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Influence of machining parameters on 3D surface roughness of powder slide bushings

Viktor Mironov¹, Pavel Stankevich², Artis Kromanis³, Janis Lungevics³

¹Laboratory of powder materials, Riga Technical university, Latvia.

²Riga Technical university, Institute of Transport, Latvia.

³Riga Technical University, Department of Material Processing, Latvia.

viktors.mironovs@gmail.com; mail020580@gmail.com; artis.kromanis@rtu.lv;

janis.lungevics@rtu.lv

INTRODUCTION

In many connection units of construction machinery and transport systems are used anti-friction bushings (AB) - slide bearings. The most efficient in terms of production and operation of AB are manufactured from powder materials by powder metallurgy method [1]. Aim of the research is to study a machining of AB, and machining parameters influence of the 3D surface roughness.

EXPERIMENTAL METHODS

The paper considers machining operation (MO) of anti-friction bushings (AB) made from powder materials Fe-C-Cu used in lever brake systems of railway wagons. Following AB are designed to operate under dynamic short-term loads, providing the sliding speed up to 3 m/sec. The recommended bearings operating in the self-lubricating mode temperature is in the range of -25 to +40 °C.

For preparation of samples were used powder mixtures containing Ni and Mo less than 0.3% and with reduced phosphorous content. Research of cutting process was carried out on finished sample, which were compacted and sintered.

The cutting tool was selected so that it would provide satisfactory surface roughness of a workpiece.

RESULTS AND DISCUSSION

During the machining operation of powder parts with high porosity, such as anti-friction slide bushings, in addition to microstructure analysis, also an assessment of the product surface parameters must be performed using 3-D measurement techniques [2] (see Fig.1.) and evaluation of the morphology of the shavings must be performed (see Fig.2.).

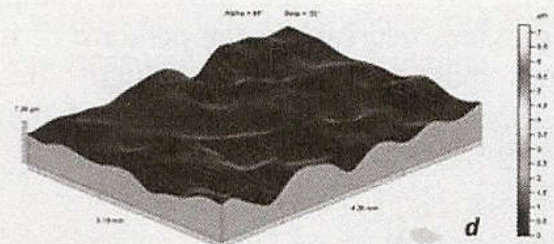


Fig.1. Waviness of the sample (Cutt-off 0,8mm)

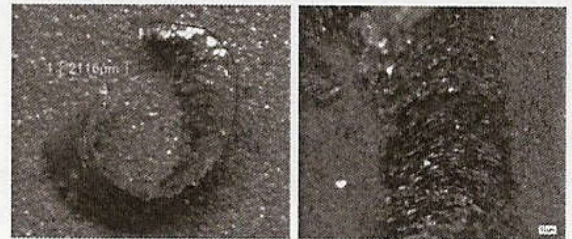


Fig.2. Morphology of the chips

CONCLUSION

When machining powder parts with high porosity, such as anti-friction slide bushings, it is necessary to select such machining parameters, which provide satisfactory 3D surface roughness. Assessment of the 3D surface parameters provide more complete picture about the machined surface. In addition to the commonly used microstructure analysis also an evaluation of the morphology of the shavings was performed.

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