



# OPTIMISE TODAY, ACCELERATE TOMORROW

How smart investments can increase the lifespan  
of plastic injection moulding equipment



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The global plastics injection moulding industry is expected to reach:

**USD  
\$496 billion**



Plastic injection moulding is one of the leading processes used for manufacturing plastic products. Its strength lies in its ability to rapidly produce identical parts with tight tolerances and with a high-quality finish. This, in combination with rapid cycle times – that range from a few seconds to a few minutes depending on complexity and size of mould - makes this equipment well placed to function in an output-intensive industry that requires cost-effective consistency.

BY 2025

Total revenue of the European plastics injection moulding market will reach:

**USD  
\$122 billion**



Injection moulded parts and products can be found in almost every market sector, from medical equipment and household appliances through to consumer electronics and packaging. Globally, the demand for plastic products is increasing. According to the Grand View Research Inc. report, the global plastics injecting moulding industry is expected to reach USD\$496.22 billion by 2025, with a CAGR of 6%<sup>1</sup>.

Europe is one of the fastest developing regions in the plastic injection moulding industry, being the second largest producer of plastic materials. Grand View Research estimates that the total revenue of the European plastics injection moulding market will total USD\$122billion by 2025<sup>2</sup>.

Strong growth opportunities for plastic injection moulding are being created in the region by a range of key industries. For instance, consumer electronics is seeing an increased demand for personal devices, such as laptops and mobile phones, particularly in UK, Germany and France<sup>3</sup>.

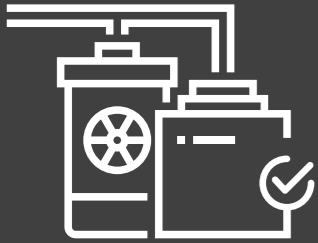
Additionally, with the automotive industry increasingly replacing metal components with plastic, automobile production plants in Germany, UK and Italy will be expanding their use of injection moulded parts<sup>4</sup>.

Alongside this market growth, there is also a rise in the 'smart factory' in what is known as Industry 4.0<sup>5</sup>. The rapid advances in new technologies is seeing the implementation of artificial intelligence, big data, and the industrial Internet of Things (IIoT) in factories.

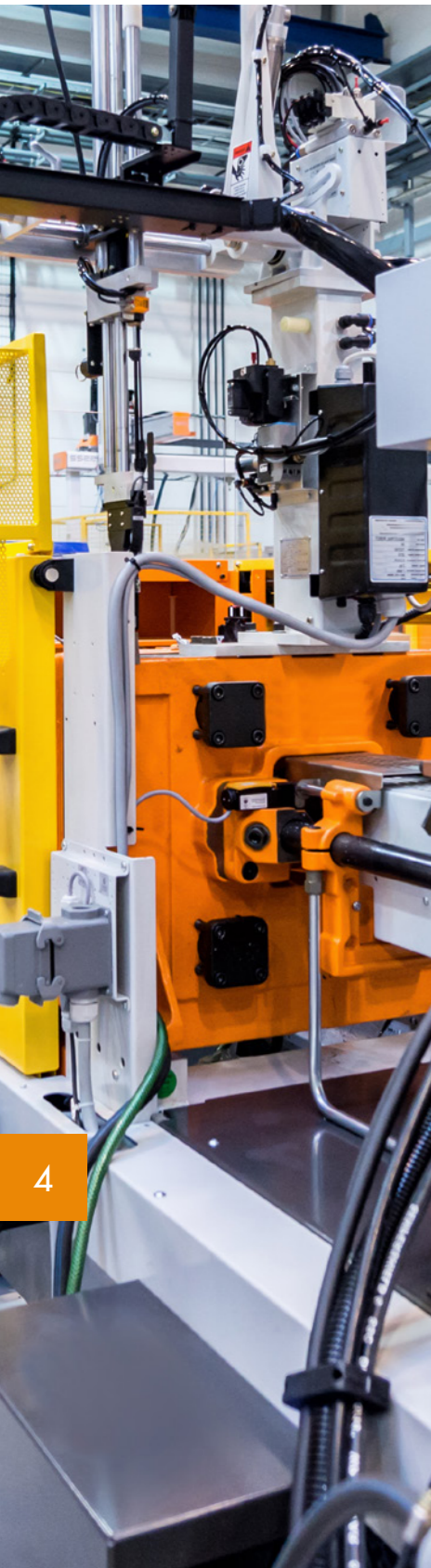
Although connected manufacturing brings exciting possibilities in terms of potential cost savings, energy efficiencies and increased production, for many plastics injection moulding businesses, taking the first steps in this direction may be a daunting prospect. However, to remain competitive in the burgeoning injection moulding industry and to ensure effective, sustainable growth, companies must remain informed and consider the long-term benefits of embracing these new technologies.

