MONITORING OF THE EDM PROCESS BY TRACKING OF THE ELECTRIC PULSES

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Abstract: The paper presents electrical erosion processes, and the oportunity of monitorising the process through which impulses occur in the workspace.

Keywords: erosion electrical impulses.

1. INTRODUCTION

Although worldwide participation by erosion processing, processing equipment in the park is quite small, highly industrialized countries, their share is about 25%. Their importance to the process as well as technical progress is vital, there are industries that would not develop or would not exist without the direct contribution of non-conventional technologies: nuclear energy, electronics, microelectronics, aerospace industry, etc. [Na83]

Manufacture processes: with the the solid electrode (Figure 1a) and filiform electrode (Figure 1b) capitalize technology, exclusively or in a significant share a wide range of physical phenomena, chemical or compound known mainly by their destructive action on nature and / or technical systems, such as abrasive erosion phenomena, thermal, chemical, electrical or a combination of these.

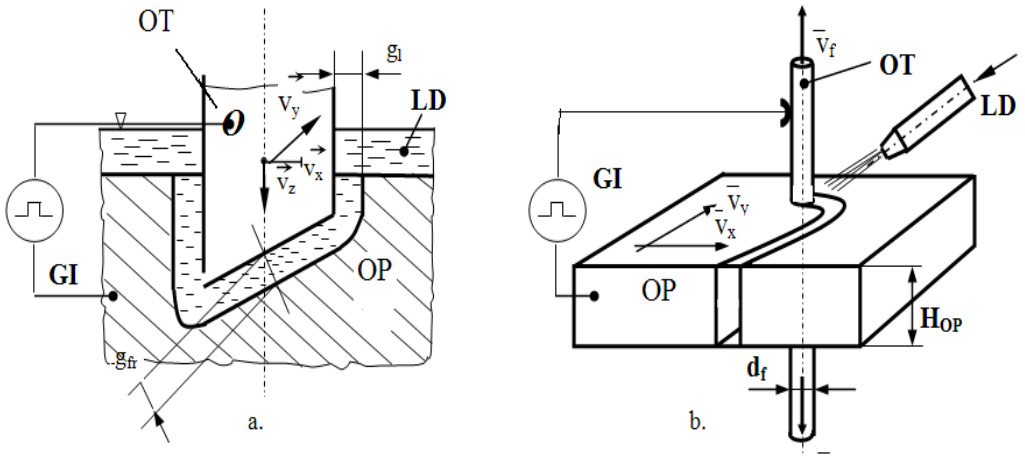

Figure 1. The principle of electrical erosion processing; a - massive erosion of the electrode,
b - filiform electrode erosion

Despite the diversity of phenomena that occur, erosion processes have an essentially identical structure of the system of technological action, represented schematically in Figure 2.

Making action is subject to erosion:

- *Technological equipment*, as a system of constructive elements, and possibly stocatoare adaptive a priori information on object action;
- *Effective energy*, maintaining the transformation process for physico - chemical and geometric blank, imposed by the objectives of the technology;
- *Command and control system*, human operator and / or automatic device is able to ensure the generation, processing and transmission of information, mainly adaptive optimal conditions necessary for completion of the action of erosion.

Machine tool technology has the components and technological equipment for processing, and filling up of equipment and device are subject of energy transfer and information processing on the surface. The main functions of the technological equipment of processing are: the generation and maintenance of erosive agent on the surface of the object to be processed, maintaining a dynamic balance between the processes of sampling and work outside the evacuation of waste resulting from the technology levy and providing relative displacement (main motions movements of advance) necessary to generate the final surface cinematic piece.

