

INSIGHT: Lubes at centre of trends reshaping industry

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HOUSTON (ICIS)--The use of lubricants in so many products and applications has made them the centre of many of the trends reshaping industries, from nanotechnology to digitisation.

The result is that lubricant makers will see a significant amount of change in coming years, according to a recent report by the Society of Tribologists and Lubrication Engineers (STLE), a professional organisation for the industry.

Among the biggest trends affecting lubricants is digitisation, said Bob Gresham, director of professional development for the STLE.

In digitisation, companies use sensors and other devices to track the real-time operating conditions of their plants. This data are analysed and manipulated digitally.

Lubricant companies can use the data to evaluate product performance, allowing them to make adjustments that can make the plants perform better. They may recommend that customers use more lubricants or cut down. They could also recommend a different lubricant based on the data. Companies could even design new lubricants based on the operating conditions they glean from the data.

Manufacturers will also be monitoring equipment to make their plants more energy efficient. Again, this could drive demand for better performing lubricants, which would allow machines to run with less energy.

The STLE report considers this trend towards energy efficiency almost inevitable. As the world's population continues to rise, it will place increasing demands on energy consumption. By making machines more efficient, lubricants can help industries meet this growing demand for more energy while offsetting air pollution, one of the consequences of burning fuels to produce power.

A similar trend to digitisation is automation, in which robots and machines decked out with sensors and cameras can work around the clock in plants.

The parts in these robots could be moving constantly, which will also affect demand for lubricants.

Automobiles present more of a mixed bag for lubricant makers.

On the one hand, automobile producers will want to make their vehicles more energy efficient, creating demand for higher performing lubricants. This trend is already affecting lubricant makers.

However, if auto makers increasingly embrace electric vehicles, this could cause demand for lubricants to fall. These automobiles do not need motor oil, since they do not have internal-combustion engines.

The increase in electrical consumption from these vehicles, though, could increase demand for other types of lubricants, Gresham said.

As these vehicles recharge, they will put enormous strain on the power grid, which will have to distribute electricity to many automobiles without becoming overwhelmed.

Gresham said power grids could need more switching mechanisms that could more efficiently distribute power to electric vehicles. These mechanisms would need lubricants.

And the electric vehicles would still have some moving parts, so they would also need lubricants.

If autonomous vehicles become common, then automobiles could spend much more time on the road, operating like 24-hour taxis. The constant wear and tear on parts would require better performing lubricants – even if the motor runs on electricity.

Autonomous vehicles could also make cars available to a larger number of people around the world. As a result, the average miles driven by a person could rise, further increasing demand for lubricants.

Like automobiles, additive manufacturing – also known as 3D printing – could also present some challenges for lubricant makers.

In traditional metal processing, material is removed from an object. For example, a bit would drill holes into a piece of metal, while a lathe would cut off material.

To preserve the lathe or the drill bit, an operator would use machining fluids to remove chips and debris, allowing the tool to last longer.

3D printing does not require any cutting, since parts are made by adding material until the finished product appears. Since 3D printing does not remove material, does not require machining fluids.

Another trend, nanotechnology, does not present a challenge to lubricant makers as much as a conundrum.

Researchers are studying how surfaces interact with each other at the atomic level, Gresham said. For lubricant makers, the challenge is linking the behaviour of materials on such a small atomic scale to that on a much larger one. Materials appear to behave differently on these vastly different scales. This suggests that these interactions are not yet understood and more research is needed..

If researchers can solve this problem, it could open up a new wave of advancements for lubricants, which could have a wide-reaching effect on all kinds of applications, from cars to power grids to manufacturing plants.

Like other industries, ever more powerful simulation technology is helping scientists learn more about the behaviour of materials. But to solve these and other problems, the lubricant industry will need new minds and talent. One of its biggest challenges is attracting new people to the field.

For years, people kind of fell into the lubricants industry, Gresham said.

"Some bright young chemist, engineer or metallurgist, who's working for a company that has tribology problems, gets assigned that problem and tries to figure it out," he said. Over time, that young mind becomes better at solving lubricant problems and evolves into a tribologist.

That's what happened to Gresham. He was an organic chemist when he went to school.

The lubricant industry evolved this way because it is far reaching and encompasses so many disciplines.

"When you really distil it down, if you have two surfaces that come in contact with any kind of movement, there is likely to be some kind of friction wear or lubrication issue," he said. "We look at things as bizarre as what allows a gecko to crawl up a wall without falling off to the friction of an eyelid over a contact lens."

This breadth is one of the best things about the lubricants industry and one of its biggest hurdles, Gresham said. "It's so broad based and so multi-disciplinary, it's hard to get your arms around it."

Such a broad and multi-disciplined field is difficult for a university programme to encompass, but more are being developed. Auburn University introduced a minor in tribology and lubrication science earlier this decade.

This and outreach from the industry could help lubricant makers find the new talent to confront the challenges and opportunities that will arise in upcoming years.

The 2017 Report on Emerging Issues and Trends is free and can be found [here](#).

By **Al Greenwood**
