

Success Story



Knowledge Transfer Partnerships

Knowledge Transfer Partnerships (KTP) provides resources and expertise to thriving businesses and organisations throughout the UK who wish to innovate, expand or improve their performance.

Part funded by Government, these Partnerships involve combining the knowledge and expertise of an academic institution, such as the University of Plymouth, with the appointment of a talented graduate who works within the business or organisation on a strategic project.

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Kawasaki's Motors Put to the Test

"We now regard the University of Plymouth as a local partner in our long term continuous improvement programme. This project alone has generated cost savings in excess of £60k per annum".

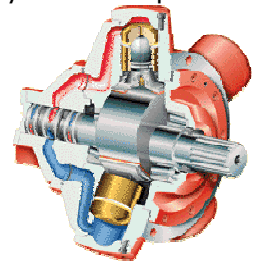
Gerry Warren, Senior Manager, Kawasaki Precision Machinery UK Ltd (KPM)



Kawasaki Precision Machinery UK Ltd (KPM) is part of the Kawasaki Group established in 1916 in Kobe Japan. 1993 saw Kawasaki purchase the Staffa motor manufacturing facility in Plymouth where Kawasaki Precision Machinery (UK) Ltd was formed for the sales, marketing and manufacturing of hydraulic components

for Europe, India and the Middle East, Africa and Australia. As global world leaders in high torque low speed hydraulic radial piston motor technology, their range of Staffa Motors are much in demand across a range of industry sectors including marine, offshore, mining, plastics processing and tunnelling. Sales of Staffa Motors are worth £15 million per annum to Kawasaki but for the past 20 years profits have been eroded due to an unacceptable amount of re-work when the motors are tested prior to dispatch. In addition, bottlenecks caused by testing, reworking and retesting negatively impacted upon company production throughput.

www.kpm-eu.com



Having unsuccessfully resolved these problems, Kawasaki eventually turned to experts at the University of Plymouth for a solution. A Knowledge Transfer Partnership employing Imperial College London First Class M.Eng Aeronautical Engineering graduate Stephen Clarke supported by research academics Dr. Murray Bell and Mr. Bob Allen from the School of Engineering, looked at introducing new analytical and modelling techniques to optimise the performance and mechanical efficiency of the Staffa Motor range and reduce the final testing failure rates.

Work began by establishing an analytical model to look at the various contacting surfaces' sensitivity to friction levels for a better understanding of the rolling torque and tribological properties of the motor's piston-con rod interface. Following on from this a change in production was necessary with the introduction of a lapping and polishing process to incorporate a much improved surface finish on the piston seat and eliminating an expensive tin-plating process. A test batch of motors were produced as a benchmark failure rate for detailed testing and, with the new lapping and polishing processes introduced, this resulted in a 50% reduction in the overall 1st time mechanical failure rates contributing to an annual saving of £10k by eliminating unnecessary expensive production processes.

Stephen Clarke, KTP Associate with Kawasaki Precision Machinery UK Ltd (KPM)

Further work was undertaken to find the root cause in the volumetric efficiency failures of the Staffa hydraulic motors and in reducing these, significant process improvements were identified in a company-wide improvement strategy with the introduction of a Six Sigma improvement team and methodology. Real gains have been achieved in evolving the new mathematical model to investigate friction levels, the results from which can accurately predict and optimise motor performance design which has resulted in direct cost savings in excess of £50k per annum on rework alone. In addition to this, highly visual and easy to understand instructions of the manufacturing processes have been documented to ISO 9001 standard and used in the training of staff in order to eliminate production errors. This will be applied to other areas of Kawasaki's long-term programme of continuous improvement.

"Stephen's ability to validly analyse the mechanical performance of the 'Staffa' motors resulted directly in the identification of the root causes of the problems Kawasaki were having. This is a graphic illustration of the importance of being able to apply mathematical and analytical techniques to real world problems. However, it is one thing to identify the technical factors, the solutions have to be put into practice by real people, and the need to inspire confidence and win hearts and minds has also been vitally necessary. Stephen has done both, and has gone on to implement sustained improvement through the application 'six-sigma' techniques and through common sense production decisions".

Dr Murray Bell, Principal Lecturer, School of Engineering, the University of Plymouth

THE BENEFITS OF THIS KTP PARTNERSHIP

To the Company:

- ⌚ Proving of a method to virtually eliminate mechanical failures leading to direct cost savings in the order of £50k per annum on rework alone
- ⌚ Expensive tin-plating process removed on certain motors with a cost savings of approximately £10k per annum
- ⌚ The mathematical model provided insight into operating mechanisms reducing mechanical efficiency failure rates by 50%
- ⌚ Oil analysis undertaken to determine contamination levels and sources
- ⌚ Implementation of highly visual assembly instructions written to ISO 9001 standard to eliminate assembly process and production errors
- ⌚ Continued development and implementation of the Six Sigma methodology
- ⌚ Retained the Associate to continue building on the success work of the KTP project

To the University:

- ⌚ Paper to be published in MechEng Science Journal (IMechE) entitled 'Modelling of Friction Levels in a Ball Joint in Boundary Lubrication'
- ⌚ Further research undertaken into the latest tribological theories, fluid dynamics and structures
- ⌚ This KTP Project has complimented the university's research interests in new analytical modelling techniques such as Six Sigma and FMEA
- ⌚ Opportunity for academics involved to gain experience and understanding of critical commercial aspects of product development and manufacturing
- ⌚ Continued collaborative links with senior management from Kawasaki Precision Machinery

To the Associate:

- ⌚ Undertook training in Black Belt, Fluid Power and Hydraulics, IMechE Tribology, Six Sigma and Mini Tab software
- ⌚ Registered member of the Institute of Mechanical Engineers (IMechE)
- ⌚ Achieved NVQ Level 4 in Management
- ⌚ Experience of leading a major technical project key to the company's global competitiveness
- ⌚ Accepted a permanent position with Kawasaki Precision Machinery UK Ltd (KPM)
- ⌚ Nominated for the KTP Business Leader of Tomorrow Award 2005

"The KTP experience over the last two years has been very rewarding and I cannot think of a better way to have started my professional career. The opportunities for project management, advanced problem solving, relevant training and development so early in my career cannot be rivalled by any other graduate scheme".

Stephen Clarke, Product Engineer, Kawasaki Precision Machinery UK Ltd (KPM)

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