Abstract:
In the sheet metal working industry, shearing represents one of the elementary process operations. In this study, a concept is presented for the manufacture of a hybrid cutting tool design developed for blanking operations based on a composite casting process. High-quality steel, such as powder-metallurgical steel, used for the area of the cutting bar, is therein combined with a ductile and comparatively low-priced cast iron to form the tool body. Based on the results of fundamental casting experiments carried out to identify the influencing factors that are decisive for the compound quality, demonstrator cutting tools are manufactured to prove the general functionality of the concept. With these tools, blanking operations with up to 100,000 strokes are performed. Furthermore, the wear development on the tool's cutting edge as well as the quality of the sheared edges of the blanked pieces is subsequently analyzed. The shearing operations are conducted using a twinning-induced plasticity steel (TWIP steel) and a micro-alloyed steel of grade H320LA.