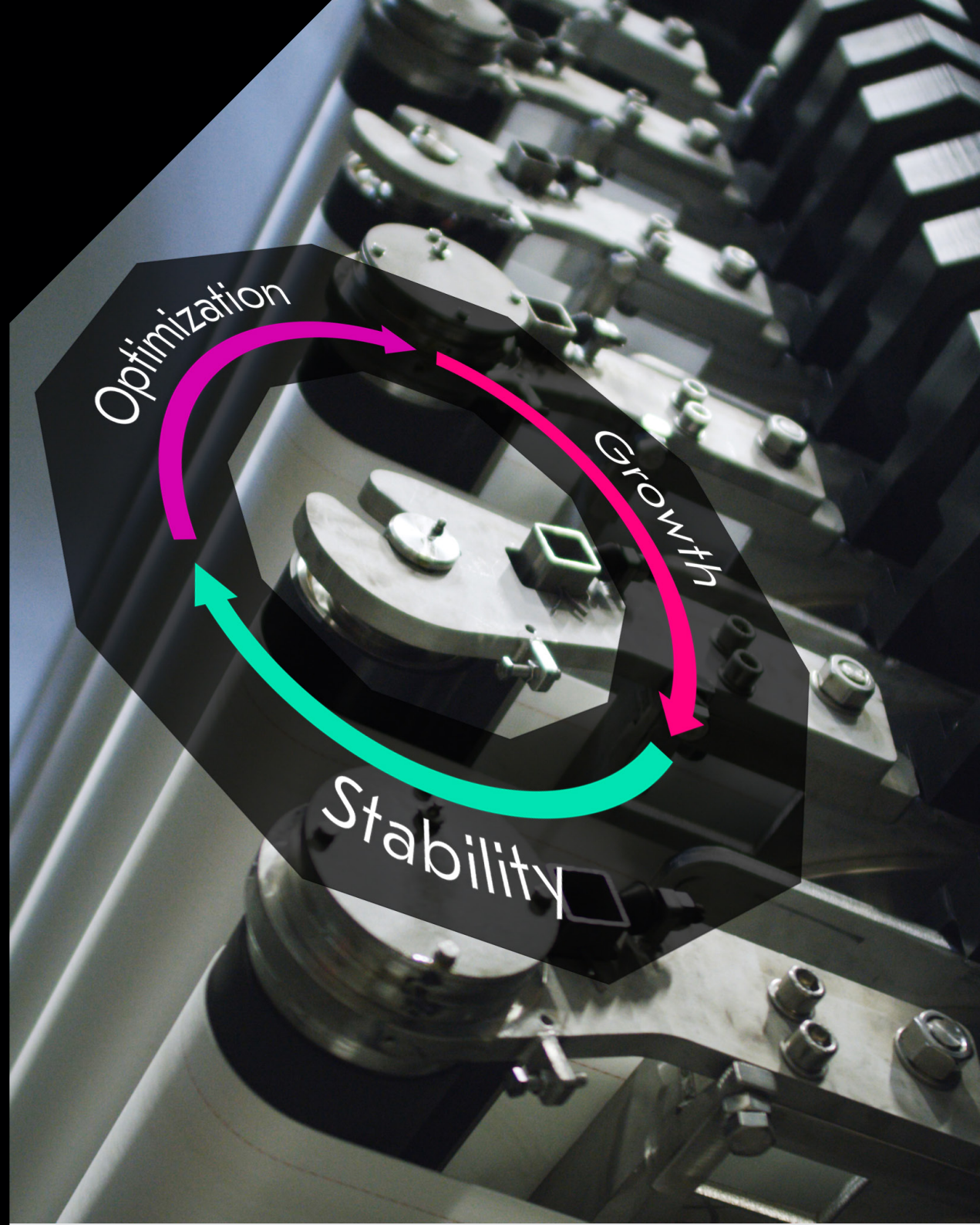


Metso

Professional services

Life Cycle Services for filters

For maximum uptime
and productivity



Life Cycle Services for filters

Achieving optimal filtration results require filters to be in excellent mechanical condition and balanced with optimized maintenance and operations. Life Cycle Services (LCS) can help improve overall filter reliability, performance and safety.

