# Title of Paper

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## Abstract

Abstract must be written in Times New Roman, font 10 (upto 200 w0rds). The paper presents a hybrid methodology of Artificial Neural Network (ANN) and Non-Dominated Sorting Algorithm-II (NSGA-II) to predict and optimize the material removal rate (MRR) and average surface roughness due to Electrical Discharge Grinding of tungsten carbide cobalt composite. The results indicate that the ANN model can predict the process parameters with reasonable accuracy under varying machining conditions. The optimization results also have been presented and discussed.

**Keywords:** Hybrid, Machining, Electrical Discharge Grinding, Artificial Neural Network, Genetic Algorithm, Optimization

## Introduction

(Times New Roman, font 11) Tungsten carbide cobalt (WC-Co) composite is an advanced engineering material having major applications in the field of cutting tools, dies, mining tools, indenters and other industrial applications where hardness and wear resistance are critical parameters [1]. Similar findings were observed by several researchers [2-5].

## Methodology

(Times New Roman, font 11) (Times New Roman, font 11) Tungsten carbide cobalt (WC-Co) composite is an advanced engineering material having major applications in the field of cutting tools, dies, mining tools, indenters and other industrial applications where hardness and wear resistance are critical parameters [1]. Similar findings were observed by several researchers [2-5]. (Times New Roman, font 11) Tungsten carbide cobalt (WC-Co) composite is an advanced engineering material having major applications in the field. (Times New Roman, font 11) Tungsten carbide cobalt composite is an advanced engineering material.

## Results and Discussion

(Times New Roman, font 11) Tungsten carbide cobalt (WC-Co) composite is an advanced engineering material having major applications in the field of cutting tools, dies, mining tools, indenters and other industrial applications where hardness and wear resistance are critical parameters [1]. Similar findings were observed by several researchers [2-5]. (Times New Roman, font 11)

## Subsection *(Times New Roman, font 12)*

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**Figure 1:** ANN architecture

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**Table 1:** Center align (Times New Roman, font 11)

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Factors** | **Values** |
| S | Wheel speed (RPM) | 700 | 900 | 1100 | 1300 | 1500 |
| C | Pulse current (amp) | 2 | 4 | 6 | 8 | 10 |
| T | Pulse on-time (µs) | 40 | 70 | 100 | 130 | 160 |
| D | Duty factor | 0.47 | 0.55 | 0.63 | 0.71 | 0.79 |

## Equations

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 MRR=mm3/min

 where, ***mi*** = Initial mass and ***mf*** =Final mass

## Conclusions

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1. Tungusten carbide cobalt (WC-Co) composite is an advanced engineering material.
2. Having major applications in the field of cutting tools, dies, mining tools, indenters and other industrial applications where hardness and wear resistance.
3. Similar findings were observed by several researchers.

## Acknowledgement

(Times New Roman, font 11) This work supported by Research Program supported by the Department of Technical Education (program name), Country Name.

## References

1. Groover MP. *Fundamentals of Modern Manufacturing: Materials, Processes, and Systems.*John Wiley and Sons, New Delhi, **2009**. (Times New Roman, font 11)
2. Choudhury SK, Jain VK and Gupta M. Electrical discharge diamond grinding of high speed steel. *Machining Science and Technology.*  3 (1) 91-105, **2008**. (Times New Roman, font 11)
3. Yadav RN, Mishra S and Yadav M. A state of art on turning process. Proceedings of *the 3rd International Conference on Advancements and Recent Innovations in Mechanical, Production and Industrial Engineering (ARIMPIE-2017)*, ITS Engineering College Greater Noida, India, April 21-22, 306-311, **2017**. (Times New Roman, font 11)
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