

A word from our Editor-in-Chief

Nonconventional Technologies - present and future

Practically, nonconventional technologies have been used in enterprises for at least 50 years. At the beginning and a good time after, specialized literature considered as Nonconventional Technologies those technologies that used as a “tool” the energies concentrated under different forms such as: electrical discharges in impulse, ultrasounds, temperature which can create an electron, ion, laser etc. beam.

With all these technologies material processing is done by removing from the surface of the object to be processed a quantity of matter under the form of small particles, yet in a large number in the time unit, phenomenon characteristic to erosion, thus the name of the technologies: “processing technologies through erosion”.

Putting the process for processing by erosion in the technological hierarchy of three-dimensional processing procedures shall be determined on a part by the technological features (relatively low), and on the other hand by the possibilities of generating (very light and with very good accuracy and execution) of some areas of high complexity and relative independence of technological characteristics of the mechanical properties of the object to be processed. These characteristics place the technological processing of three-dimensional electrical erosion through to areas where restrictions on the processing of splintering are exceeded, or when processing splintering has reduced economic efficiency (high hardness of the object undergoing processing, the impossibility or difficulty of generating surface, low rigidity of a part of the technological system, etc.). Three-dimensional processing through electrical erosion involves the removal of excess material from the surface of the object due to the erosive effects of complex processing, discontinuous and localized of electric discharge in momentum, primed repeatedly between processing and the object of transfer (electrode-tool), in terms of compliance with the physical requirements for the existence of the electric discharges, the location of their effects and ensure the continuity of the erosive process. Repeating these actions with a very high frequency, due to the original pulse generating electrical power, determines the overall achievement of the processing.

In the Romanian dictionary the definition of the word “Conventional” is: “to be established by convention, accepted through tradition”, the word being an adjective taken from Latin “conventionalis” or from the French “conventionnel”.

In the same dictionary “Nonconventional” is defined in the following manner: “which is not subject to conventions, original; which has not been imposed by prolonged usage”.

Starting from this definition and referring to technology means that Conventional Technologies are the technologies known practically all over the World, which are applied in industrial practice in all state or private commercial enterprises. Nonconventional technologies are the newer technologies, lesser known, which are applied on a lower scale, where they are known, having superior efficiency over the conventional technologies.

Electrical impulse discharges in order to accomplish the removal of material from the surface of the processed object and because these discharges should have expected efficiency technological scheme of electric erosion machining must meet several conditions: direct

introduction of electric power in erosive interstice; temporary dosage of momentum electric power; ensure a polarized character of electrical impulse discharges; restore the original state of the erosive interstice.

Having appeared during the last decades nonconventional technologies come to fill the void felt with the introduction in industry of some metals more and more difficult to process through classical processes, as well as due to the significant increase of the works' complexity and of the technological facility, as well as the demands regarding increasing productivity especially in the tool engineering department.

Processing by erosion electric discharge primed by puncturing a dielectric medium. The version is characterized by the absence of direct contact between the object to be processed and the tool-electrode. The size of the erosive interstice is maintained constant at an appropriate amount, determined by the idle voltage source (voltage priming pulse) of the advance system automatically processing technological system. This dimension takes values between 0.01 and ... 0,5 mm, being dependent on the working conditions and the adjustment parameters. In terms of the shape of the electrode-tool, electrical pulse erosion primed by penetrating the erosive interstice is classified in: electric erosion with massive electrode (electrical erosion of electrode shape copying) and electric erosion with filiform electrode.

Processing by erosion electric discharge primed by breaking some electric micro switch (electrical erosion with breaking of contact-EERC) to which electrical discharges are primed by breaking electrical contacts covered by the current set temporarily between the electrode tool and the object of processing and between which there must be relative motion. Unlike the previous version, the EERC process requires, necessarily that the exercise of contact pressure between the two objects in the interaction-the object to be processed and the electrode tool, namely ensuring the relative movements between these two objects. This version is presented in the literature as being one that is at the origin of the electric erosion machining. Identified, in theory, in terms of possible effects since 1770 by the Englishman researcher Priestley it is mentioned in 1941 by the Russian researchers Boris and Natalia Lazarenko, which actually applies for sampling material. At this version the electrical discharge develops by creating periodical electric micro switch that will be interrupted by the relative movements between the object to be processed and the object of transfer.

One should notice that everything that is new in technology is something nonconventional. But this nonconventional becomes known in time and universally applied thus turning from nonconventional to conventional.

Sibiu, 30th of June 2017

Editor-in-Chief for "Nonconventional Technologies Review"
Manager of OSIM-EPO PatLib Centre from Sibiu
Prof. Eng. & Ec. Mihail Aurel ȚÎȚU, Sc.D. and Ph.D.