

Infineum Trends

Part 1 of a 2-part series

Industry Drivers

We are seeing some signs of recovery, but it is still not clear if they will continue. Whatever the outcome, the effects of the recent economic turmoil and restructuring of the auto-industry will be felt for many years to come. The theme for this year's Trends presentation is emerging from the turbulence. By sharing some of our perspectives and highlighting some of the green shoots that need cultivating we will all have a better idea of the shape of things to come.

Perhaps we will be able to look back on 2009 as the year that vehicle sales finally bottomed out. Global auto sales declined 16% to 60 million units. The US market sold just over 10 million units last year – a 21% decline from 2008 figures. This was the lowest light-vehicle sales year since 1970. December's seasonally adjusted sales rate of 11.3 million units indicates things may be improving, and automakers are indicating a 'cautious optimism' going forwards.

In Europe, 14.5 million cars were sold across 28 countries in 2009 – a fall of just 1.6% over 2008 figures. In some of the major European economies the market has been supported by government scrappage schemes which have benefited the volume manufacturers like Volkswagen, Renault and Fiat.

Germany saw the biggest rise in sales last year – up more than 23% compared with 2008 and in France sales increased by 10%. But, sales in December 2009 dipped here in the UK following the end of the scrappage schemes – a picture that is likely to be repeated across the region. Other European countries are now thinking about introducing scrappage deals and if they need any further evidence of their success they only have to look as far as Ireland, where the lack of such a deal saw sales plummet by 62% in 2009.

2009 will also be recorded as the year China overtook the United States as the biggest auto market – and OEMs expect strong growth to continue in 2010. Boosted by Beijing's stimulus package, 2009 passenger car sales soared to 10.3 million and total vehicle sales are estimated at 13.6 million – which represents a growth of about 45 percent from 2008.

China's status as the top auto market is yet another sign of its rapid rise as a global economic power. After a two-decade economic boom, it is believed to have passed Germany last year as the biggest exporter of goods and is expected to overtake Japan soon as the second-largest economy after the United States. As for the rest of Asia, there were mixed fortunes in the automotive market with the larger markets of India and South Korea seeing an increase in car sales, whilst new vehicle sales in Japan fell below the 5 million mark for the first time in over 30 years. Sales in Japan dropped 9.5% to a total of 4.6 million cars.

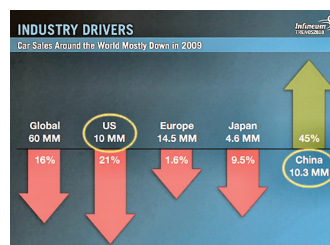
The market projections for 2010 are rather mixed, with some OEMs and industry analysts predicting reasonable recovery, while others are more cautious in their forecasts. Many expect global auto sales to recover, led by emerging markets in China, India and Brazil, with many mature markets also expected to post gains in 2010, bolstered by a double-digit advance in the US market.

The European market is likely to be the exception with sales in 2010 expected to fall an estimated 8 per cent to 12.3 million units, despite a modest improvement in economic activity.

Despite this tough economic backdrop automakers continue to invest in new products. Demands for reduced fuel consumption, emissions and dependence on oil, combined with calls for more alternative fuels, all come as a result of the pressures to reduce greenhouse gas emissions. Climate change is high on the political agenda. The very public debate on this topic has firmly placed CO₂ emissions reduction as the number one issue driving change in our industry today.

After water vapour, carbon dioxide gas makes the most significant contribution to the greenhouse effect. At present the concentration of CO₂ in the atmosphere is estimated at 385 parts per million – almost a 40% increase from pre industrialization figures – and it is still rising. This fact is driving Governments around the world to introduce and tighten CO₂ emissions limits, and has propelled CO₂ reduction strategies into poll position as the number one driver for change for on-highway OEMs, and a topic that will affect almost all forms of transport in the not so distant future. It's not just the OEMs who will have to change the way they operate – this quest for CO₂ reduction will also impact the refinery, as Greenhouse gas saving targets may limit the use of certain biodiesel feedstocks.

In Europe only voluntary agreements on CO₂ reduction are currently in place. For passenger cars, ACEA had aimed for a target of 140 g/km fleet average by 2008 and Japan Automobile Manufacturers Association (JAMA) and Korea Automobile



Manufacturers Association (KAMA) had targeted the same fleet average by 2009. As progress towards meeting these targets has been relatively slow, with the European average stubbornly remaining at 158 g/km in 2008, the European Commission (EC) has set a legislative target of 120 g/km fleet average for NEW cars by 2012 – 130 g/km of which is expected to come from vehicle technology advances with the remaining 10 g/km to be achieved by complementary measures including the use of sustainable biofuels.

