











# CUSTOMISED GAUGING SOLUTIONS



# Customised Gauging Solutions


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# Customised Gauging Solutions

## INTRODUCTION



- Our customised multi-gauging solutions range from a simple multi level diameter checking to relational parameters like squareness, center distance etc. to Semi-Automatic to completely automatic inline multi-gauging machines. The process of realizing a customised gauging solution in reality is a complex and elaborate one. It consists of the following steps.

  - **Enquiry from the customer:** The customer plays a key role of providing the correct and vital information to us which forms the basis of conceptualizing the solution to the customer
  - **Conceptualizing:** At this stage our concept cell visualizes a solution to gauge the required parameters as per the enquiry
  - **Design Approval:** Once the concept is frozen, the design team makes an overall layout for the customer to verify whether there is any gap in the inputs at the enquiry stage and what has been put on paper
  - **Design:** Once the basic design layout is finalized with the customer, based on the concept , the design team gets down to make production drawings of the conceptualized gauging fixture. Constant interaction takes place between the two departments as well as with the customer to clear doubts etc.
  - **Manufacturing:** Individual parts are carefully produced as per drawings
  - **Assembly:** An experienced and skilled set of operators assemble the gauging fixture and give shape to the concept
  - **In-house Gauge trials and tests:** A separate applications team then takes over and conducts extensive trials on the gauging station and ensures the desired results are obtained
  - **Customer joint inspection and approval:** The output on the gauging fixture is jointly confirmed with the customer at our premises before it is shipped out

- The customer plays an important role in this process. Each machine is one off and highly customised. It's a whole new ball game each time. We believe the customer is the expert in manufacturing the part and can provide valuable inputs. Such a collaborative effort from both ensures a one way passage to success.

- Over the years, we have manufactured many customised gauging solutions for a variety of components. Many of these solutions have become industry standard. This has been achieved through in depth Application Engineering exercises that we have carried out to understand the component and the manufacturing processes. This gave us the cutting edge needed to deliver total solutions to the satisfaction of the Customer. As a part of continuous technology development, the company also has developed expertise in computerised gauging with semi-auto and fully automatic gauging machines.

**The following tips are useful when you send your requirement to us:**

- While specifying requirement, please give the complete drawing with all the dimensions to be measured properly highlighted, to our sales representative.
- It is strongly recommended to give us a sample component and 3D model also, because what the drawing may not reveal is disclosed by the actual component and 3D model. Size, shape and weight gives a lot of information for designing a good gauge.
- The gauge acceptance criteria should be discussed and agreed upon at the very beginning.
- When 'General Layout' is sent to you giving overall scheme of gauging, please go through it carefully. If you have any suggestions, communicate to us as early as possible. Reconfirm all the dimensions carefully because in the interim period your drawing or process may have changed.
- Please give sufficient time to manufacture. These projects are one off type.
- During gauge installation, ensure that your operators who are going to use the gauge are properly trained in the usage.

# Customised Gauging Solutions

## WHY BAKER CUSTOMISED GAUGING SOLUTIONS ?

- Expert in-house team to handle your requirement right from Conceptualization, Design, Manufacturing, Assembly, Trials and Testing
- An experience of 50 years in gauging solutions
- Imported, high precision machines like Hauser Jig Grinder and Borer to ensure high accuracy in manufacturing
- A perfect combination of in-house developed software and electronics to ensure the solution is at par with international standards
- Strong after sales and support service. We have our own sales and service employees across India to cater to our customers in person, whenever needed.
- Expert and specialised partners overseas to ensure a complete solution is given to a customer for their most demanding needs



IN-HOUSE DESIGN TEAM




JIG BORING MACHINE



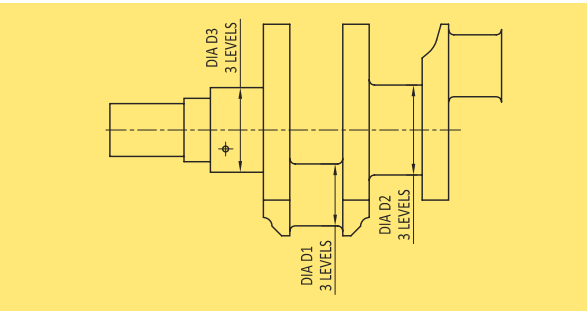
JIG GRINDING MACHINE





## MULTICYLINDER

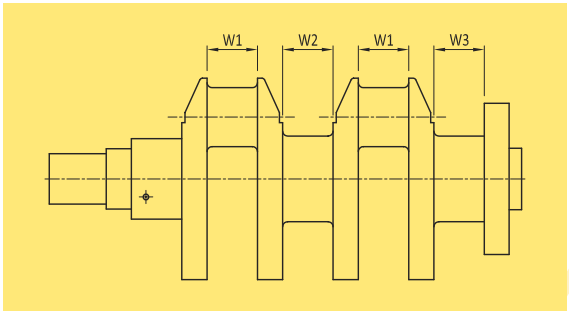
### HAND HELD DIAMETER GAUGE




### PARAMETERS

- Outer diameter at various levels
- Ovality at various levels
- Taper
- Crowning

### HAND HELD WIDTH GAUGE




### PARAMETERS

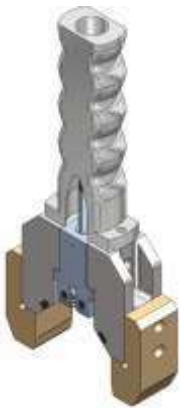
- Width

### ELECTRONIC



ELECTRONIC CALIPER FOR DIAMETER

### ELECTRONIC



ELECTRONIC WIDTH GAUGE

### FEATURES

- Precise measurement
- Easy and quick to use
- Can be used on machine
- Read out units and PC based system with SPC analysis
- Contact type principle of measurement

### AIR



AIR CALIPER FOR DIAMETER

### AIR



AIR WIDTH GAUGE

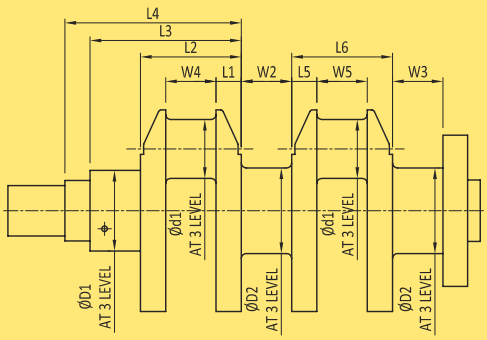
### FEATURES

- Precise measurement
- Easy and quick to use
- Can be used on machine
- Read out units and PC based system with SPC analysis
- Non contact type principle of measurement
- Self cleaning

# Crankshaft

## MULTICYLINDER

FULLY AUTOMATIC MACHINE






### PARAMETERS

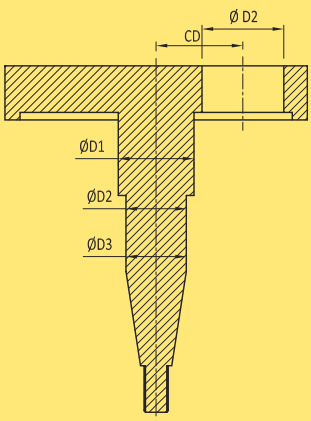
- All journal & pin diameters at multi levels
- Ovality of all journal and pin diameters
- Taper of all journal & pin diameters
- Width of journals & pins
- Lengths
- Runout of all journal diameters
- Crowning effect of diameters
- Throw of pin

### FEATURES

- All measurements in one rotation
- Optimum cycle time
- User friendly customised software with SPC analysis
- No operator fatigue
- Can be used as a final inspection equipment
- Robust design for shop floor conditions
- Fully automated in line system also possible

## SINGLE CYLINDER

PNEUMATIC GAUGING FIXTURE








### PARAMETERS

- Pin hole diameter
- Center distance
- Bearing diameter
- Shaft diameter at multiple levels

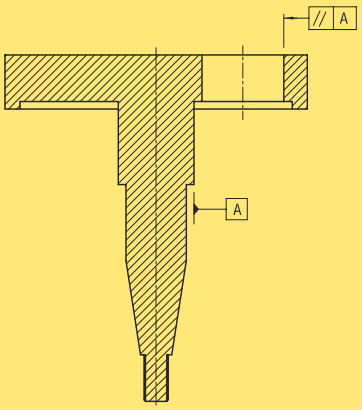
### FEATURES

- Precise, easy and quick measurement of multiple parameters in one go
- Readout unit or computerised system with SPC analysis
- Fully electronic contact type system also available
- Grading and grade marking integration



## SINGLE CYLINDER

PNEUMATIC GAUGING FIXTURE (BEND & TWIST)







### PARAMETERS

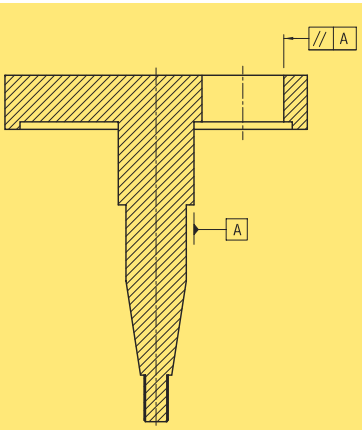
- Parallelism between Bearing & pin hole diameter (bend & twist).

