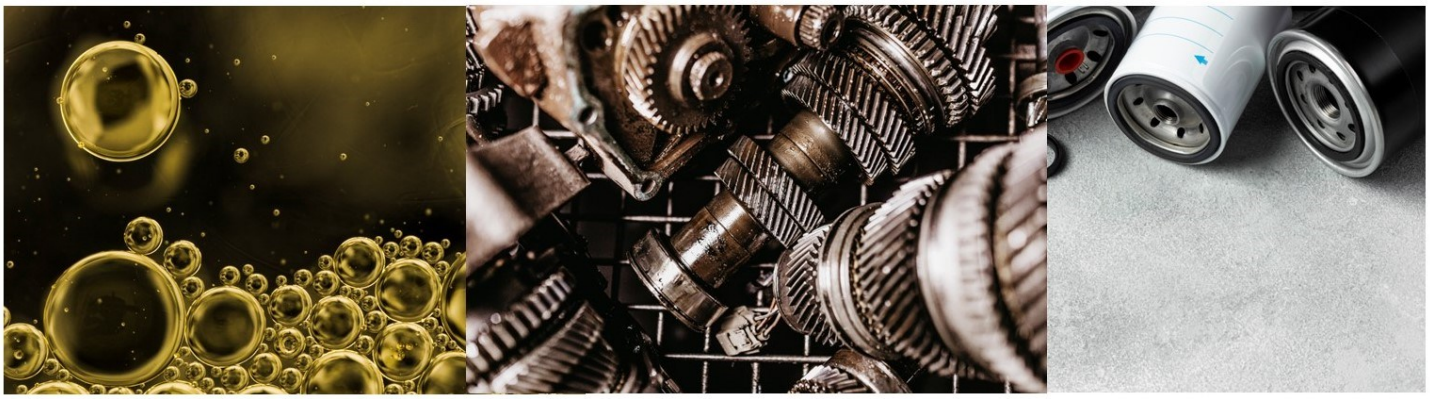


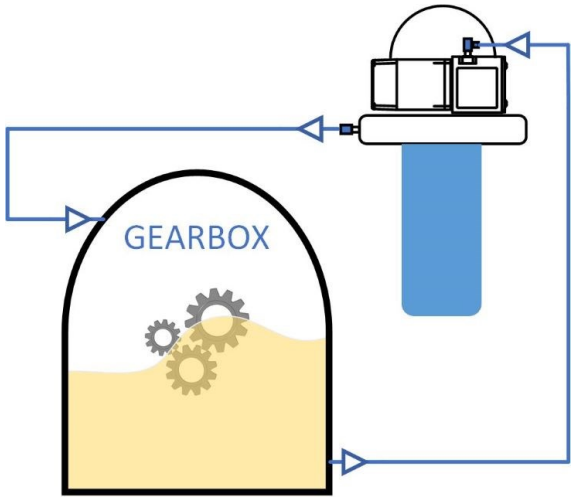
Key Advantages of Low Flow Filtration for Gear Boxes

By Dan Griswold | Fluidloop Technologies, LLC

Introduction

Gearboxes are among the most contamination-sensitive components in industrial machinery. Whether used in manufacturing, energy, mining, marine, or material-handling applications, gearboxes operate under high loads and rely heavily on clean, properly conditioned lubricating oil to prevent wear, surface fatigue, and premature failure. Numerous studies have shown that particulate contamination is the leading cause of gearbox wear and lubricant degradation.

Low flow, offline filtration—often referred to as **kidney-loop filtration**—has emerged as one of the most effective strategies for maintaining gearbox oil cleanliness. Unlike high-flow, in-line filtration systems that must balance flow demand with filtration efficiency, low flow filtration prioritizes contaminant removal efficiency and continuous oil conditioning. This approach is especially advantageous for gearboxes with relatively small sump volumes and high oil viscosities.



Low Flow Advantages

1. Superior Particle Removal Efficiency

Low flow filtration allows oil to pass through the filter media at reduced velocity, significantly improving particle capture efficiency. This enables the use of **fine, high-efficiency media (1–10 micron and below)** without causing excessive pressure drop.

In contrast, high-flow in-line filters often sacrifice filtration fineness to avoid starving the gearbox of lubrication, allowing damaging fine particles to remain in circulation. Research consistently shows that particles smaller than the oil film thickness—often below 10 microns—are responsible for the majority of abrasive and fatigue wear in gears and bearings.