With the possibilities offered by market growth and Industry 4.0, there are high value investment opportunities on the table for businesses. To secure a strong return on these investments, a Total Cost of Ownership approach must be taken. Businesses should look to understand the holistic picture of long-term savings and how to protect them through measures such as effective equipment maintenance.

This will ensure the focus remains on the bottom line, resulting in an investment that is not just high, but smart.



## MAINTENANCE MATTERS



One of the most valuable assets to a plastics business is an injection moulding machine. With productivity being a key challenge, most of these machines will run in a 24/7 operation producing repeatable, high quality parts en-masse in the fastest possible cycle speed.<sup>6</sup> Any unplanned downtime caused by equipment breakdown will impact directly on the manufacturer's bottom line. With research revealing that poor maintenance can reduce a factory's productivity by 5% – 20%, a robust maintenance strategy is business critical.

High quality lubrication is an essential aspect of effective equipment maintenance yet, manufacturers are often more likely to blame equipment breakdowns on mechanical failures rather than lubrication. However, multiple surveys carried out by hydraulic equipment manufacturers and other industry bodies have shown that 50% to 70%<sup>7</sup> of equipment failures are related to 'improper hydraulic fluid condition'<sup>8</sup>.

Lubricants, particularly hydraulic fluid, play a vital role in helping to extend the life of injection moulding equipment. With the hydraulic system at the heart of these machines, hydraulic fluid not only transmits power mechanically throughout the system, it also offers protection to moving parts.

Hydraulic systems are expected to deliver peak performance while operating at high pressures, fluctuating temperatures and often in tough conditions. With such demands on lubricants, it pays to use high quality formulations and then ensure these lubricants are properly managed to maximise their benefits. These benefits can lead to prolonged equipment service life, which results in reduced unplanned shutdowns and maintenance expenditure.

Although purchasing high quality hydraulic fluid may not be a top priority for some manufacturing businesses, it accounts for just 1-2% of total operational spend and the long-term savings can be significant. When evaluating lubrication options, consider the Total Cost of Ownership (TCO) of equipment. This is the total amount spent on industrial equipment, including the cost of acquisition and operation over its entire working life, including costs of lost production during equipment downtime.

Prioritising lubrication within the businesses' maintenance strategy by purchasing premium lubricants based on performance rather than up-front product price will help to lower the total cost of ownership, as it will lead to lower maintenance costs, reduced unplanned downtime and productivity improvements.

Shell Lubricants' Tellus range of hydraulic fluids has been specifically formulated to meet the demands of modern hydraulic systems. For instance, Shell Tellus S4 ME hydraulic fluid lasts up to 10 times longer than the industry minimum standard oil life. Long oil life means that equipment can operate for longer without interruption and its formulation, which offers excellent wear protection, also helps to prolong the life of the hydraulic pump.

Maintaining a plastic injection moulding machine requires time and attention to detail. However, recent research from Shell Lubricants reveals that current maintenance practices, including lubrication measures, are often not optimally protecting operations. Over half of manufacturing lubricant decision makers do not recognise that a proactive maintenance strategy could help shorten equipment downtime (55%) or think it would help reduce maintenance costs (53%). Maintenance staff are also feeling the strain with 36% thinking they have too few personnel, and a quarter (25%) feeling a squeeze on maintenance budgets<sup>9</sup>.



### INDUSTRY 4.0



Alongside these challenges regarding current maintenance priorities, there is the added pressure of implementing Industry 4.0 technologies. Within a 'smart factory', technological advances will allow for remote monitoring, maintenance and servicing as well as communication between different machines enabling businesses to make data-driven decisions. However, while 86% of manufacturers anticipate that Industry 4.0 technologies will result in savings, and 57% believe that they will allow for fewer breakdowns, three quarters (75%) are reluctant to invest in new equipment while theirs is still operational due to cost concerns. Additionally, 61% cite a lack of staff understanding about how the technologies work as a barrier to instalment.

In summary, to remain competitive in the plastic injection moulding industry and to take advantage of the growth opportunities, manufacturing businesses have to optimise today's maintenance strategies to accelerate the uptake of the smart factories of tomorrow. With 56% of manufacturers feeling that there is a lack of trusted third-party experts to provide support and with 78% revealing that their maintenance staff would benefit from additional training on effective equipment lubrication, this means that as an industry we must work together to succeed.



# CHALLENGES & SOLUTIONS



There are many key priorities for manufacturing businesses operating injection moulding machines. Ultimately, they want their equipment to last as long as possible, as productively as possible, with no unexpected breakdowns due to failure. A high-performance hydraulic fluid can help extend equipment life resulting in decreased downtime and increased overall productivity.

The quality of this fluid is important, as equipment design, operational parameters and surrounding environment can all pose different challenges for lubrication. Three key challenges businesses often face with their plastic injection moulding machines include varnish and sludge, water in the hydraulic fluid and aeration.

## TOP PRIORITIES FOR OPERATORS:

### PRODUCTIVITY

- Continuous operation
- Fastest possible cycle speed
- No significant downtime
- Quick changeovers
- Reliability

### PRECISION

- Maximum repeatability
- Consistent process cycle
- Very tight tolerances
- Low scrap

### COST

- Energy efficiency
- Extended oil drain intervals
- Mould protection
- Long machine life span

### ENVIRONMENT

- Waste reduction
- Emission reduction
- Reduced noise levels
- Prevent leakage



## VARNISH & SLUDGE

Oil degradation by-products as a result of oxidation and thermal degradation have limited solubility in the oil.

They are decomposed hydrocarbon molecules and components from depleted additive systems.

Plugged lines, blocked filters, sticking valves, O-ring and seal failures are common issues observed as a consequence.



## WATER IN OIL

Water in lubrication systems can lead to issues such as corrosion of components, degradation in lubricant performance and deterioration of lubricating film properties.

It also causes the formation of rust.

Rust particles can lead to subsequent mechanical problems.



## AERATION

Undissolved air circulating in the hydraulic system can cause an increase in compressibility, especially at low pressures, pressure drop and increase tendency for turbulent flow, cavitation at the suction side of hydraulic pumps, thermal degradation and oxidation.

Excessive aeration leads to high noise levels, unreliable operation, and damage at pumps and other components.

## HOW HIGH-PERFORMANCE LUBRICATION CAN HELP

Shell Lubricants has spent the past 70 years improving and enhancing the formulation of its Shell Tellus range, which has been developed to meet specific the challenges hydraulic equipment and applications.

### OXIDATION RESISTANCE

Lubricants can degrade on contact with oxygen. The impact of oxidation on hydraulic fluid includes the formation of acidic contaminants, sludge and varnish as well as an increase in viscosity (oil thickening).

Featuring excellent oxidation resistance, Shell Tellus oils enable long fluid life, and restrict oil thickening and the formation of acids. This helps to extend oil drain intervals and reduce maintenance requirements while increasing equipment life and productivity.

### THERMAL & HYDROLYTIC STABILITY

Lubricants need to resist deterioration due to heat as well as chemical decomposition (hydrolysis) in the presence of water, which helps minimise the formation of acids.

Featuring excellent thermal and hydrolytic stability, Shell Tellus oils offer better wear protection to increase the service life of equipment and consequently help reduce total cost of ownership.

### FILTERABILITY & AIR RELEASE

Filterability is the ease with which a lubricant passes through a filter membrane without clogging or plugging. Air is also a contaminant and finely divided air bubbles can form in hydraulic fluid leading to a mixture of air and oil circulating through the hydraulic system which may affect valve, hydraulic motor and actuator operation.

Featuring superior filterability and air release properties, Shell Tellus oils ensure clean oil, low pressure loss and efficient operation.

## LUBRICATION SUPPORT

Shell's 260+ technical experts can be deployed into businesses to help solve challenges.

Beyond the product, choosing a supplier that can offer expertise and guidance can help with lubrication selection, application and running challenges, and staff training:

### LubeChat

Your digital engineering companion available anytime, anywhere.

### LubeAnalyst

An oil condition monitoring service to provide insights into equipment and lubricant performance to keep operations running smoothly.

### LubeAdvisor

Designed to ensure customers use the right oil, at the right time, every time.



**ALPLA CUT COSTS WITH SHELL TELLUS S3 M AND SHELL LUBEANALYST**

Alpla, a world leader in the development and production of plastic packaging solutions, wanted to extend the ODI (Oil Drain Interval) on its Netstal-Maschinen AG plastic injection moulding machines in its Croatia plant.

Upgrading to Shell Tellus S3 M coupled with the Shell LubeAnalyst oil condition monitoring programme, resulted in an extended oil life from 5,000 to 15,000 hours, which helped reduce equipment downtime and so resulted in a reduction in the overall maintenance budget.

**ANNUAL SAVINGS**  
**\$16,500**

**JÁSZ-PLASTICS CUTS ENERGY COSTS BY 9.5% WITH SHELL TELLUS S4 ME**

Jász-Plastics, a Hungarian based plastics producer, wanted to decrease energy and maintenance costs, while increasing overall productivity, as part of their continuous operational improvements project.

Trialling machines with Shell Tellus S4 ME 46, coupled with the Shell LubeAnalyst oil condition monitoring programme, they achieved an average reduction of electric consumption of 9.5%, with oil lifespan increased 5-fold.