### FEATURES

- Fully Air electronic type system.
- Contactless measurement system.
- Precise, easy and quick measurement for critical parameters on shop floor.
- PC & Read out Base system.

## SINGLE CYLINDER

CONTACT GAUGING FIXTURE (BEND & TWIST)






### PARAMETERS

- Parallelism between Bearing & pin hole diameter (bend & twist).

### FEATURES

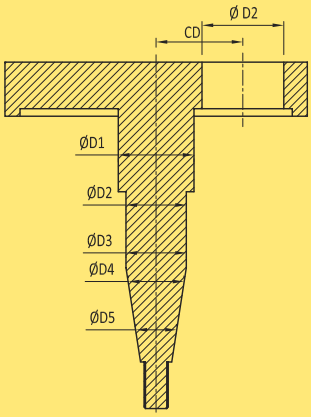
- Fully electronic contact type system.
- Precise, easy and quick measurement for critical parameters on shop floor.
- PC Base system.

# FULLY AUTO GAUGING SYSTEM- TWO WHEELER CRANKSHAFT(L.H & R.H).



## SINGLE CYLINDER

CONTACT GAUGING FIXTURE






## PARAMETERS

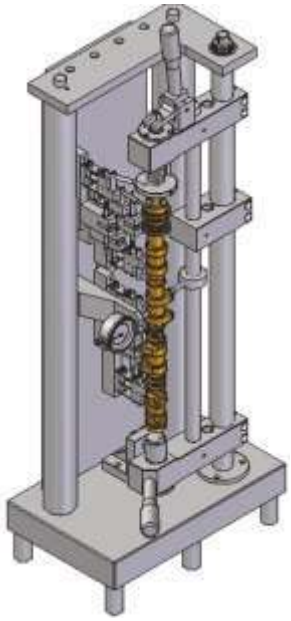
- Inner Diameter at 2 Level.
- Outer diameter at 4 Levels & its runouts.
- Center Distance, between bearing diameter and Pin hole diameter.
- Mesurement Over Pin at 2 Level and its runout.
- Dowel hole diameter.
- Heights at 4 Places.
- Internal and external thread verification (Automated).
- Keyway width/symmetricity
- Position of dowel hole
- Over ball center height
- Face runout
- Taper angle

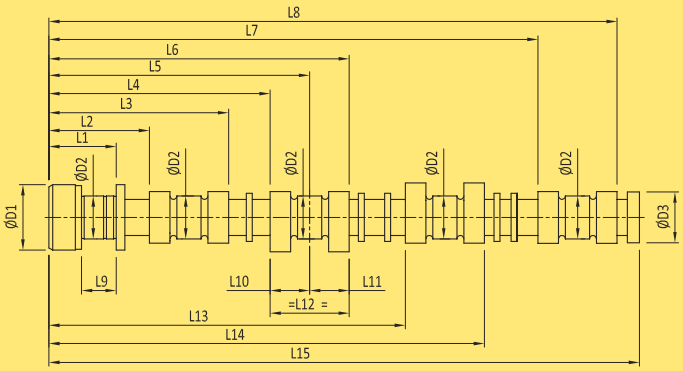
## FEATURES

- Fully Automated system, with robust and rigid design, suitable for the shop floor conditions.
- System includes auto traceability of the component.
- System Consist of carousal Conveyor, High Speed gantry system, auto sorting for Good & NG component.
- System includes Auto verification of Internal and external threads.
- Precise, Easy and Quick measurement for critical parameters on shop floor.
- PC Base system.

## LENGTHS & RUNOUT GAUGE







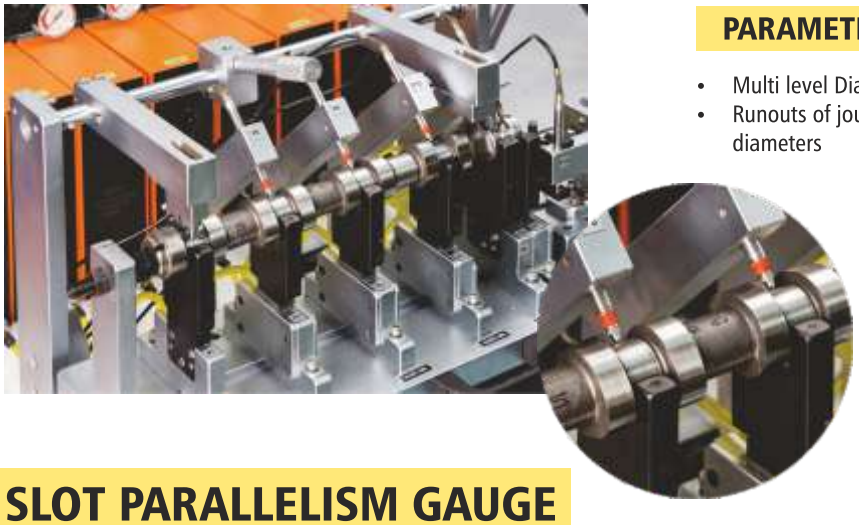

### PARAMETERS

- Multiple Lengths
- Runout of diameters

### FEATURES

- Shaft held vertically between center
- Read out units or computerised system with SPC analysis

## DIAMETERS & RUNOUT GAUGE



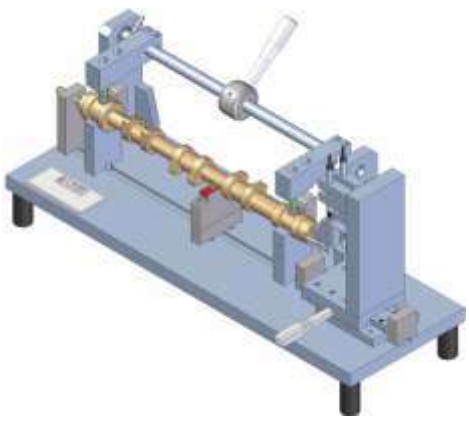
### PARAMETERS

- Multi level Diameters
- Runouts of journal diameters

### FEATURES

- Component rested on two fixed 'V' Calipers
- Floating self aligning Air Calipers
- Precise and easy to use
- Read out units or computerised system with SPC analysis
- Also available with contact type solution

## SLOT PARALLELISM GAUGE



### PARAMETERS

- Keyway slot position w.r.t. chilling pad

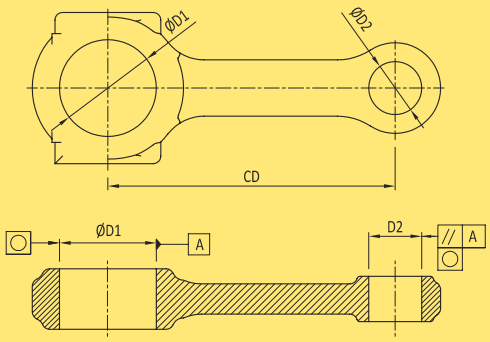
### FEATURES

- Component rested on 'V' and resting on chilling pad
- Digital readout system



# Connecting Rod






## AIR GAUGING



### PARAMETERS

- Big end and small end diameters
- Center distance
- Parallelism between big end and small end
- Bend
- Twist

### FEATURES

- Precise, easy & quick measurement
- Fully automated gauging, grading, grade marking and sorting machine also available
- Self cleaning