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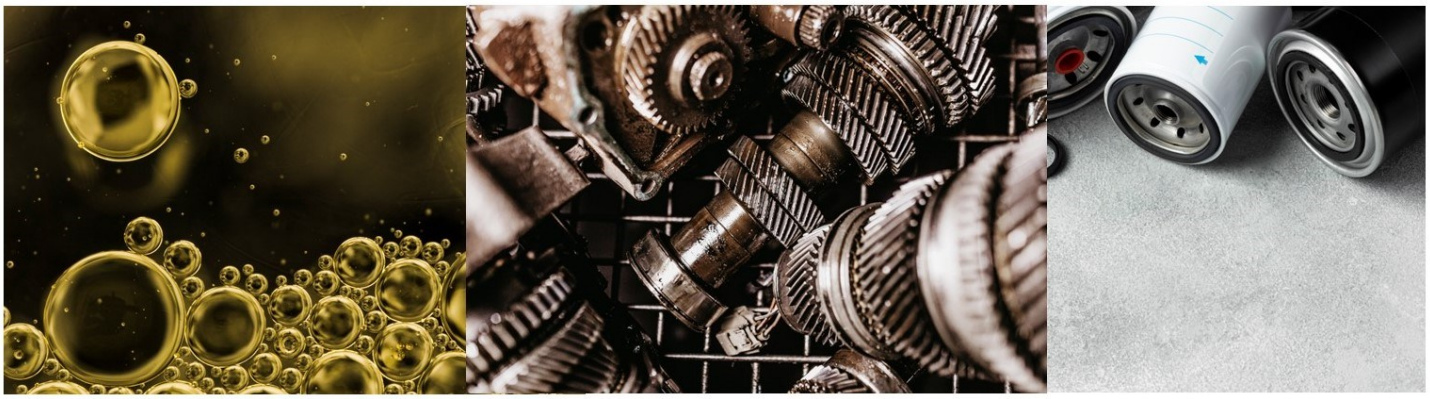


Low Flow Advantages (cont.)

2. Reduced Bypass Events and Pressure Drop

Gear oils are typically much more viscous than hydraulic oils, especially at cold start conditions. High flow filtration systems frequently experience excessive differential pressure, causing filter bypass valves to open and allow unfiltered oil to circulate.

Low flow filtration minimizes differential pressure across the filter element, **dramatically reducing bypass events** and ensuring that oil is consistently filtered—even with ISO 150–460 gear oils.

3. Continuous Oil "Polishing"

Offline filtration systems operate independently of the gearbox's main lubrication circuit. This allows them to run **continuously**, even when the gearbox is idle.

Continuous oil polishing:

- Prevents gradual contamination buildup
- Removes wear debris as it is generated
- Maintains stable ISO cleanliness codes over time

This is particularly valuable in gearboxes that operate intermittently or experience long idle periods where contaminants would otherwise settle in the sump.

4. Extended Gearbox and Oil Life

Multiple industry studies indicate that for every single ISO cleanliness code improvement, component life can increase by 30–50%. By consistently removing fine particulates and water, low flow filtration:

- Reduces abrasive wear
- Minimizes micropitting and scuffing
- Slows oil oxidation and additive depletion

The result is **longer gearbox service life and extended oil drain intervals**, lowering total cost of ownership.

5. No Impact on Main Lubrication System

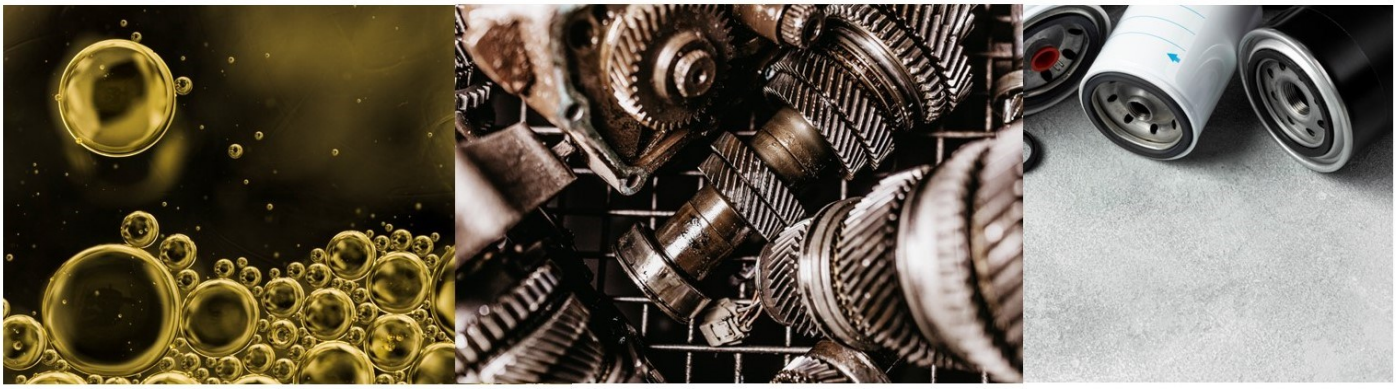
Because low flow filtration is fully offline, it does not interfere with:

- Gearbox oil pressure
- Lubrication flow rates
- OEM lubrication system design

This makes kidney-loop filtration easy to retrofit to existing gearboxes without engineering modifications or operational risk.

