

Being such as
biochemical
engineering, material
science,



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Being a part of a typical Indian family, my future was set in a few ways. But it is always difficult to foretell what kind of a person someone would grow up into in the future. This axiom applies to me perfectly.

In my primary school education, I was quite fascinated with Mathematics and I used to ace all of my math tests. However, as I grew up, I found that my real interest was in Chemistry. This interest motivated me to take up Chemical Engineering for my Undergraduate Program, which further bolstered my determination to pursue my career in the core disciplines of Chemical Engineering. My advanced education in Engineering formally began with my Undergraduate Program in Chemical Engineering at the National Institute of Technology Tiruchirappalli. The youth of today, more often than not, believe that learning is a drawn-out and tedious process. On the contrary, to me, acquiring practical knowledge adds to one's potential.

And this thought combined with my desire to fulfill ambitions reigned over any sense of hardship. Simply, on a long run, the effort exerted in my Undergraduate Program had its own satisfying rewards. I took it up as a fundamental task in my Undergraduate studies to identify my field of interest and lay a firm groundwork in terms of basic knowledge, both theoretical and experimental, and the current need of the society so that more advanced studies could be pursued. I developed an interest towards Heat Transfer and gave my best to understand the principle underlying each concept. Even though I had an affinity towards Thermodynamics and Heat Transfer, I felt it was important to also have a strong foundation in all the core courses.

This awareness helped me to become familiar not only with core courses like Reaction Engineering, Transport Phenomena, Mass Transfer, Process Control, etc. but also with supplementary courses such as Biochemical Engineering, Material Science, Environmental Engineering, etc. My diligence paid off when I secured an opportunity to work in the R sector at Bharat Heavy Electricals Limited (BHEL) for my winter project in my junior year. BHEL is an engineering company owned by the government, which fell under the elite list of eight companies that made up the majority of India's public sector undertakings and a chance to work with them was rare, especially for a student. BHEL specializes in heat transfer equipment like boilers, turbines and heat exchangers related to power plants and this aligned perfectly with my area of interest.

Considering the fact that every industry in the world has some waste heat associated with it which, commonly, depletes a considerable amount of resources, I chose to concentrate on converting that waste heat into a useful one. I decided to make use of Thermo-Electric Generators (TEGs) for the process and selected steam boilers as my target equipment. It was a fairly novel method in India, and my research would help decrease environmental pollution and improve cost-efficiency of heat transfer equipment to an extent. The underlying principle behind my research was to use the excess energy from heat sources on semiconductors (an essential constituent of TEG) to generate electricity. As the concept had not been worked upon extensively at the lab, the experiments were based on a flat-plate heater with TEGs working under low temperatures. To determine the best experimental setup to advance with, I conducted mathematical and

physical simulations on MATLAB and Visual Basic, and with the help of my guide, on COMSOL. My models examined the effect of variables such as the source temperature, the arrangement of TEGs, the type of extended surfaces present and the mode of convection. Again, as the research was fairly fresh, in addition to the literature survey and setting up the laboratory, I had to fix technical problems that arose during the experiment.

For example, after the preliminary simulations, the magnitude of error produced by the setup was large as the fins began to sag under their own weight. I rectified this problem by changing the arrangement to compensate for the contact pressure. Subsequently, within a span of three months, I was inducted by 3M India Limited into their summer internship program. This provided me with another shot to explore the world of Chemical Engineering, and to delve deeper into the field that allured me.

I did not miss this perfect opportunity to improve upon my previous work. I joined the Automotive Aftermarket Department at 3M's R Center and began working on taking my research on TEGs, one notch above. I learned from my guide regarding the usage of insulators in the exhaust systems of various automobiles, the elemental reason behind it, and that only less than one-quarter of a vehicle's fuel input is being used to propel the vehicle and that nearly a half of the remaining fuel is lost as waste heat. I had come across Phase Change Materials (PCMs) in the survey conducted during my previous project and this was a chance for me to apply it to a real-world problem. I developed MATLAB simulations that dealt with temperature cycles that varied with the operating conditions of the vehicle like load, terrain, etc.

and carried out experiments on certain selective PCMs to test their heat

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capacity. As a crystallization of my research findings, I co-authored a research paper titled "Mathematical and Experimental evaluation of Phase Change Materials (PCMs) on a vehicle exhaust system for waste heat regeneration (using TEGs)" and is under consideration to be published. The research I have conducted, though it is a tiny fraction in this broad domain, has helped me to visualize my future goals.

I have understood that it is imperative for me to probe out into the vast world of the unexplored. I have resolved to develop myself into a well-trained Chemical Engineer and have a immense interest in Chemical Engineering as a lifelong career. Meantime, I am clearly aware of the efforts I have to make in order to fulfill this aspiration.

This constitutes the very motivation behind my present application for the M. Eng. Program from the Department of Chemical Engineering of the ABC University. There are multiple strong arguments for my choosing your esteemed university, foremost being the well-designed curriculum that allows students to pursue disciplines of their interest apart from the core subjects, helping them to broaden their knowledge. Also, the experience of the faculties along with the faculty-student ratio promises to provide plentiful attention to each student.

All these make me believe that I will receive the best education I can expect. In my current college education, I have made it a point to take part in extracurricular activities. I am presently serving as the Chairperson of Pragyan, the international techno-managerial organization of my institute with a workforce of 700 odd students and a firm foothold in over 60 countries.

I strongly believe in being well-rounded, and this has enabled me to mature into a skilled communicator with radical leadership and interpersonal skills, all of which, will prove tremendously practical in your graduate program. I am convinced that my academic background and my experiences outside the classroom will make me very successful in your program. This, combined with studying at ABC University, if given the chance, will provide me with a unique range of experience which in turn, will give me an exceptional advantage in my career.