

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 investigated. The microstructures are being fabricated using ultraprecision micro-milling or photolithography etching into a metallic substrate. These microstructures are then copied to a polymer substrate and finally into nickel by electroplating. The metallic microstructured 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)

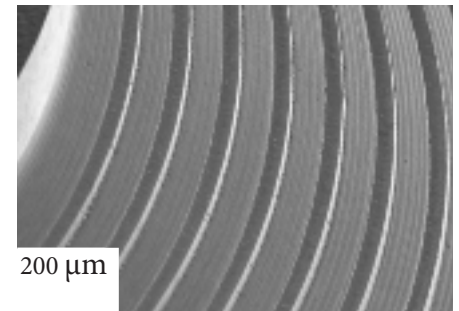


Figure 2: A microstructured curved metallic surface

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Project management:

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- Industry partner
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