An investigation of the blanking process of the quenchable boron alloyed steel 22MnB5 before and after hot stamping process

Abstract:
Recently, one of the most important issues in the automotive industry is lightweight construction. While maintaining safety standards, the fuel consumption can be decreased by reducing the weight of the vehicle. To manufacture lightweight vehicle components with high strength, hot stamping with quenchable boron steels is becoming more common in automotive industries. However, the high strength achieved in the press-hardened parts causes severe wear and sometimes unexpected premature failure in the blanking tools during the trimming and piercing processes. Because of high costs for repairing blanking tools, laser cutting has been used in almost all automotive industries in spite of the long process time. Thus, the aim of this work is to develop economical shearing methods for use on the press hardened ultra high strength steels which will enhance the tool life and meanwhile to achieve good product quality. As a preliminary investigation into the blanking strategies of the hardened boron steel 22MnB5, the conventional mechanical blanking process was carried out to predict the sheared edges of the parts and the wear evolution of blanking tools versus the number of blanking strokes. Subsequently, warm blanking was performed with a developed tool, while simultaneously applying hot stamping process to improve the tool life by reducing the shearing load.