## ELECTRONIC GAUGING




### PARAMETERS

| Sr. No. | Big end | Sr. No. | Small end | Sr. No. | |
|---|---|---|---|---|---|
| 1. | Dia. Top: 'X' | 9 | Dia. Top: 'X' | 17 | Center Distance: Top |
| 2. | Dia. Top: 'Y' | 10 | Dia. Top: 'Y' | 18 | Center Distance: Bottom |
| 3. | Dia. Bottom: 'X' | 11 | Dia. Bottom: 'X' | 19 | Bend ( Parallelism of 'X' Axis) |
| 4. | Dia. Bottom: 'Y' | 12 | Dia. Bottom: 'Y' | 20 | Twist (Parallelism of 'Y' Axis) |
| 5. | Taper: 'X' | 13 | Taper: 'X' | 21 | Perpendicularity of Big End Dia. |
| 6. | Taper: 'Y' | 14 | Taper: 'Y' | 22 | Crank Bore Thickness |
| 7. | Ovality: TOP | 15 | Ovality: Top | | |
| 8. | Ovality: Bottom | 16 | Ovality: Bottom | | |

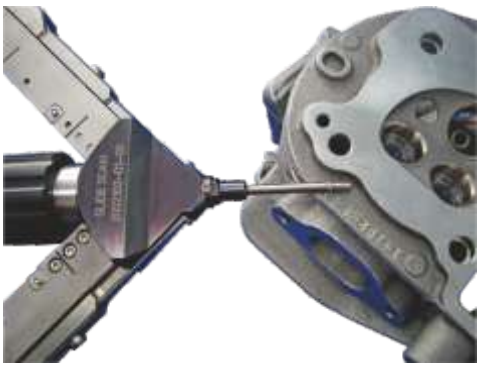
### FEATURES

- Auto /Manual Load/Unload of Component.
- Machine Operate automatically by using signal handshaking with Gudel Gantry.
- Robust steel Structure to ensure error free measurement in shop floor condition.
- Contact Type measurement with LVDT Probes.
- Combined system for two Models.
- Scanner to scan 2D Data matrix on component.
- Three point resting Principle.
- Optimum Cycle Time.
- Component Presence and orientation confirmed by sensor & seat check.
- Facility to Accommodate Temperature compensation.
- Inbuilt Probe Protection.
- "22" parameter checking facility in One Go.



# VALVE SEAT

## VALVE SEAT PROFILE



### PARAMETERS

- Seat angle
- Seat Width
- Seat Straightness
- Angular gauge line position

### FEATURES

- Scans the outline of valve seats
- Available for all kinds of gauge diameters in between 24 to 34 mm or others
- Safe and reliable since it processes about 1000 values within a scan of 1mm
- Realises this complex measurement within few seconds

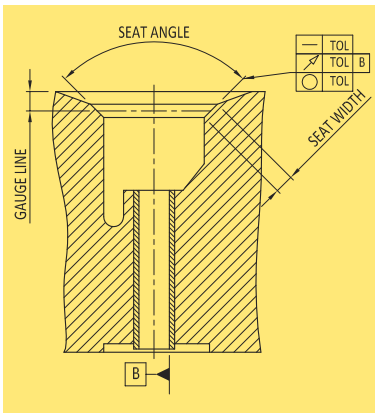
## VALVE SEAT & VALVE GUIDE





### PARAMETERS

- Seat angle to valve guide concentricity / runout
- Seat roundness




### FEATURES

- Measures without operator influence and hence is extremely reliable
- Available for all kinds of valve seats
- Can be used not only in vertical handling, but also in inclined handling
- Can be designed as a combined gauge for intake / exhaust

# ROCKER BORE

ROCKER BORE GAUGE



### PARAMETERS

- Internal Diameter of bore at multiple levels
- Bore to bore concentricity

# CAM/CRANK BORE

CAM / CRANK BORE GAUGE



### FEATURES

- Contact type gauging
- Can check all Cam bores at one time
- Enters easily in all Cam bores
- Suitably Designed long tubular handle for easy insertion of gauge into bores



## BORE MEASURING, GRADING & GRADE MARKING

### MULTI CYLINDER

CYLINDER BORE



**PARAMETERS**

- Internal diameter in 2 axis and at 3 levels of bore
- Ovality at each level
- Taper of each bore
- Grading of each bore
- Grade marking – engraving

**FEATURES**

- Fully automatic gauging cycle
- Periodic auto mastering
- Servo driven precision slides
- Close loop operation for optimum safety
- Air-Electronic gauging principle
- Data acquisition and SPC analysis
- Grade marking based on individual status of bores
- Fault indications and buzzers
- Ensured component orientation

CRANK, CAM & IDLER BORE



**PARAMETERS**

- Internal diameter in 2 axis and at 3 levels of bore
- Ovality at each level
- Taper of each bore
- Grading of each bore
- Grade marking – engraving

**FEATURES**

- Internal diameter of crank bores at multi levels & in 2 axis
- Ovality
- Grading of each bore
- Grade marking

### SINGLE CYLINDER

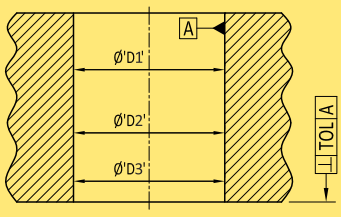


**PARAMETERS**

- Bore diameter at 3 different levels
- Ovality at each level
- Taper of bore
- Squareness of resting face

**FEATURES**

- Multi-level measurement
- Grading
- Grade marking
- Data acquisition & SPC analysis



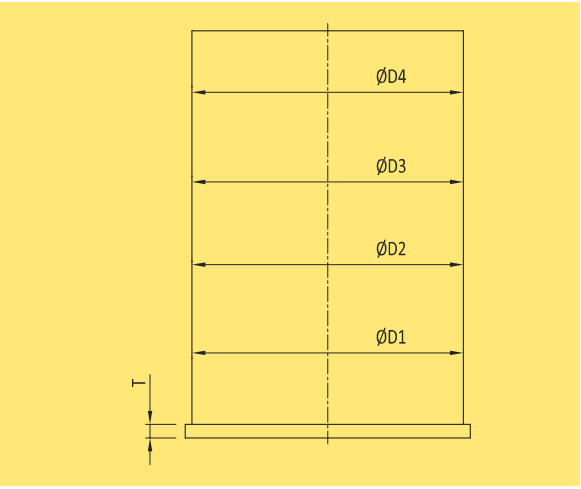





# PNEUMATIC GAUGING FIXTURES



## OUTER DIAMETER MEASUREMENT





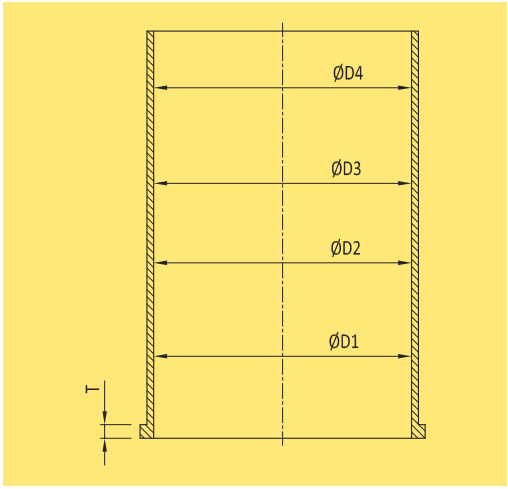

### PARAMETERS

- Outer diameter at different levels
- Collar thickness

### FEATURES

- Contact-less gauging (air gauging)
- Multilevel diameter gauging in one go

## INTERNAL DIAMETER MEASUREMENT






### PARAMETERS

- Internal diameter at different levels
- Collar thickness

### FEATURES

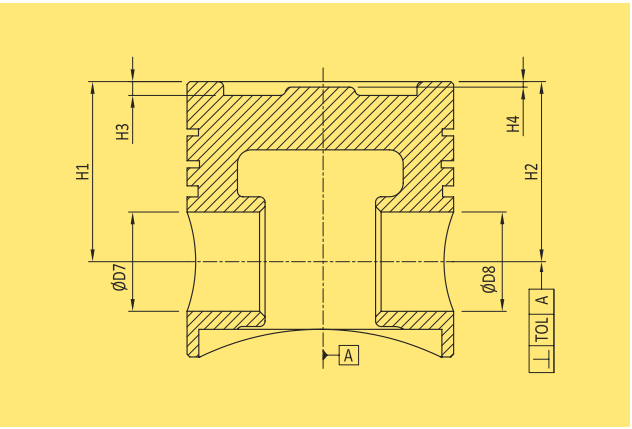
- Contact-less gauging (air gauging)
- Multilevel diameter gauging in one go

