

Process Optimisation for Internal Cylindrical Rough Turning of Nickel Alloy 625 Weld Overlay

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Abstract : Nickel-based superalloys are generally known to be difficult to cut due to their strength, low thermal conductivity, and high work hardening tendency. Superalloy such as alloy 625 is often used in the oil and gas industry as a surfacing material to provide wear and corrosion resistance to components. The material is typically applied onto a metallic substrate through weld overlay cladding, an arc welding technique. Cladded surfaces are always rugged and carry a tough skin; this creates further difficulties to the machining process. The present work utilised design of experiment to optimise the internal cylindrical rough turning for weld overlay surfaces. An L27 orthogonal array was used to assess effects of the four selected key process variables: cutting insert, depth of cut, feed rate, and cutting speed. The optimal cutting conditions were determined based on productivity and the level of tool wear.

Keywords : cylindrical turning, nickel superalloy, turning of overlay, weld overlay

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