MILLERS OILS

BREAKING THE MOULD:

Demystifying Lubricants in Plastic Injection Moulding

WHAT IS INJECTION MOULDING?

Plastic injection moulding is a highly versatile manufacturing process used to produce a wide range of everyday products. It involves heating thermoplastic polymers until molten, then injecting them under high pressure into a precisely engineered mould cavity. Once filled, the material rapidly cools and solidifies into the desired shape, resulting in every day plastic products. This highly repetitive and efficient process has been instrumental in driving advancements in modern manufacturing—enabling high-volume production with exceptional accuracy and material utilisation.

One of the most well known companies to utilise plastic injection moulding and revolutionise their entire business model is LEGO. Traditionally producing wooden toys, LEGO introduced a single moulding machine (ordered from the UK) in the mid 1940s, which started production of the plastic LEGO we know and love today.

Since the 1940's the production of plastic worldwide has reached well over 400 million metric tons per year.*

*Source British Plastics Federation

THE LIFELINE OF PLASTIC INJECTION MOULDING

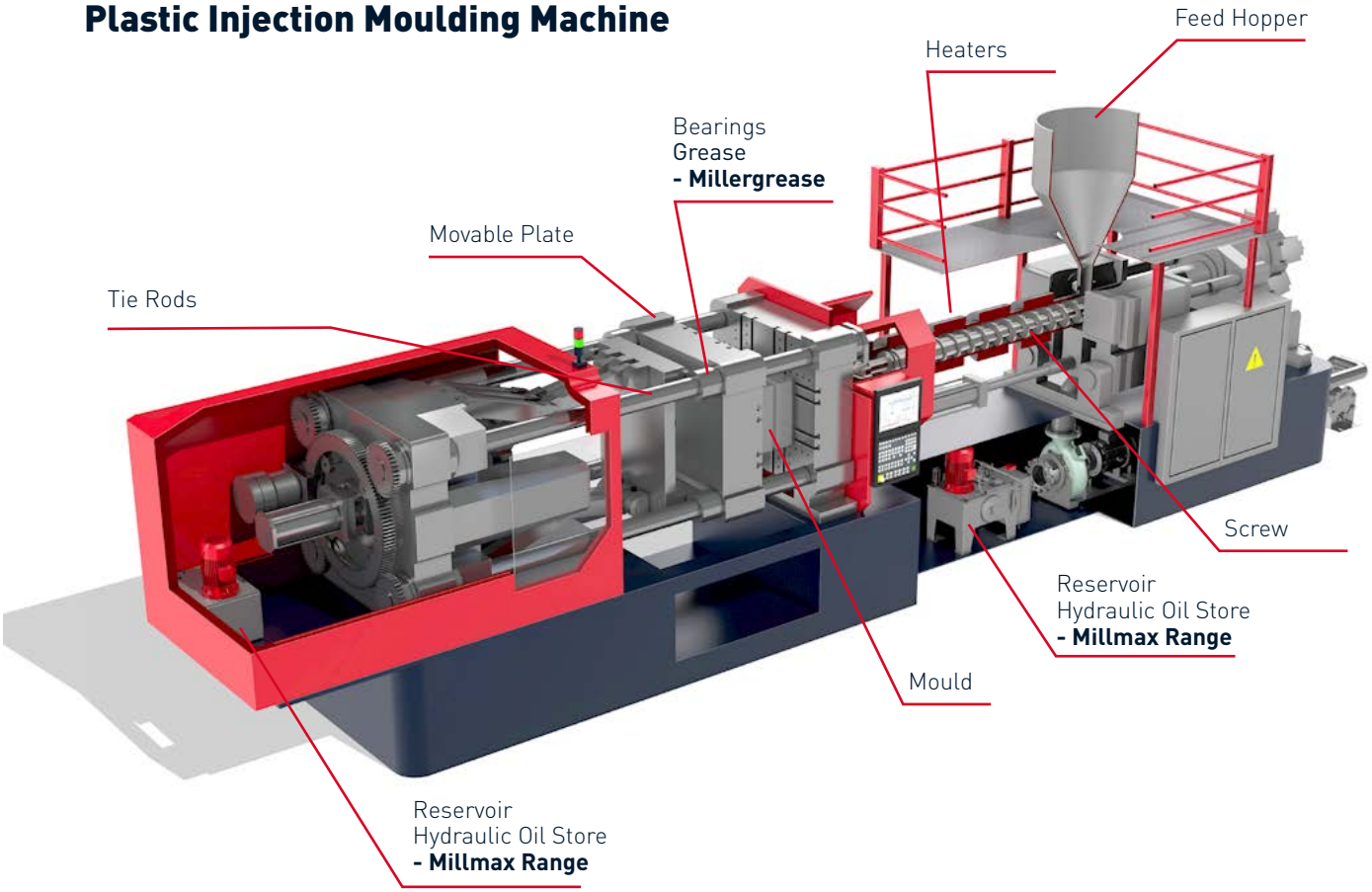
Did you know that 95% of premature pump failure in an injection moulding machine can be attributed to hydraulic oil.

