

MODEL 200

Dimpling Grinder

State-of-the-art mechanical grinder for preparing electron microscopy samples

MODEL 200

DIMPLING GRINDER

Grinding complete
Press any button

STOP

PAUSE

START

ZERO

FISCHIONE
INSTRUMENTS



MODEL 200

Dimpling Grinder

An easy-to-use, state-of-the-art, mechanical thinning instrument designed for the reproducible preparation of high-quality electron microscopy specimens.

- Prethin specimens for ion milling
- Polish specimens to electron transparency
- Controlled grinding force and rate
- Vibration-free grinding
- Precise indication of specimen thickness
- Easy to program
- Accepts mounted specimens from the Fischione Model 160 Specimen Grinder
- Optional 40 X microscope attachment allows direct observation of the specimen without the need to remove it



DIMPLING

High-quality specimens for transmission electron microscopy (TEM) need to have a large electron transparent area for analysis, but yet be rugged. One method that accomplishes both of these prerequisites is dimpling.

Dimpling is a rapid technique that involves simultaneously rotating the specimen on one axis and a grinding wheel on a perpendicular and intersecting axis. This combination of motions provides a specimen with its central area reduced to a thickness of a few microns.

By thinning only the central area of the specimen, a thick, rugged outer rim remains, eliminating the need for special handling techniques for fragile specimens. An abrasive slurry that is in contact with the grinding wheel and the specimen removes the material.

Ideal specimen prep for ion milling

The ultra-precise Model 200 Dimpling Grinder is indispensable when ion milling is used for final specimen thinning. Because the specimen is prethinned by dimpling, ion milling must remove only relatively small amounts of material. This creates specimens free from uneven thinning, surface defects, and irradiation damage.

Versatile

By simply changing tools, the dimpling grinder can be used to flat grind bulk specimens, dimple, and then finally polish the specimen to electron transparency.

Precise specimen positioning

A key component of the dimpling grinder is the specimen stage that precisely rotates the specimen. The specimen is mounted with a low melting point polymer to the top half of a two-piece platen. The platen fits into a magnetic base, which is coupled to the specimen stage by a rare-earth magnet. This magnetic coupling allows the base to be positioned so that a particular area of the specimen can be precisely placed under the grinding wheel. Positioning can be observed through a 40 X optical microscope.

The specimen can be readily removed for inspection and then precisely repositioned for continued grinding. Specimen rotation speed is continuously varied by a front panel mounted potentiometer.

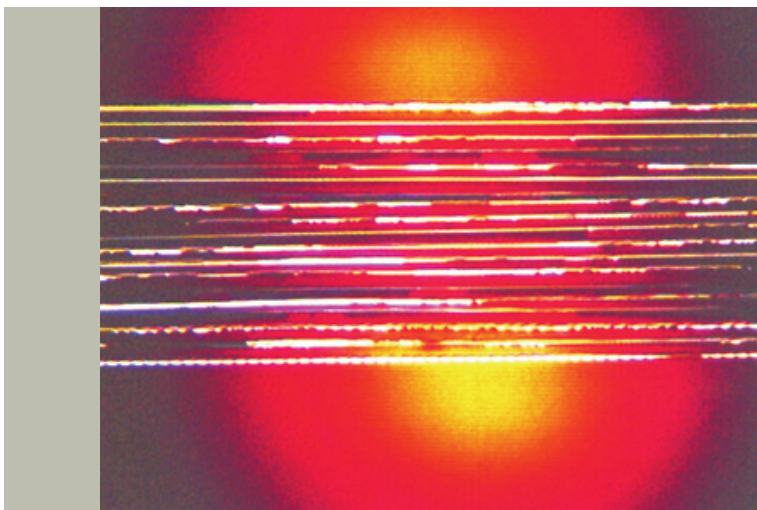
Optimized grinding control

For effective preparation and to avoid specimen damage, an electromechanical stage lowers the grinding wheel at an optimized rate. This creates a very controlled reduction of specimen thickness. Wear on the grinding wheel is uniform, virtually eliminating eccentric tool-induced vibration and ensuring grinding without the risk of specimen fracture.

At the conclusion of the grinding process, the advanced instrument control halts both the wheel and specimen rotation and then automatically lifts the grinding wheel from the specimen surface.

Vibration-free grinding

The precision fit of the grinding wheel to the shaft minimizes eccentricity. Both advanced rotary bearing technology and a specially designed drive system virtually eliminate wheel vibration. Grinding wheel rotation speed is



Optical image of a dimple ground XTEM specimen consisting of 19 individual sections of a microelectronic material. The image was taken using transmitted light and shows a color contrast due to the decreasing thickness of silicon as the center of the specimen is approached.

MODEL 200 Dimpling Grinder

continuously adjustable via a front panel mounted potentiometer.

The dimpling grinder can incorporate different types of wheels:

- Grinding wheels for rapid material removal without scratching.
- Polishing wheels for an optimal surface finish.
- Wheels with different diameters for various dimple profiles.

A variety of wheel materials are available and can be specially matched to given applications.

Controlled grinding force and rate

The grinding wheel stage is pivoted to present the grinding wheel to the specimen. It contains a micrometer-type, adjustable counterweight system to regulate the applied grinding force. The controlled grinding force and rate produces specimens with exceptional quality.

Easy programming

Programming is extremely easy via a keypad mounted on the front panel. Prompts guide you



Dimpling grinder programming panel



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through quick and easy programming steps. A liquid crystal display continuously shows performance information.

A zero position can be established on either the surface of the platen or the surface of the specimen. This enables you to either dimple to a given thickness or to remove a specific amount of material from the specimen.

Process termination

Final specimen thickness is readily programmed for accurate, unattended operation. However, at any time, the process can be either paused for specimen inspection or stopped. During grinding, specimen thickness is continuously displayed.

The dimpling grinder also features a time-based polishing mode. At the conclusion of an elapsed set time, the process automatically terminates.

Transmitted or reflected illumination

The platen that holds the specimen has a glass center section that allows light to be transmitted through the specimen from a source located beneath the specimen stage. The intensity level of the transmitted light is adjustable for optimal specimen observation. This is particularly important when dimpling silicon, which undergoes changes in color as the specimen approaches electron transparency.

The dimpling grinder also features illumination with reflected light from a high intensity lamp, powered by the dimpling grinder's power supply.

Microscope for direct observation

A 40 X microscope attachment allows direct observation without the need to remove the specimen.



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