3D Roughness Reconstruction

With the 3D Roughness Reconstruction application, the Phenom is able to generate three-dimensional images and sub-micrometer roughness measurements.

This fully automated application for the Phenom scanning electron microscope will help to communicate imaging results and will extract and visualize data normally hidden within a sample.

3D

3D imaging helps to interpret sample characteristics and makes images understandable for a larger group of users. It is often difficult, for example, to identify dents, scratches and burrs from flat 2D images.
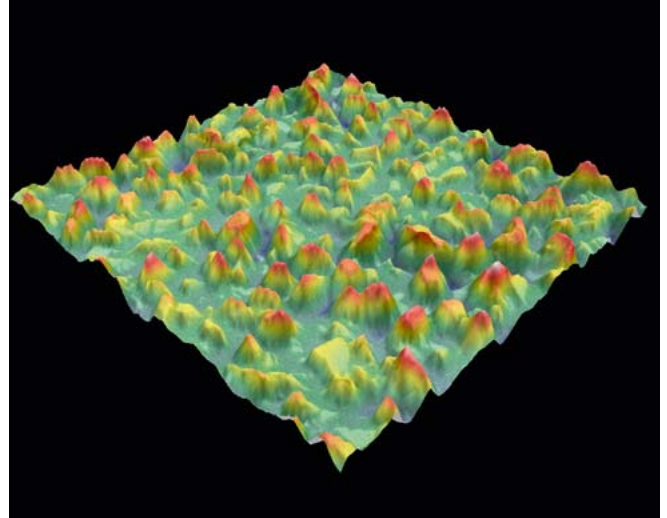
Roughness

Measuring the average roughness (Ra) and the roughness height (Rz) is critical for controlling and understanding production processes. By using SEM imaging for data collection, a much better resolution can be achieved than by using traditional (indirect) methods.

The 3D Roughness Reconstruction application is a desirable addition to any Phenom when one or more of the following are required:
• Quality control in machining
• Texture analysis
• Evidence characterization
• Defect & failure analysis
• Wear analysis - tribology

The 3D Roughness Reconstruction application is available in the Phenom Pro Suite that contains multiple Phenom-specific applications.

Figure 1: Roughness reconstruction and colored height map of abrasive material

Benefits of the 3D Roughness Reconstruction application:

• Outperforms optical and mechanical measurement systems:
  - High resolution
  - Insensitive for reflective samples
  - Direct method
  - Non-destructive
• Intuitive fully automated user interface
• Based on 'shape from shading' technology, no stage tilt required
• Integrated solution
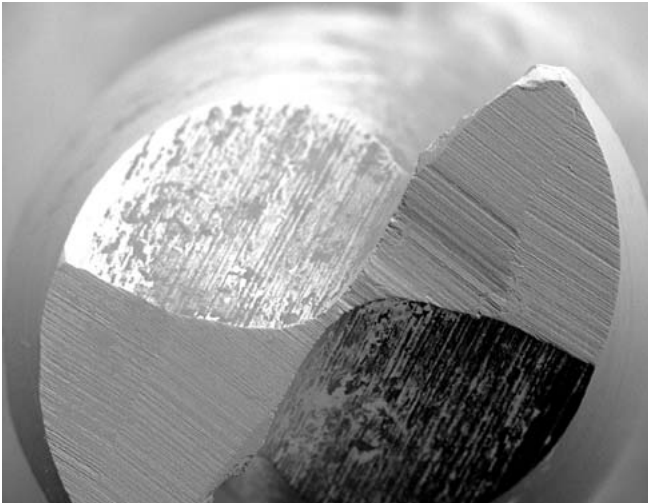• Fast reconstruction
• Retrofit onto any Phenom

