

# Measuring Automaton for Joint Plunging Joint

## Brief description

- measuring automaton for 100% check and classification

## Measuring task

- measurement of diameters, lengths, location tolerances (concentricities), pitches

## Technology

- tactile
- static

## Tolerances

- $\varnothing$  classifying size = 12  $\mu\text{m}$

## Special features

- calibration: automatic
- changeover: manual, < 10 min
- workpiece marking by means of pin marker
- traceability of the workpieces
- sorting of the workpieces
- measuring capability for the class range



# Measuring Device for Joint Outer Race

## Brief description

- measuring device for 100% check and classification

## Measuring task

- measurement of diameters, angular pitch, system level, runout tolerances (radial runouts)

## Technology

- tactile
- static

## Tolerances

- $\varnothing$  classifying size = 10  $\mu\text{m}$

## Special features

- cycle time: < 5 s
- loading/unloading: manual
- changeover: manual, < 5 min, no readjustment of probes required
- measuring capability for class range



# Measuring Device for Joint Outer Race

## Brief description

- measuring device for sample check

## Measuring task

- measurement of outer diameters, pseudo roundnesses

## Technology

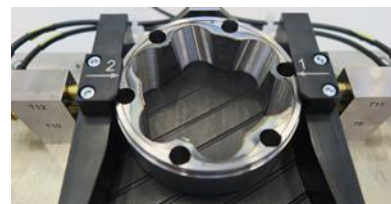
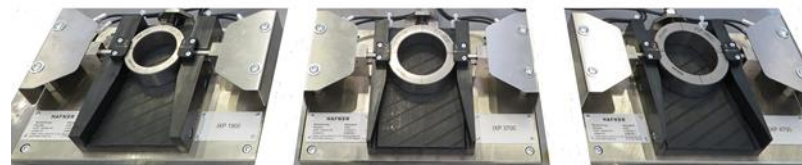
- tactile
- static

## Tolerances

- $\varnothing$  tolerance < 20  $\mu\text{m}$

## Special features

- loading/unloading: manual
- calibration: manual
- changeover: without changeover (only 1 workpiece type per device)
- 2 measuring levels
- 2 measuring axes



# Measuring Automaton for Joint Housing Plunging Joint

## Brief description

- measuring automaton for 100% check and classification

## Measuring task

- measurement of diameters, lengths, location tolerances (concentricities), pitches

## Technology

- tactile
- static

## Tolerances

- $\varnothing$  classifying size = 10  $\mu\text{m}$

## Special features

- calibration: automatic
- changeover: manual, < 10 min
- workpiece marking by means of pin marker
- traceability of the workpieces
- sorting of the workpieces
- measuring capability for the class range



# MULTIFLEX Measuring Automaton for Outer Race

## Brief description

- measuring automaton for 100% check and classification

## Measuring task

- measurement of diameters (two-ball dimension, pitch circle and crown circle tooththing), angular pitch

## Technology

- tactile
- static

## Tolerances

- $\varnothing$ -class width = 15  $\mu\text{m}$

## Special features

- cycle time: 23 s
- loading/unloading: with integrated handling
- changeover: manual, fast and easy exchange of the whole measuring stations for 11 types of workpieces
- workpiece marking by means of pin marker
- sorting of the workpieces and nok-classification



# Measuring System for Shank and Joint Housing Plunging Joint

## Brief description

- measuring system for 100% check and classification

## Measuring task

- measurement of diameters, angular pitch, system level

## Technology

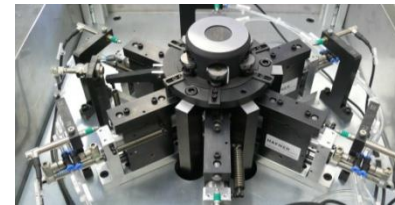
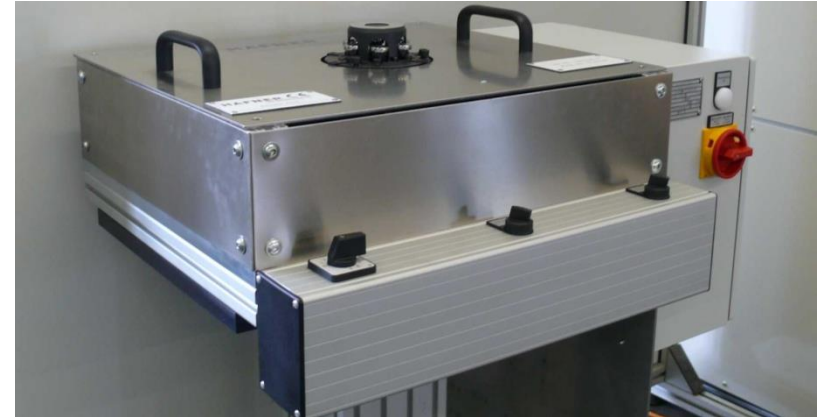
- tactile
- static

