

# TriKaroSt

## Tribological systems for cold forging of stainless steels

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### Abstract

Stainless steels are characterized by corrosion resistance and high strength. High tribological loads during forming require the use of complex lubricant systems, which are usually based on conversion layers with oxalate. Due to the environmental and economical disadvantages of these layers, this research project investigates the conversion-layer-free forming of stainless steels.

### Project description

Numerical simulations are used to determine the tribological loads of extrusion processes. Based on these loads, the tribometer sliding compression test is used to characterize both established lubricant systems on the basis of oxalate layers and single-layer lubricants without conversion layer (Figure 1). Subsequently, the single-layer lubricants are validated in extrusion processes.

### Results

The investigations show that the performance of single-layer lubricants still has deficits compared to the established systems with oxalate. Polymer lubricants appear as a promising alternative for the oxalate systems. However, the performance significantly depends on the contact temperature between tool and workpiece. In extrusion tests, stainless steels could be formed successfully with the single-layer lubricants. This was achieved both on a laboratory scale and in industrial tests at a project partner's facility, where over 1700 parts were formed without signs of wear.



[1] Tribometer samples and tools of the Sliding Compression Test

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