New sol–gel refractory coatings on chemically-bonded sand cores for foundry applications to improve casting surface quality

Foundry refractory coatings protect bonded sand cores and moulds from producing defective castings during the casting process by providing a barrier between the core and the liquid metal. In this study, new sol–gel refractory coating on phenolic urethane cold box (PUCB) core was examined. The coating density, viscosity, moisture content and wet and dry weight of the coating were evaluated on cores that had been coated at three different dip-coating times. The coating coverage, surface appearance and depth of penetration into the cores were examined with a Stereomicroscope. Gray iron castings were produced with sol-gel coated and uncoated cores and the results were related to the coating properties. The casting results were also compared with castings made with cores coated with commercial alcohol-based and water-based foundry coatings. The analyses show that castings produced with sol–gel coated cores have better surface quality than those from uncoated cores and comparable surface quality with the commercial coatings. Therefore, the new sol–gel coating has a potential application in the foundry industry for improving the surface finish of castings thereby reducing the cost of fettling in the foundry industry since the raw materials and technology are easily affordable.