

## Eurotech Technology Can Improve Rail Hygiene

One of the most frequent complaints by railway passengers is about on-board train toilets being unusable. This concern is also an operational issue, because outages could result in financial penalties to train operating companies due to this loss of service. This case study explains how train servicing company, TBM Rail Group, called upon Eurotech to create a cloud-based technology package for toilet monitoring.



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A toilet out of commission is not only an annoyance for passengers but also equates to loss of service required from train operating companies for which they can receive financial penalties. These factors led train servicing company TBM Rail Group to call on Eurotech to create a cloud-based technology package for toilet monitoring as a practical and reliable support for their service to train operators.

Over the last two decades, railway travel has risen at a significant rate. Franchised passenger journeys in the UK increased from 800 million for the financial year 1987/88 to 1.32 billion for 2009/2010. This means that train operators have an increasingly complex and demanding operation to manage, not least because of the targets they have to meet on punctuality, reliability of service and customer satisfaction.

The facilities and comfort on board trains are naturally of major concern to passengers and make all the difference between their having a positive or a negative journey experience. With rail fares being relatively high and with competition from air and road travel alternatives being an increasing threat, customer service is a major priority for train operators in their efforts to maintain and build passenger numbers.

The condition of toilets on trains is a subject that passengers often complain about. While modern on-board vacuum toilets are reliable and resilient to the wear and tear of normal usage, they are vulnerable to vandalism, inappropriate items being flushed into the system or blockages due to build-up of calcium in the pipework and other reasons. Vacuum systems flush into a holding tank which in turn leads to a CET (Controlled Emission Toilet) tank beneath the train. Servicing programmes are subject to manufacturer specifications and typically these are at 12 and 24 months, followed by an overhaul after six years of operation.



Based at Crewe, TBM Rail Group performs a wide range of train maintenance services for all the UK's train operators, including hand driers, air ducts and toilets. Vacuum toilet systems cleaned and serviced include all makes of unit used in the UK. TBM supplies logistics packages and a comprehensive spares service for customers and has extensive skills and experience in rail sector engineering, consultancy and procurement.

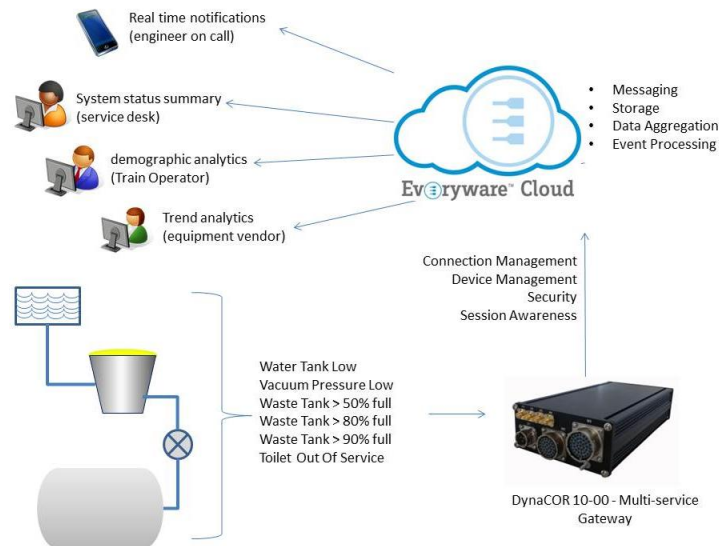
Andy Hawker of TBM Rail explained that the partnership between his company and Eurotech had been instigated in 2012 because of the specific need to reduce toilet downtime through a monitoring system that would alert maintenance teams to problems so they could be dealt with at the earliest opportunity. This would minimise the fines incurred because of passenger complaints or negative reports from rail inspectors and lead to the improved conditions on trains that industry bodies and end users alike were eager to see.

*"Eurotech has supplied TBM Rail with the robust hardware integrated with a software platform based on cloud technology that provides the facilities to monitor all the functions of a vacuum toilet system on board trains," he said.*

*"If there is a blockage or valve failure, the system will warn us in real time through an alert message to our control centre so that we can get a maintenance team out to deal with the problem. They may board the train at the next station or else carry out the required maintenance when the train reports back to the depot, if for instance the toilet needs to be changed. The system will also*

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*monitor the CET tank so that when it becomes full it can be emptied at the depot."*



**Toilet System Overview**

*"TBM Rail is delighted with the solution that Eurotech has provided and with the advice and technical support we have received from them."*

### RUGGED RELIABILITY

Eurotech's experience in rolling stock covers key areas that support driver and train safety and assist operators in managing and controlling services. Compact, rugged, low-powered solutions have been developed for rail network applications which are ideally suited to rolling stock projects in performance, longevity and reliability.