Going forwards the EC has some pretty aggressive plans for CO₂ reduction. For passenger cars, the proposals accepted by the European Parliament in late 2008 and adopted by the Council of Ministers early in 2009 require 65% of new vehicles registered to meet the 120 g/km fleet average by 2012, rising to 100% by 2015, and excess emissions will incur severe financial penalties. By 2020, the CO₂ target will be reduced to 95 g/km fleet average.

As for light commercial vehicles, the EU issued a draft regulation, setting a target of 175g/km from late 2009. This will be introduced in a phased approach, with 75% of the fleet expected to meet the target in 2014, moving to 100% by 2016. From 2020 these vehicles will be expected to meet a 135 g/km target. Again fines are proposed for non conformers which range from 5 for the first excess gramme to 120 for the 4th and every subsequent excess gramme.

The United States Environmental Protection Agency (US EPA) and National Highway Traffic Safety Administration (NHTSA) have proposed harmonized green house gas and fuel economy standards for light-duty vehicles for model years (MY) 2012-2016.

These standards require the light duty vehicle fleet to meet an estimated combined average CO₂ level of 250 g/mile and an estimated Corporate Average Fuel Economy – or CAFE of 34.1 mpg in MY 2016. Companies not meeting these standards face severe financial penalties, but credits can be gained for the use of advanced, fuel efficient technologies.

CAFE is being extended to heavy duty equipment in the US. The Energy Independence and Security Act requires the NHTSA to study heavy duty fuel economy by 2010, to promulgate regulation by 2012 and to enforce rules by 2016.

A major concern is the lack of an industry recognised test to measure HD fuel economy. OEMs are considering many strategies to comply with these limits and avoid fines. They are looking at every area of existing vehicles and powertrains for fuel economy improvements as well as alternative fuels and propulsion technologies.

Electric vehicles and hydrogen powered cars receive a large share of media attention and OEMs are investing in their development and commercialisation. However, the internal combustion engine will be the primary power source for many years to come, and improving its efficiency is very high on OEM agendas.

In the US, there are currently no new emissions limits planned. Passenger car Tier 2 emission regulations are fully implemented, with Bin 5 average required to sell in all states. Meeting this requires a significant NO_x reduction for European diesel cars which meet Euro 5.

For heavy duty vehicles, the EPA07 limits have been in force and the 2010 limits are phasing in. For non-road diesel engines Tier 4 standards, which phase in from 2008-2015 introduce substantial emission reductions.

In Europe, Euro 5 emissions regulations for passenger cars and light duty diesel vehicles have a rather complex array of introduction dates which were introduced for new type approvals from September 2009. In the longer term Euro 6 is expected in 2014 where the main change is the reduction of NO_x from 180 mg/km to 80 mg/km. For heavy duty vehicles Euro VI is expected to be introduced for all new vehicles in 2013 and will significantly reduce hydrocarbon, NO_x and particulate emission limits and is then likely to remain the same for five years. These changes will continue to drive advances in fuel injection equipment, combustion development and aftertreatment systems.

Engines for heavy duty applications are certified on the test bed over two cycles (ESC / ETC), not whole vehicle as for light duty vehicle. World-wide harmonised test cycles, WHTC (transient and stationary) will be implemented with Euro VI.

There is increased focus on particulate emissions, PM, and NO_x for Euro VI. Euro VI PM limits are 67% lower than Euro IV and NO_x limits 89% lower. These limits are comparable in stringency to the US 2010 limits.

On-Board Diagnostics (OBD) has been required for all new heavy duty vehicles since 1 October 2005 and for all vehicles from 1 October 2006; since 2008 OBD II requires emission related threshold monitoring for all components (e.g. tailpipe NO_x sensors).

As yet there is no fuel consumption / CO₂ legislation for medium and heavy duty vehicles. In fact, Euro VI could be the final emissions specification which focuses on the noxious NO_x and particulate emissions. Beyond Euro VI the focus is expected to move to CO₂. All OEMs are interested in fuel economy and are looking at this in in-house tests. Lower viscosity oils are of interest, including a willingness to consider oils with less than 3.5 HTHS. And of course hybrids will see an increasing role in the HD arena.

No fuel consumption targets are included in the Euro VI regulation. It is estimated that emissions targets will have up to 3% fuel consumption penalty from today's levels. CO₂ / fuel consumption limits could be introduced from 2015 – 2016 post Euro VI.

Recently there has been increasing interest in both product quality and its assurance in the market place.

Passenger Car Motor Oils

In Europe extended drain continues to reduce demand; however this is balanced by a small increase in East European and Middle Eastern sales. The trend to lighter grades is continuing. SAE 5W-20 and 5W-30 oils now comprise well over half of the North American PCMO market.

Within the EU countries lower tier lubricants are on the decline with growth in Mid/Low Sulphated Ash, Phosphorus and Sulphur (SAPS) and more Premium lubes. However there is still demand for low tier lubes outside the EU.

