

Applications

AxioVision Calotte Grinding Measurement

Layer thickness measurement

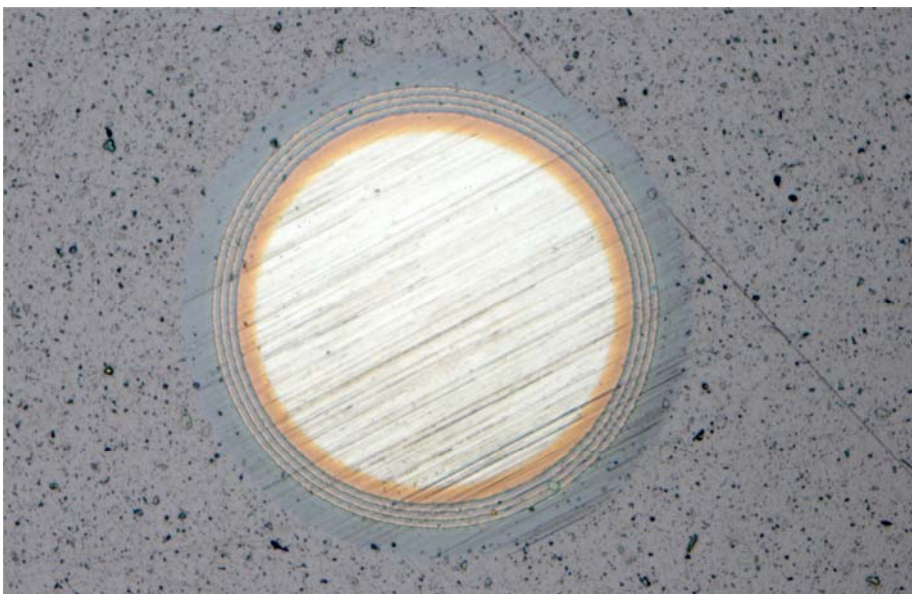
Calotte Grinding Technique

In order to increase durability and protect against wear and tear, tools and machine components are coated with special materials. Various coating processes are used to apply one or more layers, with a thickness of one to several micrometers, to the base material. At the end of the coating process, quality is controlled by measuring the thickness of layers as described in the DIN V ENV 1071 standard. To prepare the samples, a steel ball with a defined diameter grinds a calotte-shaped hollow into the sample. An alcohol-based diamond suspension supports the grinding process by moistening the ball.

The depth to which the ball penetrates into the applied layer and the base material depends on the diameter of the ball.

In the case of a single layer coating, the grinding process results in a pattern of two concentric circles (for planar samples) or ellipses (for non-planar samples), which can be allocated to the surface of the sample and the layer/substrate interface.

The samples are then examined under a microscope, generally using the 10x objective. The thickness of the applied layer can be determined from the differences between the circle / ellipse diameters.



- Flexible measurement of coated samples and large components
- Automatic calculation of the layer thickness of thin layers
- Easy generation of reports



We make it visible.

Calotte Grinding Measurement

Enhanced AxioVision Functionality

The Calotte Grinding Measurement module is integrated directly into AxioVision, thereby enhancing its functionality to include an application for determining the thickness of layers in accordance with the calotte grinding technique. User prompts, which are supported by a wizard, guide the user through the measurement procedure step-by-step: from image acquisition, the drawing in of measurement circles and the automatic calculation of the layer thickness through to the presentation of the data in the form of images and reports.

Sample Identification and Image Acquisition

The Calotte Grinding Measurement module wizard offers a flexible range of options for entering sample data to ensure that your sample is clearly labeled. You can choose the desired layer from a list of specified layer types. This list can be expanded by entering as many additional layer types as you wish. The basis for a correct measurement is a scaling, generated using a stage micrometer. This can either be generated directly or selected from a list of scalings that are already available. In addition, you also have the option of acquiring images of the calotte grinding samples directly using a camera or of loading images that have already been acquired from a storage medium.

Measurement and evaluation

To allow you to mark the concentric circles that are typical of a calotte grinding sample, a flexible range of tools are provided.

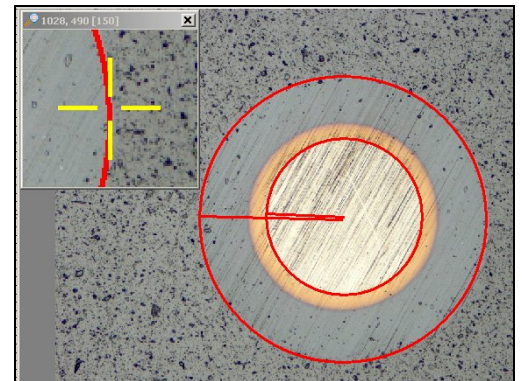
Since samples usually have an inhomogeneous surface finish, due to traces left by the grinding process and other artifacts, interactive measurement proves to be a particular advantage. Besides the option of dragging out a circle, starting from the outside edge, it is also possible to reconstruct a circle by clicking on any number of points around its edge. The precise positioning of the circle is supported by a freely movable magnifier. Not only can you measure circular indentations, but also the elliptical indentations that occur in the case of cylindrical components.

For multi-layer samples, which are characterized by several concentric circles, both the individual layer thicknesses and total layer thickness are determined from the drawn in circles.

The sample data, together with the measurement results, are overlaid onto the calotte grinding image in the form of colored annotations.

The color and font size of these annotations can be adjusted individually.

All the data displayed is saved both in the image and in a file. A report containing the image, measurement results and sample information can be generated automatically. The report is displayed as a preview and can be printed out as a test report.



AxioVision Calotte Grinding Measurement

Evaluation

Batch Number: 05-03-11-09-13
Coating Type: AlTiN-G
Date: 16.03.2005
Diameter Ball [mm]: 30
Scaling [µm/Pixel]: 0.120x.awc

Depth (µm): 0.000000
Color: 0.000000
Date: 16.03.2005
Diameter Circle (µm): 390.12

Thickness (µm): 2.78

Results (Single Layer):
Diameter 1 [µm]: 621.08
Diameter 2 [µm]: 390.12
Result 1 [µm]: 2.78
Comment:

System Configuration

- Axiotech vario reflected light microscope with 10x, 20x objectives
- AxioCam MRc5 digital camera
- Image Analysis Mini Workstation with 512 MB DDR-RAM, FireWire IEEE 1394 / USB 2.0 PCI card
- AxioVision software
- AxioVision module: Calotte Grinding Measurement
- Alternative system configuration possible