Chapman Instruments

QUALITY CONTROL OF EDGE, BEVEL AND NOTCH POLISHING

Using a Non-Contact Surface Profiler

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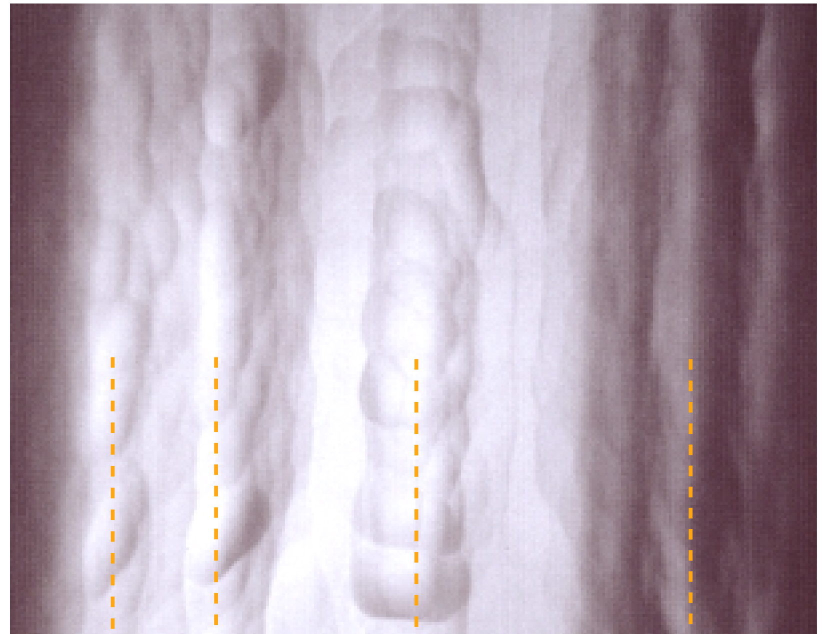
As part of the stringent guidelines in wafer processing, manufacturers are examining the edge of the wafer as part of their overall quality control. To fulfill this need, Chapman Instruments has developed wafer measurement systems that can measure the roughness across the crown, bevel, notch and flat of the wafer.

Edge and Notch Polishing

The edge polishing of silicon wafers generally occurs in three steps;

- Step 1: Front side bevel and half of the crown is polished.
- Step 2. The wafer is flipped and the backside bevel and the other half of the crown is polished on the same polishing plate as step #1;
- Step 3. The notch is polished with a specific polishing pin. After the silicon wafers have been ground and polished, the roughness of the front surface; back surface; front side bevel; backside bevel, edge crown and notch need to be inspected for process and quality control.



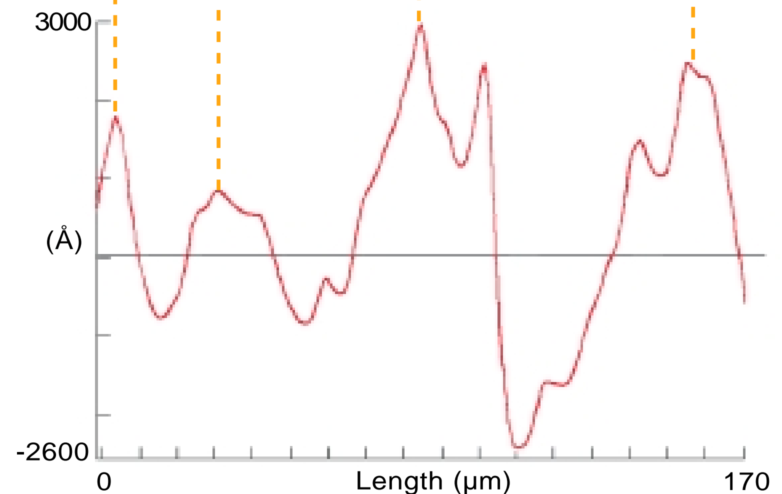


Fig. 1: *Video image and line profile at the base of the notch. The video image and corresponding line profile are shown in registry. The surface roughness at the base of the notch is 1078 Å (Ra) with a peak-to-valley measurement of 5500 Å.*

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Tools for Wafer Inspection:

Chapman Instruments provides tools that not only measure the front and backside roughness of wafer, but have also been designed to inspect the wafers edge, bevel, crown and notch (including the bevel of the notch). The two instruments most recommended for wafer inspection are listed below.

MP3100

For situations requiring full automation and cassette to cassette handling, we recommend the MP3100. This instrument comes with a whole suite of automation features such as: Auto-Notch and Flat Locator for automated wafer orientation, bevel angle optimization routine to yield maximum scan length, automated surface, bevel, crown and notch measurement from a single key stroke. The optional robot loader comes fully equipped for handling both 200 mm and 300 mm wafers.

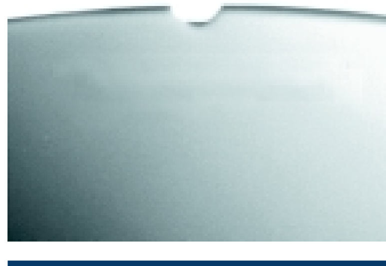

***Fig. 2**: A magnified view of a wafer notch as seen through the Nomarski Viewing System*

MP2000 Plus

For situations where full automation is not required, such as R&D, and random sampling, the MP2000 Plus is recommended.

The MP2000 Plus comes complete with a high definition Nomarski optical viewing system and the ability to obtain line profiles up to 100 mm in length with sub-Angstrom height resolution.

Results

Figure 1 shows a video image at the base of the notch and the corresponding line profile from a scan across the notch. In order to accomplish this scan, the position of the notch is first determined (Fig. 2). After the notch is located, the wafer can be moved to a variety of locations for edge measurement, as illustrated in Figure 3.

For more information, please visit our web site: www.chapinst.com

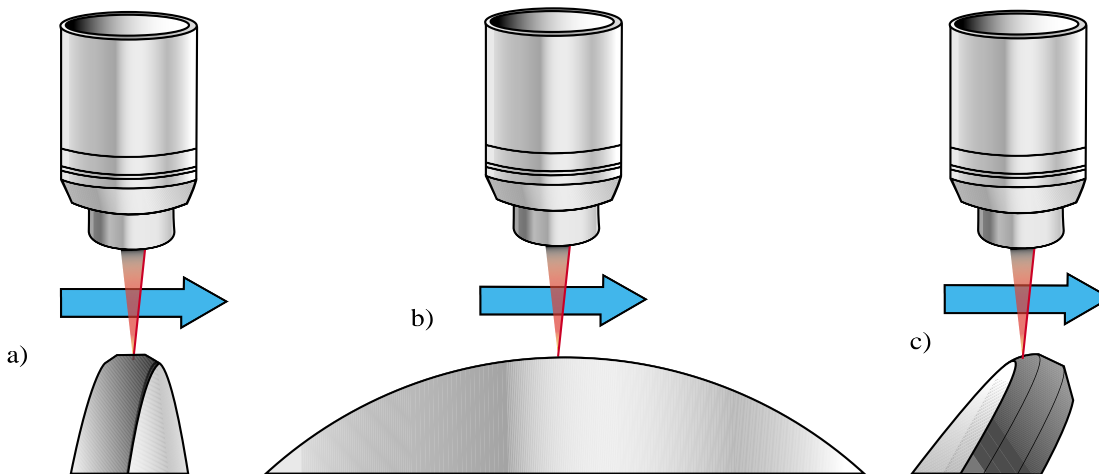

***Fig. 3**: Measurements can be taken at various orientations: a) across the edge, b) along the edge, and c) across the bevel. The arrow shows the direction of the scan.*