



**INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI  
SHORT ABSTRACT OF THESIS**

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Thesis Title: FRICTION STIR SPOT WELDING OF SANDWICH SHEETS MADE OF AA5052-H32 SKIN AND HDPE CORE

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**SHORT ABSTRACT**

Polymer core aluminium sandwich sheets have shown their acceptance in automobile sector because of their lightweight characteristics. Due to vast property difference between the adjoining layer materials, joining of these sandwich sheet is difficult. The Friction Stir Spot Welding (FSSW) is a popular joining process in automobile industries. In the present work, the capability of FSSW to join materials with extreme property difference is utilised on sandwich sheet. The FSSW joints are made on sandwich sheets and effect of welding parameters and quality of sandwich sheet is investigated. Various types of mechanical characterization of FSSW joints are done. These include evaluation of joint strength, temperature evolution, microstructure analysis, hardness distribution, failure modes, and material flow. The numerical simulations are also performed to predict the material flow and failure modes. The mechanical performance of the joints is evaluated by lap shear test, peel test, cross-tension test and uniaxial tensile test. The numerical results are validated with experimental results. At the end, the effect of core layer quality is also addressed through experimental and numerical techniques using cohesive zone modeling. The results show that the process condition affect the mechanical performance of sandwich sheet significantly. The simulation results differ with experimental results within acceptable range.