



ScotRail

Rail Maintenance Success: Knowledge Transfer Partnership

Glasgow Caledonian University (GCU) and ScotRail have collaborated to improve the reliability and performance of fleet door systems through enhanced maintenance of Scotland's Railway Rolling Stock.

Through a Knowledge Transfer Partnership (KTP) between ScotRail and GCU, the two organisations have focused on the fleet activities within ScotRail, primarily looking at conducting Reliability Centred Maintenance (RCM) on a particular fleet - Class 158, and in doors in particular.

Knowledge Transfer Partnerships (KTPs) involve the forming of a partnership between a company and an academic institution, enabling the company to access skills and expertise to help it develop. Each partnership employs a high calibre Associate, a recent graduate, to facilitate this transfer of skills and expertise. The Associate works within the company and is jointly supervised by company personnel and a senior academic.

Joint funding of £126,000 from ScotRail and the UK Government supported the two-year KTP

project, supervised by Dr Babakalli Alkali from GCU's Department of Engineering.

ScotRail is Scotland's primary railway operator, with nearly 93 million passenger journeys in 2014-15 and operates 95% of all rail services within Scotland. The KTP project focused on the door system operation of Class 158 specifically in relation to improving the reliability of door systems through enhanced maintenance.

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This system has historically underperformed, and multiple work streams have previously been undertaken to improve efficiency.

The KTP project tackled this problem using new tools and software, and the experience of knowledge partners, to consider RCM solutions. This has been incorporated within the company's condition based maintenance strategy which is being led by the Senior Continuous Improvement Manager, who was also the KTP Company Supervisor. The overall portfolio of solutions has therefore delivered a greater impact across all areas of maintenance (proactive, preventative, planned and unplanned) to improve reliability, fault finding and performance of the door system.

As a result of the KTP, the company and staff have acquired a greater understanding and core knowledge of the door system operation via specialised knowledge using the RCM approach.

Dr Alkali said: "The study conducted to review the maintenance strategies of the Class 158 door systems and the recommendation of condition monitoring solutions by GCU experts have contributed to an improved door performance and hence reduction of service delays and cancellations as well as better customer experience."

The new knowledge and understanding of the door system highlighted from the RCM analysis allows ScotRail engineers to identify maintenance oversights in planned routine maintenance

and overhaul specifications to achieve higher operational safety.

The analysis capabilities of the KTP transformed raw data into valuable information which enabled the review of historical failures, performance monitoring and condition monitoring data to identify poor performing systems. This new knowledge allowed ScotRail to develop new enhanced maintenance procedures to improve maintenance effectiveness and reduce the amount of technical failures in-service.

Additionally, specialised RCM knowledge was used to identify all door failure modes, and an extensive failure history analysis was then undertaken to determine frequency. These findings were disseminated to key stakeholders during performance review meetings to recommend new maintenance practices, design enhancements and condition monitoring solutions. These recommendations have been implemented into ScotRail's Continuous Improvement programme to achieve maximum benefits.

Abhinay Ramani, Senior Continuous Improvement Manager at ScotRail and KTP Company Supervisor said: "Overall, the KTP has delivered a multi-layered improvement across the business - up skilling maintenance staff, providing depot management staff with tools to improve efficiency and effectiveness, and guiding the overall engineering strategy towards an

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innovative condition monitoring based approach to maintenance."

"Following on from the KTP, additional systems are now being monitored as part of the company's continuous improvement strategy. Key maintenance instructions have been updated and business processes have been modified to utilise the new information streams that are now available. The outcomes of the KTP project also form part of the performance management strategy for engineering going forward."

From this KTP project, the Institute of Sustainable Engineering and Technology Research at GCU has now gained recognition as an Institutional Member of Rail Research UK Association (RRUKA) and has further research capability within the institute that could be applied in the rail industry. The project has also led to multiple peer review and industrial journal publications and international conference presentations.

The Institute is continuing to work in partnership with ScotRail post KTP to improve rail services in Scotland and beyond.

At Glasgow Caledonian University, we provide solutions to real-world problems through applied research and development, working in partnership with business, the public and voluntary sectors. GCU's strategic business and knowledge exchange teams work with academic experts across the University to support businesses with a problem-solving approach so that they can innovate for social and economic impact.

If you are interested to find out how a KTP can help your business email janette.wark@gcu.ac.uk or visit www.gcu.ac.uk/business for more information.



University for the Common Good

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