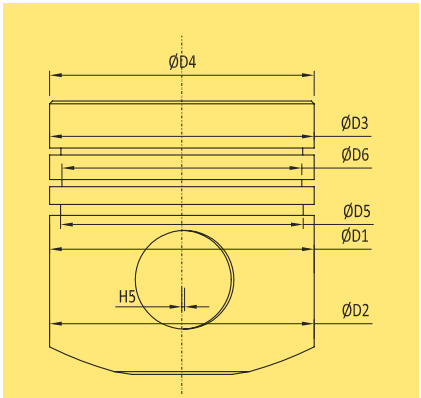


# Piston

## MULTI GAUGING, WEIGHING & MARKING






### PARAMETERS

- Ref. Diameter D1
- Diameter D2
- Diameter D3
- Top Land Diameter D4
- Groove Diameter D5 & D6
- Pin Bore Diameter at 2 levels (D7 & D8)
- Compression Height H1 & H2
- Cavity Depth H3
- Button Depth H4
- Offset H5
- Weight
- Grading

## SEMI AUTOMATIC MACHINE




### FEATURES

- Compact design
- Grading based on weight
- Grade marking
- Temperature compensation
- User friendly
- Optimum cycle time
- Computerised system with SPC analysis

## FULLY AUTOMATIC MACHINE




### FEATURES

- Smartly automated to suit fully automatic production line
- Data acquisition & quick SPC analysis
- Reduce measurement cycle time
- Checking degree of occurrence of maximum diameter
- Automatic grade laser marking
- Automatic grade-wise sorting
- Temperature compensation

# Piston Pin & Piston Ring

## PISTON PIN









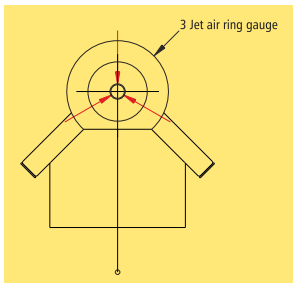
### PARAMETERS

- Outer Diameter 'D1'
- 3-Point Lobing

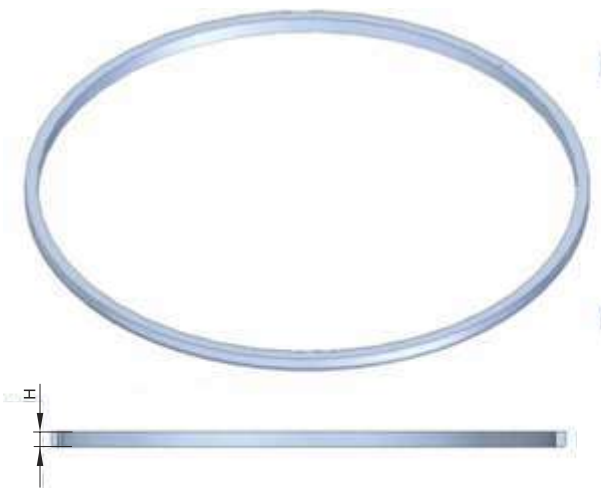
### FEATURES

- 'V' guide way support for ease of measurement
- 3 jet air ring gauge to detect tri lobing

Pneumatic measurement




## PISTON RING






### PARAMETERS

- Height ' H' (At three places)

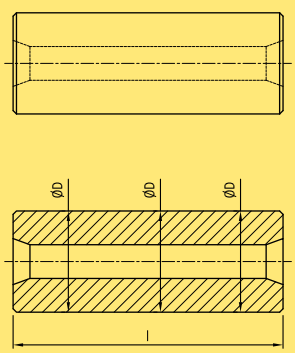
### FEATURES

- Fully automatic gauging cycle
- Auto dispensing component
- All static parameters
- Data acquisition & SPC analysis
- Sorting
- Optimum cycle time



## GUDGEON PIN GAUGING & SORTING SYSTEM




### PARAMETERS

- OD at levels
- Taper
- Length

### FEATURES

- Fully Automated system, with robust and rigid design, suitable for the shop floor conditions.
- System includes Grade wise sorting & rejection of the component.
- System consist of laser marking for component Identification.
- Precise, easy and quick measurement for critical parameters on shop floor.
- PC Base system.



## MULTI GAUGING AND SORTING SYSTEM



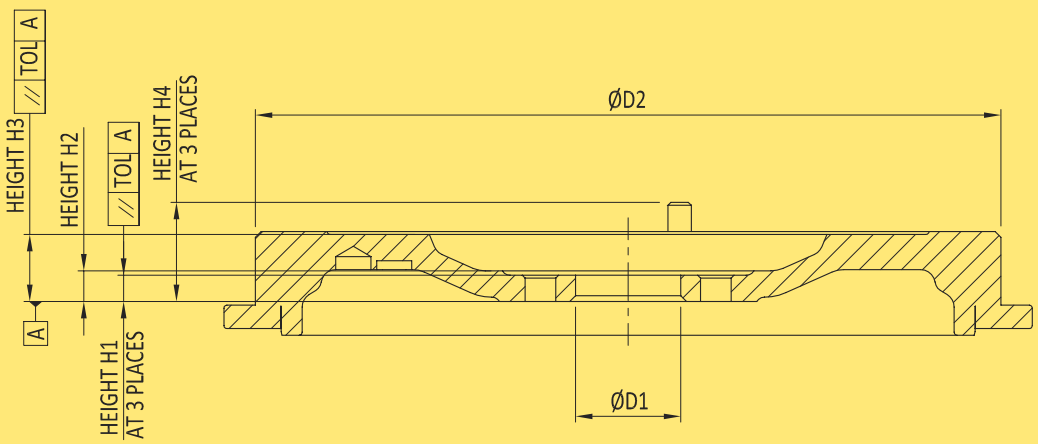



### PARAMETERS

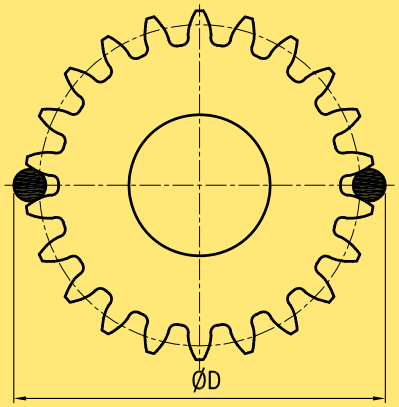
- Inner Diameter ØD1
- Outer Diameter ØD2
- Height H1, H2 & H3
- Dowel pin height H4 at 3-Places
- Parallelism

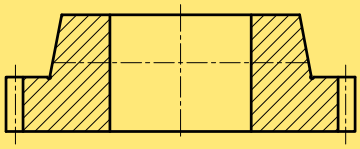
### FEATURES

- Auto gauging cycle
- Auto gauging
- Auto sorting
- Optimum cycle time
- User friendly
- Data acquisition & SPC analysis