Main challenges operating filters in the plant

When operating filters, you may encounter familiar challenges. These can range from experiencing shorter wear component life-times, having unexpected equipment failures, to experiencing high variation in the slurry feed content. Finding technical expertise at the right moment can also be challenging. These problems can lead to:

- Excessive maintenance and spare part costs
- Failing to reach production targets
- Suboptimal product quality

Choosing Life Cycle Services for filters

Metso LCS for filters programs can help you overcome these challenges. Based on many years of experience in designing, building, delivering and maintaining filters, we know how to get the most from your filtration assets throughout their entire life cycle.

By choosing Metso LCS for filters, you can simplify your maintenance, improve your filter reliability, minimize downtime, and maximize filter life while achieving the highest productivity for your equipment.

With our LCS programs, we drive value adding service solutions depending on your needs. Our programs integrate service elements into simple, comprehensive, long-term agreements targeting the high overall equipment efficiency of the filter. Core service elements in our LCS packages are spare parts and repairs, maintenance and reliability, connected equipment and process optimization. All the programs cover options to optimize your costs and cash-flows.

Three LCS programs

We offer three different levels of service programs. Each package adds additional features, and no matter how basic or how complex your needs are, our programs can be customized to help you meet your objectives.

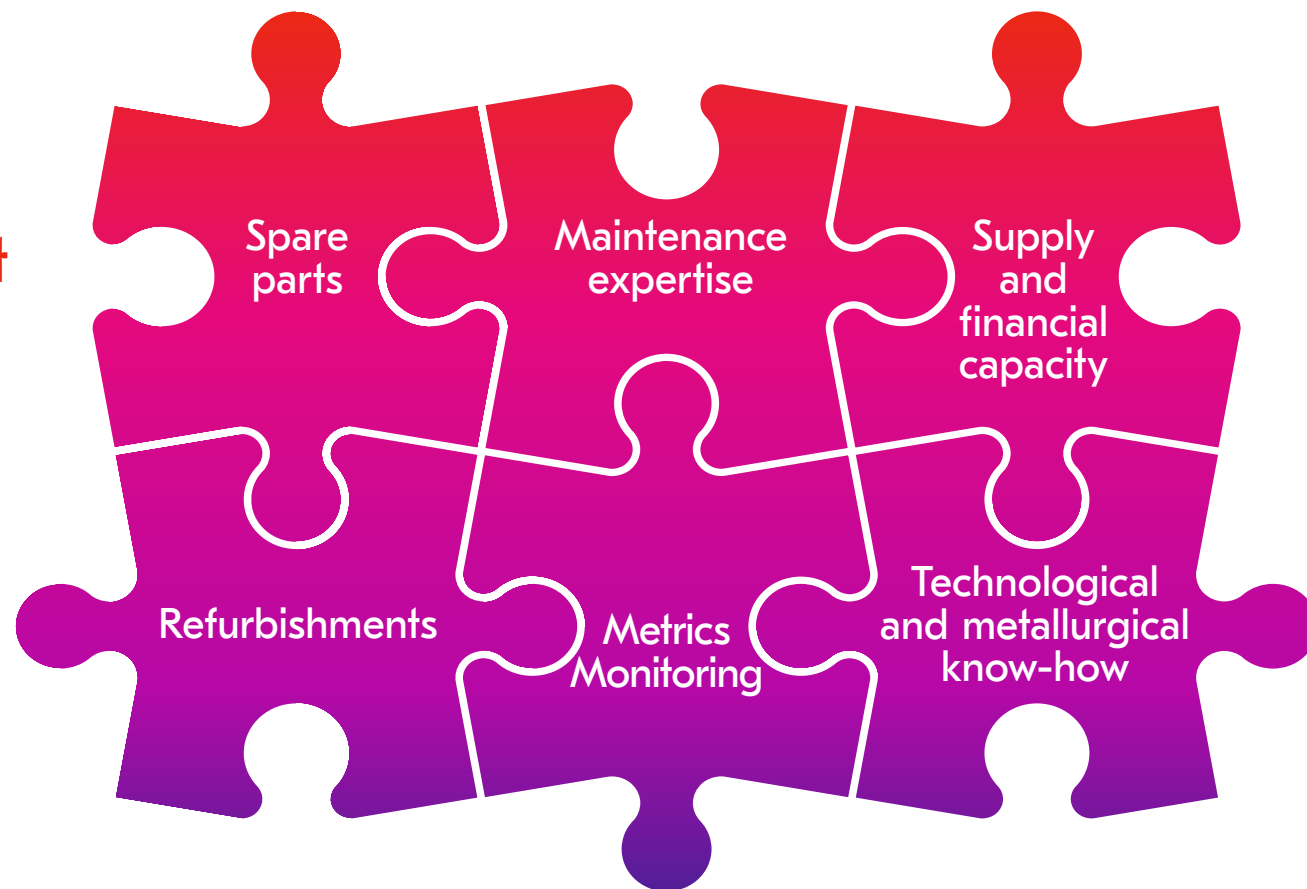
LCS programs drive long term performance optimization and continuous improvement.