A hydraulic system is used to transmit power through the medium of hydraulic oil and converts fluid power into mechanical power. The oil is stored in the oil tank or reservoir, then pressurised by the hydraulic pump and delivered to an actuator, which converts the fluid's energy into motion to close the moulds.

Lubricants are used to effectively and efficiently support the high frequency, high load expected in plastic injection moulding machines. Hydraulic oil is often referred to as the lifeline of these machines because it is so integral to the systems operation.

Choosing the right oil for your machine is often the easy part if you have OEM specifications but understanding lubricant maintenance is key to mitigating some of the challenges within the industry.

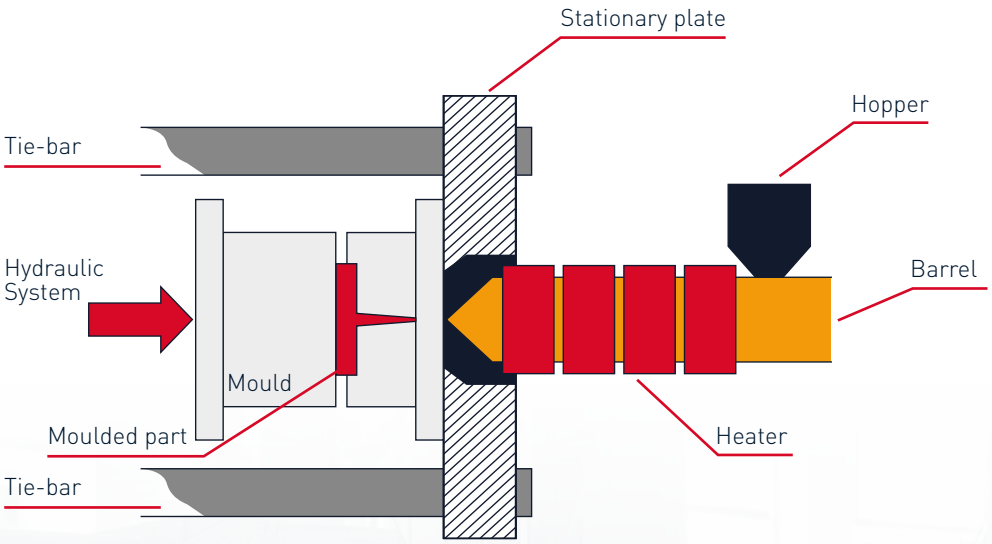
Plastic Injection Moulding Machine



SUPPORTING FLUIDS FOR PEAK PERFORMANCE

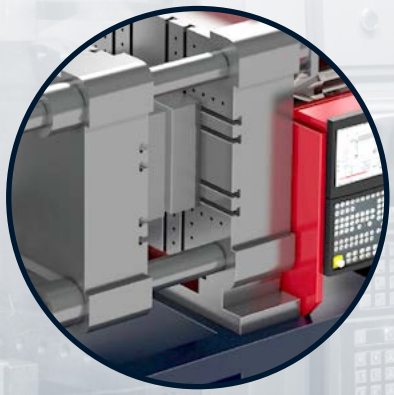
Hydraulic oil is the lifeline of a plastic injection moulding machine, however there are other fluid types needed to support this complex process which Millers Oils can support you with:

Grease - Reduce friction with moving parts such as injection and mould clamping.



