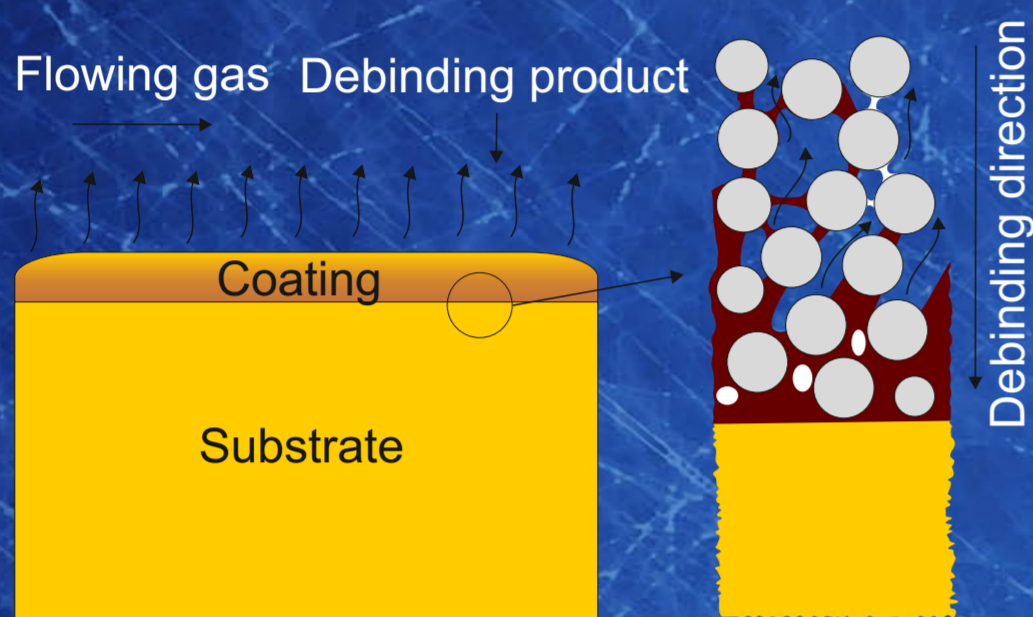


Manufacturing of corrosion-resistant surface layers by coating non-alloy steels with a polymer-powder slurry and sintering

Matula Grzegorz

Scientific and Didactic Laboratory of Nanotechnology and Materials Technologies,
Faculty of Mechanical Engineering,
Silesian University of Technology, Gliwice, Poland