The on-board controller of the train toilet monitoring system is Eurotech's rugged fanless DynaCOR 10-00 mobile computer platform. This low power (19W), fanless, off the shelf solution is ideally suited for railway M2M applications and has a range of features that make it an extraordinarily versatile tool for the demands of the transport sector.

Critical to the TBM Rail project is the product's compliance with EN50155 international standard for electronic equipment used on rolling stock. The standard involves tests on equipment that includes reliability when subject to electromagnetic interference, surges, ripple and interruptions in the supply voltage, vibration and shocks, together with high and low temperatures, high humidity and the ingress of dust and fluids.

The DynaCOR 10-00 is also certified against other key EU and national standards. It is compact (254mm long x 129mm wide x 57mm high) and has the rugged specifications suitable for a range of demanding rail network and rolling stock applications. Based on the powerful Intel® Atom™ Z510P 1.1GHz processor and with Wind River Linux OS support, DynaCOR offers a wide range of wired and wireless communication interfaces which has ensured the built-in flexibility demanded for TBM's on board railway application and renders on-vehicle integration an easy and failsafe process.



**DynaCOR 10-00 – Rugged Mobile Computer**

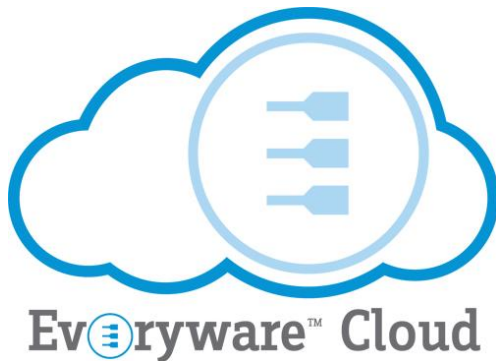
These benefits are enhanced because DynaCOR 10-00 supports Eurotech's Everyware Software Framework (ESF), a framework on the device that eases the application development and makes the device fully manageable through Everyware Cloud. A powerful and flexible Machine to Machine (M2M) connectivity platform, Everyware Cloud manages and connects device to business applications quickly and without the need to create and maintain any infrastructure.

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### CLOUD OVER TRANSPORT

Cloud computing provides an internet-based solution offering shared resources on demand, similar to an electricity grid. It was developed through the internet's ability to provide ease of access to remote computing sites, while at the same time providing complete security of data. With Everyware Cloud, Eurotech has combined proven cloud, M2M and IoT (Internet of Things) technologies to provide the means to connect and control an infinite range of devices.

Data can be collected, stored and analysed and actioned in real time, offering a powerful resource for data communication and management. Everyware Cloud provides the connectivity environment between business applications - such as database, ticketing, track & trace, ERP and CRM - and the multi-service gateways that in turn link to sensors, actuators and displays.



Eurotech's cloud solutions have proved of exceptional value for rail and road transport operations worldwide. Rugged high performance systems have been devised for accurate location tracking applications (AVL), enhanced communications and real time vehicle tracking.

Eurotech's transport expertise also includes the manufacture of automatic passenger counting (APC) systems. For example, the T1 Tramway operated by TEB is a popular commuter asset running between the Northern Italian towns of Bergamo and Albino and accurate statistics are continuously required on the number of passengers using T1 to identify the travel peaks and

troughs. The APC system supplied by Eurotech allows for real time planning of the route.

Counting is carried out on passengers entering and exiting the trams via Eurotech's DynaPCN 10-20 autonomous counting device, which is based on non-contact vision technology specifically designed for accurately counting passengers in real time entering or leaving public transport vehicles, including trains, metros or buses. Operating with high accuracy under any lighting conditions thanks to its integrated high luminosity infrared LED system, stereoscopic cameras capture the images passing the field of view below the device. When it is determined that a person is entering or leaving, incoming or outgoing counters are incremented accordingly along with the time the event occurred.

This facility, which includes Fast Ethernet, GPS and WiFi, acts as the launch pad for the next stage in the information transfer process via the cloud.

Eurotech's wide ranging experience has offered a powerful basis for the development of the invaluable new system to support TBM Rail's maintenance of vacuum toilet systems on trains, ensuring consistently high standards of cleanliness and hygiene and improving the passenger's overall journey experience.

Andy Hawker commented: *"TBM Rail is fully committed to freeing up train operators from the potential hassles of managing their on-board facilities and equipment such as vacuum toilet systems. We offer train toilet maintenance services at a fixed and competitive cost and this cloud-based early warning system is an invaluable asset for improving the capabilities and speed with which we can meet this requirement."*

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