

Dr Raju Prasad Mahto

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RESEARCH INTEREST

- Friction Stir Welding, Friction Stir Processing, Friction Cladding, Numerical Modelling and Simulation, Industry 4.0, Laser Welding and Cladding.

PUBLICATIONS: (24=1+15+4+4)

• Patent

- Pal SK, Kumari K, Mahto RP, Sharma V. A COUNTER ROTATING PIN AND SHOULDER TOOL ARRANGEMENT FOR FRICTION STIR WELD SYSTEM, Filled Application no. 201631016398.11/05/2016 (Indian).

• Journal.

- **Mahto RP**, Bhoje R, Pal SK, Joshi HS, Das S. A study on mechanical properties in friction stir lap welding of AA 6061-T6 and AISI 304. Mater Sci Eng A 2016;652:136–44. doi:10.1016/j.msea.2015.11.064.
- **Mahto RP**, Kumar R, Pal SK, Panda SK. A comprehensive study on force, temperature, mechanical properties and micro-structural characterizations in friction stir lap welding of dissimilar materials (AA6061-T6 and AISI304). J Manuf Process 2018;31:624–39. doi:10.1016/j.jmapro.2017.12.017,
- Parikh C, Ranjan R, Khan AR, Jain R, **Mahto RP**, Chakravarty D, et al. Volumetric defect analysis in friction stir welding based on three dimensional reconstructed images. J Manuf Process 2017;29:96–112. doi:10.1016/j.jmapro.2017.07.006.
- Ranjan R, Khan AR, Parikh C, Jain R, **Mahto RP**, Pal S, et al. Classification and identification of surface defects in friction stir welding: An image processing approach. J Manuf Process 2016;22:237–53. doi:10.1016/j.jmapro.2016.03.009.
- Sahu SK, Mishra D, **Mahto RP**, Sharma VM, Pal SK, Pal K, et al. Friction stir welding of polypropylene sheet. Eng Sci Technol an Int J 2018;21:245–54. doi:10.1016/j.jestch.2018.03.002.
- Sharma A, Sagar S, **Mahto RP**, Sahoo B, Pal SK, Paul J. Surface modification of Al6061 by graphene impregnation through a powder metallurgy assisted friction surfacing. Surf Coatings Technol 2018;337:12–23. doi:10.1016/j.surfcoat.2017.12.059.
- RB Roy, A Ghosh, S Bhattacharyya, **Mahto RP**, K Kumari, SK Pal, S Pal. Weld defect identification in friction stir welding through optimized wavelet transformation of signals and validation through X-ray micro-CT scan, The International Journal of Advanced Manufacturing Technology 99 (1-4), 623-633
- **Mahto RP**, Anishetty S, Sarkar A, Mypati O, Pal SK, Majumdar JD. Interfacial Microstructural and Corrosion Characterizations of Friction Stir Welded AA6061-T6 and AISI304 Materials. Met Mater Int 2018. doi:10.1007/s12540-018-00222-x.
- Sahu SK, Pal K, **Mahto RP**, Dash P. Monitoring of friction stir welding for dissimilar Al6063 alloy to polypropylene using sensor signals. Int J Adv Manuf Technol 104, 159–177 (2019).doi.org/10.1007/s00170-019-03855-3.
- Sharma A, Tripathi A, Narsimhachary D, **Mahto RP**, Paul J. Surface alteration of aluminium alloy by an exfoliated graphitic tribolayer during friction surfacing using a consumable graphite rich tool. Surf Topogr Metrol Prop 2019;7. doi:10.1088/2051-672X/ab4826.

- **Mahto RP**, Gupta C, Kinjawadekar M, Meena A, Pal SK. Weldability of AA6061-T6 and AISI 304 by underwater friction stir welding. *J Manuf Process* 2019;38:370–86. doi:10.1016/j.jmapro.2019.01.028.
- **Mahto RP**, Kumar R, Pal SK. Characterizations of weld defects, intermetallic compounds and mechanical properties of friction stir lap welded dissimilar alloys. *Mater Charact* 2020;160. doi:10.1016/j.matchar.2019.110115.
- **Mahto RP**, Pal SK. Friction Stir Welding of Dissimilar Materials: An Investigation of Micro structure and Nano-Indentation Study. *J Manuf Process* 2020;55:103–18. doi.org/10.1016/j.jmapro.2020.03.050.
- Iqbal MP, Tripathi A, Jain R, **Mahto RP**, Pal SK, Mandal P. Numerical modelling of microstructure in friction stir welding of aluminium alloys. *Int J Mech Sci* 2020;185. doi:10.1016/j.ijmecsci.2020.105882.
- Sahu SK, **Mahto RP**, Pal K. Investigation on Mechanical Behavior of Friction Stir Welded Nylon-6 Using Temperature Signatures. *J Mater Eng Perform* 2020;1991:1–8. doi:10.1007/s11665-020-05030-2.
- **Conference Publications**
- RP Mahto, SK Pal, Friction Stir Lap Welding of Thin AA6061-T6 and AISI304 Sheets at Different Values of Pin Penetrations, ASME 2018 13th International Manufacturing Science and Engineering.
- **RP Mahto**, Juhi Gaikwad, Ravi Kumar, Friction stir lap welding of AA6061-T6 and AISI304: Mechanical and metallurgical properties of stir zone, ASIA STEEL INTERNATIONAL CONFERENCE 2018.
- K Kumari, **RP Mahto**, SK Pal, SB Singh, Comparative Study on Effect of Counter-rotating Twin Tool and Single Tool on Temperature Rise during Friction Stir Welding.
- R P Mahto, Manan Kinjawadekar, Chaman Gupta, Prof Surjya K Pal, "Effect of pin diameter in underwater friction stir lap welding of dissimilar materials: AA6061-T6 and AISI304 ", Materials Processing - All India Manufacturing Technology, Design and Research Conference, 2018.
- **Book Chapters**
- **Mahto RP.**, Kinjawadekar M., Gupta C. PS. Effect of Pin Diameter in Underwater Friction Stir Lap Welding of Dissimilar Materials: AA6061-T6 and AISI304. *Adv Addit Manuf Joining Lect Notes Multidiscip Ind Eng Springer*, Singapore 2020:487–96.
- Mishra D, Sahu SK, Mahto RP, Pal SK. *Strengthening and Joining by Plastic Deformation*. Springer Singapore; 2019. doi:10.1007/978-981-13-0378-4.
- Nayak SS, **Mahto RP**, Pal SK, P Srirangam, *Micro-structure and Texture in Welding: A Case Study on Friction Stir Welding* 9. *Welding Technology*, 193, Springer, Materials Forming, Machining, 2021, Tribology, doi.org/10.1007/978-3-030-63986-06. and Tribology.
- Sahu S, Thorat O., **Mahto R.P.**, Pal S.K., Srirangam P. (2019) A Review and Case Study on Mechanical Properties and Microstructure Evolution in Magnesium–Steel Friction Stir Welding. In: Joshi V., Jordon J., Orlov D., Neelameggham N. (eds) *Magnesium Technology 2019*. The Minerals, Metals and Materials Series. Springer, Cham. https://doi.org/10.1007/978-3-030-05789-3_17.