CONCEPTION



APPLICATION

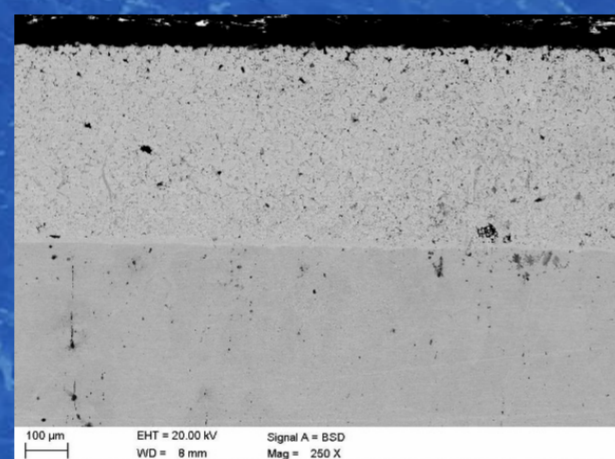
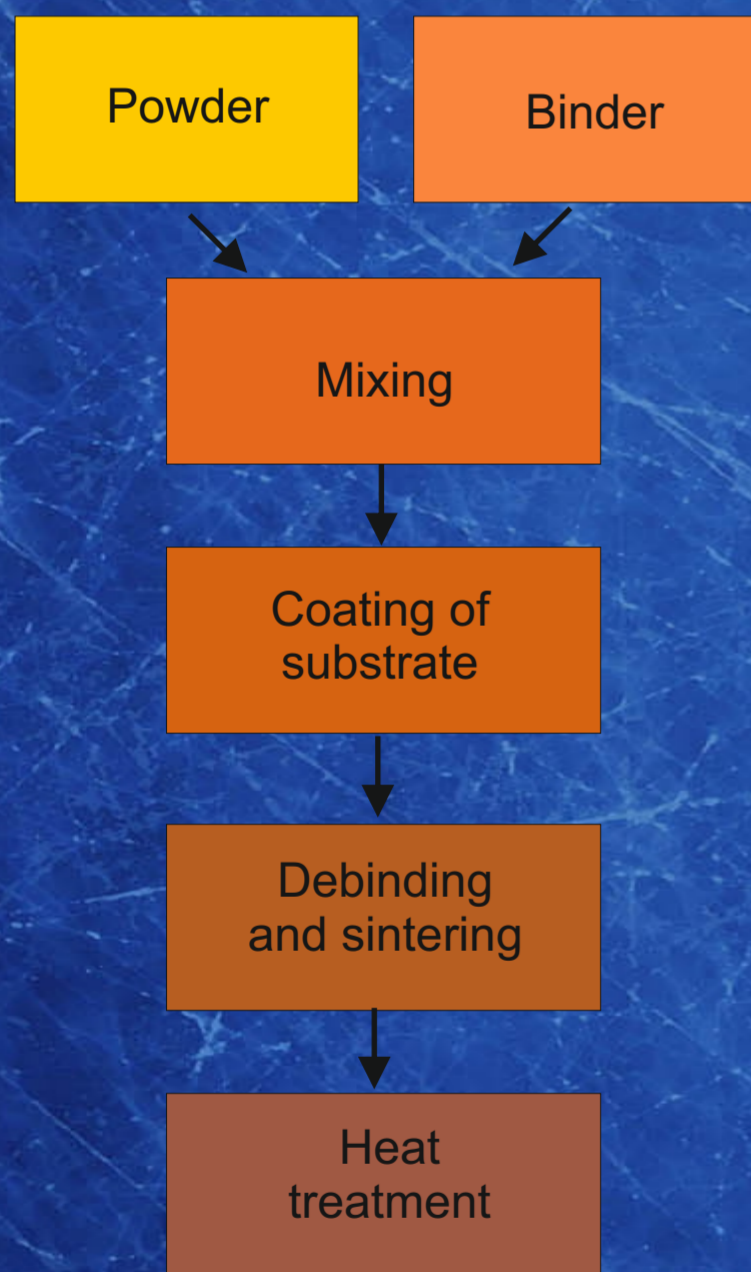


