Eskom specialisation centre enhances research

Prof Stephan Heyns

Over the next five years, the University of Pretoria (UP) will benefit from a unique opportunity to enhance and reinforce its current interdepartmental research programme in physical asset management and establish a core of expertise in this field in South Africa. This is due to the fact that the University has been chosen to host the Specialisation Centre in Plant Asset Management of the Eskom Power Plant Engineering Institute (EPPEI).

Eskom recently established the EPPEI to produce highly skilled engineers at postgraduate level in eight broad specialisation areas at South African universities. UP accepted the offer to host the specialisation centre and signed the agreement with Eskom in January 2012.

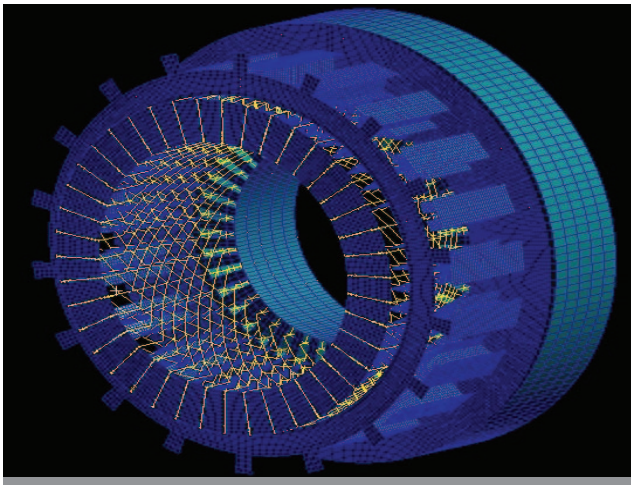
This contract will see Eskom supporting a full-time professor, a senior lecturer and an administrative position at UP over the next five years. The funding will also allow the University to engage a senior researcher from a developing university for the contract period.

The new centre at UP will develop and present a range of courses, including specialised physical asset management-related courses, that will support the EPPEI. In addition, UP will supervise and mentor master's and doctoral research students and develop collaborative research programmes with South African and foreign universities, original equipment manufacturers, as well as foreign utilities proposed by Eskom.

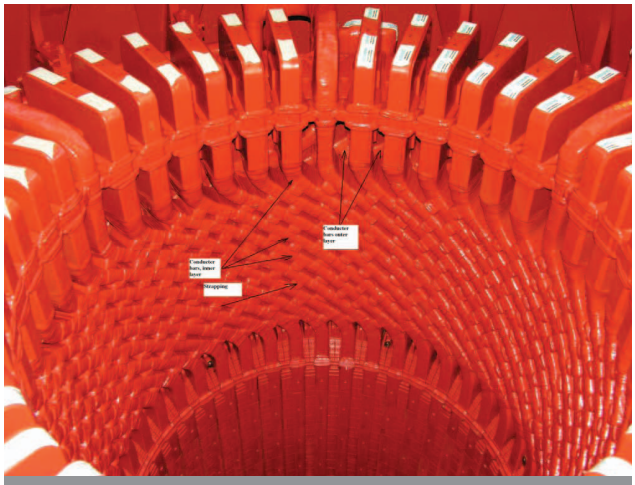
The Department of Mechanical and Aeronautical Engineering at the University of Pretoria has a well-established presence in the field of plant asset management, which has grown tremendously ever since Eskom started supporting research in vibration-based diagnostics and prognostics through its Tertiary Education Support Programme in January 1999. Over the years, this has led to a significant body of research in the field of vibration-based condition monitoring and maintenance.

Research focus areas include vibration monitoring under varying load and speed conditions, gearbox vibration monitoring and vibration modelling, and monitoring on large electrical machinery. A finite-element model was developed to model and understand the dynamic behaviour of large electrical generators and to devise appropriate monitoring strategies.

