FABRICATION TECHNOLOGY FOR THE BODY OF THE DEVICE FOR ELECTRIC DISCHARGE MACHINING OF THE SPLINED BORES OF THE ANODIC BODIES

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Abstract: the paper shows the machining technology of the modular device body, conceived by the authors in order to allow the working of the magnetron anodic body bores, by means of a combination of classic chipping technology and electrical discharge machining with wire; the *T* channels of the device body is worked by electric discharge machining with wire; for this purpose, the authors designed a semi-product orientation, fixing and dividing device, usable on machine ELER 01-GEP 50F.

Keywords: magnetron, anodic block, micrometric adjustment device, device for electric discharge machining with wire

1. GENERAL CONSIDERATIONS

The magnetron is a device which transforms the direct current energy into high-frequency electromagnetic energy.

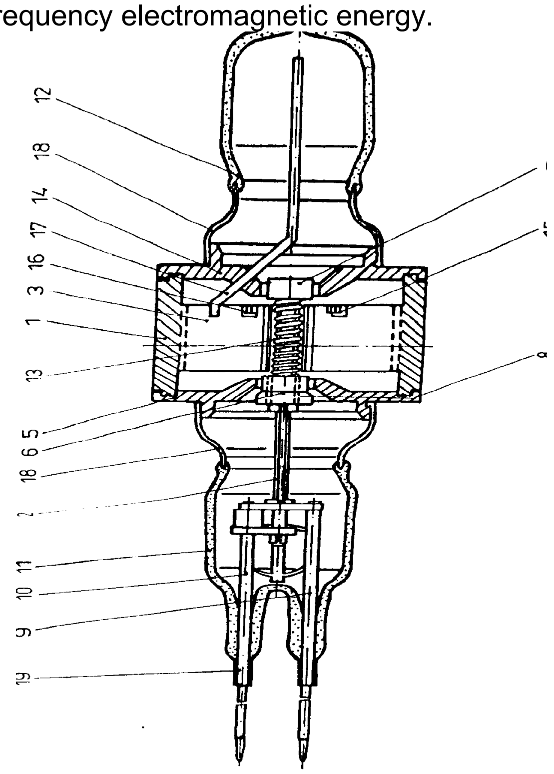

Figure 1. Section through the 800W magnetron.

The components of the magnetron (fig.1) are:
1 – anodic body;
2 – cathode connection rod;
3, 4 – palette;
5 – inferior lid;
6 - superior lid;
7 – filament lid;
9, 10 – power supply rod;
11 – superior glass tube;
12 – inferior glass tube;
13 – cathode filament;
14 – polar lid;
15 – large shorting ring;
16 – small shorting ring;
17 – antenna;
18 – kowar lid;
19 – glass tube.

2. SPECIFIC ASPECTS OF THE ANODIC BODY EXECUTION

The execution of the magnetron anodic body is technologically difficult, because it is made of OFHC copper, which has low mechanical strength and poor chipping, and a very good quality of the worked surface is required (Ra = 0,4...0,8 μm). Also, the working dimensional precision is very important in order to ensure an adequate functioning, that is a constant magnetron oscillation frequency. Fig.2 shows a version of the 800W magnetron anodic block.

In order to comply with these requirements, the authors have proposed, patented and realized a micrometric adjustment device, which allows the working of the anodic block inner splines by electrical discharge machining with the massive electrode shown in fig.3. This consists of body 1 which has channels for positioning and guiding the electrode blades 4. By adequately rotating the micrometric dial 2, the nut 3 moves axially and determines the radial movement of the electrode blades.

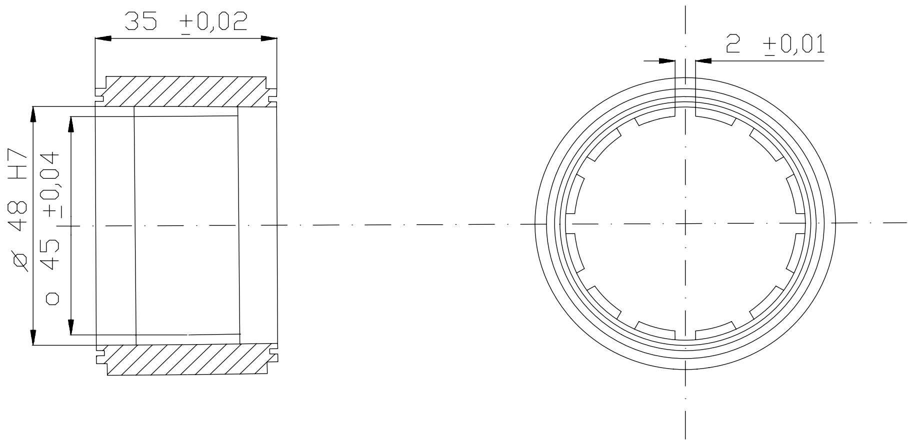

Figure 2. The anodic body of the 800W magnetron.

