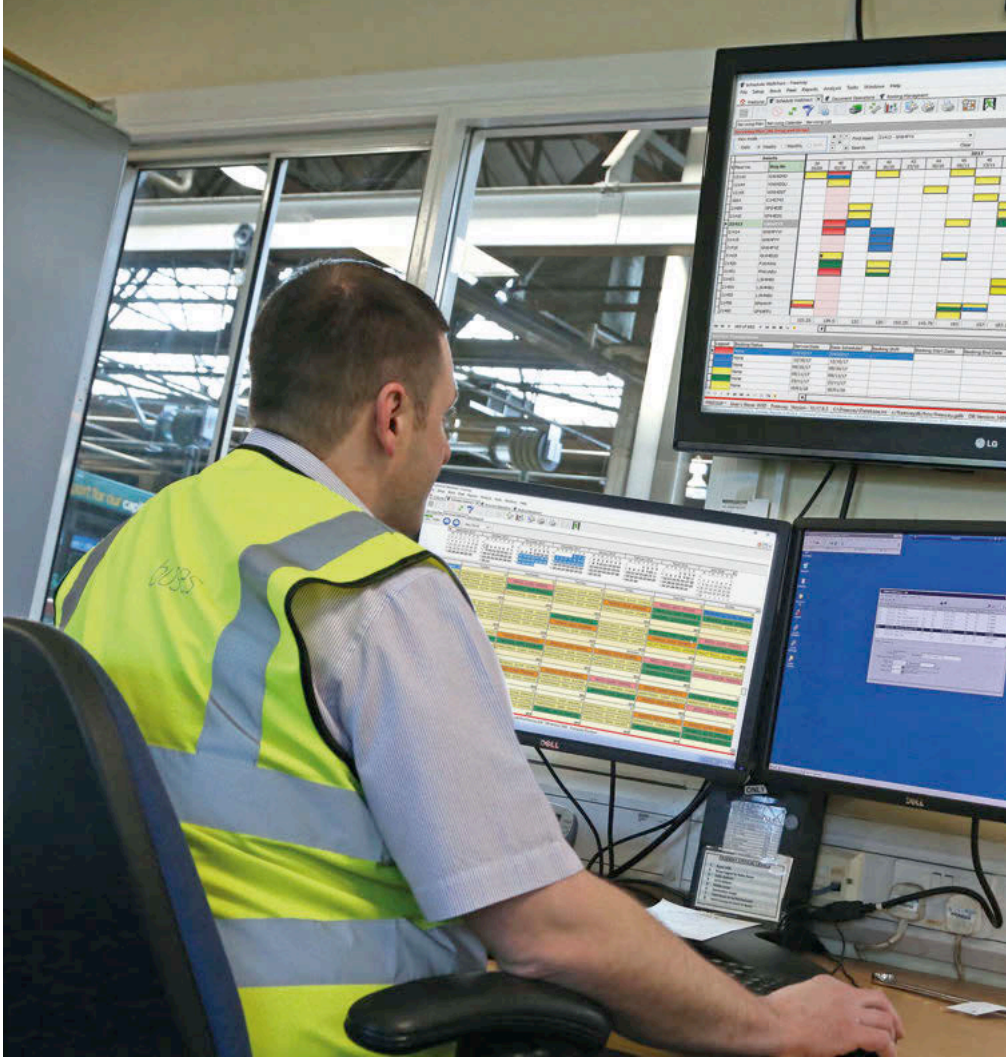
Data DAY



Trucks generate data on an industrial scale. Richard Simpson considers the implications of this for fleet engineers (additional reporting by Lucy Radley)

Last century, oil became the new gold, and now we are seeing data become the new oil. Indeed, the gathering and sale of data is the fastest growing business area in the USA.

Road transport is a part of this: all trucks on sale today can be 'connected', which is to say that data about their use and condition is there to be taken.

This data is of obvious use to the vehicle operator: telematics is now standard issue when it comes to the management of large and medium fleets, and can go from simple location data to detailed information about how the truck is being used and its current mechanical condition, covering everything from fuel consumption to engine temperature and tyre pressures.

According to automotive bearing manufacturer Schaeffler (UK): "Much maintenance is carried out when there is nothing wrong in the first place. Significant cost savings can be obtained by avoiding unnecessary repair work. Such an approach is known as predictive maintenance."

With the introduction of Scania's latest truck range came the announcement that it could collate data gathered from its global fleet of connected vehicles, and use it as a guide to predict component life. Nearly ten years ago, in 2011, Scania started building connectivity into its European-spec vehicles, and this rapidly expanded into other markets. Three years later there were 100,000 connected Scanias on the road, and a further 70,000 were added in 2015 alone.