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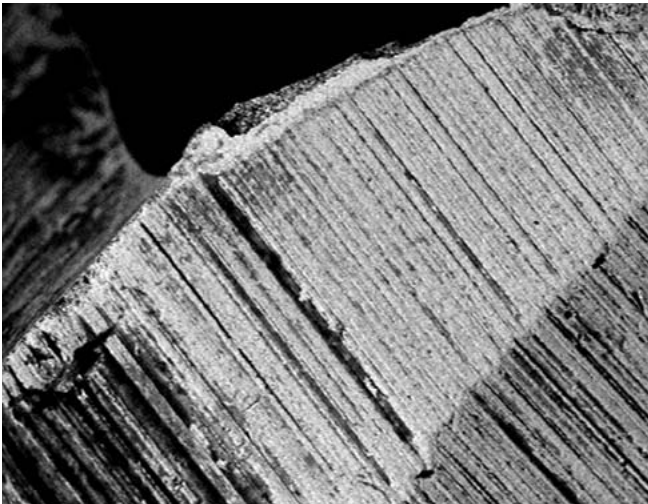PHENOMWORLD

Figure 2: Drill bit, top view at 600x magnification

Figure 3: Drill bit, top view at 2900x magnification

Specifications:

- Automated 3D image creation
  - Full 3D
  - 2D or 3D with colored height indication
  - Filtered 3D for surface roughness
- Automated roughness measurement
  - Ra (average roughness) and Rz (roughness height)
  - User-set waviness filtering
  - Up to 5 line measurements
- Height profile
- Position identification
- CSV – automatically generated statistical data
- FOV 2 mm to 10 µm
- 3D reconstruction in just a few seconds
- 512x512 pixel resolution
- Output:
  - Line profiles
  - CSV files
  - 2D/3D view images

Part of the Phenom Pro Suite
- Network storage enabled
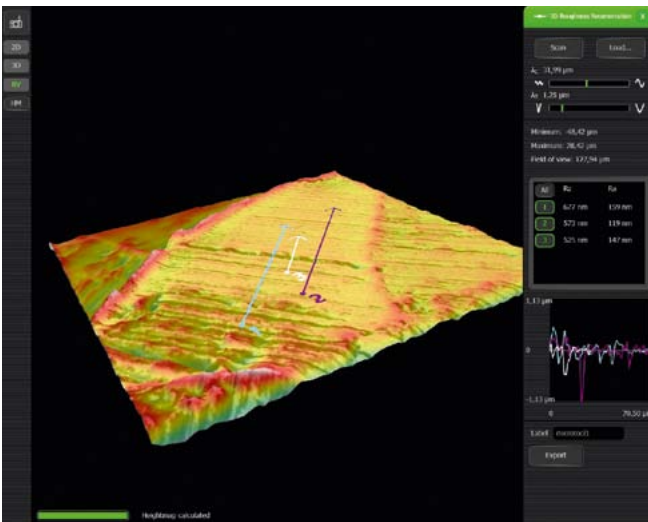- Phenom integrated system

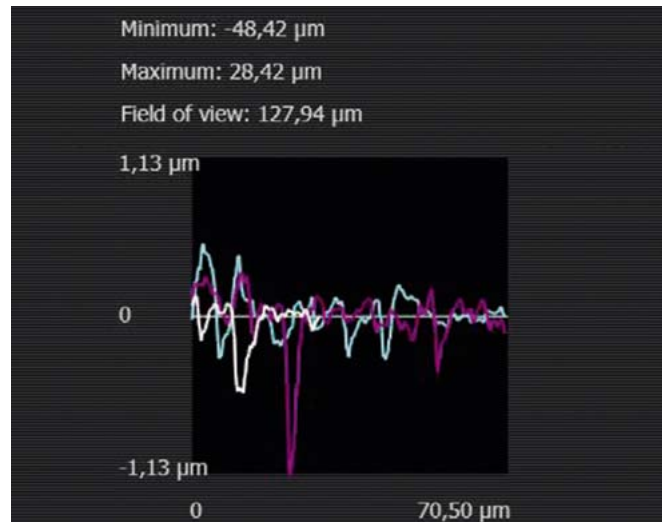**Figure 4: The 3D Roughness Reconstruction view contains three profile measurement lines. The table on the right contains measurement results Rz and Ra (see Figure 5).**

Figure 5: Line profile chart

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