MEYER BURGER
TECHNOLOGY GROUP

Saw Technology

Wire saw

In a wire saw, a wire is unwound from a reel and wound onto at least two wire guide rollers (WGR). The WGR are notched at a clearly predefined and constant distance. This process is also known as grooving the WGR. The wire passes through each individual groove of the WGR to form a complete wire web (see figure). The rotating wire guide rollers move the wire web in one direction or both directions depending on the application. In the end, the wire is wound onto a reel.

A suspension, usually a mixture of silicon carbide or diamond and polyethylene glycol, is fed through nozzles onto the moving wire web and brings about mechanical abrasion. While the workpiece to be sliced is lowered into the wire web, the wires coated with the suspension cut the material into slices, the so-called wafers, the thickness of which is defined by the distance between the grooves on the wire guide rollers. Another method of wire sawing is to use a diamond wire on which the diamonds performing the abrasive action are mechanically connected with the wire. A coolant, usually water, is added here in place of a suspension.

Band saw

On a band saw, an endless, horizontally mounted and routed plain steel band saw blade is fed over two aluminium wheels driven by a motor and tensioned by means of a hydraulic band tensioning unit. The load on the saw band blade is detected by pressure sensors and monitored and indicated by the control system. The band saw blade is coated with particles, usually diamond particles.

Band saws slice large silicon blocks, quartz glass or ceramic materials very precisely, but only single cuts are made as a rule. The workpiece, a silicon ingot for example, is lifted up into the running band saw blade on a workpiece mounting table at a set feed speed. The band is cleaned by water nozzles, strippers and air nozzles. Fresh water provides efficient cooling of the band saw blade as well as cleaning and flushing of the machining area.

Inner diameter saw

With an inner diameter saw, a hole is cut in a thin round disk made of plain steel. The edge of this hole is coated with diamonds. The slicing blade is fitted vertically on an air-supported hollow spindle and fixed in place in the unit by means of a tension ring. Before the workpiece, a mono-crystalline silicon ingot for example, is sliced, it is fed deep into the recess in the slicing disk on a so-called index slide depending on the application. One outstanding feature of this slicing technology is that the slicing disk can be adjusted automatically by air nozzles during the cutting process. This principle offers minimum kerf loss for very high accuracy and surface quality. As a result, slicing costs are lower in comparison with other slicing procedures and technologies. Inside diameter saws are used predominantly today in the solar and semi-conductor industry for the slicing of valuable silicon. Other examples of possible applications are the slicing of:

- variably defined sections, the so-called cross-cut lengths of a silicon ingot
- disks, the so-called wafers, made from mono- or multi-crystalline silicoingots
- “topping & tailing“ end pieces of mono-crystalline silicon ingots
- “capping” of multi-crystalline silicon bricks

Outside diameter saws

With an outside diameter saw, one or more slicing blades are fixed vertically next to one another on a spindle by flanges and spacer sleeves. The spindle is driven by two V-belts powered by a rotary current motor. The outside of the slicing disk is coated with diamond particles in a galvanic procedure. This diamond coating allows hard and brittle materials such as optical lenses, ceramic materials, ferrite and other valuable special crystals to be sliced. Outside diameter saws are used primarily in the optical industry.

Meyer Burger Technology AG
Grabenstrasse 25 / CH-6340 Baar
Phone +41 (0) 41 761 80 00 / Fax +41 (0) 41 763 08 08
mbinfo@meyerburger.ch / www.meyerburger.ch