ACADEMIC DETAILS

Examination	Department/Subject	Institute/University	Year	CPI/%
PhD	Department of Mechanical Engineering	IIT Kharagpur	2019	
M.Tech	Mechanical Engineering	NIT Warangal	2014	8.0
B.Tech	Mechanical Engineering	BPUT Odisha	2012	8.0
Intermediate	Science	JAC Ranchi	2008	75
Matriculation		JAC Ranchi	2005	65

EXPERIENCE

University/Institute	Position	From	To	Time
IIT Kharagpur, India	Project Staff	June 2020	August 2020	3 Months
MIT AP, India	Assistant Professor	September 2020	November 2020	2 Months
IEST Shibpur, India	Temporary Faculty	November 2020	Till Now	-

TEACHING And STUDENT GUIDANCE

- Mentor 3 Master students and 7 Undergraduate students
- Worked as a teaching assistant for undergraduate students in NIT Warangal for one Year during Master Degree
- Worked as a teaching assistant for undergraduate students in IIT Kharagpur for three years during Doctoral degree

TECHNICAL SKILLS

- **Material Characterizations:** SEM, TEM, XRD, EBSD TSL and Channel software, X-ray Mirco CT.
- **Software:** Solid-Works, Abacus, DEFORM, AutoCAD, LAB View, Adobe Suite, MS Office.
- **Programming Languages:** C, C++, JAVA, MATLAB, LATEX.

RESEARCH EXPERIENCES & MAJOR PROJECTS

- **Friction Stir Welding of AA6061-T6 and AISI304 Dissimilar Materials** (Research Project)
(Guide: Prof. S K Pal ,)
 - Developed a setup for FSW of Al-6061 and AISI-304 using a low cost tool design made of C2 WC and H13 Tool steel. .
 - Measured the Welding Force and Temperature for IOT by using Dynamometer and Thermocouples.
 - Analyzed the different types of welding defects and quantified the weld porosity by using X-ray microtomography.
 - Complete analysis of mechanical properties and weld interface followed by the mechanism of failure and corrosion properties of the welded samples obtained at different process parameters.
- **Design and Development of a set up for underwater FSW of dissimilar materials: AA6061-T6 and AISI304.**
(Guide: Prof. S K Pal)
 - Studied the formation of Inter-metallic compounds of Al and Fe by using Transmission Electron Microscopy (TEM).
 - Studied evolution of Micro-structural and Texture in welded zone was done using Scanning Electron Microscopy (SEM and EBSD) and Optical Microscopy (OM).
 - Texture analysis and grain evaluation of the welded sample was done by Electron backscatter diffraction (EBSD) technique and studied using TSL software.
- **Numerical Modelling and simulation of Friction Stir Welding.**
(Guide: Prof. S K Pal)
 - Simulations of FSW of aluminum and steel dissimilar material by using Finite Element Method in Abacus Software.
 - Simulation and modeling of FSW by using Finite Element Method DEFORM Software Software.
- **Worked in Twin Tool and Dual Counter Rotating Pin and Shoulder FSW Set-Up .**
(Guide: Prof. S K Pal)
 - Carried Experiments in FSW of AA6061.
 - Characterize the Welds by Using EBSD, TEM, SEM, OM, UTM, and Micro-hardness.
- **Monitoring and Control of the FSW Process .**
(Guide: Prof. S K Pal)
 - Recorded the signals of the process and captured the images of the welds.
 - Applied images and signal processing approach and predicted the weld defects in similar and dissimilar materials welds.

STRENGTHS

- Positive Attitude, Social Interaction, Hardworking.

INTEREST AND HOBBIES

- Solving Puzzles.
- Playing Chess.

REFEREES

- **Prof. S K Pal**
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- **Prof. A K Samantaray**
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