CHASE TECHNOLOGY

Cutting Edge Systems...

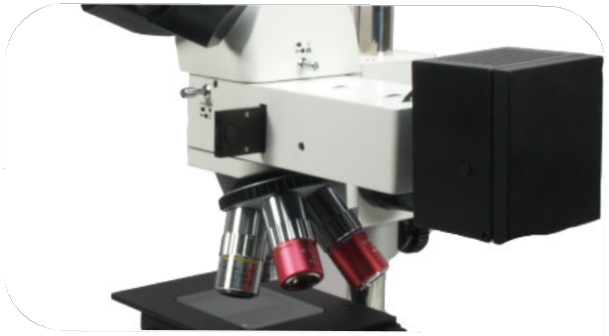
Diamond Tool Measuring Systems

Product Information

Over many years Chase has been developing and manufacturing ultra precision tooling for many Hi-Tech industries. Our tools needed more and more specialised measuring technology to aid in our production to ensure repeatability, consistency and high quality. Having now further developed our measuring systems we are now proud to present our latest systems.

DTMS

Diamond Tool Measuring Systems



DTMS-1 AutoCal

Utilising a Meiji[3] Microscope with precision optics the standard system can measure controlled waviness tools with a Radii from R0.750mm down to R0.001mm. Waviness down to 50nM.

Automated calibration is now standard
High Specification PC running Windows[1] 10 64 bit.
5MP PoE PointGrey[2] video camera.
PC Monitor Full HD 1920 x 1080p
A range of option software modules are available.

DTMS-2 AutoCal

Utilizing a custom developed microscope with precision optics and the choice of long working distance objectives, this system will measure larger Radii from R10mm down to R0.200mm

Automated calibration is now standard
High Specification PC running Windows[1] 10 64 bit.
5MP PoE PointGrey[2] video camera.
PC Monitor Full HD 1920 x 1080p
A range of option software modules are available.

OPTIONAL SOFTWARE MODULES

FACET & POINT

GROOVING TOOL

PARABOLIC ELLIPTICAL

FREE FORM

DATA EXPORT

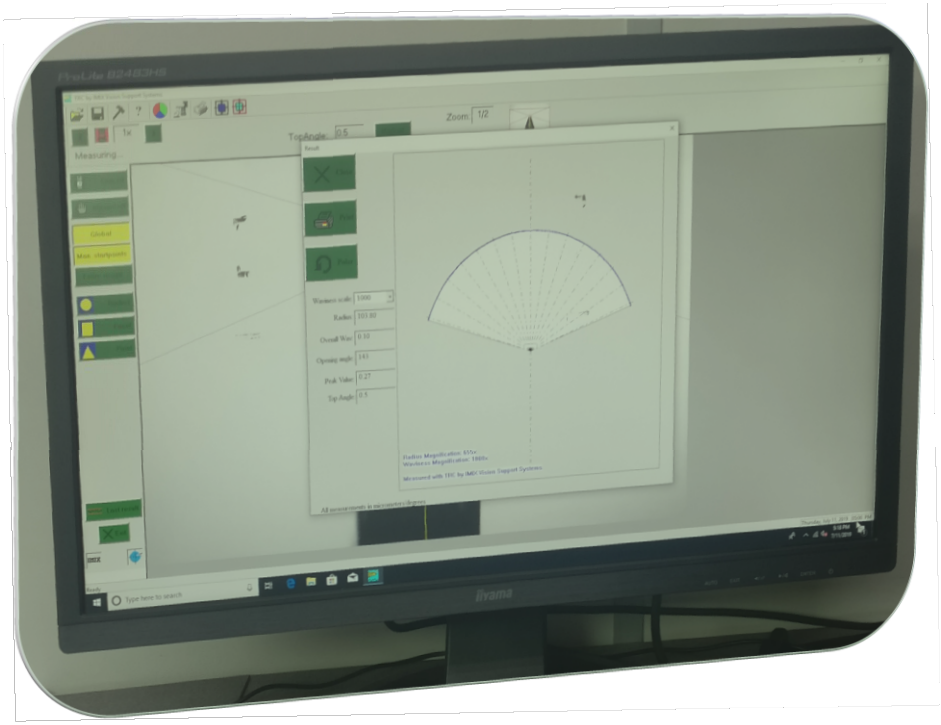
DTMS-1 AutoCal

System Description

Meiji MT8100 Microscope

Meiji Techno's upright incident and transmitted light brightfield metallurgical microscope line is a cost-effective microscope. The MT8100 employs all new and improved Plan Episcopic optical system. Meiji Techno's ICOS™ (Infinity Corrected Optical System) makes the observation and evaluation of tooling fast and easy while delivering an excellent cost-to-performance ratio.