In the US mainline International Lubricant Standardisation and Approval Committee (ILSAC) GF-4 products constitute roughly 2/3 of this market, while specialty products such as top tier, high mileage and synthetic blend oils account for another 20%. As the ink dried on the ILSAC GF-4 specification, work was already underway to develop the new tests that would be required for GF-5.

Last November, ILSAC members accepted a compromise proposal offered by the Oil Marketers, and in December, the GF-5 standard was finally approved. American Petroleum Institute (API) licensing of the Starburst Certification Mark can begin on October 1 2010, and GF-5 becomes the only acceptable quality for API Starburst licensing after September 30th 2011.

GF-5 includes a number of significant performance enhancements with both a number of new tests and tighter limits on existing tests.

After some delays all specifications can now be licensed beginning October 2010. GF-5 includes a new fuel economy test, the sequence VID replacing the VIB. It is a more precise test, but it gives smaller FEI results. It will require new formulation approaches. GF-5 is projected to last until at least 2015, which could lead to a period of stability.

New Global engine oil performance specifications from GM, trademarked dexos, are entering the market. GM will be specifying dexos 1, with performance well beyond ILSAC GF-5, as factory fill for MY 2011 gasoline engines. For Europe, dexos 2 with an equal focus on diesel engine performance will be of more interest.

All in all GM's future target is to balance the combination of fuel economy requirements verses the durability requirements of further downsized engine designs.

Infineum think that fuel economy and long drain intervals don't have to be mutually exclusive. In Europe the next ACEA specifications are due this year. However, this should only be a tidying up exercise, providing an opportunity to replace obsolete engine tests and the main changes are as follows:

Key drivers for the 2008 specification revisions were to ensure that lubricants can continue to deliver the correct performance for the latest hardware and to replace several obsolete tests. During the development of the Passenger Car Motor Oil (PCMO) specifications we saw a better process, with more dialogue and improved issue resolution than in previous revisions.

That said, Euro V engine technology is not vastly different from today's engines, and current oils are delivering the required performance. With this in mind, the sludge and ring sticking requirements, which significantly increase the severity of the A/B category, could hardly have been predicted.

Another change to the A/B category was the introduction of a fresh oil Total Base Number (TBN) limit of 8.0 which is designed to provide some protection to engines operating outside Europe on high sulphur fuel. In Infineum's view this would have been better defined by performance testing rather than these chemical limits. And, despite considerable opposition from ATC and ATIEL, which was based on their analysis of all the available VW turbo diesel test data, an end of test TBN limit of 4.0 for all A/B categories for the Volkswagen TDI test was also set.

The changes in the C categories were fairly minor, with just some increase in sludge performance requirements and an increase in the fuel economy requirement for C1.

The resulting ACEA 08 oils should provide a safe foundation level on top of which OEMs can build additional specifications for improved performance such as extended drain interval or improved fuel economy.

Daimler, GM, Ford, Renault and PSA have all released new specifications since the last Infineum Trends article – these are likely to require action in 2010. Lubricant companies have been focused on gaining or maintaining these OEM specifications many of which now require ACEA 08 performance levels. And it seems that these OEM approvals are a greater driver for change than ACEA 08.

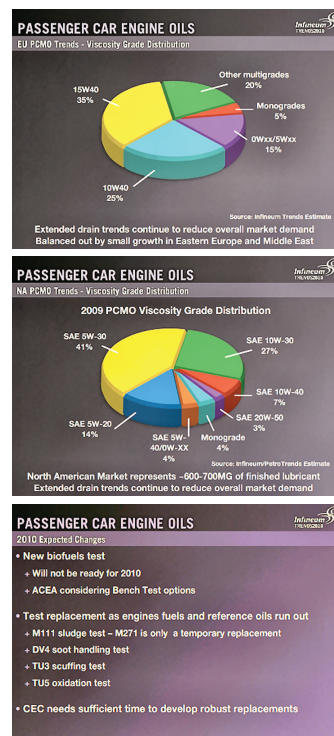
Looking further into the future, the next update to the sequences is scheduled for 2010, although with no new engine technology on the horizon questions on this timing must be raised. Yes, there may be a need for minor revisions to replace obsolete engine tests, but work should really now focus on the changes required to protect new Euro VI engines scheduled in 2013.

That said, the lack of a test to measure the effects of biofuels in ACEA 08 was seen as one of the main shortcomings. And although the test severity of the VW TDI test was increased and the OM646 runs on diesel containing 5% biofuel, neither properly measure the effects of biofuels. CEC has begun the test development process and has formed a working group. However the instability and variability of biofuels is likely to make it a very difficult test to develop, which means it will not be ready for the planned 2010 updates. Perhaps ACEA should consider rescheduling the update of the sequences to coincide with the availability of this crucial test.