6. Simplified Maintenance and Reduced Downtime

Offline filtration units are typically easy to access, allowing filters to be changed without shutting down the gearbox. Oil sampling ports can also be integrated directly into the filtration loop, improving condition monitoring accuracy while reducing maintenance labor and downtime.



Why the Fluidloop Technologies FL1000V2 is well suited for Gearbox applications

The **Fluidloop Technologies FL1000V2** filtration system is specifically engineered to capitalize on the advantages of low flow filtration while addressing the real-world constraints of gearbox lubrication systems.

Optimized Low-Flow Design

The FL1000V2 delivers controlled low flow rates (up to approximately 0.67 gpm depending on viscosity, temperature, and filter selection), making it ideal for:

- Small to mid-size gearbox sumps
- High-viscosity gear oils
- Continuous offline filtration without aeration or disturbance of settled contaminants

Variable-Speed, High-Torque Pump

The stainless-steel, brushless DC variable-speed pump allows precise adjustment for different oil viscosities and operating temperatures. This is critical for gearboxes using ISO 150–460 oils, where fixed-speed pumps often struggle or generate excessive pressure.

High-Efficiency Spin-On Filtration Options

The FL1000V2 supports a wide range of high-efficiency spin-on filters, including:

- 2 and 4-micron synthetic media filters for fine particulate removal
- Water-removal filters for moisture-sensitive gearbox applications
- 1-micron Depth Filters for fine particulate and water removal

This flexibility allows users to tailor filtration performance to specific gearbox requirements and contamination risks.

*Patents granted and pending

Compact, Flexible Installation

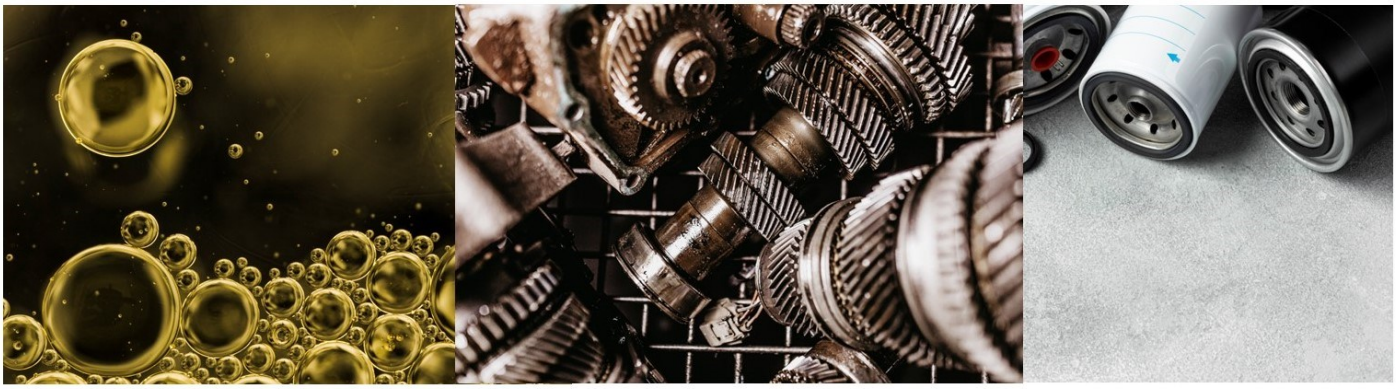
Available in portable, wall-mounted, or reservoir-mounted configurations, the FL1000V2 is well suited for:

- Individual gearbox installations
- Multi-gearbox maintenance programs
- Permanent or temporary oil conditioning set-ups

Its compact footprint makes it ideal for space-constrained environments where traditional cart-based systems are impractical.

Integrated Oil Sampling and Visual Monitoring

Clear inlet and outlet hoses allow operators to visually confirm flow and oil condition, while built-in sampling ports enable accurate oil analysis without disturbing the gearbox. This supports proactive reliability and condition-based maintenance programs.



Conclusion

Low flow offline filtration is widely recognized as one of the most effective methods for controlling contamination in gearbox lubrication systems. By enabling finer filtration, reducing bypass events, and continuously polishing the oil, it significantly extends both gearbox and lubricant life.

The **Fluidloop Technologies FL1000V2** embodies these principles in a compact, flexible, and gearbox-optimized design. Its low-flow capability, variable-speed pump, high-efficiency filtration options, and ease of installation make it exceptionally well suited for maintaining oil cleanliness in modern industrial gearboxes—ultimately improving reliability, reducing maintenance costs, and minimizing unplanned downtime.

*Patents granted and pending

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