

# ATF technology rises to the challenge

## part 2



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In Part 1 of this two part feature, The Strategy Works examined the commercial forces driving the ATF market in Europe. In part 2 we examine the technical findings from the research and assess how the ATF supply chain is responding to the needs of service managers both now and in the future.

### Commercial Vehicle type impacts on ATF choice

The most common vehicle types such as city buses, refuse trucks, etc. with the typical 'stop/go' driving profile, place their own demanding conditions on the type of ATF and its performance. The more payload the vehicle has to carry, the higher the stress the ATF within the gear unit has to sustain, often due to extremely high temperatures. These can arise from insufficient cooling due to slow speed of the vehicle and/or high ambient temperature.

Using an approved premium quality ATF extends drain intervals as long as possible and enhances transmission performance and durability in all operating environments throughout the interval.

### Key Technical Requirements of ATF:

- Lubrication of sliding/rolling parts
- Internal cooling of gears by transporting heat to transmission housing or separate oil cooler
- Protection against corrosion, wear, deposits and foam
- Durability to allow long drain intervals
- Elastomer-compatibility: sealing materials must not become brittle or soft and they must not shrink or swell
- Application specific friction characteristics in clutches or brake bands for shift-comfort and torque capacity
- Torque transfer in gears and torque converter and variator (CVT)
- Viscosity optimum for cold start as well as high temperature operation

These features need to be viewed in the context of the features that Service Managers most value as indicated by the research:

### Transmission Reliability and Durability

This can only be achieved if the ATF itself is designed for sufficient protection against the wear & tear of the transmission hardware. The ATF anti-wear- performance, must be adjusted with the gear unit's demand, deriving mainly from vehicle operating conditions including environmental thermal stress.

It is therefore important to decide on the right ATF as Alexander Roder, Service Manager at OVK Kirchheim, explains *"The company wants to ensure that the transmissions last for 8 years. So we procure exactly the ATF recommended to us."*

This is endorsed by the technical coordinator at a leading French truck operating company: *"Transmission reliability and durability is linked with the longevity of the vehicle"*.

A leading bus company in Turkey stresses the importance of this feature: *"Protection against wear/tear is a valuable feature for modern ATFs. Since we operate more than 200 buses in the city, so smooth operation of the buses in alignment with our routine maintenance cycles is very important for our operations."*

### Oil Drain Intervals

The length of the oil drain interval is driving the operating efficiency of a vehicle or fleet. OEM's test and approve selected ATF products for individual applications, interval length and operating conditions.

ATF suppliers have responded to transmission manufacturers (e.g. ZF EcoLife transmission box, ODI up to 240,000 km / all 4 years) by introducing leading edge products mostly based on an advanced synthetic technology, allowing extended long drain intervals for the demanding requirements of modern, full automatic, heavy duty gearboxes. Synthetic ATF products offer increased resistance to heat peaks as overheating can lead to 'coking effects', causing oil thickening. These types of products also offer enhanced protection against deposits and corrosion, contributing towards extended transmission life.

### Corrosion; Wear & Tear; Thermal / Heat Conductivity

Typical thermal stress factors are stop/start driving profiles, high loads and high external temperatures, often co-occurring. The ATF has to deflect heat from inside to outside the gear box which has a cooling effect. Beyond cracking of the oil molecular chains over the operation time can lead to viscosity change, loss of lubricity and depletion of friction properties. The oil may become thinner, leading to shifting problems and finally to increasing wear. This is confirmed by two service quotes below:

Ahmet Kucuk, Coordinator for Repairs at Ozemniyet Turizm Ltd in Turkey comments, *"We value the thermal protection that comes with ATF with constant starts and stops."* Herr Doeffinger,

Workshop Manager at the prominent German bus company Fische comments: "As we have many hills and valleys on our routes, the ATF has to cool down the transmission and this is of highest priority for us."

### Fuel Economy

Fuel economy can be achieved by reducing friction between all gear parts being in motion in the gear box – especially at cold temperatures. Selected base oil (mostly synthetic) and sophisticated additive technologies make this possible.

