

Design of Hand Tools (*Raghawal and Raghawal Patti*) and Improvement of Workstation Design in Dal Mill using CATIA

Someshwari Agre

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

Qutubuddin S.M.

Associate Professor, Department of Industrial & Production Engineering,
P.D.A.College of Engineering, Kalaburagi, India
syedqutub16@gmail.com

Smita Shabadi and Rudreshwar Hiremath

Students, Department of Industrial & Production Engineering,
P.D.A.College of Engineering, Kalaburagi, India
smitasmita1919@gmail.com, rudreshwarhiremath@gmail.com

Pooja Alookar

Trainee Engineer, Epiroc India
poojaalookar01174@gmail.com

Abstract

Kalaburagi in North Karnataka is a cluster for pulse processing units locally called as ‘dal mills’. Most of the units are small scale employing about 20-30 workers and about 300 plus industries are located. Pulse processing is carried out by machines, but many of the activities like loading, unloading, material handling, drying in sun, filling the bags etc. is carried out manually. The study focuses on the awkward working postures of workers and design of hand tools for spreading, and filling the pulses. The tools presently used are studied and the compatibility with operators noted down. The tools used known as ‘rake’ and ‘rake hoe’, but locally called as ‘*raghawal*’, *raghawal patti* and *chata* are designed in CATIA considering the anthropometric measurements of the workers. A modification is done and the tools *raghawal* and *raghawal patti* are redesigned and combined, thus saving the costs. RULA and REBA analysis is done on selected postures which indicate high risks (about 48% and 53%) in most of the postures and need corrective action. Another improvement is shown at the mixing workstation, where the risk is high due to unnatural postures. The workstation is designed in CATIA showing improvements in working posture and reducing the risks of musculoskeletal disorders. The findings also revealed prevalence of musculoskeletal disorders, excessive noise, poor awareness and usage of personnel protection devices like masks, ear plug, shoes etc. Several suggestions and recommendations are made to improve the working conditions to reduce the risks of MSDs, better design of tools and encourage the use of PPEs in the dal mills.

Keywords

RULA, REBA, Dal Mill, Musculoskeletal disorders, and CATIA.

Biographies



Someshwari Agre



Smita Shabadi



Rudreshwar Hiremath



Pooja Aloorkar

Someshwari Agre, Smita Shabadi and Rudreshwar Hiremath are students in Industrial & Production Engineering Department, P.D.A.College of Engineering, Kalaburagi. **Pooja Aloorkar** is an alumni passed out last year and working in Epiroc India. Apart from academics they are a part of the research group in Human Factors and Ergonomics Laboratory. They are also actively involved in organizing various events and local industrial visits under IEOM student chapter, and have competed in Best Student Chapter competition at 12th Annual IEOM International Conference at Istanbul, Turkey in March 2022, and awarded the Best Student Chapter. Pooja Aloorkar and her group has presented a paper at 18th International Conference on Humanizing Work and Work Environment (HWWE2020) 10th -12th Dec 2020. She has also presented a paper in First Central American and Caribbean International Conference on Industrial Engineering and Operations Management, Port-au-Prince, Haiti, June 15-16, 2021. The group has also presented a paper at International Conference on Industrial Engineering and Operations Management, Harbin, China, July 9-11, 2021. The group has also been a part of the 4th African International Conference on Industrial Engineering and Operations Management, Nsukka, Nigeria, April 5-7, 2022.



Dr. Qutubuddin S.M., working as Associate Professor, Industrial and Production Engineering Department, P.D.A.College of Engineering, Kalaburagi. He has more than 30 years experience in teaching and research and has published more than 40 papers in International and National journals and Conferences. Under his supervision 01 research scholar has completed PhD and 02 are undergoing. His research interest include Human Factors and Ergonomics, Occupational Health and Safety; Production/Operations Management. 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, Human Factors & Ergonomics Laboratory and Quality Control Laboratory. He was actively involved in getting NBA accreditation for the department. He is a life member of ISTE, IPE, IAENG and IEOM Society USA. He has started a student chapter of Industrial Engineering and Operations Management Society (IEOM) Michigan, USA in the institute. The chapter was awarded the best student chapter in the year 2019 at IEOM International conference in Bangkok, and in 2020 at IEOM International conference held at DUBAI and in Isnatbul 2022. He is serving regularly in various capacities as a Reviewer, Track Chair, Session Chair and Technical Committee member in IEOM International conferences since 2015. He is assigned as Director of IEOM Operations in India. Under his guidance UG students have participated and presented papers in International Conferences in India and abroad.