**Effect of grain size on machinability and fatigue life of Inconel -718**

**Qasim Murtaza, Baibhav Kumar, Anshuman Piyush, Anant Vohra**

1Mechanical Engg. , Delhi Technological University, Delhi, New Delhi, India, baibhavkumar\_me20a8\_69@dtu.ac.in

2Mechanical Engg. , Delhi Technological University, Delhi, New Delhi, India, anshumanpiyush\_me20a8\_57@dtu.ac.in

**Baibhav Kumar**

**Abstract:** In this study, Inconel 718 is systematically classified into three grain sizes: fine, medium, and coarse. These parts are then subjected to wire EDM machining in three separate conditions to produce machining patterns named Rough, Trim3, and Trim5. The resulting 3x3 factorial design allows for a thorough investigation of the relationship between particle size and processing methods. Processed specimens are carefully inspected with particular attention to surface roughness, residual stresses and fatigue life. Statistical analysis, including analysis of variance (ANOVA), was used to describe the relationship between particle size, sample processing area, and the results of the three tests. Our findings show a significant relationship between residual stress and surface roughness in a subset of mechanical models, supported at a 95% confidence level. Other hypotheses were not well supported. To ensure clarity, the microstructure of the fabricated samples was carefully examined by fractography and scanning electron microscopy (SEM). In addition, ABAQUS/Standard analysis of four bending tests on Inconel 718 was performed and the results were satisfactory. This comprehensive approach provides valuable insight into the complex relationships between particle size, processing methods and material properties. These findings contribute to a solid foundation for further exploration and application in materials science and engineering

**What will audience learn from your presentation?**

* The effect of grain size variation on microstructural property of Onconel-718
* Surface characterisation and inclusions
* Effect of machinability on surface roughness and residual stress of Inconel-718
* Integrate the material enhanced surface layer in aerospace elevated gas turbine engine
* Material property alterations on account of resistive forces

**Biography of presenting author** (should not exceed 100 words)

Baibhav Kumar is currently a Sophomore at Delhi Technological University(Formerly Delhi College of Engineering) pursuing my Bachelor of Technology having a major in Mechanical Engineering. Skilled in Vehicle Dynamics(Brakes for ATV vehicle), Content head at editorial, hands on MATLAB, solid works, ANSYS and actively looking for research opportunities in Manufacturing and process plant. He has vast experience in material science and chemical engineering research , have worked in DRDO , University of Montreal -MITACS Globalink Research Intern. He is passionate towards atomic inclusions and property characterisation for superalloys.

**Details of presenting author to be mentioned in certificate:**

Name: Baibhav Kumar

Affiliation: Delhi Technological University

Country:India

**Other Details:**

Presentation Category: Oral/In-person

Session Name: Chemical Engineering

Email: baibhavkumar\_me20a8\_69@dtu.ac.in

Alternative Email:baibhav.vsv@gmail.com

Contact Number:+91 9773966064
Whatsapp Number: +91 -9773966064

Twitter/Facebook/LinkedIn: https://www.linkedin.com/in/baibhav-kumar-461899201/
Suggestion of speakers to be invited: Names and email address of your colleagues or friends interested to attend.

Recent Photograph: (High Resolution)

