INFLUENCE WORKING PARAMETERS ON THE PRODUCTIVITY IN FLAT LAPPING

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The lapping of plane tightening surfaces can be done by means of a lapping disc with a complex rotating motion, where no point of the lapping disc is repeated by its trajectory on the processed part.

In lapping, the tooling allowance is minimum and it overtops only a little the height of the roughness resulting from previous grinding. That is why mechanical lapping should be accompanied by the selfcentring of the parts or of the tool and it cannot correct the geometrical shape obtained as a result of the previous operation.

Lapping consists in the final smoothing of previously grinding surfaces. This is done by means of certain fine abrasive particles impressed on the lap or freely interposed between the part to be processed and the lap. Abrasive pastes applied on the lap can also be used. Through the relative motion of the lap as compared to the part, in the presence of abrasive grains, particles are being removed from the processed material.

The abrasive and the material out of which the lap is made are chosen according to the lapping procedure, which can be classified as follows:

- *Free, impenetrable abrasive lapping.* This procedure uses a soft material: Vienna lime, chromium oxide, which, during the process, penetrates neither the surfaces of the lap nor that of the permanently free actioning part. The lap is made of a material characterized by a high degree of hardness, lg. quenched steel. The liquid containing suspended abrasive grains is a mixture of machine oil and gasoline or petroleum.
- *Lapping with abrasives previously penetrated in the surface of the lap.* In this situation, the lap is made of soft material: copper, lead, soft allots, capable of retaining the abrasive grains under good conditions. The abrasive used can be: diamond dust, carborundum, electrocorundum, boron carbide.
- The abrasive grains should be impressed on the surface of the lap without being dulled.
- *Abrasive paste lapping.* This method uses abrasive pastes which exert not only a mechanical influence, but also a chemical one on the working surface (they oxidize the surface). The oxide film which is being formed can be easily removed from the
- lap. The pastes can have various compositions: grains of chromium oxide and oleic or stearic acid as a binder. the paste is diluted by adding petroleum in the case of cast iron and machine oil in the case of steel laps.

The experimental research was made on a device for lapping the tightening surfaces of valves.

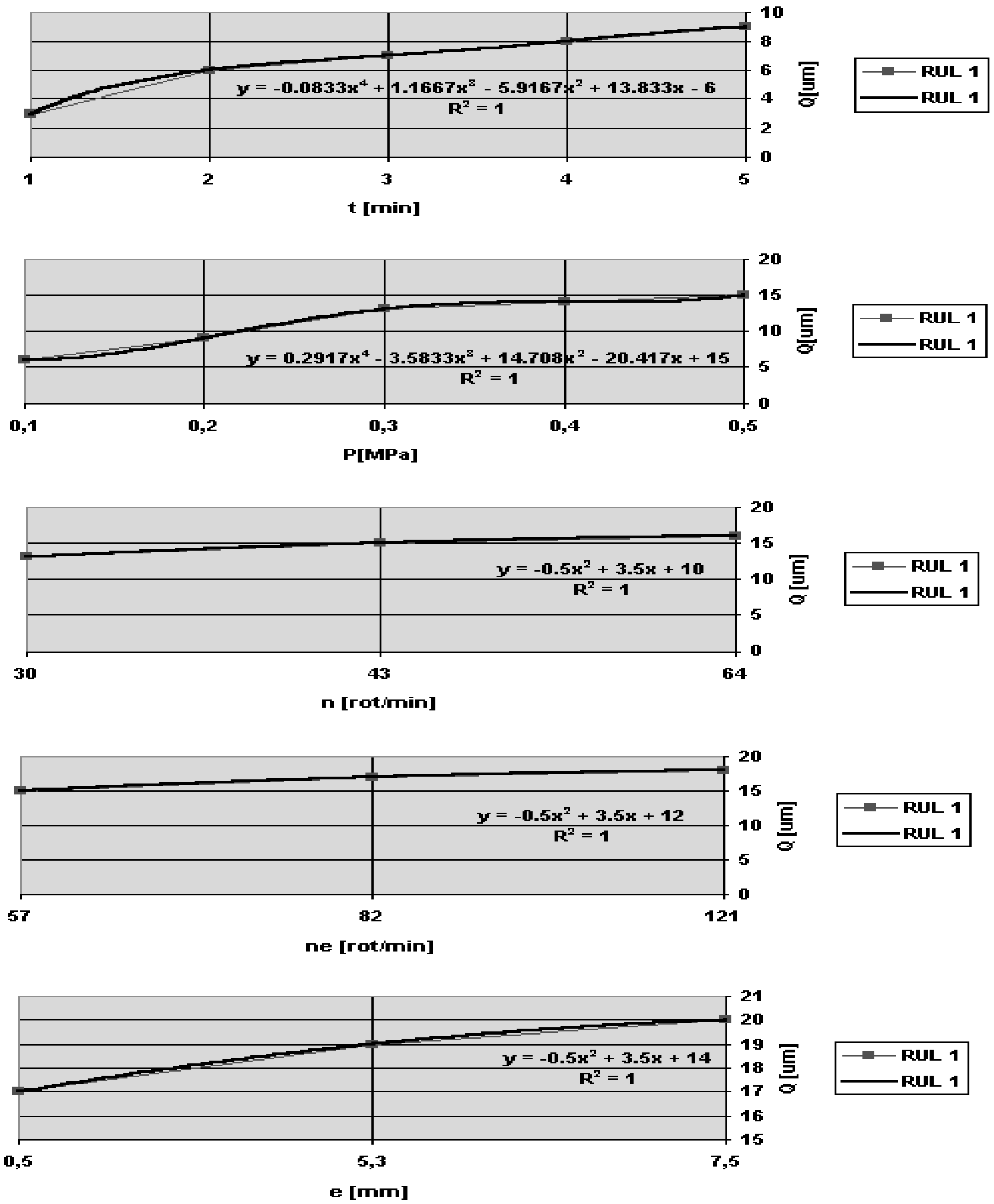
Several types of materials were processed, starting with 40Cr10 and rul1. For each combination of the working parameters were processed at the same time. After each processing the height of the pieces was measured for the same five points. The difference between the initial height and the post processing height was calculated for each of the five points. The arithmetic mean of the five differences was then calculated, obtaining a value for the height of material removed in the case of each part. Since four pieces were simultaneously processed, each point on the graph represents the arithmetic mean of the height of the volume of material removed for the four pieces.

Research has experimentally show the dependence of the height of material removed after lapping on the variables *e* (eccentric), n_e (number of rotations of the eccentric), *n* (number of rotations of the main axis, *P* (working pressure) and *t* (operating time). The problem is to find a relation of the type:

$$Q = f(t);\ \ Q = f(P);$$
$$Q = f(n);\ \ Q = f(n_e);\ \ Q = f(e).$$

Figure presents the curves of the type Q=f(t), Q=f(P), Q=f(n), $Q=f(n_e)$, Q=f(e), for the two materials, 40Cr10 and RUL1, while keeping the other variables at constant values. These curves evince a tendency to increasing, so that the higher the value of the respective parameter, the higher the value of the height of the volume of material removed.

As can be sun from the respective graphs, the curves corresponding to the functions for 40Cr10 display a more prominent tendency to



increasing than that corresponding to RUL1. Therefore material 40Cr10 may be said to lend itself better to being processed. The curves traced through the experimentally obtained points deviate from the curves of the particularized function with at most 10% of the maximum value of the height of material removed measured in the respective situations.

References

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