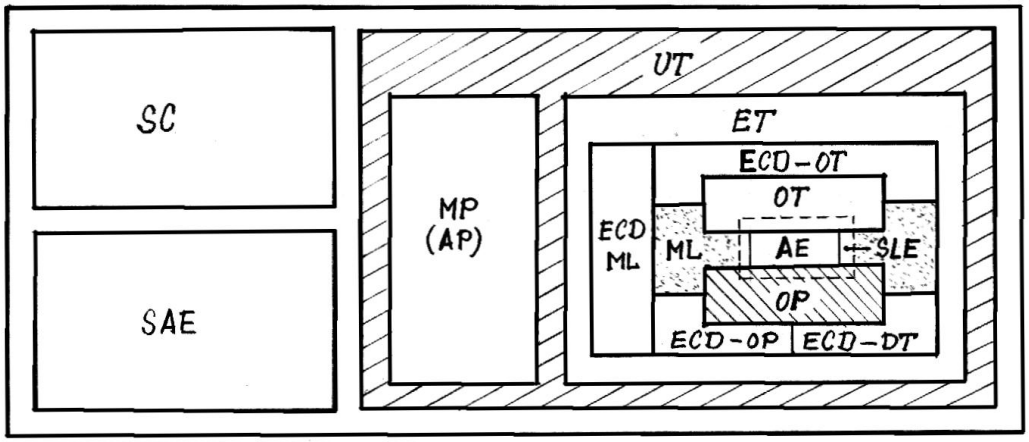

Figure 2. Action Technology System; UT - technological equipments, MP (AP) - processing machine or apparatus, ET - technological equipment; EDC - Completion equipment and dispozitivare, OT - the object of transferring, ML - working environment, AE - erosive agent, SLE - elementary space of working, OP - object processing, storing, DT - design technology, SAE- power supply system; SCC - command and control system.

Energy effect, mainly thermal, electrical discharge because of spring in the form of subject and object transfer machines, usually comes from the technological equipment appropriate transformation of primary energy - electricity - in another form of energy. In practice we meet several schemes of work so, depending on the features of erosion, this energy can be transmitted to the object to be processed in continuous or pulsating regime, through interaction with nature areas punctual, linear or surface.

It considers two metal objects (object transfer - OT - and the object to be processed - OP) connected to a power source separated by a dielectric. At a sufficient voltage and power supply between the two electrodes is an electric discharge passing through a series of successive stages: glow discharge, spark, sparkle - bow and bow.

2. CONSIDERATION AND EXPERIMENTAL RESULTS

Bibliographic research and study results offer the possibility of optimizing processing parameters by prescribing the procedure according to the function Objectives: Qp, uv, etc. Ra. In the literature [Lu 89], [Re 93] are optimization strategies for different off-line single or compound objective functions. These strategies use data collected from data banks or deternated with appropriate mathematical models, obtained off-line. Major shortcoming of these data is their special character, meaning that they were determined to working conditions "standard." In actual processing, the deviations from standard situations act as disturbances which may alter significantly the technological characteristics expected values. For such cases we can state that the information flow (Figure 3) is open curl, scheduled operation results not beeing available in real time, efficient manner making corrections. Overcoming this drawback is possible by using state parameters for feedback loop closure.

The actual gap may be known by interpreting lightning characteristics consistent with known effects of their technology. Highlighting their individual characteristics or group of pulses can be done using a number of devices so far completed specialized circuit together form a "transducer" of the status gap, known in literature as the EDM pulse analyzer [Lu 89], [Re 93], [Ma02].