Outstanding cold flow properties giving high protection to transmission especially at start-up, helps to reduce fuel consumption and emissions as observed by Sebastian Ziele, Manager In-house Workshop at Zweckverband Abfallwirtschaft in Germany. "It is known that a state of the art ATF can contribute to fuel economy of a vehicle".

### ATF Product ranges

Looking at the available ATF product ranges there are 3 categories of fluids which are different in respect of their base oil technology:

- Category 1): Mineral oil based ATF – the majority of products. These products are often older standard oils with classic features, mainly for standard applications, and multi-functional products.
- Category 2): Part synthetic ATF – products, consisting of a mineral oil and synthetic oil mix. To this group belong products based on HC-Synthesis or XHVI-Synthetic-Technology which are offered by Shell, for example. Part synthetic products have a broader application range and higher performance than mineral oils and offer multi applicability on higher levels.
- Category 3): Full synthetic ATF-products, the Top-Tier products which are the latest developments for special and new transmission types, very long oil drain intervals and severe operation conditions. Some of these products are backward compatible.

For the latest vehicle technology the 'best' ATF products are required - typically two alternatives - standard drain and extended drain. For very long drain intervals mostly only one ATF product per supplier is suitable.

### Applications

The main ATF product differentials (for all brands) are application related:

- Mineral based ATF and alternatively synthetic type (cold environment operation conditions)
- Standard ATF for standard oil drain intervals; alternatively premium ATF for extended drain intervals / fill for life
- ATF products for single application and products for combined services (e.g. retarder)
- Products with very individual friction properties for optimized gear shift in a specific gear type
- Products with special elastomer compatibility when certain sealing materials are used
- Products with extremely high temperature stability

### European presence of Shell

Shell maintains excellent relations with the OEMs – both vehicle and transmission manufacturers – and has gained the status of a preferred technology development partner. The result is a complete and state of the art ATF product portfolio.

"Shell is one of the few Top-Tier market suppliers. Shell has a wide portfolio of high performing and approved products", explains the Head of Sales for a German distributor.

### Recent Technical Developments - ultra-long drain interval products

ZF have played a key part in driving the demand for higher grade ATF products as the Department Manager at a well known German bus operator explains:

"There has been a significant improvement in automatic transmissions from ZF. The new generation ZF EcoLife is significantly more reliable compared to the older Ecomat transmissions and they also offer a much higher comfort to passengers and the driver".

Vishal Mesih, Service Engineer at UK based bus operator, Arriva, adds: "The ZF Eco Life Boxes helped a lot because the frequency of oil replacements could be reduced significantly (from every 6 months to theoretically 5 year intervals). This will be a lot cheaper and they work really well, there have been no complaints and they have been working for 4 years without problems."

### Are further increases in drain intervals possible?

In terms of their 'wish list', this is the area service managers and distributors alike most require in the future. Essentially service managers want 'more of the same' as evidenced by the quotes:

"They are not asking for anything different from today. They want quality ATF and long drain intervals" says Philippe Bichon, Commercial Executive at the French distributor, Lubexcel.

"More shear-stable, longer drain intervals" adds the sales manager at a UK distributor.

Erkan Arslan, Service Manager at the prominent Turkish distributor, Koluman explains, "Prolonged ATF drain/change intervals per kilometre. More clean and efficient products that protect the transmission".

### Conclusion

Service managers express a high degree of satisfaction of the degree to which ATF manufacturers have adapted to their technical needs and also the levels of technical support on offer across the supply chain. The future certainly holds further challenges, but the extent of the technical co-operation between OEMs and lubricant companies within the ATF value chain gives rise to optimism.

*This article has been prepared by Michael Herson and Bernd Heyse of London based strategy consultancy - The Strategy Works - specialising in original research on a global basis within the lubricants sector and other international B2B markets. Contact: 44 208 868 0212 or mherson@thestrategyworks.com; TSW's other recent B2B articles can be viewed at: [www.thestrategyworks.com/articlesindex.htm](http://www.thestrategyworks.com/articlesindex.htm)*

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