Hochschule Kaiserslautern
University of Applied Sciences

Applied Research Center
Integrated Miniaturised Systems

IMS

Microstructured metal seals for ball valves using pulsed electrochemical machining (MiDi-PEM)

The main aim of this project is to create microstructured curved metallic surfaces for ball valves using Pulsed Electrochemical Machining (PEM). This will allow burr-free microstructures with great design versatility to be manufactured.

The main challenges are the fabrication of the PEM tool and the quality of copying the microstructures of the PEM tool into the workpiece. Different methods and process lines for fabricating the PEM tools as well as process variations for PEM are being investiga-ted. The microstructures are being fabricated using ultraprecision mi¬cromilling or photolithography etching into a metallic substrate. These microstructures are then copied to a polymer substrate and finally into nickel by electroplating. The metallic microstruc¬tured parts obtained in this way are PEM tools.

A variety of different microstructure designs are being tested to adapt the surface topography to the functionality of the devices.

Figure 1: Two way ball valve (Industry partner)

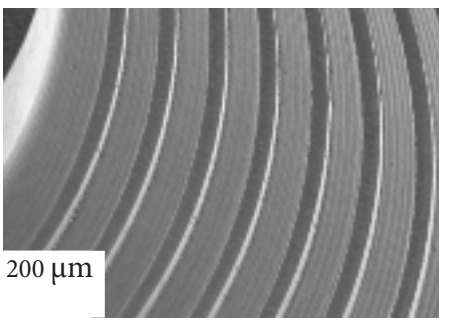

Figure 2: A microstructured curved metallic surface

Project duration:
01/2018– 03/2020

Project management:

Prof. Dr. Monika Saumer
Hochschule Kaiserslautern
University of Applied Sciences
Amerikastrasse 1
66482 Zweibrücken
Germany
phone: +49 631/3724-5420
e-mail: monika.saumer@hs-kl.de

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- Industry partner
- Saarland University

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