EU Stage V, EPA Tier 4 final, China 3 or Japan 4 – more and more different emission standards are coming into force across the world. There is now only a handful of countries left which do not have any emissions regulations. This presents construction machinery manufacturers with the problem of maintaining, for each new model, different variants whose engine space and ancillary design features accommodate the approved engine for the emissions standard in question. In the used market, too, vehicles with high-tech engines cannot be sold blindly into countries whose diesel fuel contains higher levels of sulphur. Demand is growing for an engine for the global market. Squaring up to this challenge, MTU has now developed its Emission Flex Package. This enables customers to operate engines in countries where very different emission requirements apply and fuels are used that have a high sulphur content. Engine systems that to date have been developed solely for markets with stringent emission regulations with exhaust gas aftertreatment, can now be operated outside these highly regulated markets by using engine management software designed specifically for the purpose, thus eliminating the need for complex exhaust gas after treatment systems. In highly regulated countries, the operation of such engines is no longer permissible, which is subsequently ensured by appropriate processes and the removal of emission labels. Since no changes are needed to the engine itself, eliminating the need for time-consuming modifications, the vehicles are easier to sell in numerous countries. This solution means that new vehicle designs will not require any additional changes to the installation space needed to accommodate the engine. Here it is introduced by Frank Bühl, Director of Industrial Sales, and Oliver Moll, Team Leader, Product Development, Service.

Mr Bühl, why has MTU now developed the Emission Flex Package?
Bühl: Nowadays we’ve got state-of-the-art engines with exhaust aftertreatment systems (Adblue injection) developed primarily for countries with high emissions requirements such as Europe and the US. However, customer demand is telling us, firstly, that the used market is taking vehicles mainly into countries outside Europe and the US for resale – countries with less exacting emissions requirements. Secondly, new vehicles are, of course, being designed for worldwide use. This means that customers need engine systems capable of running anywhere in the world on various different qualities of diesel, sulphur content being one of the variables. This way, we’re able to restore a certain flexibility to our OEMs, the vehicle manufacturers.

And why is this development being called for right now?
Moll: The first construction and agricultural machines featuring high-tech engines have now reached the age where they’re being sold on the second-hand market. OEMs are using the markets in countries without emissions directives to sell their used equipment. MTU, for its part, wants to do what it can to assist OEMs with such sales because this will in turn help our sales of new engines.

What are the technical details behind the Emission Flex Package?
Moll: In designing the solution for smooth operation, we took great care to avoid any construction alterations to the engine hardware. This means the customer saves a lot of time, and of course money too. Using the Emission Flex Package, a new set of data is copied across to the engine, effectively reprogramming it. Engine systems featuring exhaust aftertreatment which up until now were only developed for markets with stringent emissions regulations can now be operated outside these highly-regulated countries using specially developed engine software without having to incorporate sophisticated exhaust aftertreatment systems. After the software update, Tier 4 interim engines no
longer meet any emissions level, and Tier 4 final engines meet the limits of the EU Stage IIIA regulations.

What fuel compositions are tested worldwide in order to guarantee that customers will be able to run their engines smoothly with the Emission Flex Package?
Bühl: We're assuming the sulphur content of fuel is set to keep falling worldwide. As infrastructure is added and enhanced in individual countries, there will be a major step up in the supply of low-sulphur diesel. After all, the countries have to assume, for example, that cars and trucks with identical technology which are also being driven in all countries also have a requirement for low-sulphur diesel. We're assuming that a maximum sulphur content of 500 ppm will be the worldwide diesel standard in a few years' time.

For which series engines is the Emission Flex Package available?
Bühl: The Emission Flex Package is available immediately as a retrofit solution for Tier 4 interim engines in the OM 900, 460 and 500 series. For Series 1000 to 1500 engines, the Emission Flex Package has been available since 2016 for the Tier 4 final and EU Stage IV emissions standards both for new engines and also as a retrofit package.

Are there already any MTU engines with the Emission Flex Package in service?
Bühl: Yes, we've a range of customers who have already applied the Emission Flex Package to Tier 4 interim engines – for a wide variety of applications in various different countries.
When it comes to reprogramming, emission compliance plays a key part. How does MTU safeguard itself here?

Moll: End-users are not directly involved in handling the MTU Emission Flex Package which is only available to authorized MTU specialists for compliance reasons. End customers should therefore contact their OEM. We start by signing an agreement with the OEM setting out the duties and obligations, the legal stipulations and the OEM's responsibility. Part of this says, for example, that reprogramming of engines may only be undertaken in countries where this is allowed. Not every country allows engine data to be altered prior to export. Once set up, these engines are no longer approved for use in highly-regulated countries this being safeguarded by a number of processes, including removal of the emission labels. It's the OEM's responsibility to ensure that these kinds of up-to-the-minute country-specific requirements are checked in terms of registration criteria, and that compliance is thus ensured. Based on this agreement, the OEM is then able to order the Emission Flex Package for each engine in question. The emissions label, removed from the engine, must be appended to the order as evidence of de-certification. Only once this order is in place is the engine's equipment data amended on the engine manufacturer's database, and the new data able to be copied across to the engine. The technical effort involved is fairly low, but compliance with emissions requirements takes quite some effort.

What are the benefits of the Emission Flex Package to new customers?

Bühl: Where a customer installs one of our engines in, say, an excavator, he wants to be able to sell it worldwide at some point in the future without having to adapt it first. You have to remember that big vehicle manufacturers mostly offer a variety of engine types. If these have to be able to be called off in a variety of different emissions levels, the whole thing becomes so complex that the customer finds it difficult to handle and loses interest. Yet just one single engine configuration gives the customer all these benefits in logistics, with spare parts, in engineering and in procurement.

You mentioned selling used vehicles to countries without emissions restrictions. Why is an Emission Flex Package required here?

Bühl: You have to bear in mind that some OEMs take back up to 90% of vehicles sold, and then sell them on in the second-hand market. We're talking, often, of machines with list prices of upwards of one million euros here. The engines are fitted with Emission Flex Package in the field in order to maintain the value of the used machinery and ensure they can be exported to countries with other emissions environments. Another key point is that the initial-user market doesn't get “clogged up” with second-hand machinery at fire-sale prices. As a result, trading in used vehicles is also a lucrative business for our OEMs as well as being flexible in terms of exporting to other countries.
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