Low temperature gaseous nitriding and carburising of stainless steel

The response of various austenitic and duplex stainless steel grades to low temperature gaseous nitriding and carburising was investigated. Gaseous nitriding was performed in ammonia/hydrogen mixtures at temperatures 723 K; gaseous carburising was carried out in carbon monoxide/hydrogen mixtures for temperatures 783 K. The case developed by thermochemical treatment was examined using reflected light microscopy, X-ray diffraction analysis and microhardness testing. Both nitriding and carburising led to the development of expanded austenite in the surface adjacent zone, irrespective of the phase constitution of the substrate. A two step process, consisting of carburising followed by nitriding, provides great flexibility with regard to adjusting the hardness–depth profile.