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Notice for the PhD Viva Voce Examination

Mr Ivan Sunit Rout (Reg. No. 1670087), PhD scholar at CHRIST (Deemed to be University), will defend his PhD thesis at the public viva-voce examination on Tuesday, 22 December 2020 at 3.00 pm on the Webex Meeting platform.

Title of the Thesis	:	**An Investigative Approach to Hard Machining of Inconel 718 with Coated Carbide Tool**
Discipline	:	**Engineering**
External Examiner (Outside Karnataka)	:	**Dr Jeyaprakash J** Professor Department of Mechanical Engineering Saveetha School of Engineering Saveetha Institute of Medical and Technical Sciences Saveetha Nagar, Tandalam, Chennai, Tamilnadu
External Examiner (Within Karnataka)	:	**Dr Shanmukha Nagaraj** Professor & Dean Department of Mechanical Engineering R V College of Engineering R V Vidyaniketan Post Mysuru Road Bengaluru - 560059 Karnataka
Supervisor	:	**Dr P Pal Pandian** Associate Professor Department of Mechanical and Automobile Engineering School of Engineering and Technology CHRIST (Deemed to be University) Bengaluru Kengeri Campus Bengaluru - 560074 Karnataka

The members of the Research Advisory Committee of the Scholar, the faculty members of the Department and the School, interested experts and research scholars of all the branches of research are cordially invited to attend this open viva.

Registrar

Place: Bengaluru
Date: 16 December 2020

ABSTRACT

Super alloys sustain good strength at high temperature and pressure conditions. Such materials have high demand in Aerospace industry, Marine industry, and Nuclear power plants. They have a great demand in Nuclear and Aerospace applications because of it retain its properties at temperature over 700 °C. Machinability of nickel based super - alloys is extremely poor, mainly due to their low thermal conductivity, build up edge and self-hardening which leads to high dynamic cutting forces. They are difficult to machine because of its high shear strength, work hardening and precipitation hardening. High abrasive particles in its microstructure and tendency forming chip to weld to tool and form Built Up Edge (BUE) make it more difficult to machine. Friction between tool and material and its low thermal conductivity results in high temperature generation. They have Nickel (Ni), Chromium (Cr), Ferrous (Fe) or Cobalt (Co) as base contains. Small amount of Al, Ti, Nb, Ta, W, Mo added to these alloys to sustain at high temperature. Chromium is important alloying element in order to obtain the hot corrosion resistance property. Due to these factors the tool wear is extremely high and increasing the tool life by minutes is an enormous success. To overcome this situation, various materials have been developed for Inconel 718 machining. Though Ceramic tools, Silicon Carbide whiskers, reinforced alumina tools, carbide tools have been used to machine Inconel 718 but they have failed to produce good surface, better accuracy and minimum tool wear. The present study is to improvise the surface roughness, reduce tool wear and create better machining parameters for extensive use of the material. Taguchi methodology, Grey Relational Analysis (GRA) and Response Surface Methodology (RSM) have been used to analyze the cutting parameters and determine better response parameters for the machining characteristics of Inconel 718. The tools taken for machining are Tungsten Carbide tool and Ceramics tool which are found to be suitable tools for improving the machinability of Inconel 718. Coating (AlTiCrN) of Tungsten Carbide tool has been developed to increase the tool life and provide better machining features on Inconel 718. The Coated tool is compared with Cryogenic treated tool s and Ceramic tool to find its suitability over machining Inconel 718.

Keywords: Tungsten Carbide, Ceramics, PVD Coating, Cryogenic Treatment, ANOVA, Grey Relational Analysis, Response Surface Methodology