

# **Identification of Ergonomic Risk Factors and Postural Analysis in Electrical Transformer Manufacturing Industry**

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## **Abstract**

Ergonomics is concerned with the analysis of several work-related factors that may be a potential risk for developing musculoskeletal disorders, and development of solutions to eliminate or reduce such risks. The present study aims to identify ergonomic risk factors and analysis of postures in an electrical distribution transformer manufacturing industry in Karnataka. Some of the major activities in transformer manufacturing are core building, coil winding, drying in oven, final assembly and manufacturing of tanks. The manufacturing activities are characterized by repetitive actions, forceful, or prolonged exertion of the hands, heavy lifting and carrying of heavy objects; and prolonged awkward postures. The industry employs about 150 workers and 60 workers were selected for the study. A sample of 36 workers from various sections is selected for study. The mean age is  $31.41 \pm 8.17$  year and average experience  $9.26 \pm 5.91$  year. The Body Mass Index (BMI) indicated 75% workers are normal and only 8% are overweight. A MSD questionnaire was used to determine the prevalence of MSDs and ergonomic assessment tools RULA and REBA were used for postural analysis. The self reported MSD questionnaire shows discomfort in lower back (86%), upper back (55%), wrists/hands (61%) and shoulder (58%). The results of RULA and REBA revealed about 40% and 47% postures in high risk category. Few selected postures are analyzed using CATIA software and recommended improvements are shown which results in reducing the risks of postures. To reduce the risk factors several ergonomic interventions were recommended like redesign of work stations to reduce awkward postures, and risks of manual handling. Use of personnel protective equipment is also recommended and awareness and training the workers about ergonomic principles may result in improved health, environment and productivity.

## **Keywords**

Ergonomics, Postural Analysis, WRMSDs, RULA, REBA

## **Biographies**

**Vidyadhar G Biradar** is a PhD. Candidate in the Industrial and Production Engineering Department under Visvesvaraya Technological University, Belagavi, India. He has completed B.E in Mechanical Engineering and

M.Tech in Production Engineering. Currently he is working as Assistant Professor in Mechanical Engineering Department, PDA College of Engineering, Kalaburagi. His research interest includes Ergonomics/ Human factors, CAD/CAM, Manufacturing.

**Dr. Qutubuddin S.M.** is presently working as Associate Professor, Industrial and Production Engineering Department, P.D.A.College of Engineering, Kalaburagi. He has more than 29 years experience in teaching and research and has published more than 40 papers in International and National journals and Conferences. He has introduced the course Human Factors and Ergonomics in the curriculum in under graduate engineering and has developed laboratories such as Industrial Engineering Laboratory and Ergonomics Laboratory. He is a life member of four societies including ISTE, IIPE, IAENG, and ISE. He is an active member of IEOM Society and serving the society in various capacities. Research interest include Industrial Ergonomics; Human Factors; Occupational Health and Safety; Productivity Improvement Studies; Production/Operations Management; Environmental Ergonomics.

**Dr. Hebbal S.S.** is presently working as Principal, P.D.A.College of Engineering, Kalaburagi, Karnataka. He has over 33 years of experience in teaching and research. He has held various positions as Head of Department, Industrial & Production Engineering, Dean, and Principal. He also served as member of Senate, Visvesvariah Technological University, Belgaum. He obtained PhD from IIT, Roorkee. He has guided several MTech theses and supervised 15 scholars for PhD. Currently, 6 research scholars are working under his guidance. He has attended a number of International and National Conferences. He has over 100 publications in peer reviewed journals and conferences.