## Tolerances

- $\varnothing$  classifying size = 10  $\mu\text{m}$

## Special features

- changeover: manual, < 5 min, no readjustment of probes required
- classification on the basis of the measurement of the diameter
- measuring capability for the class range





# Measuring System for Outer Race

## Brief description

- measuring system for 100% check and classification

## Measuring task

- measurement of diameters, angular pitch, system level

## Technology

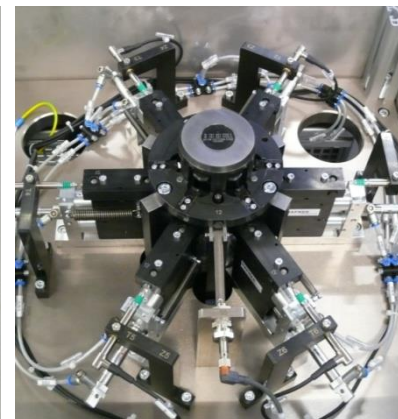
- tactile
- static

## Tolerances

- $\varnothing$  classifying size = 10  $\mu\text{m}$

## Special features

- loading/unloading: manual
- changeover: manual, < 5 min, no readjustment of probes required
- classification on the basis of the measurement of the diameter
- measuring capability for the class range
- mobile machine frame



# Measuring Device for DO-Outer Race

## Brief description

- measuring device for sample check

## Measuring task

- measurement of diameters

## Technology

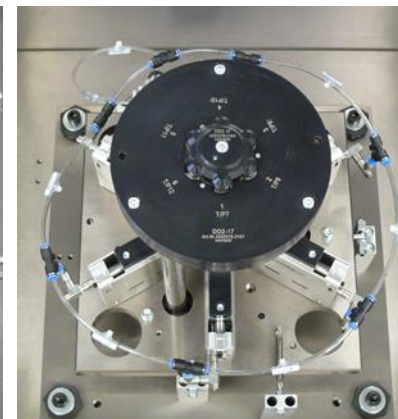
- tactile
- dynamic

## Tolerances

- $\varnothing$  classifying size 10  $\mu\text{m}$

## Special features

- cycle time: 15 s (without handling)
- loading/unloading: manual
- calibration: manual
- changeover: manual, in 10 min without calibration
- control system: external control





# Measuring System for Joint Housing Fixed Joint

## Brief description

- measuring system for sample check

## Measuring task

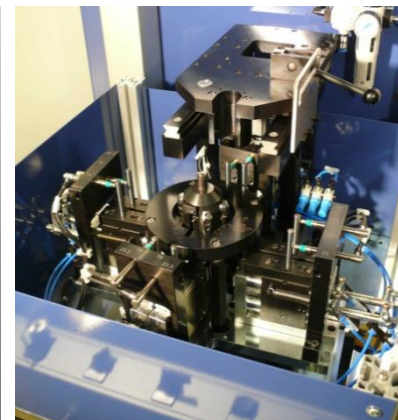
- measurement of diameters, system level distance, offset

