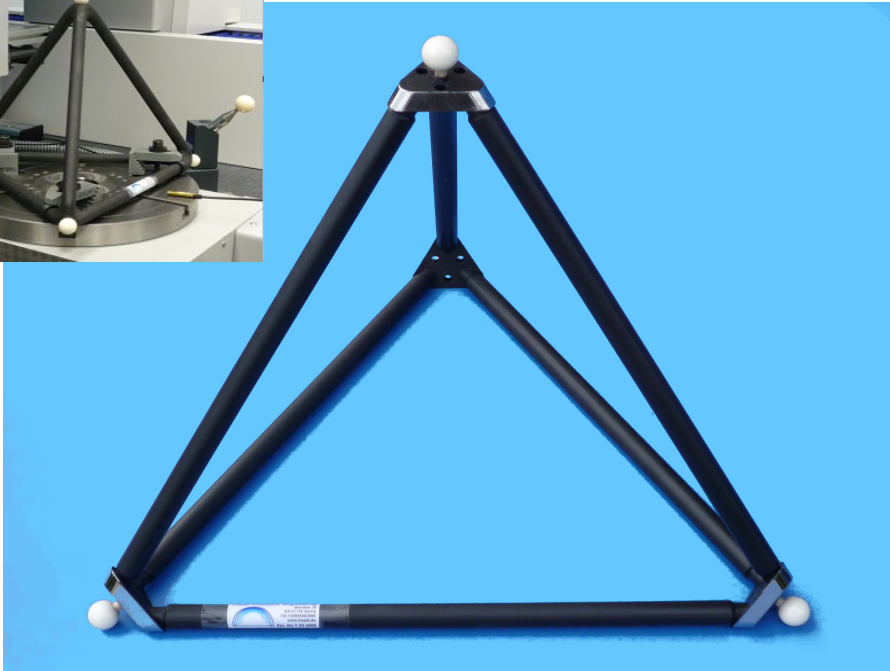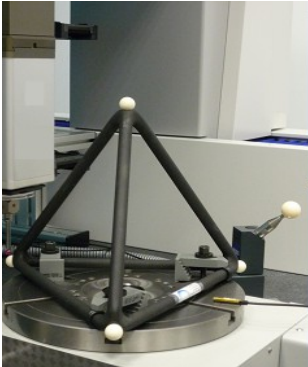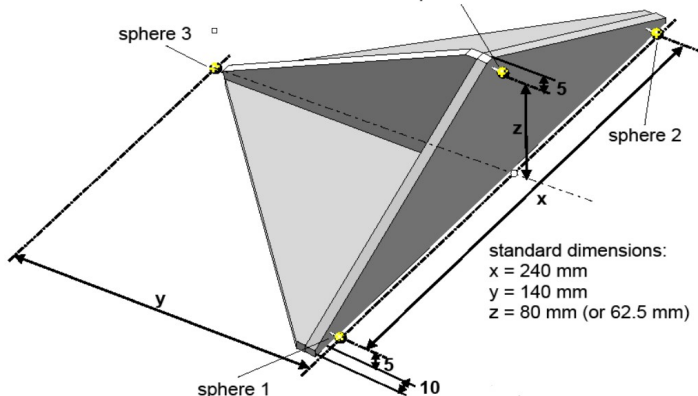
Ball Tetrahedron, Version ENG, 04-2022

NEWLY manufactured by
Qopas GmbH, Germany

FORMERLY manufactured by
Trapet Precision Engineering

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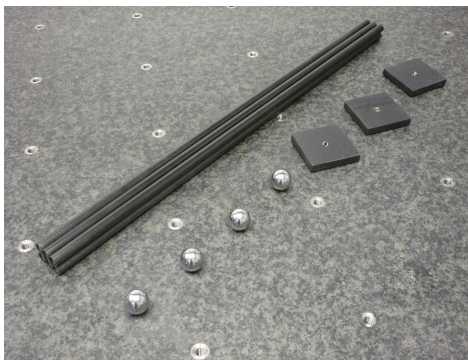Compact packing possible

Corner ball with foot and security lock

A type of Ball Tetrahedron is available which can be assembled and disassembled with a repeatability of better than 1 µm. This allows to periodically verify large CMMs and mobile measurement systems. This tetrahedron size ranges between 800 mm and 1500 mm.

The disassemblable ball tetrahedron consists of 6 carbon fibre rods with magnetic precision joints at the ends. These joints connect to the 4 stainless steel balls. What is calibrated are as usual the centre distances between the balls, however now the calibration is easier as only 6 ball bars are to calibrated and not a 3D-structure.

A unique feature of our disassemblable tetrahedron is that the corners are first secured with locks, before the rods are connected with the balls. This provides safety for the further use of the tetrahedron; an accidental disintegration and subsequent damage of joints and balls is prevented.

The 3 bottom balls are screwed to the 3 feet, thus an accidental dropping of balls becomes unlikely (as it may happen easily with lose balls).

In January 2016 we introduced the first large dismountable tetrahedron without magnets; it has ceramics spheres and ceramics self-centering cones. It consists of 2 dumbbell-like fixed 2-ball bars and 4 rods with centering cones at their ends. The 2 dumbbells are pulled against each other by springs and the 4 self-centering rods are clamped / centered between the balls of the dumbbells. Safety corner connectors prevent that the tetrahedron collapses when cones disengage from the balls.

Small tetrahedron for tomography, includes resolution test

The smallest tetrahedron has only 3 mm distance between ball centres.

This tetrahedron on the left is for tomography systems verification.

Balls are typically of ruby. The balls are pressed together by radially directed spring forces, assuring that all 4 balls are in contact with a defined force.

No metal parts are used in this case.

Ball Tetrahedron, Version ENG, 04-2022