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# Influence of Rotation Speed and Axial Force on the Friction Stir Welding of AISI 410S Ferritic Stainless Steel

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**Abstract.** The Friction Stir Welding process parameters were varied to provide a combination of an acceptable surface finish, absence of cracks, and full tool penetration. Two levels of rotation speed and axial forces from 10 to 30 kN were applied, whilst keeping the welding speed constant at 1 mm/s. One of the defects analyzed was the production of flashes. This can occur due to an increase in axial force and because of the instability in its applications, which implies directly on the formation of volumetric defects along the stir zone. FSW joints without root flaws can be achieved through a correct balance between the axial force and rotation speed, which also allows a greater immersion of the tool probe in the joint. Both rotation speeds using an axial force of around 20 kN proved to be good welding parameters for the FSW process. The welding of the AISI 410S steel (under these conditions) resulted in joints without internal defects and with a good surface finish.