



EDM Technical Article

By Paul Lutz, Keith Felts & Patrick Reynolds

At one point an infrequent machining method, EDM has grown in popularity over the last half century to become an important aspect in the success of Advanced Machining & Tooling, LLC.



Unlike other types of machining, EDM creates a desired shape by using an electrical discharge or sparks. This method can create intricate contours and cavities that are usually difficult to make. EDM also has the ability to cut very hard metals with impunity that are challenging to machine with other processes.

There are three basic types of EDM processes -- sinker EDM, wire EDM and small-hole EDM drilling. All three work similarly with spark erosion creating the desired shape.

The most conventional of the three types of EDM processes is sinker EDM, which is also widely known as ram, cavity or conventional EDM. In this process, sparks from a sinker electrode that's been previously machined into an exact image of the coveted shape cause the metal to erode from the workpiece in order to create the desired part. The two electrodes never touch, as a dielectric liquid, which continuously

circulates around the two electrodes and flushes away the scrap, separates them.

Wire EDM is comparable, but as the name of the process would indicate, a wire is used to provide one of the electrodes. Sparks from the wire jump to the workpiece and erode metal to create the desired part. This process typically occurs in deionized water.

In small-hole EDM, brass or copper tubes are rotated while lowered into the material. Again, the tube never makes contact with the workpiece, but the sparks from the tube erode the metal to create the desired part.

Advanced Machining specializes in the first two types of EDM processes -- sinker and wire. In total, EDM processing accounts for a significant percentage of the company's sales on a yearly basis.

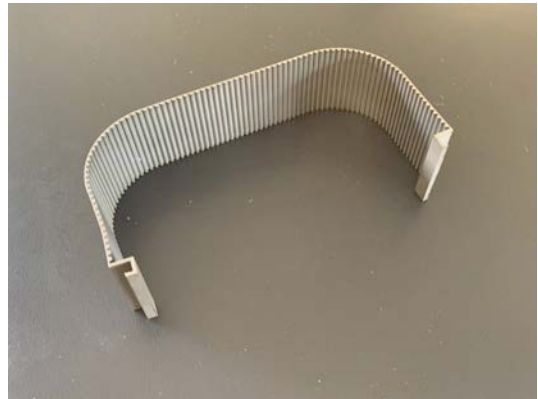
One of the biggest advantages of the EDM processes is the ability to create highly complicated part geometries, with tight tolerances, like the parts depicted in the pictures to the right and below. These parts would be very difficult or impossible to manufacture with any other conventional metal forming process.



Advanced has seven Agie Charmilles EDM units, manufactured by GF Machining Solutions, to support this part of its business,

and it continues to grow in this area. Late in 2019, the company acquired an additional sinker EDM machine, and early in 2020, it added another wire EDM unit.

These seven machines -- four wire EDM & three sinker EDM -- are part of a large family of CNC machines deployed on a daily basis at Advanced. The company also possesses six 3, 4, and 5-axis vertical machining centers and two turning centers, one with live tooling for multi-tasking milling and turning. These capabilities are continuing to help Advanced grow in the CNC machining industry.



Performing the wire and sinker EDM processes permits Advanced to create some truly unique parts. Some of the more rare shapes Advanced Machining constructs on a day-to-day basis are machined from materials such as Inconel, tungsten, titanium, rhenium and indium. Again, those metals are difficult to machine with other processes.

Additionally, EDM methods allow Advanced to be extremely accurate and efficient, keeping costs to a minimum and customers pleased.

The shapes and parts Advanced creates have become extremely important to its aerospace & defense, telecommunications and medical customers.

About the Authors



Paul Lutz

Paul serves as Advanced Machining's EDM & Maintenance Specialist and has extensive expertise in wire EDM. He gained this knowledge working 16 years for GF Machining Solutions, a leading manufacturer of wire EDM equipment, before joining Advanced Machining in 2014.



Keith Felts

Keith co-founded Advanced Machining in 1985 and has served as President since then. He is a leading expert in electrical discharge machining, particularly sinker EDM. He previously worked as an application engineer for Agie Charmilles, a top manufacturer of EDM equipment based in Switzerland.



Patrick Reynolds

Patrick is Advanced Machining's Operations Manager. He has a diverse background in various machining technologies, including horizontal and vertical milling as well as wire and sinker EDM. He previously worked at several other machine shops in positions of increasing responsibility before starting at Advanced in 2015.