Influence of Ag and MoS_2 addition on high temperature wear of Ni-based self-lubricating laser claddings

R. Kumar[1,2,*], M. Varga[2], M. Rodríguez Ripoll[2], M. Antonov[1], R. Ivanov[1], I. Hussainova[1]

[1]Department of Mechanical & Industrial Engineering, Tallinn University of Technology, Tallinn, 19086, Estonia

[2]AC2T research GmbH, Viktor-Kaplan-Straße 2/C, 2700 Wiener Neustadt, Austria

For hot forming and other high temperature applications where, conventional lubricants pose problems due to their degradation and worsening human health, solid lubricants are the key to increasing performance. In the current work, self-lubricating NiCrSiB coatings with addition of different blends of solid lubricants Ag and MoS_2 were fabricated through laser cladding on stainless steel substrates. Tribological performance of the clads were evaluated under reciprocating sliding condition in a pin-on-plate configuration at temperatures up to 600°C. The formation of lubricous phases and their effect on friction reduction was studied. The worn surfaces were investigated using scanning electron microscopy, energy dispersive spectroscopy and 3D profilometry to understand the responsible wear mechanisms. The results are reported in comparison to the unmodified reference alloy.

Keywords: Solid lubricant; Ag; MoS_2; NiCrSiB; sliding wear; laser cladding

*Corresponding author: rahul.kumar@taltech.ee