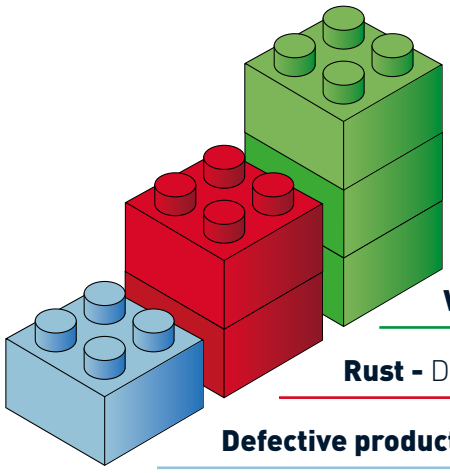
Milliclean - A specialised maintenance formulation designed to remove contaminants ensuring your oil is in the best condition.

Mould Oil - Prevents parts from sticking to the mould and helps produce good surface finish.



INJECTION MOULDING MACHINE INEFFICIENCIES

With any high pressure hydraulic system there are inevitable challenges within the operation of machinery. Some of the most common challenges in plastic injection moulding machines relate to pump wear, rust, and degradation of the hydraulic fluid through oxidation which can also give rise to sludge formation.



Wear - Potential replacement costs

Rust - Downtime

Defective products - Temperature fluctuations

Wear

As the main fluid used in plastic injection moulding, premium hydraulic oils need to provide excellent anti-wear and protection properties due to the high pressure and intense environments. Wear occurs most commonly in the hydraulic pump, however hydraulic oils with optimised anti-wear chemistry can prolong the life of a pump saving you expensive replacement costs and downtime.

The **Chemistry**

Friction modifiers and anti-wear chemistry in the hydraulic fluid work together to form protective films on metal parts, protecting them from abrasive wear and reducing friction to minimise energy losses.

Rust and Oxidation

Rust and oxidation are common issues due to the chemical reactions that degrade materials used in injection moulding machines. Rust forms when iron combines with water and oxygen in the electrochemical process and compromises a machine's integrity and performance. Corrosion can degrade non-metallic components and depends on factors such as pH levels, lubrication and the material's composition.

The **Chemistry**

Rust preventative oils have a dual performance strategy:

1. Passive surface exclusion to form a molecular film across a surface, creating a barrier that restricts the ingress of oxidising agents such as oxygen and water.
2. A chemical neutralisation where embedded corrosion inhibitors react with iconic contaminants and neutralise acidic species before they can initiate oxidation.

Temperature Fluctuations

Plastic injection moulding machinery can reach high temperature levels due to the speed and frequency of production; additives ensure that the fluid is able to resist the high temperatures meaning the end products aren't compromised.

The **Chemistry**

Additives extend the operating rage of oils to higher or lower temperatures without affecting fluidity and causing friction and other issues occurring.

WHAT MAKES A HYDRAULIC OIL HIGH-PERFORMANCE?