## Technology

- tactile
- static

## Special features

- loading/unloading: manual
- calibration: manual



# Measuring Device for Joint Housing Plunging Joint

## Brief description

- measuring device for sample check

## Measuring task

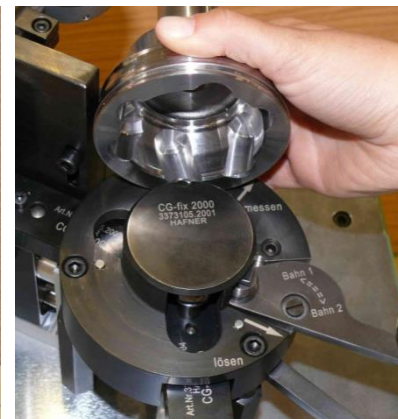
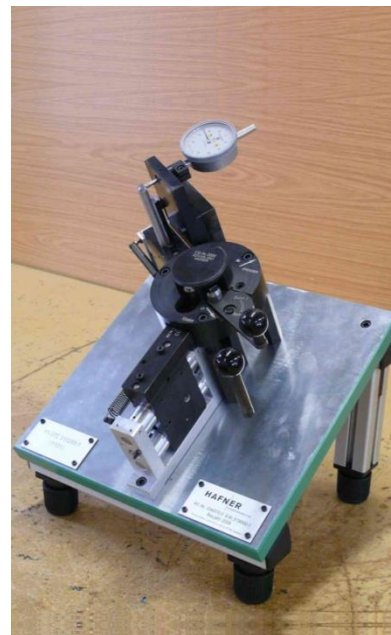
- measurement of system level distance

## Technology

- tactile
- static

## Special features

- calibration: not necessary
- setting master: not necessary



# Measuring Device for Joint Housing Fixed Joint

## Brief description

- measuring device for sample check

## Measuring task

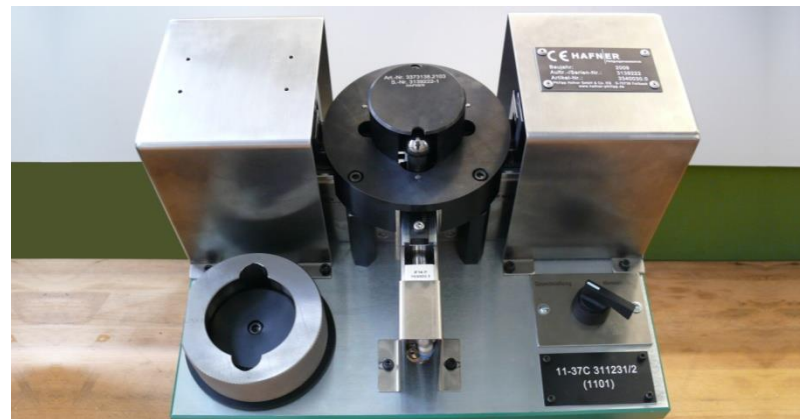
- measurement of two-ball measurement (in one track pair), cage diameter (in one measuring level)

## Technology

- tactile
- static

## Special features

- calibration: manual
- display of the measuring values via measuring computer



# Measuring Device for Joint Housing Plunging Joint

## Brief description

- measuring device for sample check

## Measuring task

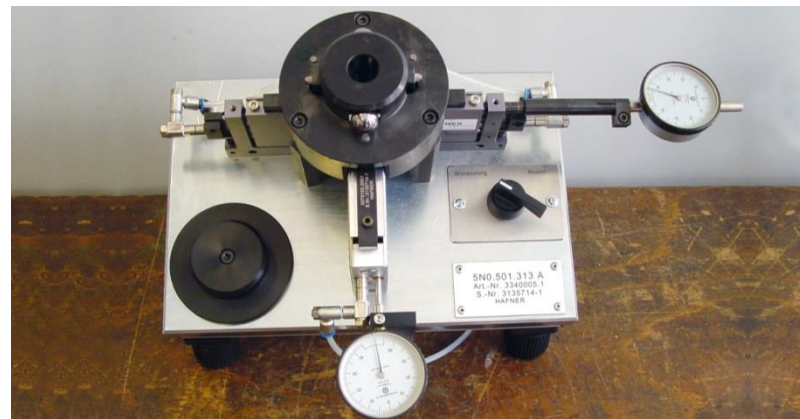
- measurement of two-ball measurement (in one track pair), cage diameter (in one measuring level)

## Technology

- tactile
- static

## Special features

- calibration: manual
- display of the measuring values via dial gauges



# Measuring Automaton for Inner Race

## Brief description

- measuring automaton for 100% check and classification

## Measuring task

- measurement of diameters PCD, run-out tolerances (radial run-outs), system level, angles, ball track

