

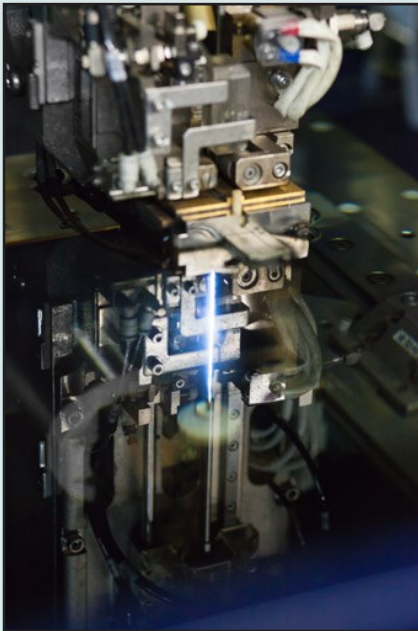
## Wire Cutting EDM: *It May Not Be What You Think*

**W**hen most people think of a wire cut part, the normal assumption is that the wire is somehow working like bandsaw to cut through the metal part. However, an electrical discharge machining or EDM uses heat instead of physical cutting tools to machine mechanical parts.

More specifically, it uses a brass wire of approximately 0.2 mm in diameter as an electrode to generate heat sufficiently high enough to melt a metal surface.

Wire is fed from an unwind spool to a take up spool with the workpiece set in between. Controlling tension on the wire is critical because the wire must maintain the proper spacing between itself and the workpiece.

As the positively charged wire and the negatively charged workpiece come in close proximity to each other, an electric spark (discharge) is created.



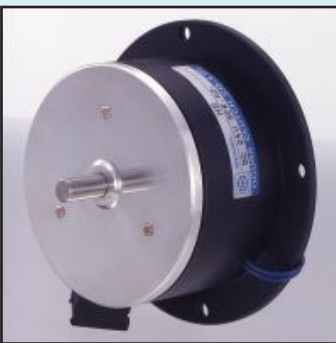
*Wire cutting head*

This electric spark is extremely concentrated, and is called the arc column. The arc column is so hot, it can melt metal. At the same time, the water that comes in contact with this extremely hot wire, explosively vaporizes. That creates pressure that helps remove the small metal chips.

When current in the wire stops, the water refills the space to wash away the small pieces of cutting debris. The distance between the electrode wire and the metal surface is reestablished, restoring the insulation. This process is repeated as many as 100,000 times per second in order to cut metal.

As long as the material is conductive, EDM can cut any material regardless of its hardness. This makes EDM irreplaceable technology when it comes to fine machining. To control wire tension, both a hysteresis brake (HB) and a magnetic particle clutch (OPC) can be used.

The wire pulled from the wire bobbin passes through the pulley, tension roller, and wire guide, and is then collected into a wire hopper while performing the electric discharge process. An OPC clutch is used between the wire bobbin and motor. Since it is a magnetic particle clutch, torque is proportional to voltage, and tension of the wire can be controlled extremely quickly. Some machines also need to control the rewind, which can also use the OPC clutch.

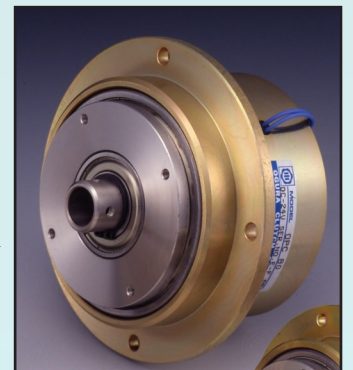


*Ogura HB Series*

For high precision tension applications, in some machines for controlling tension on only the unwind, a hysteresis brake (HB) is used. Since torque is controlled purely by a magnetic field and there are no frictional components to generate the torque, the HB brakes are extremely precise.●



*Wire cutting machine*



*Ogura OPC Series*