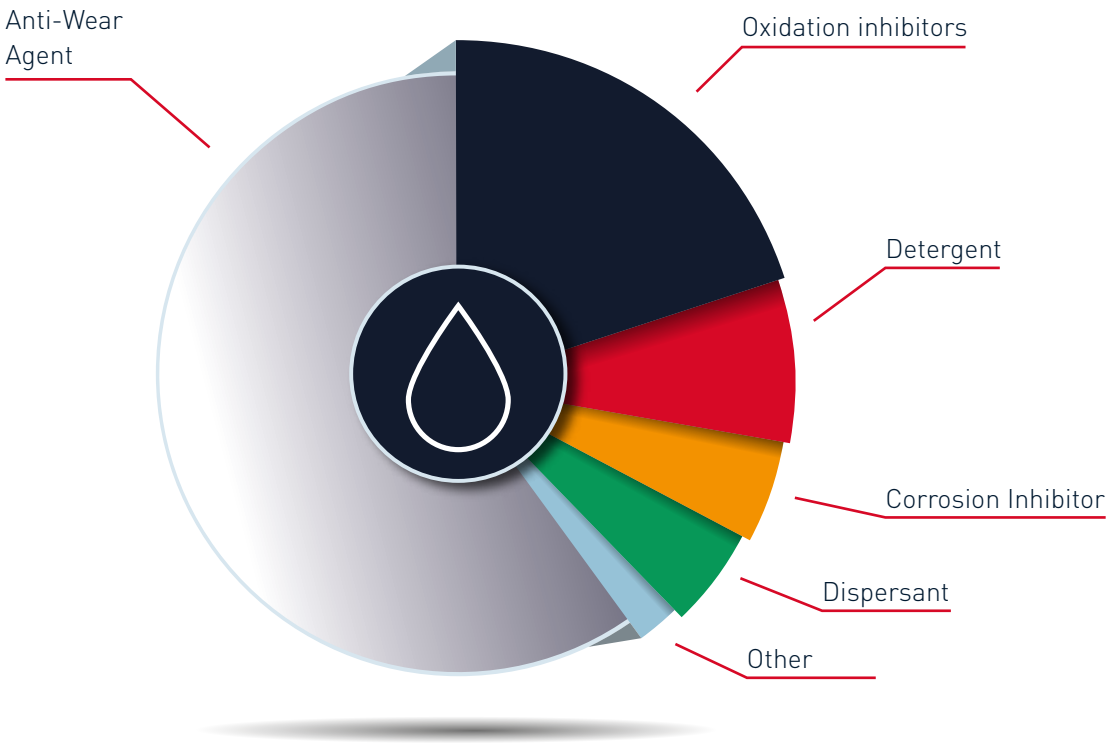
Additives are what gives a lubricant its je ne sais quoi or its special properties. The combination of additives determines how the hydraulic oil performs and how suitable it is for a particular application.

Most conventional hydraulic fluids offer a basic level of performance requirements. However, high-performance hydraulic oils deliver superior operational efficiency, enhanced protection and reliability by maintaining optimal viscosity within the system's ideal operating window across varying temperature and pressure conditions.

Their advanced formulation reduces internal fluid friction, thereby enhancing mechanical efficiency and minimising energy losses. Additionally, these fluids exhibit significantly extended oxidation stability, particularly under high-speed and high-pressure environments—contributing to longer service life and reduced frequency of oil replacement.

Components of a hydraulic oil vary depending on the formulation of additives. Millers Oils blending expertise is what makes us stand out from the crowd. A typical hydraulic oil may include a combination of additives but our formula is what sets us apart.