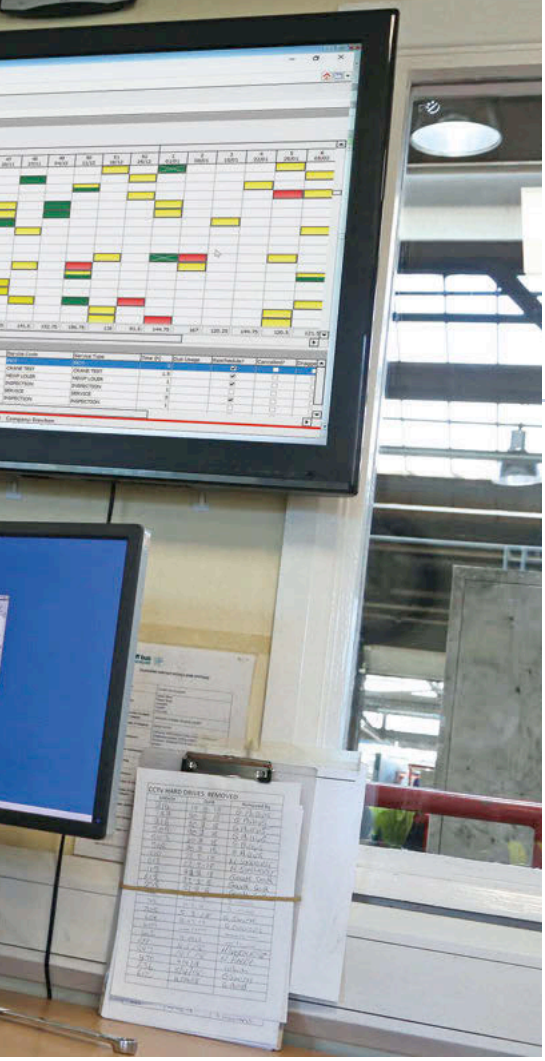
The huge amount of data generated is anonymised and then applied to individual fleet operations. For example, tippers operating in dry and dusty summer conditions might need clean air filters more frequently than in a damp and dust-free winter. In short, Scania was moving from preventative maintenance (action before any possible failure) to predictive maintenance (action before actual failure).

SOFTWARE OPTIONS

Suppliers explain how their products make predictions. Here, software; p24, hardware.

Aftermarket data specialist TecAlliance, which covers light commercial and passenger vehicles, started life over two decades ago as effectively an oversized parts catalogue, TecDoc, which drew together databases held by various participating OEMs. Now it also carries exclusive repair and maintenance information and instructions, including expected labour times as well as details and prices of the parts themselves. Its Fleet Manager software package includes a forecast module designed to calculate reliable anticipated maintenance and wear-and-tear costs, based on the use of OEM parts. Users enter whatever combination of time period and mileage is appropriate, to generate an annual cost projection.

Second is asset management software Freeway Fleet Maintenance. It draws on tachograph and odometer data to enable operators to predict planned maintenance based on distance, rather than using a rather arbitrary system based on time. It then uses that information to predict parts requirement and labour time, so both stockholding and technician hours can be managed more efficiently, increasing cashflow by enabling larger mixed fleets to replenish on a just-in-time basis. Where



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Martin Evans

Volvo is also heavily involved in this technological transition. Having pioneered in-house telematics with Dynafleet, it worked with IBM to produce a predictive analytics platform to process the vast amount of data generated by vehicles in service. Machine learning automatically discovers patterns in the data collected, and Volvo can now identify the parts required and provide repair instructions to the workshop before the vehicle arrives. Volvo claims this has reduced diagnostic times by up to 70% and lowered repair times by over 20%. In 2019, Volvo Group announced that it had one million connected trucks and machines worldwide.

This raises the question of who owns the data. One-make fleets are a rarity in the UK and, for the moment, there appears to be nothing preventing operators from obtaining data from any make of truck for independent scrutiny, providing they have the necessary kit, thanks to the J1939 protocol that allows the ECUs in trucks and trailers to communicate via CAN-Bus systems.

One manufacturer is now moving from an own-marque offering to a universal service. Traton, VW's commercial vehicle arm that controls Scania and MAN, has a dedicated data-handling subsidiary called RIO. Among the wide spectrum of services offered by RIO is the ability to keep track of vehicle performance data which "makes maintenance routines more predictable". The RIO 'box' which enables this has been built into MAN trucks from Euro VI C onwards, but, crucially, since 2018 has been retrofittable to all trucks with an FMS interface.

While Traton is seeking to draw other makes into the RIO net, third party suppliers offer a one-solution for all makes product, which would be particularly attractive to mixed fleets (see also software and hardware sidebars). Magic Internet Technologies has developed Truckfile, which since launch in 2006 has accumulated records covering 200,000 vehicles for 24,000 users. Managing director Paul Cooke says: "The wealth of information that today's trucks are capable of giving us is huge – a modern vehicle can easily generate four gigabytes of data per day. All of that has to be stored somewhere, but it also has to be boiled down into something simple that offers a clear benefit.

"At the same time there's the potential for even more information to be gleaned from the trucks on our roads. Imagine if you could combine and analyse data on the performance of individual

it claims to be unique is in bringing this together behind a single interface, making it easier for complex operations to achieve this happy medium without the risk of missing something. Customers include Cardiff Bus, pictured above, and Suffolk-based Bartrum Group, pictured right.

