Tribological study in roll forming of lean duplex stainless steel sheets - DTU Orbit

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In roll forming a sheet metal strip undergoes deformation in several successive forming steps until the desired shape is reached. It is a very cost effective process to produce series of continuous profiles. Though roll forming is not considered a tribologically critical process, as process loads are relatively low and surface expansion is more or less non-existent, long roll forming production runs imply large sliding/contact lengths due to relative movement between steel strip and rolls. This requires an efficient tribological system to prevent pick-up formation on the forming tools. The present work focus on tribological issues are galling and pick-up formation as well as tool life in roll forming of stainless duplex steel sheets. The roll forming process is exemplified by production of an s-shaped profile used in interlock carcass production for flexible pipes used in off-shore oil extraction.

Production tests show that galling can be a problem but pick-up formation on the tools seems to reach a consistent level. Improvements to tool surfaces and lubricant quality are proposed with a view to optimizing the tribo-system in order to increase the produced length before galling initiates and tool refurbishing is required. The production also shows damage to critical tool surfaces after extensive production time. Investigations focus on adhesive wear due to lubricant film breakdown and tool fatigue. Finite Element Analysis (FEA) is utilized to analyse contact interface pressures for estimation of stresses on the tools and tribological system.

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