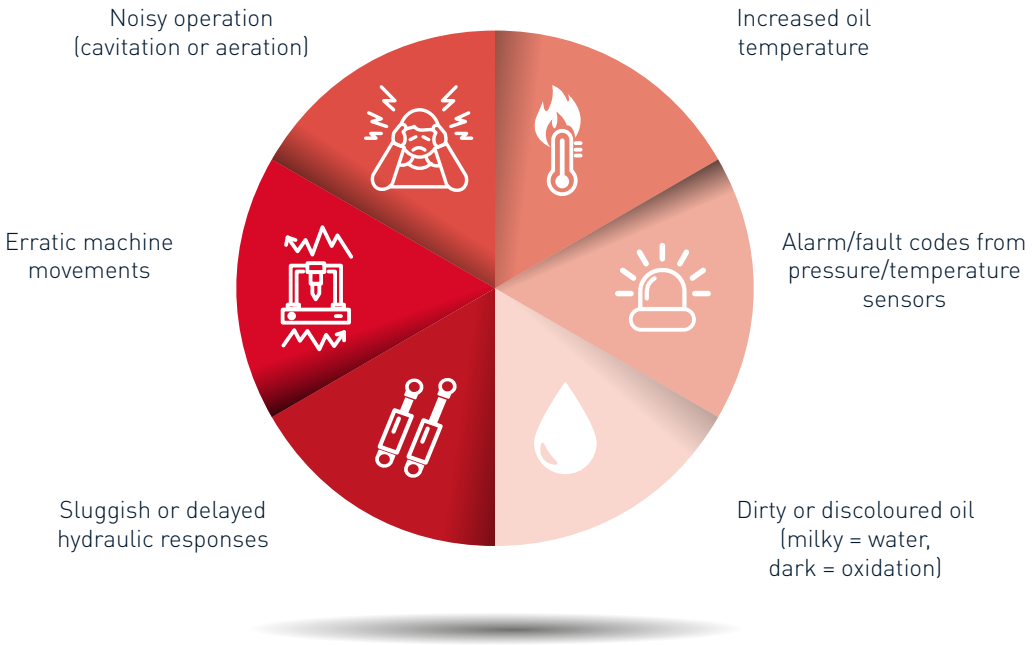
A typical hydraulic oil formulation



IT'S MORE THAN JUST OIL

Over 80% of damaged hydraulic components can be attributed to contamination within the hydraulic oil.

Investing in high quality oil may not be top of your priority list but a small maintenance spend now could decrease the likelihood of costly impacts from oil contamination.



Contaminated hydraulic oil in an injection moulding machine is a serious issue that can lead to mechanical failures, reduced efficiency, and costly downtime. We understand the high cleanliness standards required for lubricants in plastic injection moulding. That's why our filtration oil fills are designed to meet those demands from the outset—giving you peace of mind that your machine is ready to perform from day one.

Implementing a robust oil management program is a cost-effective strategy that not only boosts operational efficiency but also ensures long-term profitability. Lubricant care is essential for maintaining machinery performance and minimising downtime. Using the right lubricant—and preserving its condition—boosts productivity and reduces costs. Regular oil analysis helps monitor performance and identify when replacement is needed.

Oil Analysis = Increased performance + reduced downtime + decreased maintenance costs

MILLERS OILS
FLUID MANAGEMENT DIVISION

Our priority at Millers Oils is to keep costly failures and downtime to an absolute minimum for our customers by maintaining the life of the oil before any degradation occurs. Our Fluid Management Service takes a proactive, on-site approach to safeguard your high-value equipment. Using industry-leading filtration technology, we help ensure your systems operate at peak efficiency, extend oil life, reduce drain intervals, and significantly cut operational costs and environmental impact.

- **Ongoing Oil Analysis**
- **Oil Filtration**
- **Oil Changes**
- **Metal Working**
- **Waste Disposal**
- **Water Contamination**
- **Initial Oil Fills**
- **Machine Drains**

"I've been working for Millers Oils for over 10 years and the majority of clients I visit with hydraulic oil in their machines, see a huge improvement in efficiency and lifespan of the oil when they understand how to maintain it effectively."

Dave Mulliner - Millers Oils Fluid Management Division

MILLERS OILS

At Millers Oils, we don't just supply premium-grade Millmax hydraulic fluids engineered to safeguard and optimise equipment performance—we're driven by integrity to recommend solutions that genuinely serve your best interests. Our expert technical teams are well-versed in OEM performance standards and take the time to understand your machinery, operational demands, and strategic objectives. This ensures we deliver product recommendations precisely tailored to your equipment and business goals.

Contact us today >>

View Our Product Range >>

Approved PLASTIKCITY Partner

MADE IN BRITAIN

MillersOilsLtd