ABRASIVE ABSORPTION STUDY IN AWJ CUTTING

Bogdan BARABAŞ[1],Tudor DEACONESCU[2]

Rezumat. *Cercetarea se referă la procesul de formare a jetului hidroabraziv şi la influența factorilor care determină comportamentul acestuia de la ieşirea din duză până în momentul impactului cu piesa, în scopul obținerii unei configurații optimizate pentru întregul proces de prelucrare. Obiectivele sunt acelea de a creşte calitatea suprafețelor prelucrate, de a mări productivitatea şi de a reduce costurile de producție. Studiul evidențiază modelul de formare a jetului prin absorbția de aer şi abraziv. Rezultatele obținute confirmă importanța configurării exacte a cantității de abraziv introduse în jet, prin modificareaparametrilorprocesului.*

Abstract. *This paper studies the forming process of the hydro abrasive jet and the factors that determine its behaviour after leaving the nozzle until the moment of impact with the piece, in order to obtain an optimized configuration of the processing. The objectives are those of obtaining optimal surfaces in terms of quality, increased productivity and reduced costs. The paper specifies the model of the jet forming through air and abrasive absorption. The obtained results have confirmed the importance of exactly configuring the abrasive quantity in the jet by modifying the size of the abrasive grains and the attraction force required for their absorption.*

Keywords: abrasive absorption, abrasive flow rate, hydro abrasive jet density

1. Introduction

The hydro abrasive process managed to impose a high standard amid unconventional technologies, being safe, precise, fast and economic. The ongoing development of this process is based on the optimization of the manufacturing process, achieved through the study of complex fluid phenomena that occur from taking the water from the grid until it is transformed in an extremely powerful manufacturing tool, versatile and accurate.

The forming phenomenon of the hydro abrasive jet in the jet cutting machines is considered a complex one with many variables. Water enters in the cutting head at a pressure between 300 MPa and 600 MPa, being directed through an orifice with a diameter d = [0.03 – 0.3] mm, made in a nozzle of extremely hard materials: sapphire, ruby or diamond. The fluid pressure pushed through the nozzle orifice creates a hydraulic coherent jet with a theoretical speed between 700 m/s and 1000 m/s. This jet passes through the mixing chamber gathering in its

[1]PhD Student, Eng.: Faculty of Technological Engineering and Industrial Management, "Transilvania" University, Braşov, Romania (e-mail:bogdan.fb@gmail.com).
[2]Prof., PhD, Eng.: Faculty of Technological Engineering and Industrial Management, "Transilvania" University, Braşov, Romania (tdeacon@unitbv.ro).