ACEA have also recently suggested using bench tests to look at the impact of biodiesel on low temperature operability, oxidation and bearing corrosion. These suggestions need to be evaluated carefully to ensure that they would provide meaningful protection.

A number of existing tests are also coming to the end of their useful lives as engines, fuels and reference oils run out. These include the M111 sludge test, the DV4 soot handling test, the TU3 scuffing test and the TU5 oxidation test.

There is a lot of frustration around the lack of availability of a replacement sludge test because the industry has been aware of the situation for some time, but no new engines have been proposed.



Small Engines

Global motorcycle production and sales have generally risen steadily year on year, but 2008 saw a slight deceleration, as the world recession took hold. Worldwide production grew to just over 50 million units. This was one transport sector that was expected to grow, despite – or perhaps even because of the recession.

However, in reality 2009 was a rather dismal year for motorcycle sales and production. Japanese domestic motorcycle production dropped sharply in 2008. However, on a global scale Japanese OEM presence in the motorcycle market is still strong with global sales in the region of 15-20 million units.

In the US, figures released by the Motorcycle Industry Council in January show that sales were down by over 40% to just over 520K units in 2009. Even the industry favourite – Harley Davidson – saw sales drop by over 20%.

In Europe, where sales are expected to slip over 20% from 2008 levels, Triumph has been one of the few manufacturers to hold relatively steady in 2009.

However, all is not doom and gloom. In August 2009 Freedonia published a report which forecast global demand for motorcycles to rise 7.6% per year through to 2013 to reach 114 million units. In developing markets growth will be spurred by rising standards of living, making motorcycles more affordable. In developed economies higher energy prices are expected to make two wheels an attractive alternative to the automobile.

Electric motorcycles, which are extremely popular in China, but account for only a small share of demand in most other parts of the world, are expected to register strong growth in the coming years driven by their generally lower purchase prices, low cost of operation and lack of harmful emissions. However, conventional two and four stroke motorcycles will still account for the majority of demand over the next five years.

These conventional motorcycles will be subject to increasingly stringent emissions legislation in the coming years. Currently European motorcycles must meet Euro 3 emissions limits. But, the European Commission and the Association des Constructeurs Européens de Motorcycles (ACEM) have issued a proposal to the motorcycle industry that would see emissions limits progressively tighten through Euro 4 in 2012 to Euro 5 in 2015. Moving from current Euro 3 to Euro 5 will effectively halve motorcycle pollutant emissions.

OEMs are investing in research and development to not only improve fuel consumption and environmental impact, but also to enhance comfort and safety. Many innovations first developed for passenger cars are finding their way into motorcycles and models now include advanced transmissions, ABS brakes, improved fuel injection and alternative fuel and power technologies.

Despite the incorporation of passenger car technology into motorcycles, their lubrication requirements remain very different. As OEMs look for improved fuel economy without sacrificing clutch performance the requirements and formulation approaches for motorcycle and automotive oils will diverge even further. It is important that Japanese Automotive Standards Organization (JASO) continues to update its four stroke motorcycle engine standard which was introduced in 1998 and was last updated in

2006. The next update is slated for 2011 and is expected to retain the existing MA, MA1, MA2 and MB classifications that are based on clutch friction performance.

However development of a gear pitting test has not gone according to plan. A number of different approaches have been tried, they have so far proved unsuccessful. Despite any changes, it is unlikely the 2011 updates will prevent the use of PCMOs in motorcycle applications.

The leisure marine market has also experienced difficulties with the economic downturn. The US is the largest leisure marine market in the world and its statistics can serve to chronicle the tough times that the industry has endured, as well as the hope for the future. Most boating in America is a leisure-time activity and purchases of new equipment are largely based on discretionary spending. So not surprisingly new power boat sales dropped over 16% in 2008 and fell again by another 20% in 2009.

In the US new emissions regulations are in effect beginning this year for new gasoline stern drive and inboard engines. These engines must now come equipped with catalytic converters and electronic controls including OBD.

In 2009, The National Marine Manufacturers Association (NMMA) launched a new low-phosphorus four-stroke oil standard called FC-W Catalyst Compatible. This new standard demands a level of quality and performance that cannot be provided by automotive oils for the severe operating conditions of leisure marine engines. Lubricants that pass the specification are designated as FC-W Catalyst Compatible and are added to the NMMA FC-W(CAT) approval list.

On a global basis, motorcycles are generally viewed as a necessity for transportation, while outboard, sterndrive and inboard engines are often seen as being used for leisure pursuits. Borrowing a nautical expression that “a rising tide floats all boats”, it’s expected that the improving global economic picture will help both of these segments of the small engine market to recover.