Three Life Cycle Services levels

1 Inspections and technical support

2 Maintenance and reliability

3 Optimized performance



Core outcomes:

- Maximized filter reliability and production
- Highest end-product quality
- Lowest sustainable costs and quick return on investment

Other benefits:

- Minimum spare parts inventories for the customer
- Steady cash-flow and volume price incentives

Level 1: Inspections and technical support

Having everything perfectly in place for a successful major maintenance event for your filter can be a challenge. Our Inspections and technical support LCS program ensures that equipment condition is well monitored, and correct maintenance actions and overhauls are efficiently executed for highest availability.

Improved performance

Our certified OEM experts take care of planning the overhaul, providing the filter inspections and technical support as well as supervising the maintenance. Predefined spare parts kits are supplied and changed out during the service. Technical resources for wear and spare parts replacement labor are also provided when required. Metso recommends connecting the filter to its global remote monitoring platform (Metrics Monitoring) to further improve its performance and provide performance guarantees as part of the agreement.

Continuous improvement

The program is scheduled annually with renewal options to continuously improve the following production period as well as the next overhaul event. This way, Metso can provide precise improvement suggestions for better performance and reduced costs. The package simplifies your internal work and administration processes as it is delivered under one agreement. Spare parts availability always remains at optimal levels as the supplied parts kits ensure you don't deplete your regular spares inventory.



Core outcome:

- High filter availability with fewer unexpected surprises

Other benefits:

- High quality and completion of major maintenance activities and overhauls
- Less unexpected downtime due to failures
- Optimized parts availability



Level 2: Maintenance and reliability

High filtration performance, limited time for maintenance and cost pressures require a comprehensive maintenance strategy. Often, preventive maintenance activities focus on major areas like the filter plates, with less consideration for other critical systems in the filter. Problems with the filter are not always visible until they become serious, often resulting in expensive damage to the equipment. The larger the filter is, the more time is required to identify and solve the issue.

Metso's Maintenance and reliability LCS program covers all the functional systems of the filter. This program spreads the complete maintenance activities across shorter, more manageable events on critical systems, ensuring that all important components and materials are covered. These shorter and efficient service events help reduce the need for longer planned shutdowns throughout the year, allowing for maximum use of the filters.



Comprehensive asset management

The program is adjusted according to the equipment production targets, available maintenance time and wear part lifetimes. It includes initial set-up of the correct program, execution support, complete spare part kits as well as continuous improvement using reliability engineering, data analysis and technical support. An agreed maintenance schedule allows Metso to plan supervision and proactive spare parts supply which comprises the core content of the agreement.

Using our Metrics Monitoring platform, we can foresee potential performance issues within the systems and quickly act to provide the right solution. Root cause analysis on failures and component lifetimes help to optimize the maintenance plan and provides sustainable savings to the customer.

Core outcome:

- Maximized equipment reliability

Other benefits:

- Simple and time optimized preventive maintenance and parts schedules for all core systems of the filter
- Optimized maintenance resourcing, inventory, and supply chain



Level 3: Optimized performance

Having a reliable filter and high process stability are the keys to maximizing filter performance. With the constant variation of slurry feed influencing your filtration processes, it can be challenging to manually maintain a filter within its optimal operational range to reach targeted production and end product moisture levels.