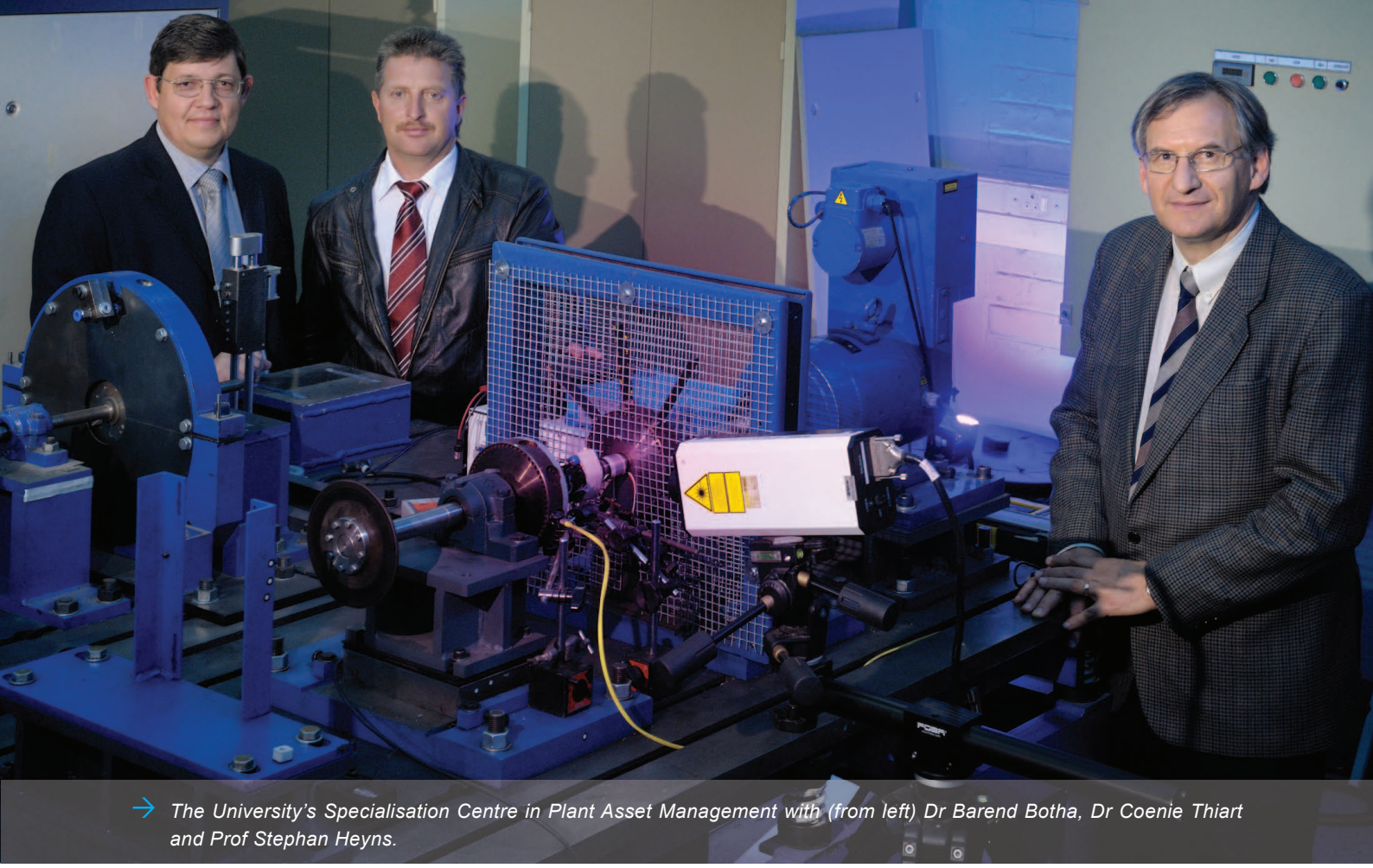
The research programme was enhanced in 2010 when two senior lecturers in maintenance engineering were appointed with the support of Anglo American, Eskom, Exxaro and Sasol. These positions are focused on reliability and maintenance practice, as well as condition-based maintenance.



A finite-element model.



The end windings on a typical large electrical generator.



The University's Specialisation Centre in Plant Asset Management with (from left) Dr Barend Botha, Dr Coenie Thiart and Prof Stephan Heyns.

They strongly reinforce the new plant asset management programme.

The programme is well supported by the Sasol Laboratory for Structural Mechanics, which was established in the early 1980s and has been actively developed ever since. This laboratory now has excellent testing and analysis capabilities and a very good infrastructure for specialised laboratory investigations on rotating machinery, as well as a unique fatigue-testing capability. In addition, the laboratory features a strong field measurement capability for in situ investigations on, among others, mills, generators, fans and gearboxes at power stations.

While the new centre will be hosted by the Department of Mechanical and Aeronautical Engineering, there are various other entities at UP with significant expertise in plant asset management. These include the Graduate School of Technology Management and the Department of Industrial and Systems Engineering. This positions UP very strongly in the field.

The support from EPPEI provides the University with an excellent opportunity to enhance and reinforce the current research programme. While the UP team has always had a strong focus on addressing real problems, the scale of operations can now be expanded to include a broader understanding of the entire plant life cycle. In addition, more attention can be given to integrating traditional technical focus areas, such as fatigue analysis, vibration-based condition monitoring, vibration signal analysis, finite element analysis and experimental modal analysis, with fields such as reliability, statistics and financial modelling.

Worldwide, there is a great need to integrate these disciplines for the optimisation of life cycle performance. It is therefore believed that the new specialisation centre will contribute to the establishment of a core of expertise that will play a significant role in improving plant asset management practices in South Africa and abroad.

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