

# EXPERIMENTAL RESULTS ON THE MAGNETO-ABRASIVE FINISHING OF EXTERNAL CYLINDRICAL SURFACES USING MAGNETO-ABRASIVE POWDERS MADE FROM WASTE

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**Abstract:** *The article aims to present the equipment and experimental data obtained in finishing external cylindrical surfaces with magneto-abrasive powders made from waste, in different percentages.*

**Keywords:** *magneto-abrasive finishing, roughness, granite, electrocorundum, siliceous sand.*

## 1. Introduction

In magneto-abrasive processes, the working environment consists of magneto-abrasive powder (ferromagnetic particles such as ferrite or composite powders) or from suspensions, namely ferrofluids or magneto-rheological liquids. Abrasive materials are natural or synthetic crystalline substances with high hardness, used for grinding or polishing materials.

To achieve the required materials used in the experimental research for finishing external surfaces, metal waste (steel and iron chips) granite, grinding wheels and siliceous sand waste were used.

## 2. Equipment used for quantitative and qualitative experiments [1], [3], [4], [5]

In order to obtain metal powder used in magneto-abrasive materials the magneto-abrasive powder, a ball mill has been designed (figure 1). The equipment is designed and constructed to prepare metal waste (chips etc.), in order to re-use it for finishing magneto-abrasive operations or with other purposes.

The metal waste (steel chips, iron cast) used to obtain metal powders, where taken from those resulted after cutting processes like turning, milling, drilling, grinding, broaching

etc.), from various companies and from the cutting tools laboratory of the Faculty of Mechanical Engineering, Mechatronics and Management. For a charging of  $m=0,750$  kg of waste, 0,232 kg of metal powder was obtained in a period of time  $t=6$  hours, using a number of 60 balls with a diameter of  $\varnothing 20$  mm. The mill is powered with a direct current (D.C.) motor of 24 V and an amperage of 5A.



**Figure 1** - *Equipment for grinding metal waste (Ball mill)*

The powder obtained was subjected to a sieving procedure using an equipment with mechanical sieving through horizontal and vertical vibration type PSS (figure 2), in a time period  $t=15$  minutes. The electromagnetic sieving device for sieves with a diameter of 200 mm, (in accordance with EN 932-5), located in the Laboratory of materials technology, it is