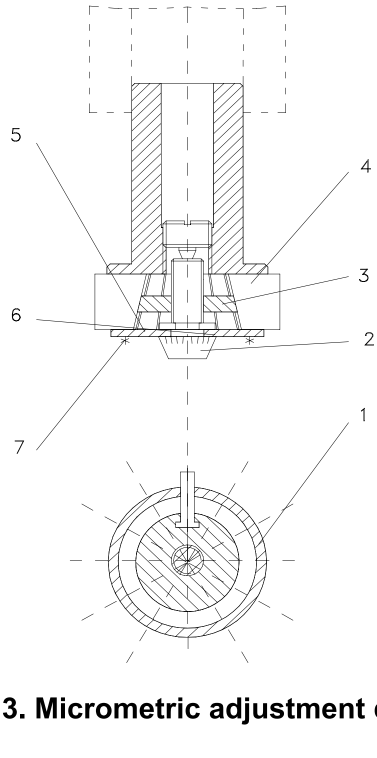

Figure 3. Micrometric adjustment device.

This device gives the possibility to adjust the electrode blades group to the desired diameter, so that various dimensions of anodic body bores can be machined, and the wear can be compensated when it exceeds the admissible values. The radial orientation of the electrode blades is achieved by means of semi-lids 5 and 6 and screws 7. The level adjustment is made by means of calibrated bores, before machining. Fig.4 shows the designed and realized device, with the anodic body that was worked with it.

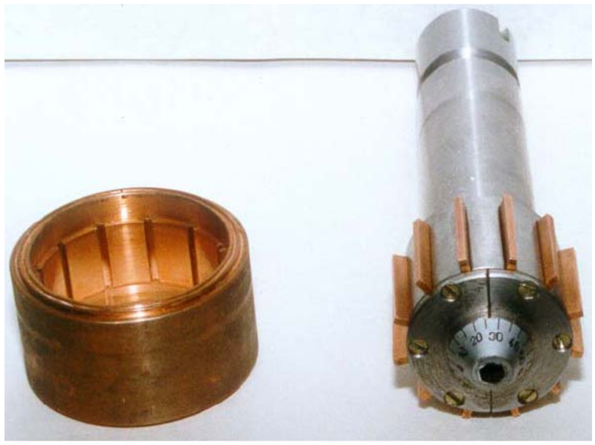

Figure 4. The micrometric adjustment device and the anode body that has been worked with it.

3. ASPECTS ABOUT THE EXECUTION TECHNOLOGY FOR THE BODY OF THE ELECTRICAL DISCHARGE MACHINING DEVICE FOR SPLINED BORES OF MAGNETRON ANODE BODIES

The device body 1 (fig.3) is fitted with T-shaped channels for electrode blades movement, inclined by 6º in order to achieve micrometric adjustment. Two fabrication modes were considered:

- by chipping;
- by chipping and electrical discharge machining with wire.

In the first mode, the technological working succession is:

- cutting of semi-product;

- frontal, external and internal turning for coarse grinding and finishing;
- milling of T channels;
- thermal treatment;
- frontal, external and internal rectification of T channels.

The disadvantage consists of the technological restrictions concerning the T channels milling and rectification processes because of their small dimensions (channel width of about 2mm)

Figure 5. Device for orientation, fixing and dividing for T channels, lateral view.

In the second mode, the technological working succession is:

- cutting of semi-product;
- frontal, external and internal turning for coarse grinding and finishing;
- thermal treatment;
- rectification of external and internal frontal surfaces;
- T channels working bu electrical discharge machining with wire.

Figure 6. Device for orientation, fixing and dividing for T channels, frontal view.

The advantage of this method consists of the fact that the classic chipping procedures can unfold without particular difficulties and the EDM of T channels is made after the thermal treatment, which ensures the obtaining of the required dimensions and surface quality without any further working procedures.

Due to the above considerations, the authors have chosen the second fabrication mode, by chipping and EDM with wire of T channels. In order to use EDM with wire, the authors designed and made the device shown in fig.5 (lateral view) and fig.6 (frontal view), which allow the semi-product fixing and orientation in order to achieve the prescribed channel inclination and circumference division for obtaining the number of channels comprised in the execution documentation.

4. CONCLUSIONS

The authors plan to extend their research in order to design and make devices for a wider adjustment ranges, so that they can machine several types of magnetron anodic body bores.

5. REFERENCES

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