## Technology

- tactile
- static

## Tolerances

- $\varnothing$  classifying size  $\pm 10 \mu\text{m}$

## Special features

- cycle time: 15 s
- loading/unloading: with an integrated handling incl. infeed conveyor
- calibration: automatic
- changeover: without changeover
- workpiece separation as well as sorting of the workpieces
- infeed conveyor incl. cooling section for temperature control of the workpieces
- flexible division of the classification chutes





# Measuring Automaton for CV Joint Inner Race

## Brief description

- measuring automaton for 100% check and classification

## Measuring task

- measurement of diameters, angular pitch, system level, location tolerances (concentricities)

## Technology

- tactile
- static

## Tolerances

- $\varnothing$  classifying size = 8  $\mu\text{m}$

## Special features

- cycle time: 6,8 s
- loading/unloading: with an integrated handling, rotary table including run-in conveyor, workpiece separating as well as a sorting of the workpieces
- workpiece marking by means of pin marker
- modular measuring device insertion (replacement as complete assembly by a lifting carriage)





# Measuring Automaton for Inner Race

## Brief description

- measuring automaton for 100% check and classification

## Measuring task

- measurement of diameters, angular pitch

## Technology

- tactile
- static

## Tolerances

- $\varnothing$  classifying size = 15  $\mu\text{m}$

## Special features

- cycle time: 6,0 s
- loading/unloading: with an integrated handling, rotary table including run-in conveyor, workpiece separating, workpiece identification as well as a sorting of the workpieces
- run-in conveyor with 3 lanes
- parallel measuring of 2 different types of workpieces
- workpiece marking by means of pin marker



# Measuring System for Ball Hub Plunging Joint

## Brief description

- measuring system for 100% check and classification

## Measuring task

- measurement of diameters, angular pitch, system level

## Technology

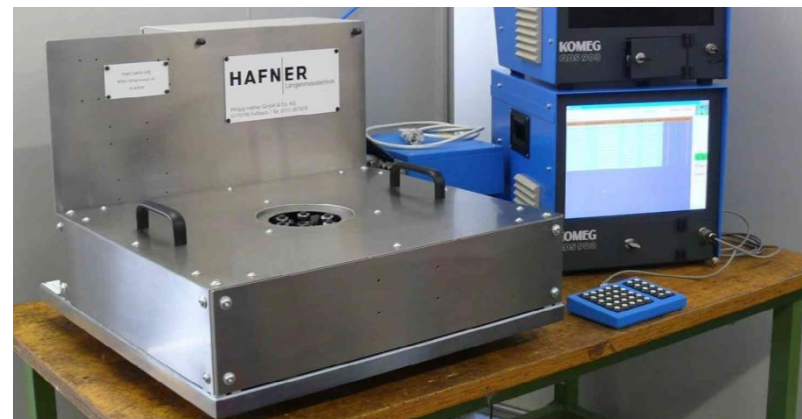
- tactile
- static

## Tolerances

- $\varnothing$  classifying size = 10  $\mu\text{m}$

## Special features

- changeover: manual, < 5 min, no readjustment of probes required
- classification on the basis of the measurement of the diameter
- measuring capability for the class range



## Measuring Device for Inner Race

### Brief description

- measuring device for 100% check resp. for sample check

### Measuring task

- measurement of lengths (height of tracks)

### Technology

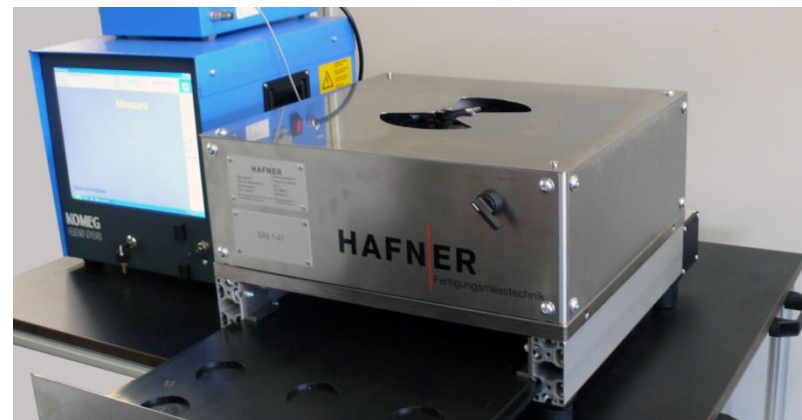
- tactile
- static

### Tolerances

- 26  $\mu\text{m}$

### Special features

- loading/unloading: manual
- calibration: manual
- changeover: manual, no readjustment of probes required



