*Proceedings of the International Conference on Industrial Engineering and Operations Management*

Publisher: IEOM Society International, USA DOI: 10.46254/IN05.20250444
Published: November 6, 2025

# Postural Analysis of CNC Machine Operators by Ergonomic Assessment Tools RULA and REBA

**Gunderaya**
Student, Department of Industrial & Production Engineering
P.D.A. College of Engineering, Kalaburagi, India
gunderayash2001@gmail.com

**Qutubuddin S.M.**
Professor, P.D.A. College of Engineering, Kalaburagi, India
syedqutub16@gmail.com

**Saniya and Laxmi**
Student, Department of Industrial & Production Engineering
P.D.A. College of Engineering, Kalaburagi, India
naiksaniya463@gmail.com, chavanlaxmi193@gmail.com

**Fatima Firdous Nikhat**
Assistant Professor, Faculty of Engineering
KBN University, Kalaburagi, India
fatima.afn05@gmail.com

**Umme Salma**
Assistant Professor, Faculty of Engineering
KBN University, Kalaburagi, India
umme.salma26@gmail.com

## Abstract

Computer Numerical Control machines are extensively used in manufacturing, and the operators perform tasks like programming, tool handling and monitoring. In this era of advance manufacturing techniques, design of machine tools also plays a crucial role in productivity maximization, as well health and safety of the operators. It is often seen in these manufacturing environments that the workers adopt awkward and static working postures like trunk bending, neck flexion, forceful grips while handling heavy loads affecting the health and safety of the operators. Exposure to one or more risk factors may cause an increase in the prevalence of the musculoskeletal disorders. The present study is aimed to identify the ergonomic risks associated with the postures of Computer Numerical Control (CNC) machine operators using the REBA method. The goal is to determine the likelihood of work-related musculoskeletal disorders (WMSDs) and recommend interventions. This study is conducted in a heavy component manufacturing industry in Maharashtra State. The methodology involves posture analysis using ergonomic assessment techniques such as Rapid Upper Limb Assessment (RULA) and Rapid Entire Body Assessment (REBA). The results indicate about 40% postures in high risk according to RULA analysis. Similar results were obtained by REBA analysis (46% postures in high risk and 11% postures in very high-risk categories). The postural analysis consistently demonstrates significant

ergonomic risks in CNC machining, leading to work-related musculoskeletal disorders. The resulting high-risk scores underscore the necessity for implementing ergonomic improvements, which can enhance worker health, reduce the risk of injury, and increase overall productivity. Several suggestions were made such as Ergonomic Interventions – incorporating adjustable work tables, platforms and material handling assists to eliminate awkward postures. Process Modification- implement standard operating procedures to minimize manual lifting and reduce static or prolonged awkward postures and Training and awareness of the workers on Ergonomic Principles.

## Keywords
CNC machines, Awkward Postures, RULA, REBA, Musculoskeletal Disorders