



PhD Project

Project Details	
Project Title	Design and development of rolling bearings using multi-scale bionic textures
Project Summary	<p>Achieving effective lubrication in rolling bearings (roller and ball bearings) is a challenging task due poor conformity at the concentrated contacts of rolling elements & races and presence of centrifugal force during motion. This makes the rolling bearings prone to vibrations and energy inefficient. Thus, designing and developing the new generation ball bearings is very vital issue. Moreover, it is worth noting here that since recent past, surface textures have emerged as viable technology using which researchers are exploring and improving the performance behaviours of tribo-pairs. Based on the literature review, it has been found that most of the studies reported have mainly addressed the effects induced by single-scale surface textures. Additionally, it has been seen that the roles of bionic textures have not been explored on the performance behaviours of rolling bearings due to manufacturing constraints. It is also found that the potential of multi-scale bionic textures on rolling bearing performances have not been explored.</p> <p>Therefore, the objective of this research is to conceive different multi-scale textures taking the inspiration from different bionic surfaces and using these textures to perform numerical simulations for designing new rolling bearings (both roller bearing and ball bearing) for enhanced tribo-dynamic performances followed by conducting the experiments to validate the finding based on mathematical models.</p>

PhD Supervisors			
Role	Faculty	Academic Unit in IITD	Email ID
Supervisor 1	R. K. Pandey	Professor, Dept. of Mech. Engg	rajpandey@mech.iitd.ac.in
Supervisor 2	Dinesh Kalyanasundaram	Professor, Biomedical Engg. Centre	dineshk@cbme.iitd.ac.in

Project requirements (Student qualification, experience required, etc.)
M.Tech. (Mechanical engineering) having exposure to numerical simulations (computations using FEM and FVM) and experiments

Source of funding (IRD/FITT Project details, if any)
RP04255

Role of Faculty Members involved:
<p>Prof. R K. Pandey will guide the candidate in design and simulation.</p> <p>Prof. Dinesh Kalyanasundaram will guide the candidate in bionic texturing and experimental validation of the numerical results.</p>