Optimal parameters for the process

Metso Optimized Performance package will help you maximize productivity and the energy efficiency of your filters by addressing your specific plant challenges. Using our process and technology expertise gained from thousands of process tests and filter installations, we can identify the optimal operating parameters for your filters as well as help with the selection of the most suitable filter cloth.

Automated filtration processes

Metso LCS contracts offer a systematic way to measure and identify improvements for any process condition. Making use of proprietary Design of Experiments (DoE) tools, we carry out plant trials to find improvement areas.

In addition to our expert services, we have developed Advanced Process Control (APC) solutions for thickening and filtration processes that can significantly raise your equipment's productivity and end product quality (moisture), while reducing filtration cycle times and energy consumption. Installations across the world have shown improved filtration plant capacity up to 30% after implementing Metso APC solutions for dewatering plants.

Thickener and Filter Optimizers stabilize the effect of upstream process variations, provide tools for improved process control, and reduces the need for manual intervention.

Core outcome:

- Maximized filtration rates
- Lowest end-product moisture

Other benefits:

- Optimized power and reagent consumption
- Stable filter operation under any process condition
- Safer and higher autonomy of filter operation



Financial and payment options

Upgrades and CAPEX deferred payments

Deferral plans let you make payments for investments such as upgrades or new capital equipment over a longer time period, rather than the date of purchase. This gives you financial flexibility to quickly acquire the solution you need.

Metso Inventory Solutions (MOI)

Having Metso inventory on site allows you to reduce your working capital while maintaining high parts availability to keep your equipment running.

Fixed monthly billing

We mutually predetermine your payment schedules to allow better predictability. Once we've defined the scope of your LCS for filters program (in terms of services, spares, filter cloths, etc.), we'll set up an amortization schedule, laying out invoice amounts on a monthly basis.

Performance/KPI based billing

KPI targets can be linked to fixed fee payments, with Metso receiving additional payment for exceeding targets and vice versa if targets are not attained. Multiple KPI's can be considered, typically being equipment availability, component life-times, end-product quality and safety indicators.

Cost per ton billing

Cost per ton payment plans take cost spikes out of the picture and charge you based on what you produce in a given month. This allows you to better predict costs and cash flows and ensures that interests are perfectly aligned to maximize production.





Case study: Jindal Steel and Power Limited (JSPL), New Delhi, India

New Delhi based Jindal Steel and Power Ltd. (JSPL), benefiting from the huge steel demand in the country, has established itself as one of the leading players in the industry. To meet increasing demand, JSPL was looking for partners to complement their strengths and provide world class equipment and support to deliver excellent results.

To lower energy consumption and to increase plant availability, JSPL decided to install a wet grinding circuit with filtration for its second pellet plant. JSPL awarded Metso a 3-year LCS contract for the operation and maintenance of eight Metso VPA filters which has been renewed every year post the completion of the initial 3 year contract.

With LCS for filters, JSPL was assured of enhanced availability, higher production and predictive and preventive maintenance to enhance machine life. The VPA's are performing as per JSPL's expectations and are also providing significant cost benefits. Under the LCS contract, JSPL and Metso agreed on a clear target, i.e. consistent VPA filters availability of more than 90%, which has been delivered ever since.



Case study: Titanium Dioxide production in Western Europe.

Operating in Western Europe, a major producer of Titanium Dioxide (TiO_2 , a pigment used in paints and plastics) has had a Metso LCS Inspections and technical support contract in place for over 12 years for its filters. This has allowed the producer to shift its focus from maintenance to ambitious production and efficiency targets.

With the LCS contract in place, high levels of filter availability have been reached and maintained. Since the initial contract, the producer has also added an additional five Metso filters (FP models) at the plant in two streams, which are now covered by the LCS agreement.

The high level of machine availability was reached thanks to the combination of OEM expertise in terms of maintenance and filtration process knowledge, combined with a culture of transparency and cooperation with the producer's key service teams at the site. Metso has also provided process support for filter setup which has added additional value in terms of improved final product quality.