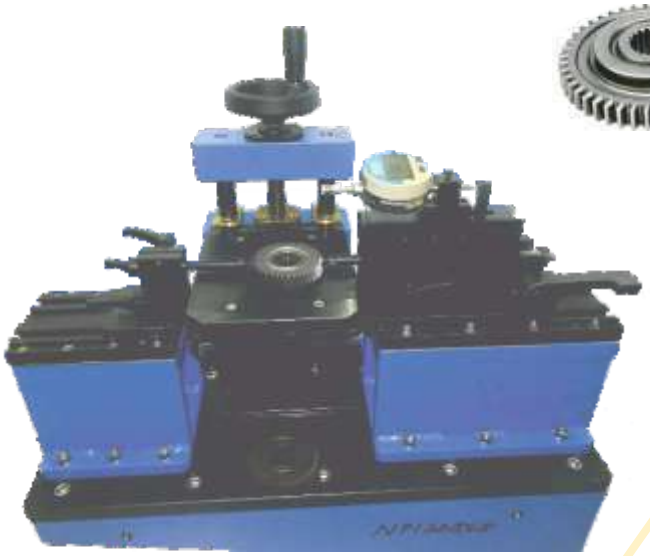


## GEARS







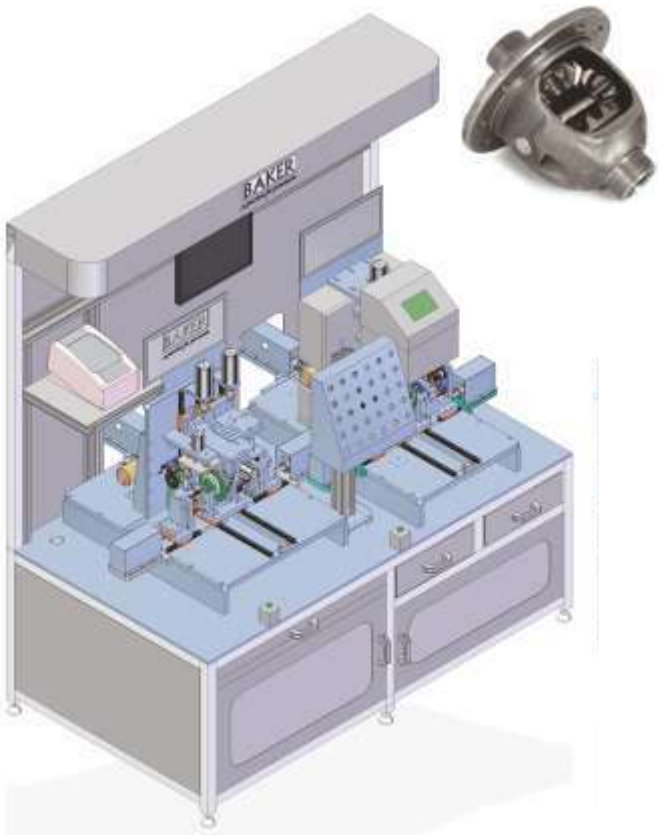
### PARAMETERS

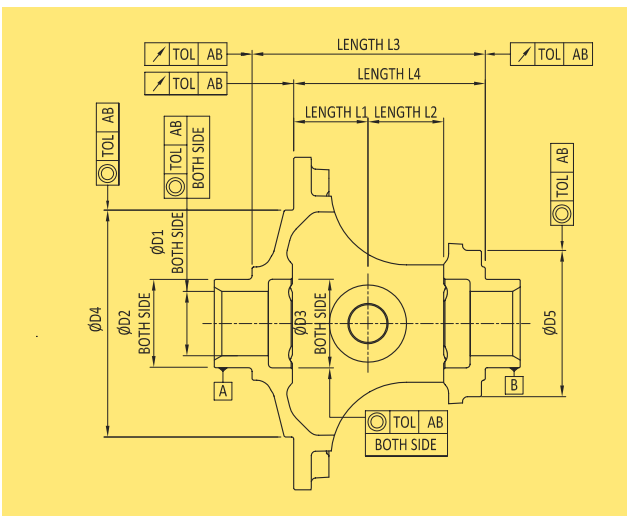
- Over ball diameters
- Bore dia. at 2 levels
- Height 'H'
- Parallelism
- Squareness
- Cone angle 'θ'

### FEATURES

- Gauging system for over ball diameter measurement
- Easy loading & unloading
- Data acquisition and SPC analysis
- Odd and even numbers of teeth
- For spur and helical gears

## CASE DIFFERENTIAL




### PARAMETERS

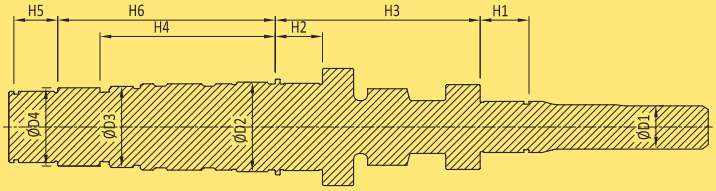
- Inner diameters
- Outer diameters
- Lengths
- Runouts
- Concentricity
- Symmetricity

### FEATURES

- Automated gauging solution
- Dynamic measurement
- User friendly
- Data acquisition & SPC analysis
- Poka Yoke with marking

# Shafts

## STANDARD SOLUTION







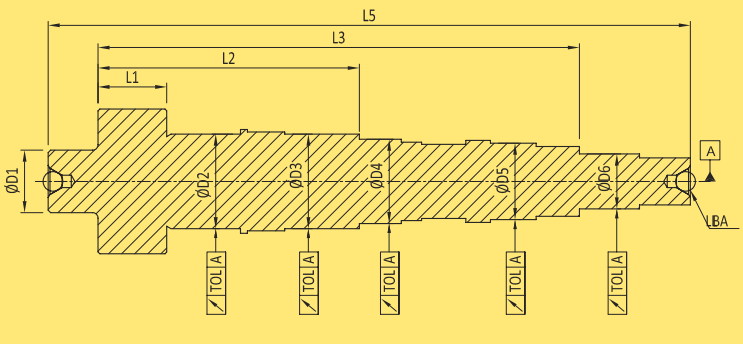

### PARAMETERS

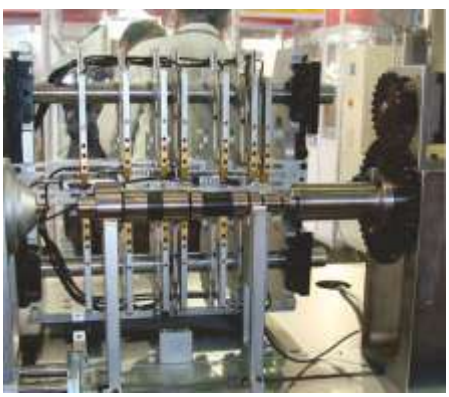
- Multiple Diameters
- Multiple Lengths
- Runouts
- Ovality
- Taper

### FEATURES

- Swinging arms for easy loading & unloading
- Provision to hold components between centers
- Vertical fixture which occupies less space
- Motorised component rotation

## ABBE PRINCIPLE SOLUTION

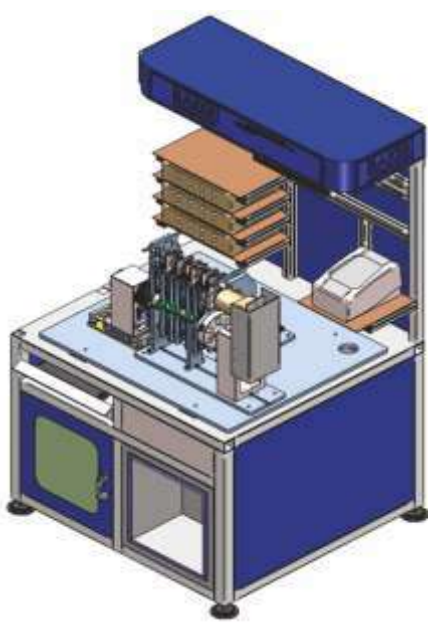




### PARAMETERS

- All Outer Diameter ØD1 to ØD6
- All lengths L1 to L5
- Run Out of ODs w.r.t. both side ball centers



### FEATURES

- Automated gauging solution
- Multiple outer diameters & lengths in a single setup
- Measured in ABBE Principle by 'True-Line' measuring element (in Technical Collaboration with REORG Germany)
- Solution for Input shaft, output shaft & various types of shafts
- Dynamic parameter measurement can be easily done
- Small variation in shaft can be accommodated in a single fixture
- Diameters only 2 mm apart can be measured with special bridge
- Highly robust & durable technology
- Probe protection inbuilt
- Modular design

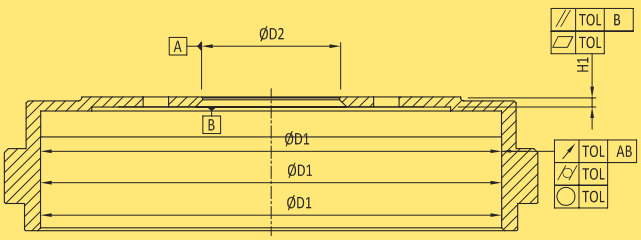
# BRAKE DRUM AND BRAKE DISC

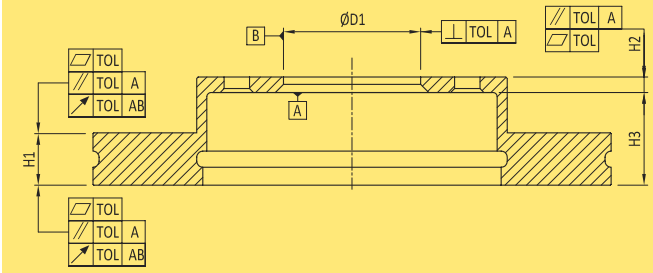


BRAKE DRUM



BRAKE DISC




## PARAMETERS

- Brake ID at 3 levels
- Pilot Diameter
- Face thickness
- Roundness at 3 levels
- Runout
- Face flatness
- Calculated Cylindricity
- Fourier analysis