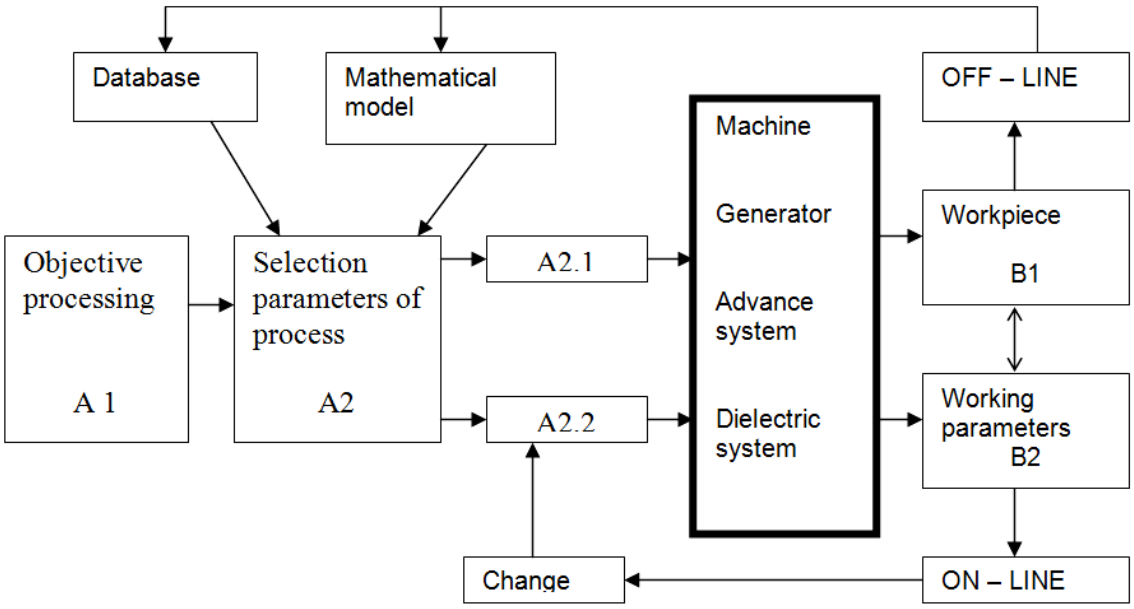

Figure 3. The information flow from EDM

Interest shall discharge normal maximum (actual) to be maximized in relation to other types of pulses, which are those that produce useful technological effects - actual sampling of the blank material and reduced wear on the tool electrode. At the same time, because they produce negative effects - excessive wear (even damage) tool, coke between the electrodes - to be highlighted and abnormal discharges and short-circuit and is useful for optimizing processing and measuring the number or duration pulses went Empty.

To investigate the erosion process under ON-LINE Electric have been designed, built and tested two types of discriminatory (analyzer) EDM pulse (hard and soft), whose working principle is based on the time course of blood electrical pulses between two reference levels: **UL** (low) and **UH** (high). The output logic analyzer signals provide pulses corresponding types of discrimination (Table 1):

x0 - the pulses in the gap;
xn - for normal pulses (working, actually);
xf - the fictional impulses;
xsc - for pulses in the cage.

Discriminatory accuracy of the information provided is subject to calibration pulse (calibration) of it correct, according to the parameters of the pulse generator supplying energy gap.

In practical conditions of working the crowd disturbances affect the process of transformation - and therefore the characteristics of electrical impulses - at random. As a result, it was necessary to simulate ideal processing, free of disturbances, the generation of programmed electrical pulse sequences ideal.

Primary information contained in logical signals **x0**, **xn**, **xf**, **xsc** characterize individual pulses, a gap developed in the pseudorandom sequence. Technological implications of these pulses are felt at the group level (train) of pulses, acting cumulatively over a period of time. In this sense, logic signals can be interpreted in two ways (Table 2):

- Each signal pulse corresponds to a category of discrimination. On the train of pulses, frequency is measured, the number of pulses that are counted in each type;
- Each discriminated pulse signal characterized by its duration.

One of the main objectives of the LabVIEW program is to acquire data from different processes using computers, and during this process a few pitfalls that can occur during data capture operation. This software package is designed specifically to enable quick implementation of data acquisition, operation controlled by a computer and a system of analysis can be extended to meet the most demanding requirements.

Interface developed in LabVIEW provides a tracking process by counting the pulses occurring during processing to achieve desired track every possible situation.

Table1. Types of electrical impulses from electrical erosion process

Types of impulses	How procesing	The conditions U and I
Going in gap	Without removal of material processing	I=0, $u=U_o$
Normal impulses	Effective Sampling of material Wear OT	U_d = 15…30V I > 0
Fictitious download	Small sampling of material High wear OT Coking OT	U_d < 15 V I > 0
Cage	Without removal of material Damage OT, breaks High wear OT	U=0 I max

Table 2. Pulse discriminator variables states.

x_P	x_H	x_L	Q	x_0	x_n	x_f	x_{sc}	THE CONDITION IN THE INTERSTITIUM
1	0	0	0	0	0	0	0	pause between pulses u = 0
0	1	1	1	1	0	0	0	going in gap $u> U_H$
0	0	1	1	0	1	0	0	download actual $U_L < u < U_H$
1	0	0	0	0	0	0	0	pause between pulses u = 0
0	0	1	0	0	0	1	0	download your fictional $t_a = 0$
1	0	0	0	0	0	0	0	pause between pulses u = 0
0	0	0	0	0	0	0	1	cage $u < U_L$ and $X_P = 0$

3. CONCLUSION

Using a pulse discriminator is an essential condition for real-time analysis of electro process through ON-LINE state parameters - coefficients of efficiency of processing. Outlining program runs as its name implies only the outline of processing in its complexity but it bears the brunt of processing information from the desktop with all its complexity. It is therefore attaches great importance to the counter or pulse analyzer gives relatively accurate information on the course of processing.

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