



Distinguished Lecturers Program on “ Why the small PM machine is relegating induction machines to niche applications? ”

Date: 18th July 2007 (Wednesday)

**Venue: Dept of Electrical and Electronic Engineering,
Universiti Putra Malaysia.**

**FREE of
CHARGE**

Organized by:

**Power Electronics, Industrial Electronics and Industry Applications
Societies (PELS/IES/IAS) Joint Chapter of IEEE Malaysia Section**

Co-organizers:

- **Centre of Electric Energy and Automation (CEEA), Faculty of Engineering, MMU**
- **Dept of Electrical and Electronic Engineering, Universiti Putra Malaysia.**

Program Overview

The interest in adopting electric actuation in ships, cars and aeroplanes often founders on the issue of the mass and volume of electric actuators, which are perceived to be significantly worse than those of competing technologies. Certainly looking at the volume, mass, power and torque of a typical 3 phase induction motor, even in comparison with a typical automobile engine produces some rather disheartening numbers. This presentation will discuss some fundamental principles as originally presented by Laitiwaite, as well as some commonly held beliefs, or rules of thumb. These principles and rules of thumb indicate that the power and torque density (kW/m³, Nm/m³), the specific power and the specific torque (kW/kg, Nm/kg), and the efficiency must all degrade dramatically as the machine rating goes down. The presentation will then present some numbers for existing machines, representing standard, generally available technologies today. The presentation will then examine some specific designs of special purpose permanent magnet (PM) machines, which produce numbers which appear to confound both the theory and the practice described. Conclusions will be deduced that the small induction drive will quite rapidly lose its place as the drive of choice in small applications, and be relegated to "niche" applications. It will further be concluded that this displacement can be justified on cost alone, with dramatic efficiency increases being simply fortuitous additional benefits. Some details will be given of a specific geometry, axial flux geometry, which offers some dramatic advantages over radial flux machines when combined with power electronics and modern permanent magnet materials. Many examples will be presented and discussed.

Seminar Presenter (Prof. Dean Patterson, *Fellow, IEEE*)

Dean Patterson was born and raised in the Southern Australian city of Adelaide, where he took his degrees from the University of Adelaide. In 1984 he went to the remote tropical north of Australia, to the city of Darwin, to help set up a new university. He was responsible for the 4 year undergraduate degree program, the graduate degree program, and the establishment of a research focus. He immediately got involved in building solar cars for the tri-annual races across Australia which began in 1987, so the research focus naturally ended up in the area of solar and alternative energy. He developed a high performance electric traction system for the solar vehicles, and specialised his research into high performance axial flux permanent magnet machines. In 2001 he went to the USA, to the University of South Carolina as a research professor, working on the electric ship program of the US Navy, and in 2004 was invited to the University of Nebraska Lincoln, to help set up courses in Energy Studies. He is the author of about 100 technical papers. He is a Fellow of both the Institution of Engineers Australia, and the Institution of Electrical and Electronic Engineers, (IEEE). He has been very active in the IEEE Power Electronics Society, having just completed a 2 year term as President of that society. His spin-off company from the Northern Territory University, specialising in high performance machines, was bought in 2006 by FASCO/TECUMSEH. He now divides his time between the company and the university.

Program Schedule

- 1.30 to 2.00 pm - Registration
- 2.00 to 4.30 pm - Lecture by Prof. Dean Paterson
- 4.30 to 5.00 pm - Tea Break

Fees and Registration

This is a Free Lecture Program. Please register in advance to book your seat. For more details, please contact:

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To know more about our PELS/IAS/IES Joint Chapter, please visit http://www.ieee.org/go/Malaysia_pels_ias_ies

Kindly fax/email this page back to the Seminar Secretariat latest by 13th July 2007.
 Fax: 03 83183029 (Attn: Gobbi Ramasamy/Jega)



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Name and Address of Organization:			
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Email address:			
Name of participants:			<i>IEEE membership number (if any)</i>
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