Trinocular metallurgical microscope for transmitted and reflective light Transmitted light is used for all measurements. Reflected light used for visual surface inspections.1x 'C' mount & phototube, SWH10X eyepieces FN22, Plan Epi 5X, 10X, 20X,50X and 100X objectives, ceramic coated flat-top X-Y stage, 6V 30W halogen illumination.



PC System

The computer has a slim desktop format. Utilising a Intel celeron or Pentium dual core processor. 8 GB memory with a SSD 120GB drive, Internal optical drive.USB cabled Keyboard and mouse.

Running Windows 10 Pro 64bit operating system.

PC Monitor

Full HD 1920 x 1080p resolution.
27 inch LED Screen
Built in speakers

Microscope Video Camera

The camera is as important in quality as the optics are in the microscope.

Utilising a PointGrey monochrome camera GigE

5 MP 25448 x 2048 pixel
Cmos Sensor
24 fps
Global shutter

A colour camera is an option if required.

DTMS-2 AutoCal

System Description

Chase Custom Microscope

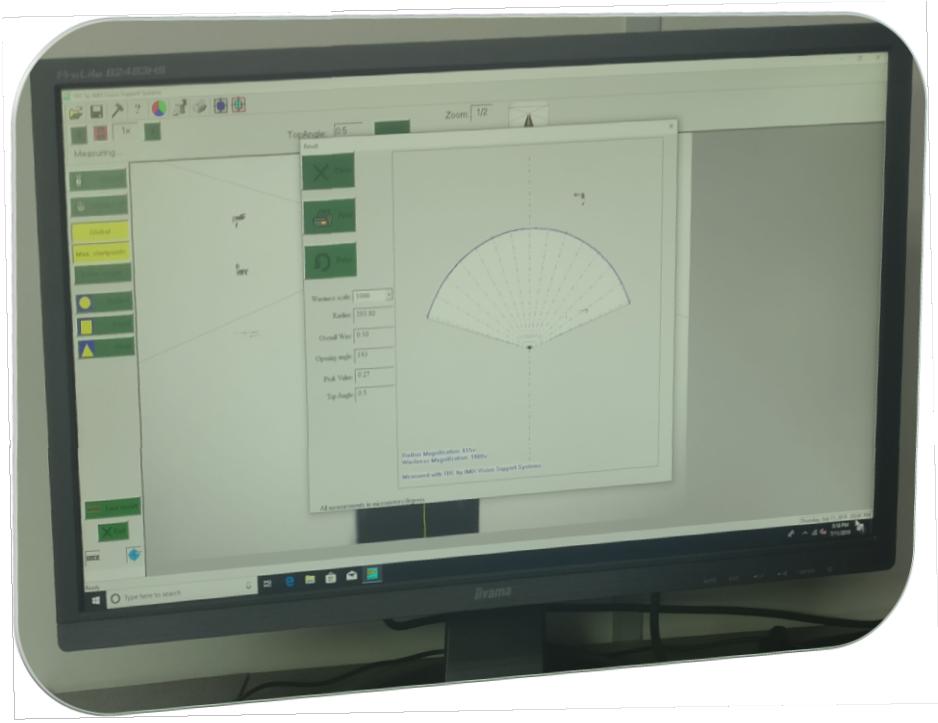
For measuring tooling with larger Radii and requiring larger working distances.

Designed by us, this is a specialist microscope responding to the need for very long working distance objectives that can examine more complex shape diamond geometries. This is an extremely flexible instrument with both incident and transmitted LED lighting that can be used together or independently. The double length support pole allows tooling with significant depth to be examined. In addition the trinocular head provides a ‘right way round’ that allows a degree of manipulation using the lower power objectives. It can be supplied with standard bright field/dark field objectives with standard working distances or with Mitutoyo style extreme long working distance bright field objectives.