Sample of unalloyed steel, a) uncoated, b) coated, c) sintered

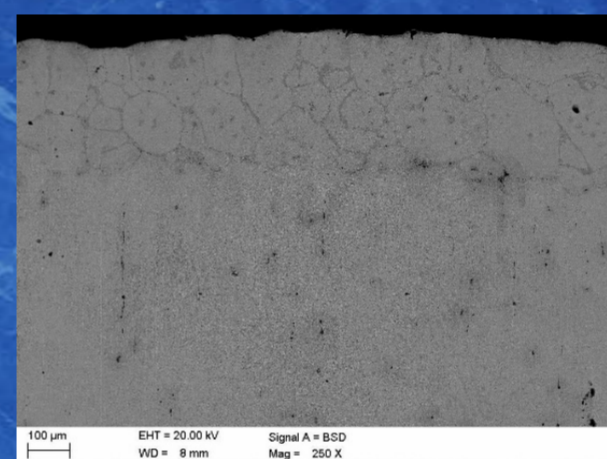


Screw of extrusion machine partially coated by polymer-powder slurry

RESULTS



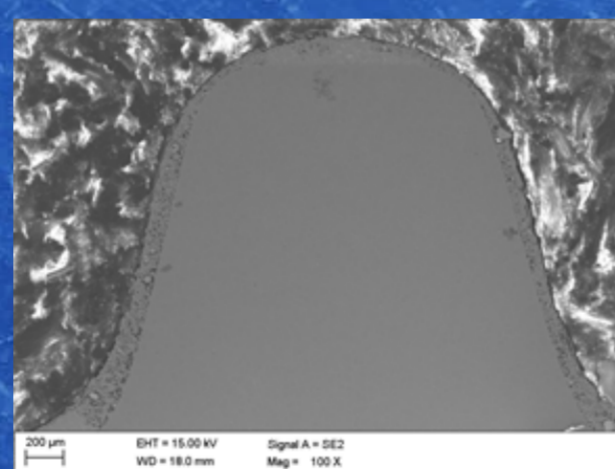
Layer of austenitic steel



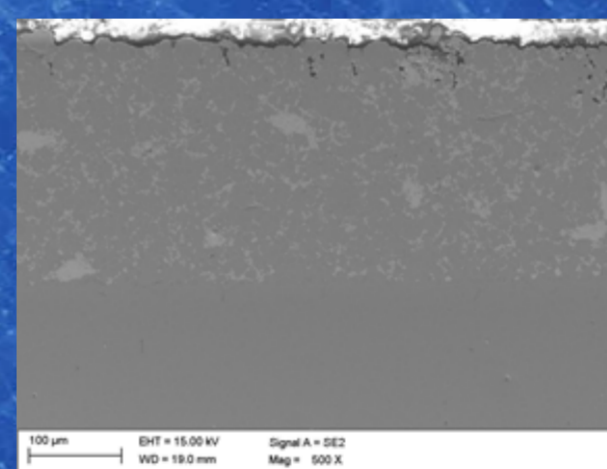
Layer of ferritic steel



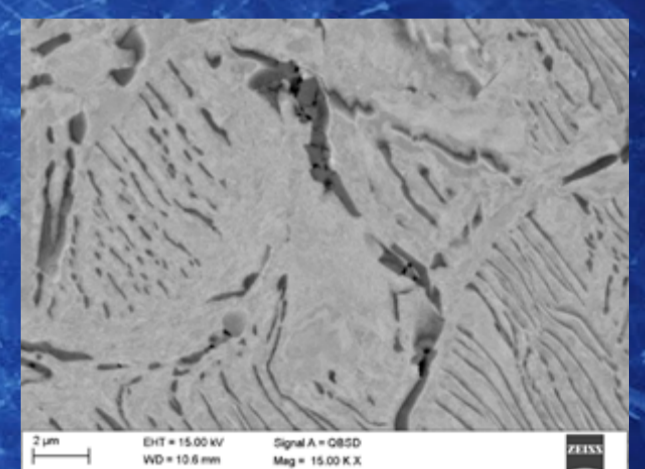
Layer of ferritic steel etched with nital



Layer of austenitic steel on irregular surface of substrat



Structure of carbide-steel layer



Structure of austenitic layer sintered in nitrogen reach atmosphere

CONCLUSIONS

The sinters manufactured as stainless steel and carbide-steel layers on a non-alloy steel substrate tightly cover the substrate and do not show decohesion under well-chosen manufacturing conditions. The top layers are characterized by relatively low porosity. Undoubtedly, the sintering temperature and the atmosphere are of decisive importance regarding the properties and structure of the sintered layers. Using a nitrogen-rich atmosphere causes the release of carbonitrides in the 316L stainless steel layer, which slightly increases the hardness of the surface layer and does not require the application of carbide powder. However, due to the austenitic structure, it is still plastic, and even the addition of carbides does not increase the hardness to the level of 430 steel reinforced with carbides, reaching 540HV. Particular attention should be paid to the fact that the applied technology of coating non-alloy steels with a polymer-powder slurry allows for manufacturing surface layers on developed surfaces and hard-to-reach holes. Despite the irregular surface of the substrate, the applied top layer is continuous both after degradation and sintering