# Effects of machining conditions on the efficiency of electro-discharge milling in gaseous dielectric

**Agnieszka Żyra[1], Wojciech Bizoń[2], Sebastian Skoczypiec[3]**

*Institute of Production Engineering, Cracow University of Technology, al. Jana Pawła II 37, 31-864, Kraków, Poland*
*[1] agazyra@gmail.com,*
*[2]bizonw@mech.pk.edu.pl*
*[3]skoczypiec@mech.pk.edu.pl,*

**Abstract**

Recently dry electrodischarge machining (dry-EDM) is becoming a popular alternative to traditional machining with liquid dielectric. Following advantages of dry-EDM should be underlined: (1) thinner heat affected zone, (2) easier formation of plasma channel (lower dielectric strength and viscosity of gaseous medium) and (3) infinitesimal working electrode wear comparing to EDM in liquid dielectrics. It allows to obtain a very good machining accuracy and machined surface quality, what makes this EDM variant a very attractive solution, especially in micromachining area. What is more, the gaseous dielectric supply system is simpler than for liquids – gaseous medium is supplied with pressure to the machining gap through thin-walled pipe electrode. It is also worth to underline that dry-EDM is environmental-friendly process. Regardless to mentioned advantaged, dry EDM is not commonly used in the industrial applications because it is still a challenge to find an effective way to dissipate heat from the machining gap in order to obtain machining reliability (i.e. satisfied process efficiency).

In this paper the results of dry-EDM milling of austenitic steel X5CrNi 1810 in the air and in the air in the deionized water environment are presented. The goal of these primary tests was to determine an influence of current voltage, current intensity, pulse on-time, pulse off-time on the material removal rate, working electrode wear and workpiece surface structure.