

Improvement of surface hardness of duplex stainless steel by laser shock hardening for the application to seawater desalination pump

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ABSTRACT

A high-capacity pump for seawater desalination plant is open to highly corrosive and abrasive environment. To improve anti-corrosion and anti-abrasion properties of pump material, laser modification technology can be applied to the surface of pump material. In this work, experimental results for the laser shock hardening of 2205 duplex stainless steel (22% chromium–5% nickel) for the application to rotating pump parts are reported. The changes in surface hardness and morphology before and after laser shock hardening are investigated for varying process conditions. It is demonstrated that the hardness of duplex stainless steel can be significantly enhanced, up to 30%, by properly controlling the process parameters. The applicability of laser shock hardening for surface treatment of mechanical parts of seawater desalination pumps is discussed.

Keywords: Desalination; Pump; Laser shock hardening; Hardness; Residual stress

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