corrosion resistance and mechanical properties [49]. This modern direction of studies is aimed at producing sintered stainless steel with its surface free of any roughness and offering higher corrosive resistance and mechanical properties. The final outcome of the proposed technology is to achieve a duplex structure in the surface layer on the substrate made of sintered ferritic single-phase steel and austenitic steel that will be characterised by improved anticorrosive properties, in particular improved resistance to pitting corrosion and a duplex structure with enhanced mechanical properties on the substrate made of sintered dual-phase steel characterised by improved corrosive resistance combined with strong grain refining resulting from fast crystallisation, which will additionally improve functional properties. In addition, the modern surface treatment methods combined with the controlled depth of laser beam's interaction and introducing additional alloying materials into the surface layer allows to achieve a gradient structure of the item, which is beneficial considering functional properties. Other state-of-the-art and promising works contain the effect of specific elements introduced into TRIP steel on its structure and properties is also undertaken. Complex hot-work tool steels should be characterised by their functional properties first of all (such as abrasive resistance and resistance to heat fatigue) exceeding other steel grades. Of note are also studies over hot-work tool steel properties are concerned with the impact of micro-additions, especially Ce, Zr and Ti on the progress of structural mechanisms and the properties of thermally-treated steel, with subsequent heat fatigue due to repetitive inductive heating and fast cooling. Studies have also been undertaken on the enrichment of surface of such steel by applying other types of lasers, including disc lasers.

Summing up, it should be underlined that the foresight- materials science research described in this chapter are a fragment of broader individual activity [1-3, 37-43, 50-53] aimed at selecting, researching, characterizing and determining strategic development perspectives of priority innovative material surface engineering technologies in the process of technological e-foresight understanding as computer aided scientific forecasting and shaping of the future in researched area.

References