LONG WORKING DISTANCE OBJECTIVES

OBJECTIVE	WORKING DISTANCE
x5	45mm
x10	34mm
x20	30.8mm
x50	20.5mm
x100	13mm

The stage area has full mechanical adjustment with drop down coaxial controls and a glass centre plate for the transmitted lighting system. The incident light path has polariser/analyser filters with the polariser able to be rotated through 360 degrees.



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SYSTEM SOFTWARE

RADIUS CONTROLLED WAVINESS

The measuring system has the ability to measure Radius tools with a range of 100mm to 1micron, and a Controlled Waviness to 0.05 microns, this is dependant on the optical configuration of the system.

The radius measurement is defined as follows:

A circle is fitted through the contour points in the shadow projection image of the tool.

Outliers (large deviations of the cutting edge, pollution) are not taken into account to compute the best fit circle.
The contour points are extracted with sub-pixel accuracy from the image using advanced image processing algorithms.

After the best fit circle is found, the distance (error) from each contour point to the best fit circle is computed.

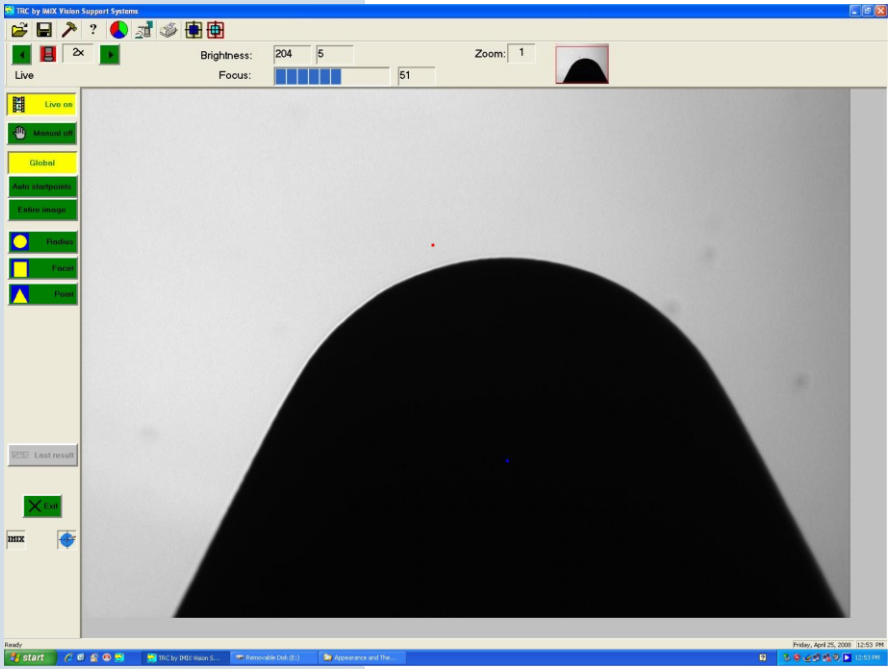
After filtering these errors, the waviness (the root mean square of the errors) and the peak value are calculated.

The peak value is the largest deviation of a filtered contour point with respect to the best fit circle.

The software can automatically detect the start/end points of the cutting edge.

Alternatively, these points can be selected manually.

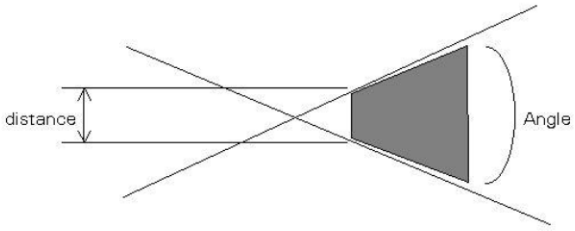
Additional to radius measurement, the top angle can be automatically measured simultaneously.



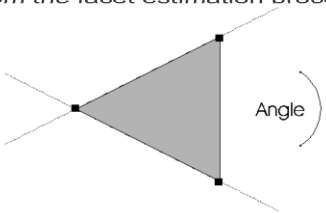
OPTIONAL SOFTWARE MODULES

FACET & POINT

For facet measurement the tool is illuminated from the back.
The software extracts the contour of the tool.
First the points are computed where the slanting slopes start/end. Then the starting points of the straight side of the facet are determined.
The contour between these four points is selected.
With an iterative linear least squares algorithm, the best fit for the lines is estimated. Large local distortions are excluded from the facet estimation process.

