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## Studies on the specific drills for austenitic stainless steel 1Cr18Ni9Ti

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**Abstract:** Specific drills are developed for austenitic stainless steel 1Cr18Ni9Ti. The drills are designed by UG software and fabricated by ANCA TGX multi-axis CNC tool grinding machine. Three different coatings, TiN, TiAlN and TiCN, are utilised by PLATIT PL1000 coating system. Drilling performance is evaluated by chip deformation coefficient, thrust force, torque, cutting temperature and cutting tool failure mechanism. Results indicate that new specific drill with split point surface, 138° point angle and 38° helix angle is suitable for 1Cr18Ni9Ti. Compared to commercial available standard uncoated drill, the new uncoated drill makes thrust force decrease 40% and torque decrease 35% under the same cutting parameters. TiN-coated drill, TiAlN-coated drill and TiCN-coated drill yield good cutting performance and tool life increases by 138%, 188% and 255%, respectively. New specific drill with TiCN coating is appropriate in drilling of 1Cr18Ni9Ti with long tool life and high material removal rate.

**Keywords:** drill; drilling performance evaluation; CAD; surface configuration; tool grinding; coating; tool failure mechanism; austenitic stainless steel; tool life; chip evacuation.

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