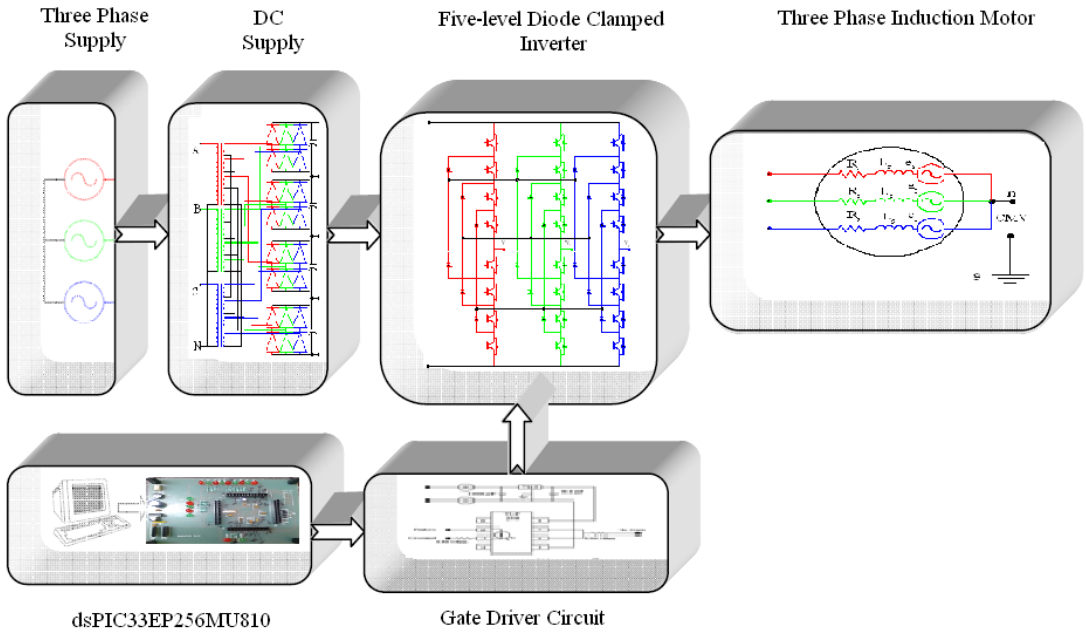
RESEARCH AND DEVELOPMENT

Name of the Researcher	Designation & Department	Research Topic	Year of Completion
Dr. R. K. Dhatrak	Associate Professor & Head, Department of Electrical Engineering	Investigations on Bearing Currents and Shaft Voltage in PWM Inverter Fed Three Phase Induction Motor Drive	2017

BRIEF SUMMARY OF THE WORK: The modern VSI provides high dynamic operation to variable speed drives with accrued energy savings, though with some limitations. One of the limitations of such drive is the manifestation of induced currents in bearings, caused by common mode voltage (*CMV*) and parasitic capacitances. Unwanted parasitic capacitances in motor co-exist as conducting materials is separated by dielectric medium. In any motor, the existence of four parasitic capacitances can be traced: (i), Stator winding to frame, (ii) Stator to rotor, (iii) Rotor to frame and (iv) Lubricating film present between bearing balls and races i.e. bearing capacitance. At low frequencies, these capacitances are ineffective but at high carrier frequencies, they form a capacitive voltage divider, which builds up shaft voltage. When shaft voltage exceeds breakdown limit of lubricating film, it results in high bearing current, causing damage to the bearings.

This research work is an attempt to investigate bearing current problem in inverter fed induction motor drive and evolves a systematic approach with underlying rationale to eliminate Bearing current, shaft voltage and *CMV*. The present work explores viability of five-level diode clamped inverter to reduce/eliminate the above issues. This research work is an attempt to mitigate shaft voltage and bearing current issue as well, in addition to *CMV*. It has been observed that reduction in *CMV* can be brought in by proper selection of switching states. A novel technique is developed to select three appropriate voltage vectors that constitute the reference vector in SVPWM modulation technique. In this work, the numbers of splitting hexagons are reduced from *216 to 36*. In addition to SVPWM, the performance of DCMLI is also observed for popular SPWM techniques.



INDUSTRY RELEVANCE : The work is of great use to the industries where variable speed electrical drives are used. The life of the bearings can be increased with decrease in harmonics & rate of rise in voltage. It also reduces the ratings of the switching devices.

RESEARCH OUTCOMES : Three papers in International Journal (including one SCI) and two papers in IEEE conferences have been published on this research work.