

ACKNOWLEDGEMENT

At the outset, let me pay my obeisance to Lord Ganesha for catapulting me to this level of academic pursuit. Thereafter, I feel proud and privileged to get the chance to thank the people who played the indispensable role during this research programme. Though the success in this endeavour is the result of number of known and unknown spirits, it is my pious duty and happiness to recall and gratefully acknowledge the great efforts and love of those few people, who made this possible with their supreme strength and the power of will.

First and foremost, I would like to express my deep sense of gratitude and appreciation to my supervisor *Prof. A.P. Harsha* for his esteemed guidance, invaluable encouragement, moral support, providing enough space to work on my ideas and scholarly inputs from early stage of research work that build confidence in me during the research work. This research work would have not been possible without his valuable guidance, moral support and continuous encouragement.

I would like to express my heartiest thankfulness to the members of my Research Progress Evaluation Committee (RPEC) *Prof. Rajnesh Tyagi* and *Dr. R. K. Gautam*, subject expert in Department of Mechanical Engineering and *Prof. R. B. Rastogi*, external expert from the Department of Chemistry of the Institute for their kind co-operation, useful suggestion and insightful comments throughout the period of research work which has been instrumental in the success of the dissertation.

I am also highly obliged to *Prof. A.K. Jha*, Head, Department of Mechanical Engineering; the former heads *Prof. V.P. Singh* and *Prof. A.K. Agrawal* for providing me the necessary

resources to enable me complete this research work. I am also thankful to Convener DPGC, *Prof. Rajesh Kumar* and all respected DPGC members for their kind support.

My sincere thanks to all the faculty members of the Mechanical Engineering Department who directly or indirectly helped me to carry out this research work successfully.

I am thankful to the office staff of the Mechanical Engineering Department, in particular, *Shri J.K. Sinha* and *Mr. Akash Mishra* for their constant help and support. Special thanks are due to the staff of Tribology and Dynamics of Machine Laboratory of the Department, *Shri S.P.Singh* for his enthusiastic support.

I thank my colleagues at Tribology Laboratory *Mr. Shushant singh, Mr. Manvandra Kumar Singh and juniors Mr. Sooraj Singh Rawat, Mr. Homender Kumar, Mr. Amod Kashyap, Mr. Hemant Choudhary, Mr. Sagar Singh, Mr. Dinesh Kumar, Mr. Vivek Gupta* and *Mr. Ishan Kumbhare*, for sparing their valuable time and efforts in helping me with the conduct of the experiments. Special thanks to my seniors *Mr. Pushkar Jha, Mr. Vinay Jaiswal, Mr. Khemraj, Mr. Bharat Singh Patel*, for engaging me in fruitful discussions on my research work and encouraging me throughout the work.

I also express my appreciation to my batch mates and friends *Mr. Ankit Sharma, Mr. Parshant Kumar, Mr. Harikishor Kumar, Mr. Sunil Yadav, Mr. Subhashish Dey, Mr. Ashish Srivastava, Mr. Rabindra Prasad* and *Mr. Ashish Pareta* for their support and co-operation that seems difficult to express in words.

I am thankful to Central Instrument Facility Centre (CIFC) of the Institute to provide most of the sample characterization instruments. My special thanks to the instrument operators *Mr. Girish Sahu* and *Mr. Nirmal* for their interactions and continuous help during the course of research.

I express my heartiest thanks to my parents, *Shri Lal Bahadur Gupta* and *Mrs. Veerpati Devi*, for their inseparable support and encouragement at every stage of my academic and personal life. I can never thank them enough for everything they have done for me and everything they continue to do for me. They are truly my inspiration and possibly the best parents a child could have.

My special thanks to my wife *Renu Kumari* and my lovely daughter *Kashvi Gupta* for moral support without which this research work was not possible. In the process, they have made many sacrifices of their expectations from me as a husband and father and relieving me from my responsibilities towards the family. I acknowledge their most important contribution at this joyous moment.

Finally, I would like to thank my younger brothers *Mr. Ashok Kumar Gupta* and *Mr. Santosh Kumar Gupta* and sister-in-law *Mrs. Pooja Kumari* in every possible way to see the completion of this Ph.D. dissertation work.

To all these people and to those unmentioned, my heartfelt thanks.

Rajeev Nayan Gupta