Finishing of sliding surfaces with geometrically defined cutting edges

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The rising importance of friction reduction of parts and components, especially in the power train, leads to increasing demands on the finishing of sliding surfaces. In order to meet these new requirements, new methods have to be applied. A new approach for the surface finishing is, to generate an approximated run-in condition to the surface by the finishing process in order to obtain lower initial friction and a shorter run-in period. This requires specific surface properties to ensure the proper function. This preconditioning of the finished surface for cylinder-liner-systems is achieved in a precision boring process by modified cutting edge geometry. The investigations were carried out on a hypoeutectic AlSi alloy, which serves as a basis for a cylinder surface of a combustion engine. During the investigation it was found that the grain size in the surface layer of hypoeutectic AlSi alloys can be reduced by machining with specific modified cutting edge tools. The finished microstructure of the AlSi alloys has a high potential for reducing the running-in time of engine components. First tribological investigations on the finished surfaces were carried out in a piston-ring-cylinder liner simulator. These first investigations have shown a reduction of the friction coefficient compared to finished surfaces by conventional cutting inserts.

In addition to surface finishing with defined cutting edge micro-structuring of the surface by rolling or EC-machining was investigated. Both procedures allow a fast and reproducible manufacturing of microstructures for friction reduction.

Figure 1: Microstructured Cylinder Liner

References: