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Laser based techniques to adapt the tribological conditions in dry deep drawing

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Sheet metal forming is widely used in industry to transform a flat metal sheet to a final shape. However, sheet metal forming requires the use of lubricants to prevent the direct contact between tool and workpiece. These lubricants are often toxic and have to be removed after the forming process. Therefore, the environment and the process chain will profit from the abandonment of lubricants. The use of tool sided coatings is a well-known approach to substitute lubricants and perform dry deep drawing. To achieve satisfying results in deep drawing it is beneficial to tune the tribological conditions. Here, we show laser based techniques to locally adapt the tribological conditions by either reducing the roughness of the surface or by creating structures within the surface. It is e.g. shown that the reduced peak height of coated surfaces can be decreased by a laser process. Furthermore, the resulting tribological conditions are investigated for zinc coated DC04 and AA5162 specimens. In Addition to the tribological behavior the changes of the chemical coating properties are investigated using Raman spectroscopy.