The third example is the workshop management tool from software developer Jaama's Key2 Vehicle Management System. "This not only stores data, but actively manages, monitors and analyses it automatically, with automated tolerance checks and notifications being carried out by the system," explains Martin Evans, Jaama's managing director. "Fleet managers can graphically view exactly where costs move from a normal curve up to a spike, which helps to identify the optimum time to de-fleet assets or undertake additional preventative maintenance programmes to further extend lifecycles."

In other words, instead of fleet engineers having to manually sift through all their records to weed out problem vehicles, the system informs them when something is going awry. It does this by looking at what has happened previously, extrapolating that data to predict what should happen in future, and flagging up situations where something different is happening in reality. Whether blame for this is due to the vehicle itself or the way it is being used is, as ever, something for the technician to ascertain.

Lucy Radley

components, not just on your own vehicles, but on every other identical model in operation across the country. The level of accuracy in predicting future maintenance needs could be sharpened massively. This, we believe, is where predictive maintenance is heading," Cooke concludes.

A new heavy vehicle data interoperability standard may also help. In November, the remote FMS (rFMS) standard was published. This application programming interface (API) enables telematics providers to receive vehicle data in a standard format from all OEMs, independent of brand, according to Armin Keller, moderator of the ACEA heavy truck electronic interface (HDEI) group task force, responsible for the FMS standard.

OTHER SOURCES OF INFORMATION

It would be wrong to see electronic data as being the only information that can be harvested from trucks to indicate their mechanical condition. The sampling of lubricants for wear metal analysis has been going on for far longer than trucks have had ECUs, and a thorough analysis can provide a picture not just of how fast internal engine components are wearing, but will also highlight issues such as gasket failure (glycol in oil) or inadequate air filtration (silica in oil). Laboratories undertaking this work have data relating to various engine types and applications against which the sample can be compared.

Recent trends towards extended oil drain intervals have thrown renewed emphasis on lubricant condition monitoring. Sensors that can monitor lubricant 'in the sump' and warn of abnormal conditions, or just the need for an oil and/or filter change, are now available. Typically, they measure the rising electrical conductivity of oils, and relay it to an analogue or digital output, which can appear as an on-vehicle display or be relayed to a remote location.

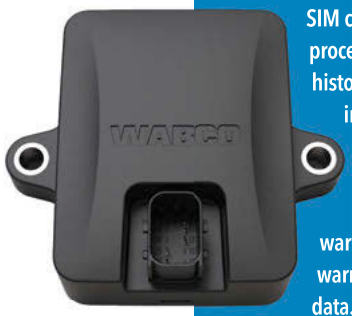
Lubriguard says its sensor will detect excessive soot, oxidation products, water, glycol, wear particles and changes in the level of total base number (TBN) indicating that alkaline additives are depleted and the oil is becoming acidic. However, this information is not as comprehensive as that provided by off-vehicle sample analysis.

There is other information available for analysis, if you know where to look for it. US firm Predictive Fleet Technologies, for example, measures pressure pulses in the exhaust system and crankcase to garner information about bore and ring wear and other factors that would not be apparent on the vehicle ECU. Data can be compared with previous recordings from the same vehicle and current data from others to identify possible issues.

Another tell-tale is vibration as an indicator of bearing failure. Motorcycle racer Barry Sheene once famously pitted during practice and told his mechanic that he had felt a slight increase in vibration that indicated the imminent failure of a little-end bearing. The mechanic protested that a change was not due. The bearing broke up in the race, and the resulting fallout saw Sheene and Suzuki part ways. While few of us have the mechanical sensitivity of a world champion motorcycle racer, it is notable that, in the world of fixed plant, vibration frequency analysis is often used to pre-empt the catastrophic consequences of bearing failure. Skilled analysis of changing vibration frequencies can be used to help identify the fault, as they can be related to a specific bearing's characteristic frequencies. TE

HARDWARE

Last year, WABCO launched an onboard trailer monitoring and remote diagnostics solution, TX-TrailerPulse, alongside which comes web-based portal TX-TrailerFit. This connects directly to the trailer EBS and allows diagnostic codes and other information to be accessed in real time, potentially allowing faults to be spotted even in trailers left to stand for extended periods of time away from base. The system is said to be easy to fit or retrofit, connects to the GNSS and GSM networks, and broadcasts data via an embedded SIM card. The WABCO system processes the diagnostic code history, including translation into plain English via the web portal, and specifically records events such as tilt alerts, low tyre pressures, warning lamps, supply pressure warnings and axle load sensor data. When the system detects a diagnostic trouble code or warning lamp, it queries the trailer for a read-out of everything stored within the operating data recorder. This is intended to enable operators to spot patterns and recurrences to prioritise maintenance activities and act preventively to mitigate any degradation of overall trailer health.



Another system on the market is Goodyear's tyre pressure monitoring system (TPMS), which uses an in-tyre sensor to flag pressure issues as soon as they arise. This, it claims, will prolong the tyre's lifespan and increase vehicle safety. The predictive bit involves a set of algorithms – patented under the name G-Predict – designed to spot developing issues before they otherwise become apparent, potentially reducing downtime. "Once the TPMS sensor is fitted, the fleet operator uses a mobile app interface that we provide to keep a constant eye on their tyres," explains commercial sales manager David Howe. *-Lucy Radley*