## PARAMETERS

- Brake Plate Thickness
- Wheel Face Thickness
- Offset
- Pilot Internal Diameter
- Outer/Inner Brake Surface Straightness
- Outer/Inner Brake Surface Runout
- Outer/Inner Brake Surface Parallelism
- Wheel Face Parallelism
- Wheel Face Flatness
- Fourier analysis




## FEATURES

- Automated measuring cycle
- Minimisation of human errors
- Dynamic measurement by component rotation
- Precision grade slide used
- Auto seat check sensor to ensure proper seating of component
- Rigid and robust construction for harsh shop floor environment
- Fourier calculation for analysis of heat dissipation while applying brake
- Computerised SPC analysis

# Shim & Spacer Selection

## WHY ?

Any assembly which requires free movement & noise reduction demands a proper clearance amongst its parts. Hence shims and spacers come into the picture to achieve this requirement

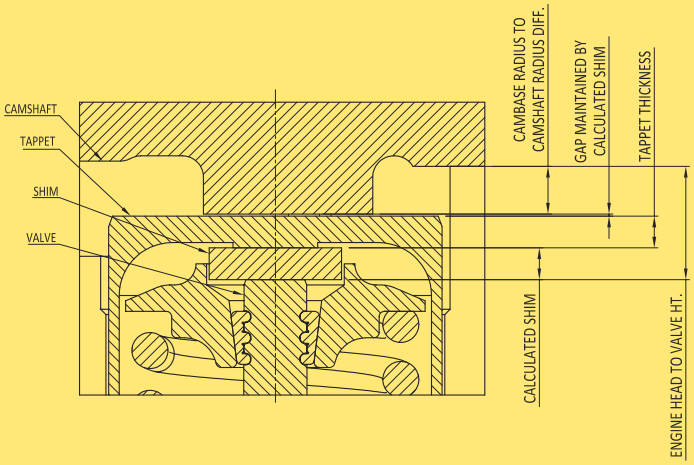


## HOW ?

To maintain the proper clearance, various parts are individually measured for particular dimension & based on clearance formula, the Shim or Spacer size is derived. After defining the Shim or Spacer size, the proper Shim or Spacer is selected. An independent station verifies whether the selected shim dimension matches the calculated dimension. After selection of correct Shim or Spacer, it is put in that particular assembly & the performance of the assembly is checked.

## CYLINDER HEAD TAPPET SHIM SELECTION




## PARAMETERS

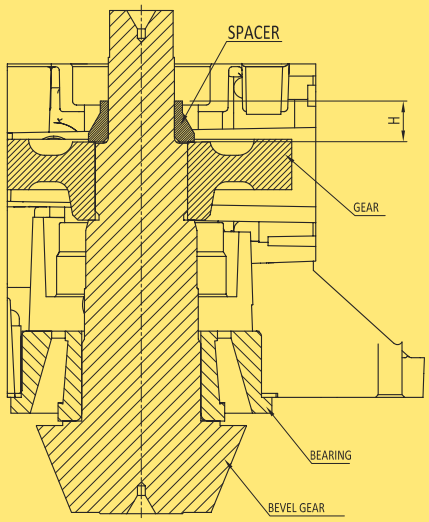
- Cam base radius to journal radius distance
- Tappet thickness
- Engine head to valve height distance
- Calculated shim thickness based on measurements
- Shim verification

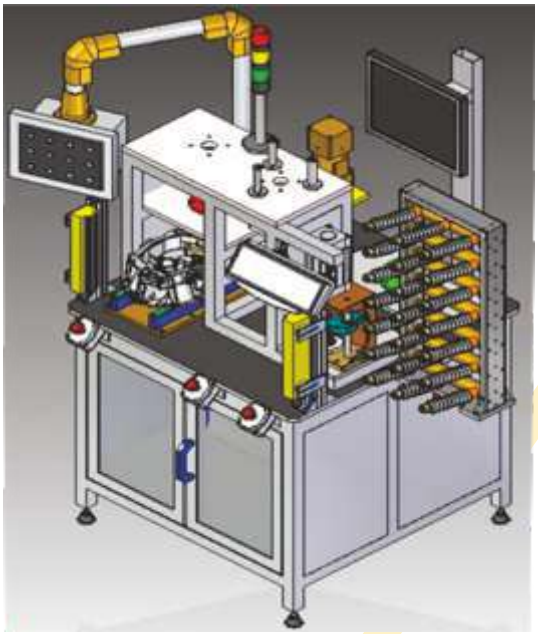
## FEATURES

- Integration with customer's auto palleted conveyor
- Fully integrated in-line gauging system
- Ergonomic design for operator efficiency and safety
- Shim calculation, clearance verification is independent & integrated in software
- Poka Yoke to ensure correct shim is picked up and assembled

# Shim & Spacer Selection

## GEAR BOX



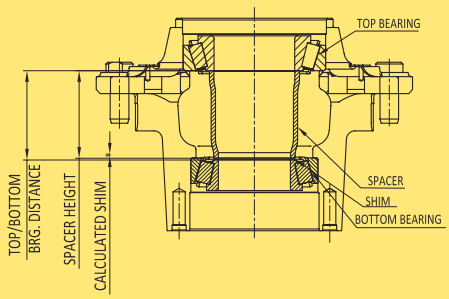
### PARAMETERS

- Calculated spacer height 'H'

### FEATURES

- Dynamic gauging
- Actual assembly condition simulated
- Pick to light facility for shim selection
- Optimum cycle time
- Measurement done under pre loaded condition of bearing

## WHEEL HUB









### PARAMETERS

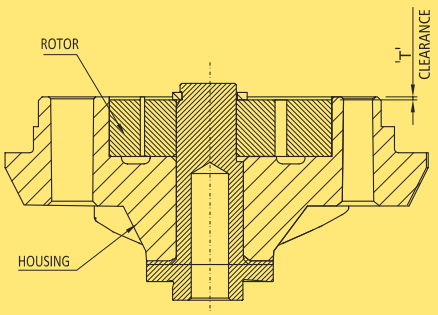
- Hub bearing inner face distance
- Spacer height
- Calculated shim thickness based on above measurement

### FEATURES

- Dynamic gauging
- Actual assembly condition simulated
- Common system for front and rear hub by tool changing facility
- Pick to light facility for shim selection
- Optimum cycle time
- Measurement done under pre loaded condition of bearing

# Fuel, Oil & Water Pump

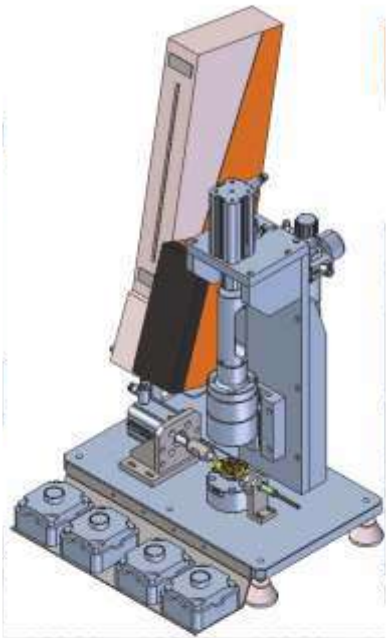
## BODY & ROTOR CLEARANCE









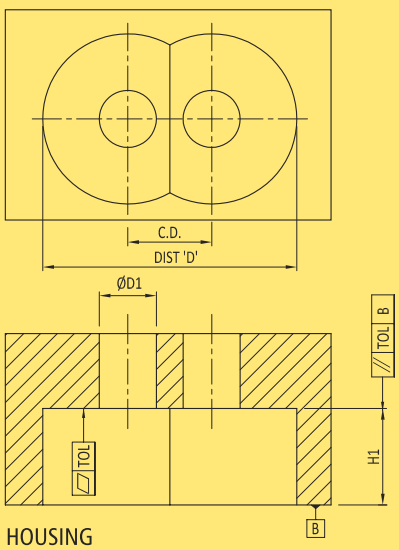
### PARAMETERS

- Clearance 'T'

### FEATURES

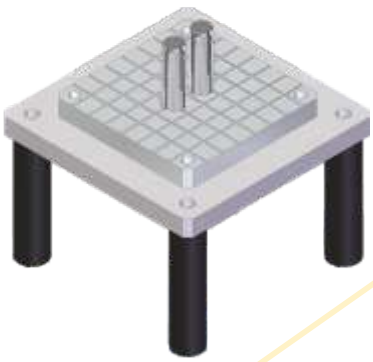
- Poka Yoke component location arrangement
- Optimum cycle time
- Automatic Punch Marking for OK components