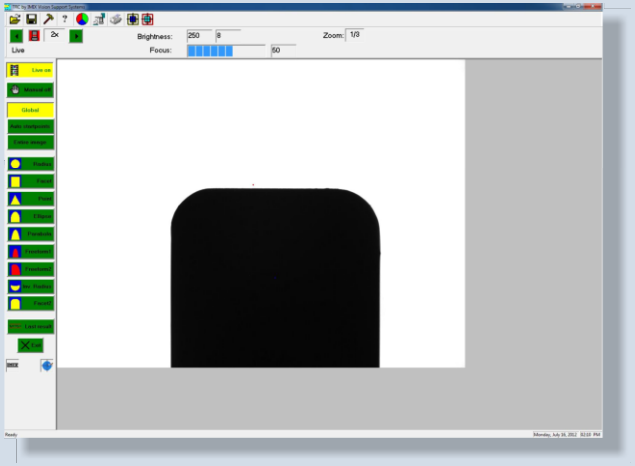


For point measurement the tool is also illuminated from the back.
The software extracts the contour of the tool.
First the points are computed along the straight sides.
The lines found are extended and cross each other thus forming the top angle.
The contour between these lines is selected. With an iterative linear least squares algorithm, the best fit for the lines is estimated. Large local distortions are excluded from the facet estimation process.



GROOVING TOOL

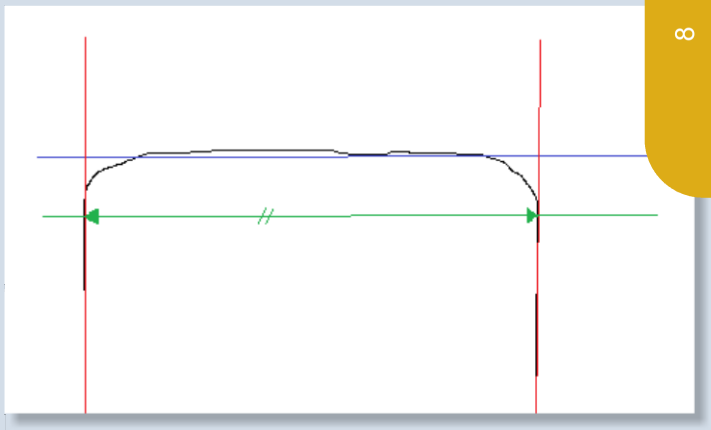
Grooving form measurement is an extension of the facet measurement for grooving tools.
On the picture on the next, the facet tool outline is shown with a black contour.



The new proposed measurement of the facet width is defined as follows

The blue line represents the best fitted straight line of the facet cutting edge,as is in the current measurement.

The red lines represent the best fitted straight lines of both sides.



The width is defined as the maximum distance of any line between the red lines, parallel to the blue line. This line is shown in the picture as the green line.

The search area is 300 pixel along the flank starting from the top, downwards.
Besides the maximum distance, also the angle of both slopes (red lines) with a virtual line perpendicular to the green line is measured.

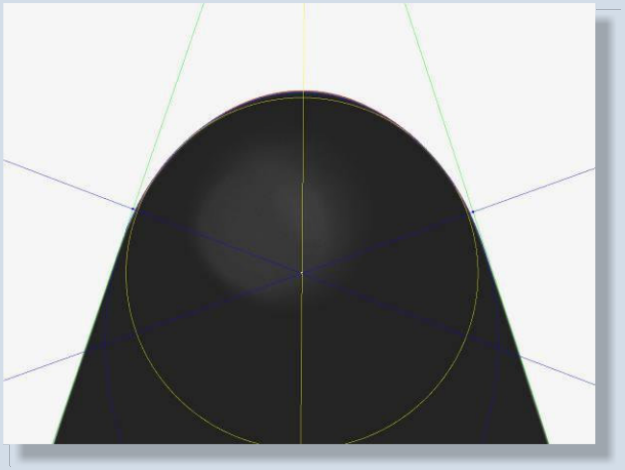
OPTIONAL SOFTWARE MODULES

PARABOLIC AND ELLIPTICAL

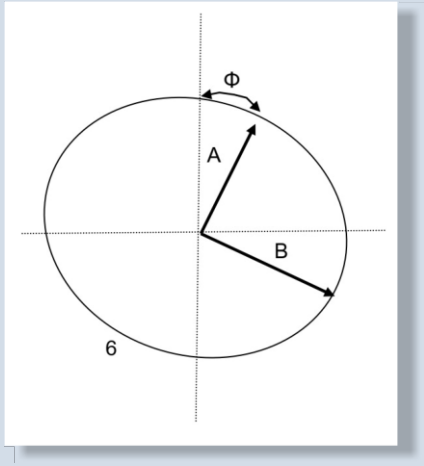
Parabolic and elliptical tools are defined by: A x2 + B y2 + xy = R2.

