Clean forming of stainless steel and titanium products by lubricious oxides

Big social benefits can be attained through increased use of stainless steel or titanium in new sheet metal applications. Unfortunately, forming of these materials is often a challenging and costly operation, that can lead to environmental and health problems when solving the technical limitations. One possible method to overcome these problems is to use an oxide layer with optimised properties to reduce friction during forming, either as a substitute to lubricants, or acting as a conversion layer for environmental friendly lubricants. The most beneficial group of oxides for low friction is called lubricious oxides with a rutile crystal structure. Oxides of Ti, Mo, V, and Zn can build rutiles under certain contact temperatures during rolling and forming. The aim of this investigation is to evaluate if oxides designed on metal sheets display a lubricious effect under conditions similar to industrial forming processes. Preliminary evaluations show a beneficial influence of two oxides types, on stainless steel and on titanium. More work is needed to test the lubricating effect in other forming operations and to analyse the sustainability aspects for products manufactured with this alternative surface.