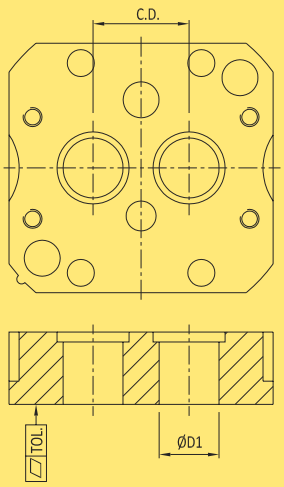
## HOUSING AND COVER




HOUSING



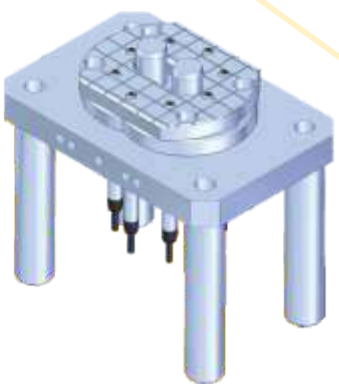





COVER

### PARAMETERS

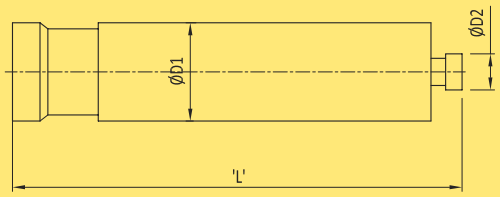
- Distance 'D'
- Height 'H1'
- Center distance 'C.D.'
- Flatness
- Parallelism
- Diameter 'D1'

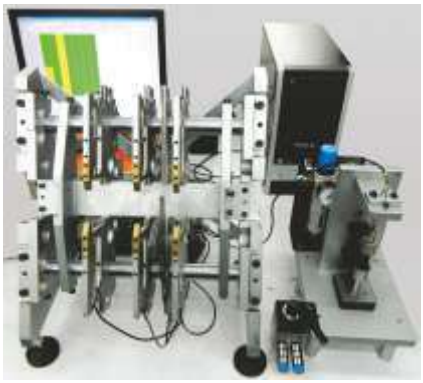


### FEATURES

- Contactless measurement.
- Offered with analogue or electronic read out or computerised space solution with SPC analysis
- Easy to use
- Compact & Robust
- Multiple parameters at a time

## PUNCH





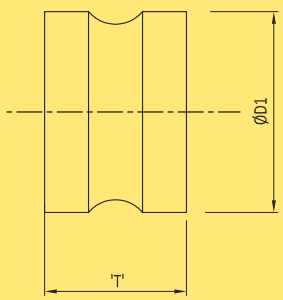
### PARAMETERS

- Diameter D1
- Diameter D2
- Length L

### FEATURES

- Baker provides the gauging solution for punch and dies
- Measured in ABBE Principle by 'TrueLine' Measuring
- Element (in Technical Collaboration with REORG Germany)

## DIE





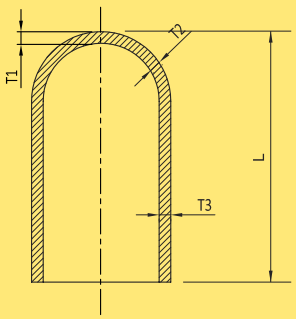

### PARAMETERS

- Thickness 'T'
- Diameter Ø D1

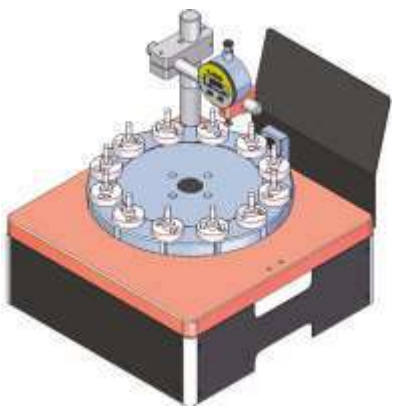
### FEATURES

- Direct probe measurement
- Probe adjustment facility

## CAPSULE BODY & CAP





### PARAMETERS

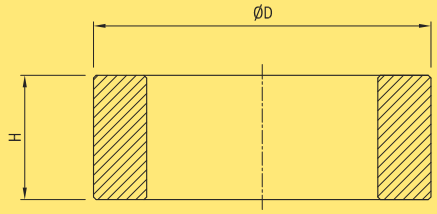
- Dome thickness 'T1'
- Shoulder thickness 'T2'
- Wall thickness 'T3'
- Cut Length 'L'

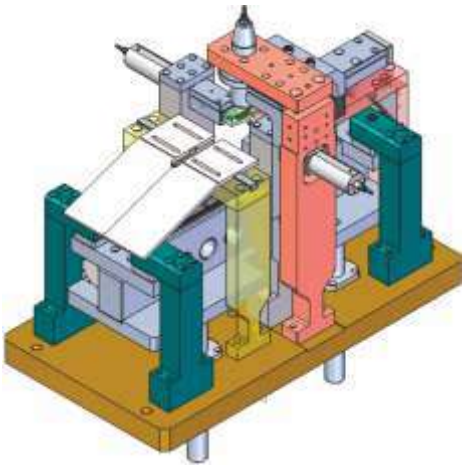
### FEATURES

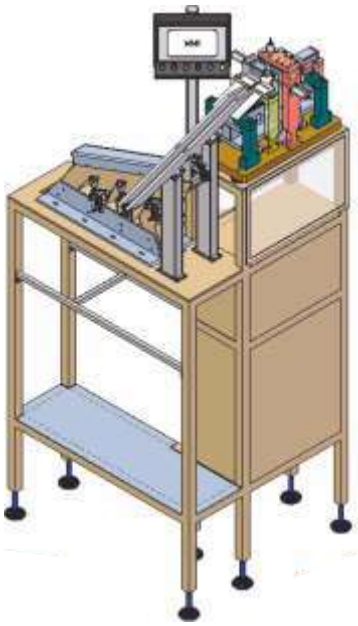
- Rotary gauging bed.
- Captures highest measuring point.
- Multiple component loading facility
- Optimum measuring cycle time

# High Speed Dimensional Grading & Sorting

## BEARING INNER/OUTER RACE





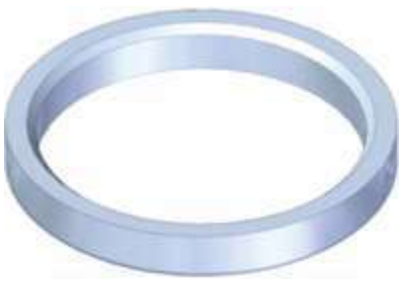
### PARAMETERS

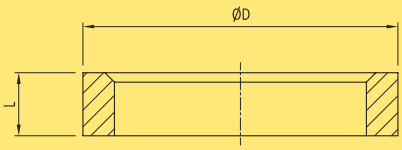
- Outer Diameter ØD
- Height 'H'

### FEATURES

- Auto loading through bowl feeder
- Auto grading on Outer Diameter and sorting
- Optimum cycle time
- Solution for roller grading and sorting is also available
- Fast & reliable measurement

## VALVE SEAT









### PARAMETERS

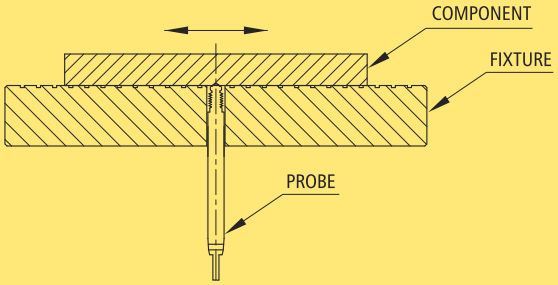
- Outer Diameter
- Length

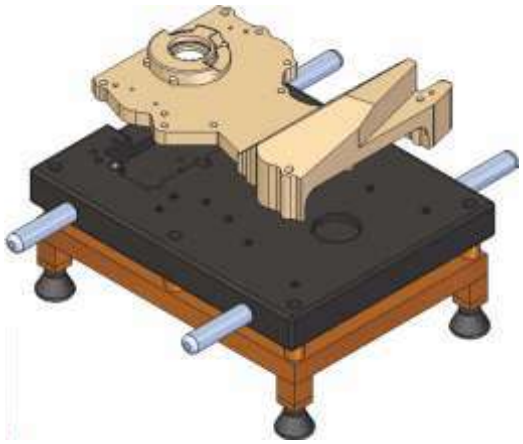
### FEATURES

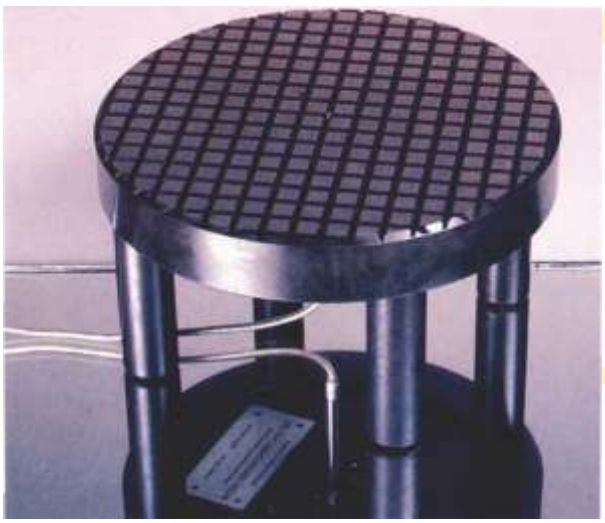
- Auto loading through bowl feeder
- Auto sorting
- Optimum Cycle time
- Fast & reliable measurement