# Measuring Device for Ball Hub Counter Track Joint

## Brief description

- measuring device for sample check and machine setting

## Measuring task

- measurement of radius ball track, location tolerances (concentricities), vertical clearance

## Technology

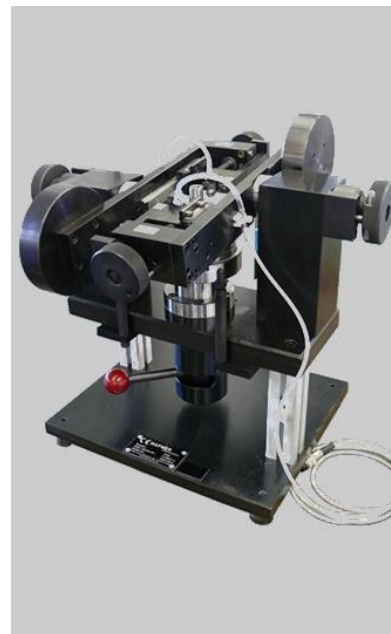
- tactile
- dynamic

## Tolerances

- $\varnothing = 40 \mu\text{m}$ , concentricity =  $30 \mu\text{m}$

## Special features

- changeover: manual
- batch mode for 4 different types of workpieces
- measurement of hardened workpieces



# Measuring Device for Ball Hub Counter Track Joint

## Brief description

- measuring device for sample check and machine setting

## Measuring task

- measurement of diameter cage track, run-out tolerances (radial runouts)

## Technology

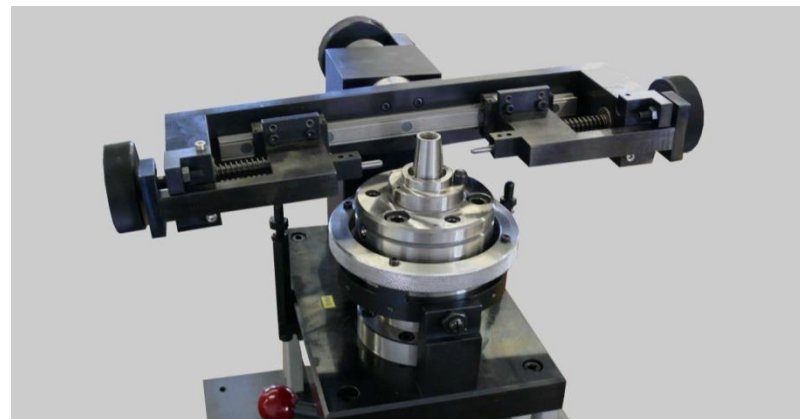
- tactile
- dynamic

## Tolerances

- $\varnothing = 20 \mu\text{m}$ , radial runout =  $50 \mu\text{m}$

## Special features

- changeover: manual
- batch mode for 4 different types of workpieces
- measurement of hardened workpieces



# Measuring Device for Ball Hub Counter Track Joint

## Brief description

- measuring device for sample check and machine setting

## Measuring task

- measurement of radius ball track

## Technology

- tactile
- dynamic

## Tolerances

- $\varnothing = 40 \mu\text{m}$

## Special features

- changeover: manual
- batch mode for 4 different types of workpieces
- measurement of the workpieces before heat treatment





# Measuring Automaton for Ball Cage Fixed and Plunging Joint

## Brief description

- measuring automaton for 100% check and classification

## Measuring task

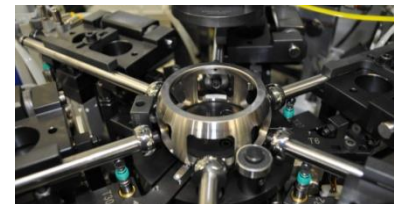
- measurement of diameters, lengths, form tolerances (roundnesses), location tolerances (symmetries), runout tolerances (radial runouts), cracks, hardness, temperature/compensation of the temperature

## Technology

- tactile
- static

## Special features

- cycle time: 8 s
- loading/unloading: with an integrated handling including a run-in and a run-out conveyor as well as a workpiece separating
- calibration: automatic
- option: workpiece marking by means of laser
- nok-classification
- possible as 1-lane or 2-lane automaton