**TOTAL SAVINGS**  
**\$19,600**

**RETAL EXTENDED ODI AND SAVED MONEY WITH SHELL LUBEANALYST**

Retal Lithuania, a plastics packaging company working with international beverage companies, wanted to increase its oil drain interval (ODI) and overall productivity.

The plant undertook an ODI extension trial on its Husky injection moulding machines with its existing product – Tellus S3 M 46 - and coupled it with the Shell LubeAnalyst oil condition monitoring programme. The outcome was a doubling in ODI from 8,000 hours to 16,000 hours, decreased production losses due to oil change and overall savings on maintenance costs due to decreased downtime, consumables and longer oil life.

**SAVINGS**  
**€54,500**

**CONCLUSION**

It's an exciting time to be in the plastics injection moulding industry, both globally and regionally in Europe. Demand for plastics is increasing, driven by strong growth opportunities from several key European industries. To boost competitiveness, manufacturing businesses must maximise efficiency, cost effectiveness and improve productivity.

The correct maintenance of plastics injection moulding machinery is key to achieving this. An essential element of the maintenance strategy should be the application of high-quality lubricants, such as the Shell Tellus range of hydraulic fluids. Protecting components from damage, hydraulic fluid helps increase the service life of equipment and reduce unplanned shutdown, thus lowering total cost of ownership.

With the emergence of Industry 4.0, maintenance has never been more crucial. It can help the industry advance into a connected, predictive and data-based future. Effective lubrication is a vital component of this, helping ensure reliable, productive operations.

With change on the horizon, collaboration is essential to help accelerate industry progress. Shell Lubricants has the knowledge and expertise to support manufacturing businesses to help get the most from their equipment.

## Source

- 1 [www.grandviewresearch.com/press-release/global-injection-molded-plastics-market](http://www.grandviewresearch.com/press-release/global-injection-molded-plastics-market)
- 2 [roboticsandautomationnews.com/2018/03/09/market-insight-injection-moulding-plastics-market-set-to-double-in-size-in-10-years/16365](http://roboticsandautomationnews.com/2018/03/09/market-insight-injection-moulding-plastics-market-set-to-double-in-size-in-10-years/16365)
- 3 [www.fmindustry.com/en/2018/perspectives/3615/Plastic-Injection-Moulding-Market-Set-To-Double-Over-10-Years-injection-moulding-moulded-plastics-market-2018-automotive-industry-medical-industry-construction-industry-environment-market-research-Industry-News-Industrial-Manufacturing-EMEA-Americas-APAC.htm](http://www.fmindustry.com/en/2018/perspectives/3615/Plastic-Injection-Moulding-Market-Set-To-Double-Over-10-Years-injection-moulding-moulded-plastics-market-2018-automotive-industry-medical-industry-construction-industry-environment-market-research-Industry-News-Industrial-Manufacturing-EMEA-Americas-APAC.htm)
- 4 [www.grandviewresearch.com/industry-analysis/injection-molded-plastics-market](http://www.grandviewresearch.com/industry-analysis/injection-molded-plastics-market)
- 5 Industry 4.0 technologies are defined as technologies that support the digitisation and automation of operations (e.g. sensors, connected equipment, autonomous equipment, robotics, cloud based or big data-based technologies)
- 6 [www.creativemechanisms.com/blog/everything-you-need-to-know-about-injection-molding](http://www.creativemechanisms.com/blog/everything-you-need-to-know-about-injection-molding)
- 7 [www.essentracomponents.com/en-gb/news/product-resources/why-its-essential-to-schedule-maintenance-for-your-plastic-injection-moulding-machine](http://www.essentracomponents.com/en-gb/news/product-resources/why-its-essential-to-schedule-maintenance-for-your-plastic-injection-moulding-machine)
- 8 [www.s08.static-shell.com/content/dam/royaldutchshell/documents/shell-lubricants-tco-manufacturing-paper.pdf](http://www.s08.static-shell.com/content/dam/royaldutchshell/documents/shell-lubricants-tco-manufacturing-paper.pdf)
- 9 This survey, commissioned by Shell Lubricants and conducted by research firm Edelman Intelligence, is based on 350 interviews with power sector staff who purchase, influence the purchase or use lubricants / greases as part of their job across 7 countries (USA, China, India, Germany, Russia, Indonesia and the UK) from March to April 2018. For more information, please visit [www.edelmanintelligence.com](http://www.edelmanintelligence.com)
- 10 The savings indicated are specific to the calculation date and mentioned site. These calculations may vary from site to site and from time to time, depending on, for example, the application, the operating conditions, the current product being used, the condition of the equipment and the maintenance practices