## FLATNESS MEASUREMENT





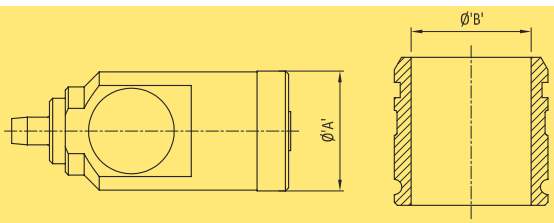
### PARAMETERS

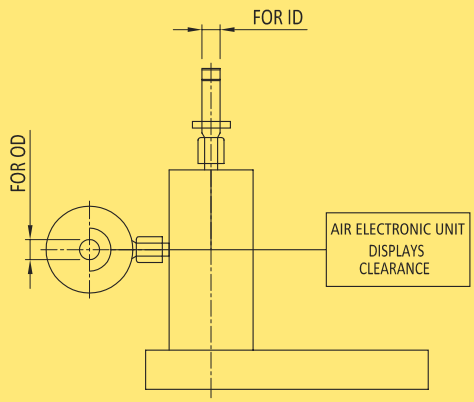
- Flatness of the surface

### FEATURES

To check flatness of a surface of small parts like valve plates used in refrigeration and industrial hydraulics. This fixture is supplied in three table sizes: Ø150, Ø200 and Ø250 mm. The top surface of the table is ground to a high degree of flatness. Depending on the specific requirement, surface of the table can be lined with carbide strips to render more wear resistance. At the center of the table, an electronic probe is fitted with tip of the probe protruding outside. When a component whose flatness is to be measured is slowly moved over the probe contact, variation in the readings is recorded, which is flatness.

## MATCH GAUGING






### PARAMETERS

- Outer diameter
- Internal diameter
- Clearance / interference between internal diameter & external diameter

### FEATURES

- Useful for selective assembly
- Useful for parts with high accuracy and small tolerance of clearance

## TAPER MEASUREMENT



ISO / BT TAPER

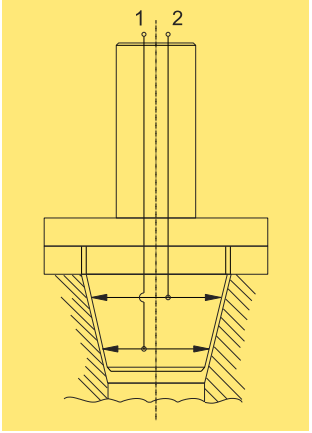


ER TAPER

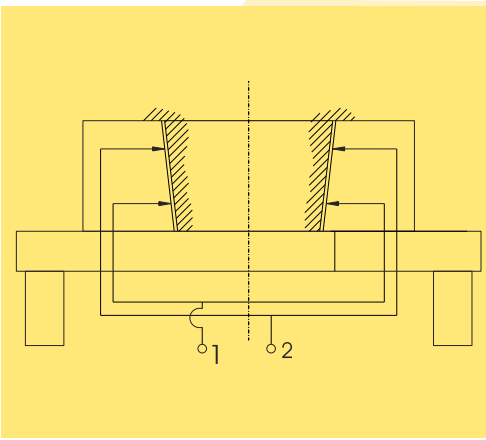


HSK TAPER






Internal taper measurement




External taper measurement



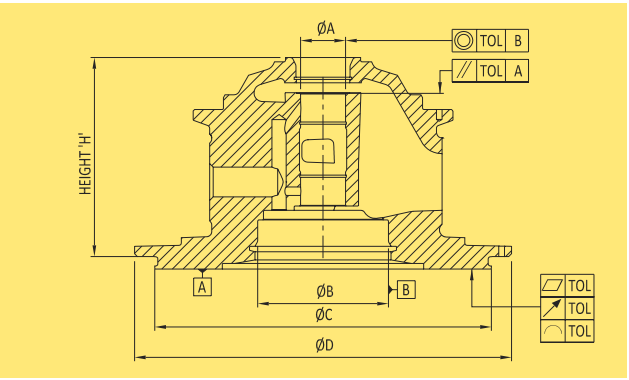
TAPER ROLLER BEARING

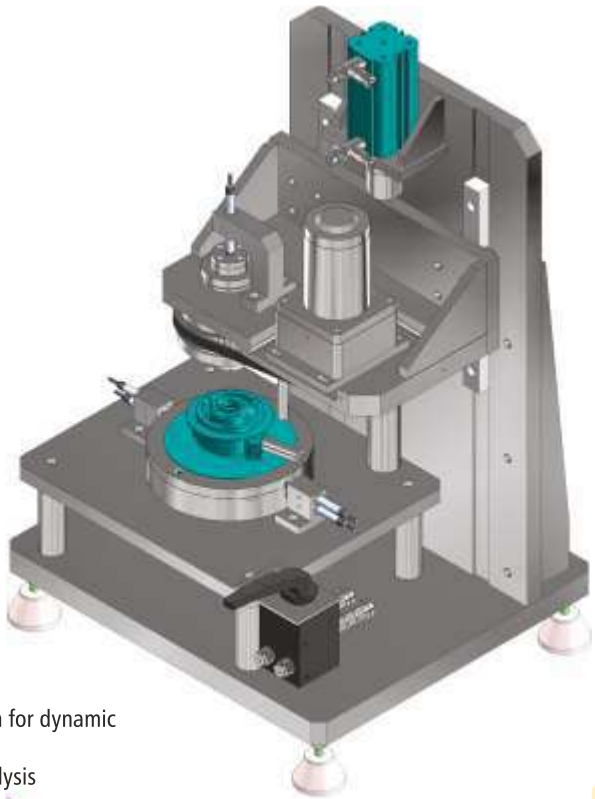


GEARS

## TURBO CHARGER

TURBINE HOUSING



### PARAMETERS

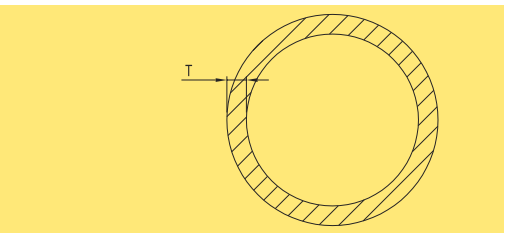
- Height 'H'
- Outer diameter
- Internal diameter
- Internal diameter at two levels
- Flatness of resting face
- Face runout
- Concentricity
- Parallelism
- Profile

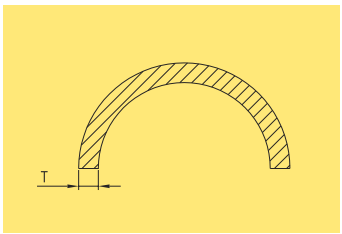
### FEATURES

- All parameters in one go
- Easy to operate
- Optimum cycle time
- Motorised component rotation for dynamic measurement
- Data acquisition with SPC analysis

## SHELL BEARING

PNEUMATIC MEASUREMENT




### PARAMETERS

- Thickness 'T'




WITHOUT FRONT SUPPORT




WITH FRONT SUPPORT

### FEATURES

- Contactless measurement
- Range:
  Internal diameter Ø 15 - 36 mm & Ø 36 - 160 mm
- Adjustable arms provided to support & guide the shell while measuring
- Offered with analogue or electronic read out