# Measuring Automaton for Ball Cage

## Brief description

- measuring automaton for 100% check

## Measuring task

- measurement of diameters, distances, Form and Position Tolerances: symmetries

## Technology

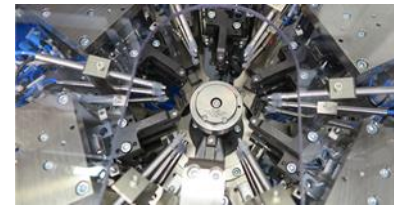
- tactile
- static

## Tolerances

- $\varnothing$  tolerance  $\pm 0,015$  mm

## Special features

- cycle time: < 10 s
- loading: bunker conveyors / unloading: outfeed conveyor
- calibration: automatic
- changeover: manual, without readjustment of the probes
- control system: PLC control
- nok-classification
- crack test



# Measuring Automaton for Ball Cage

## Brief description

- post-process measuring automaton

## Measuring task

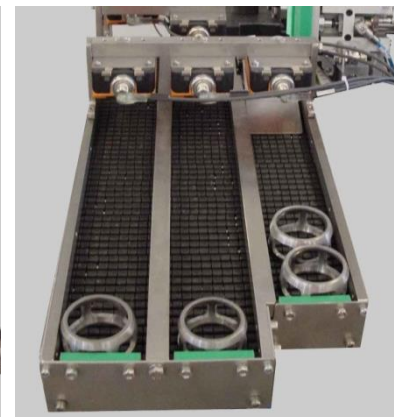
- measurement of diameters, lengths

## Technology

- tactile
- static

## Special features

- cycle time : 60 s for 2 workpieces measured at 3 positions
- loading/unloading: with integrated handling
- calibration: automatic
- changeover: manual, ~ 5 min
- sorting of the workpieces: ok and not ok
- respectively one measuring automaton with different measuring stations for inner and outer measuring, layout of both automatons is identical



# Measuring System for Ball Cage Counter Track Joint

## Brief description

- measuring system for sample check

## Measuring task

- measurement of diameters, lengths, form tolerances (flatnesses, roundnesses), location tolerances (symmetries)

## Technology

- tactile
- dynamic

## Special features

- loading/unloading: manual
- calibration: manual
- measuring system constructed for pre- and finish machining



# Measuring System for Ball Cage

## Brief description

- measuring system for sample check

## Measuring task

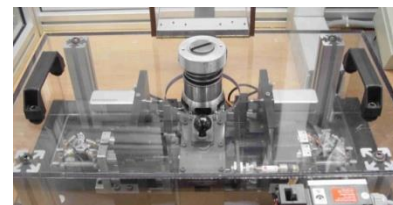
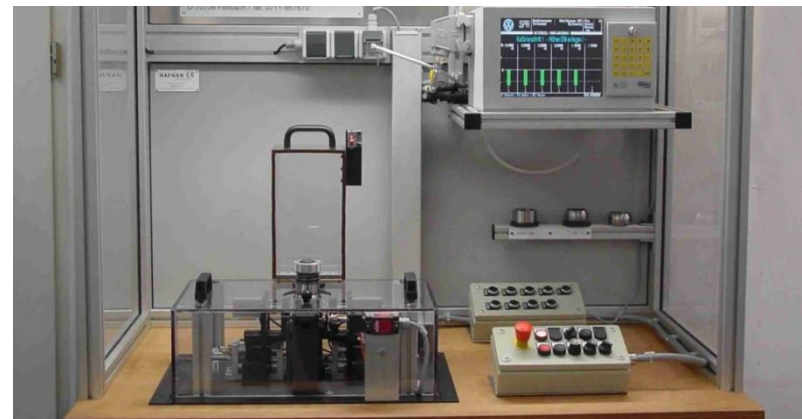
- measurement of diameters, lengths (offset)

## Technology

- tactile
- dynamic

## Special features

- loading/unloading: manual
- calibration: manual
- changeover: < 5 min
- batch mode for 10 different types of workpieces



