

Anirban Mandal
Ph.D. Applicant in Joint Doctoral Program

Statement of Purpose

Born in a developing country like India, I am fortunate enough to witness the massive shift in technology we are going through in the 21st century. Being interested in manufacturing, I always noticed how research at micro and nanoscales promoted this shift. As we scale down the materials and machines to the micro and nanoscales, new physical phenomena emerge, resulting in exceptional electrical and thermal performances. My objective behind pursuing the research in this domain is to contribute to the research at these scales to keep up with the growing challenges of electronic, thermal, medical and biological systems that will benefit society. After my Ph.D., I wish to continue in research field and potentially do something better towards the society.

A desire to understand the fundamental reasons behind different physical phenomena kept me motivated throughout my academic journey. However, it was my B.Tech. thesis project that pushed me towards considering a future in composites. I did my undergraduate thesis project titled 'Thermal Analysis and Material Selection for Railway Brake Pads' under the guidance of Prof. T V K Gupta using Commercial Finite Element Software Ansys. Data for various material induced in brake shoe was already available in the literature. But selection of material on the basis of stopping distance of wagon wheel was a new approach. I was able to reduce down the stopping distance and even thermal stresses also got reduced. This result motivated me to get a view on how come simulation nowadays predicts efficiently.

After graduation, I joined SHV Energy Private Limited as a Plant Engineer, where I learned how the LPG industry works. At a plant level, I got the opportunity to apply basic engineering principles at wherever required. In my bachelor's, I learned the basic concepts of mechanical engineering, but during my job, I understood the importance of higher education, so I decided to pursue master's. To pursue master's, I appeared for the Graduate Aptitude Test in Engineering exam (GATE) and got admission in the Masters' program in Manufacturing Science and Engineering at the prestigious Indian Institute of Technology, Kharagpur.

At IIT Kharagpur, I was introduced to an excellent research environment. Some course subjects like Finite Element and Boundary Methods in Manufacturing and Numerical Modelling of Manufacturing Process and interactive sessions like Seminars gave me confidence and ability to understand research papers. For my master's thesis project, I wanted to combine my computational skills with numerical modelling approach, thus Professor Soumitra Paul and Dr. Nilanjan Das Chakladar were right choice for me. My objective was to numerically model the orthogonal machining of Ti-6Al-4V alloy allowing variation in tool geometry and process parameters. My work in the project involved first performing ABAQUS simulations for the initial characterization and literature validation thereafter. Here I understood the importance of patience and perseverance, which is very crucial for any research.

Ph.D. through Joint Doctoral Program will provide me the best fit to pursue my interests in composites and will help me build a solid foundation in academia and research for my career. Both the universities offer a rich academic environment and excellent research facilities, which are critical for substantial research. The mechanical engineering department prepares a diverse group of students to excel within and outside of engineering. Therefore, I am very confident

that this program which will provide me the perfect atmosphere to grow, and I look forward to contributing to this joint venture. I would be thrilled to work with Prof. Prasad Potluri whose work on ‘Natural Fiber Composites’, Prof. Chamil Abeykoon’s work on ‘Thermal investigation in Polymers’ and Prof. Nilanjan Das Chakladar’s work on ‘Modeling of composite plates’ deeply motivates me and relates to my interests.

I always enjoyed taking such rigorous and demanding courses, which developed me to handle challenging concepts. My academic record has always been with a positive slope showing that although I started initially slow but did not give up and excelled through hard work and persistence. My research experience and courses completed in IIT Kharagpur offer me a strong academic background to research in my field. With my experience in the corporate and academic world, I believe I have a holistic education that makes me the perfect candidate for the Joint Doctoral Program.

