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Effect of Powder Shape on Physical Properties of Porous Coatings

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Abstract : Decreasing the size of heat exchangers in industries is favorable due to a reduction in the initial costs and maintenance. This can be achieved generally by increasing the heat transfer coefficient, which can be done by increasing tube surface by passive methods named “porous coat”. Since these coatings are often in contact with the fluid, mechanical strength of coatings should be considered as main concept beside permeability and porosity in design, especially in high velocity services. Powder shape affected mechanical property more than other factors. So in this study, the Copper powder with three different shapes (spherical, dendritic and irregular) was coated on Cu-Ni base metal with thickness of ~300µm in a reduction atmosphere (5% H2-N2) and programmable furnace. The morphology and physical properties of coatings, such as porosity, permeability and mechanical strength were investigated. Results show although irregular particle have maximum porosity and permeability but strength level close to spherical powder, in addition, mentioned particle has low production cost, so for creating porous coats in high velocity services these powder recommended.

Keywords : porous coat, permeability, mechanical strength, porosity
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