# Measuring System for Ball Cage

## Brief description

- measuring system for sample check

## Measuring task

- measurement of diameters, lengths, system level distance

## Technology

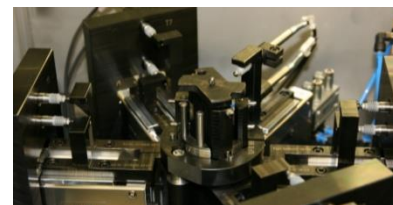
- tactile
- static

## Tolerances

- system level distance = 20  $\mu\text{m}$

## Special features

- changeover: manual, ~ 2 min, no readjustment of probes required
- measuring devices cover the complete production process
- measuring devices constructed for two different types of workpieces





# Classifying Line for Counter Track Joint

## Brief description

- classifying line for 100% check and classification consisting of measuring automaton for ball hub, ball cage and outer ring

## Measuring task

- measurement of diameters, temperature/compensation of the temperature

## Technology

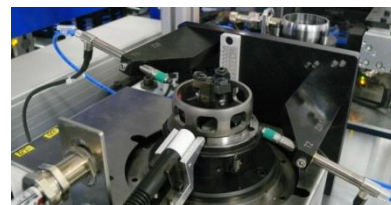
- tactile
- static

## Tolerances

- pairing ball grading of 2  $\mu\text{m}$

## Special features

- cycle time: 16,5 s
- loading/unloading: conveyor, with integrated handling
- ball storage for 20 ball classes with automatic feeding of exact 8 balls
- workpiece pairing of 4 components (ball hub, ball cage, outer ring and balls) in a workpiece carrier and nok-classification



# Measuring Automaton for Counter Track Joint

## Brief description

- measuring automaton for 100% check

## Measuring task

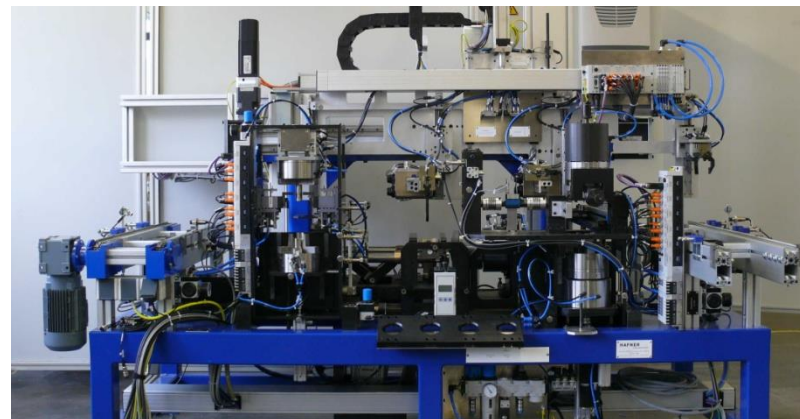
- measurement of diameters, lengths, location tolerances (concentricities), axial clearance, torsional clearance, static and dynamic torque

## Technology

- tactile
- static as well as dynamic

## Special features

- cycle time: 17 s
- loading/unloading: with an integrated handling of a conveyor with a workpiece carrier
- calibration: manual
- changeover: manual, no readjustment of probes required
- traceability of the workpieces



# Measuring and Test Automaton for Pre-Installed IDF-Joints

## Brief description

- measuring automaton for 100% check

## Measuring task

- measurement of axial- and distort play, bending moment

## Technology

- static
- dynamic

## Special features

- cycle time: 18 s
- loading/unloading: loading with workpiece carrier, unloading with chain conveyor
- changeover: manual
- control system: PLC control



# Measuring System for Plunging Joint

## Brief description

- measuring system for sample check

## Measuring task

- measurement of displacement force

## Technology

- tactile
- dynamic

## Special features

- loading/unloading: manual
- changeover: manual
- batch mode for 17 different types of workpieces
- optional: extendable for other types of workpieces



# Measuring Automaton for Universal Joint Star

## Brief description

- measuring automaton for 100% check

## Measuring task

- measurement of diameters

## Technology

- tactile
- dynamic

## Tolerances

- $\varnothing$  tolerance 11  $\mu\text{m}$

## Special features

- cycle time: max. 33 s (measuring cycle without loading and unloading by the operator)
- loading/unloading: manual on workpiece carrier
- calibration: manual
- changeover: manual, measuring station without changeover for  $\varnothing 18$  to  $\varnothing 26$  mm
- control system: PLC control
- nok-classification in box