Depending on the sign of A and B, the tool is either elliptical, parabolic or hyperbolic.

The results of the measurement are the values A, B and R (as well as the waviness, included angle and top angle).



A: value (smallest radius)
B: value (largest radius)
Ratio A/B
Φ: rotation ellipse in image compared to centre line



MEASUREMENT DATA EXPORT

For every completed measurement performed by the system a CSV file can be generated which would export the following data:

Radius per 0.25 Degree

- Radius
- Opening Angle
- Peak Value
- Top Angle
- Waviness

This data can be used for generating your own graphs or graphics.

OPTIONAL SOFTWARE MODULES

FREE FORM

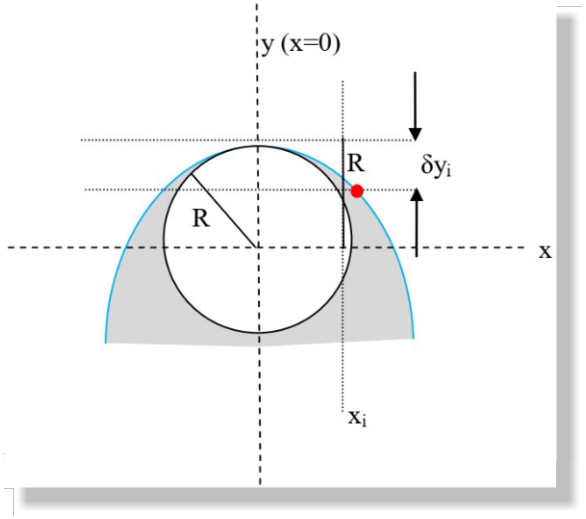
This module is for Free Form and includes the measurement of symmetrical aspheric shapes as well as asymmetrical a-spheric shapes.

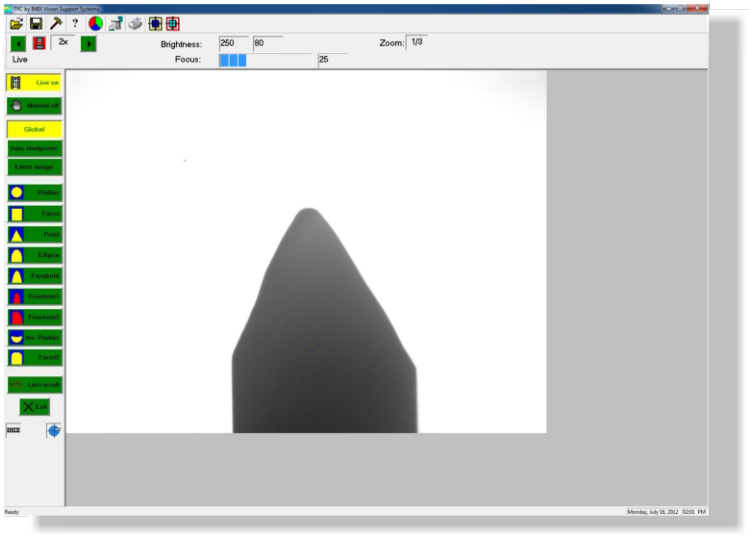
In this case, the match is not against an explicit know mathematical curve, but to a set of data points that should be fitted accurately.
For each data-point, the perpendicular distance of the data-point to the contour is determined as the deviation.

The data points have to be supplied to the system as (x,y) numbers in a normal text file.

Because these shapes are orientation sensitive, some constraints have to be put on the positioning of the tool (the apex has to be the highest point in the image).

Ideally the tool should be “jigged” so that placement of the tool is repeatable and accurate on every measurement.





[1] Microsoft
[2] Point Grey
[3] Meiji

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