

Electric discharge machining - EDM

Lightning, strikes in unconceivably short distances. With each strike enormously high temperatures are created and tiny craters are left even in the hardest steel or tungsten carbide. This is an oversimplification but describes the principle of EDM exactly. It is a wearing down of metal using hundreds of thousand of sparks per second, which slowly erode the required form into a piece of metal.

In 1943 a paper was published by the Russian physicists Lazarenko about "the inversion of the wearing effect as result of electrical discharge". During studies about the wearing of switching contacts they developed a machining procedure where they could take advantage of the destructive effect of electrical charges. This was the beginning of EDM. The discharge generator, developed at that time, was used on EDM machines for a long period of time. Many innovations and technical improvements have contributed to make EDM a significant industrial manufacturing process.

There are 3 different procedures, namely EDM-drilling, wire cut and sink erosion. With this thermal erosion procedure for machining of any kind of conductive material, the material is point melted or vaporized by sparks arcing over the gap between the electrode and the work piece. Depending on intensity, frequency, duration, length and polarity of the discharge, different erosion results arise. Even complicated geometrical forms can be produced.

Where mechanical energy reaches its limits with materials difficult to discharge, EDM-drilling is used. Innovations and further developments show that there still is a great potential of undiscovered ranges of application.

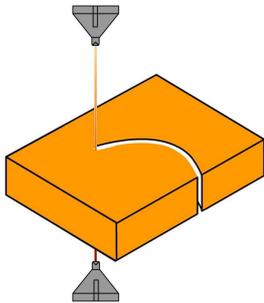
EDM-drilling

EDM-drilling is used for manufacturing small bore holes. Micro processing of work pieces like machine parts, surgical needles or implants have only become possible because of EDM-drilling.

Drilling into injection nozzles for diesel or petrol engines with electrodes of 0.10 to 6.0 mm diameter is possible without ridge formation and entry deformation. Cooling bore holes are made into turbine blades without influencing the material. Further ranges of application are vents into moulds for tire engravings and drilling of start holes for wire cutting.

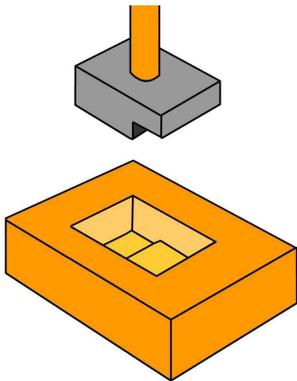


Wire cut



For wire cutting the required cutting form is stored or pre-programmed. Then the machine automatically cuts the form set in advance. Even complicated sloping or conical cuts are possible because of the independently working upper and lower wire guide. The proceeding is mainly used for the manufacturing of cutting and punching tools for the sheet metal industry.

Sink erosion



For sink erosion the required form is reproduced with a tri-dimensional electrode. This creates a negative of the final product. This procedure is used for manufacturing of forms for plastic parts like telephone casings, screw-type caps for bottles, forms for yogurt cups, spectacle frames and many other things.

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