LCS levels for Tube press filters

Level 1
Inspections and technical support

Level 2
Maintenance and reliability

Level 3
Optimized performance

	Level 1	Level 2	Level 3
Spare and wear parts			
Parts inventory management and optimization	●	●	●
Operational and capital spare parts	●	●	●
Maintenance specific spare parts		●	●
Assessments and monitoring			
Equipment inspections	●	●	●
Performance assessment		●	●
Maintenance and reliability			
Technical support	●	●	●
Customer maintenance training	●	●	●
Maintenance advisory	●	●	●
Maintenance execution		●	●
Component recycling		●	●
Operation and process optimization			
Customer operation training	●	●	●
Operations and process advisory	●	●	●
Thickener Optimizer - APC			●
Financing options			
Upgrades and CAPEX deferred payments	●	●	●
Metso Inventory Solutions (MOI)	●	●	●
Payment options			
Fixed monthly billing	●	●	●
Performance/KPI based billing		●	●
Cost per ton billing		●	●

● Recommended | ○ Optional

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LCS levels for Larox PF filters

Level 1
Inspections and technical support

Level 2
Maintenance and reliability

Level 3
Optimized performance

	Level 1	Level 2	Level 3
Spare and wear parts			
Parts inventory management and optimization	●	●	●
Operational and capital spare parts	●	●	●
Maintenance specific spare parts	●	●	●
Assessments and monitoring			
Equipment inspections	●	●	●
Metrics Monitoring	●	●	●
Performance assessment	○	●	●
Maintenance and reliability			
Technical support	●	●	●
Customer maintenance training	○	●	●
Maintenance advisory	○	●	●
Maintenance execution		○	●
Plate pack management service (PPMS)*		○	●
Repairs and refurbishments		○	●
Component recycling		○	●
Operation and process optimization			
Customer operation training	○	●	●
Operations and process advisory			●
Filter Optimizer - APC**			●
Thickener Optimizer - APC			●
Financing options			
Upgrades and CAPEX deferred payments	○	○	○
Metso Inventory Solutions (MOI)	●	●	●
Payment options			
Fixed monthly billing	●	●	
Performance/KPI based billing		●	●
Cost per ton billing			●

Disclaimer: final level content is tailored to each case individually | *Larox PF models with metal plates - check availability in your MA/country | **Larox PF models with product conveyor

● Recommended | ○ Optional

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LCS levels for Larox FFP filters

Level 1
Inspections and technical support

Level 2
Maintenance and reliability

Level 3
Optimized performance

	Level 1	Level 2	Level 3
Spare and wear parts			
Parts inventory management and optimization	●	●	●
Operational and capital spare parts	●	●	●
Maintenance specific spare parts	●	●	●
Assessments and monitoring			
Equipment inspections	●	●	●
Metrics Monitoring*	●	●	●
Performance assessment	○	●	●
Maintenance and reliability			
Technical support	●	●	●
Customer maintenance training	○	●	●
Maintenance advisory	○	●	●
Maintenance execution		○	●
Repairs and refurbishments		○	●
Filter plate repairs and component recycling**		○	●
Operation and process optimization			
Customer operation training	○	●	●
Operations and process advisory			●
Filter Optimizer - APC***			●
Thickener Optimizer - APC			●
Financing options			
Upgrades & CAPEX deferred payments	○	○	○
Metso Inventory Solutions (MOI)	●	●	●
Payment options			
Fixed monthly billing	●	●	
Performance/KPI based billing		●	●
Cost per ton billing			●

*Currently available as a pilot project | **Check availability in your MA/country | ***Currently available for Larox FFP installations with cake transportation conveyor as a pilot project

● Recommended | ○ Optional

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LCS levels for VPA filters

Level 1
Inspections and
technical support

Level 2
Maintenance
and reliability

Level 3
Optimized
performance

	Level 1	Level 2	Level 3
Spare and wear parts			
Parts inventory management and optimization	●	●	●
Operational and capital spare parts	●	●	●
Assessments and monitoring			
Equipment inspections	●	●	●
Performance assessment	○	●	●
Maintenance and reliability			
Technical support	●	●	●
Customer maintenance training	○	●	●
Maintenance advisory	○	○	●
Maintenance execution		○	●
Repairs and refurbishments		○	●
Component recycling		○	●
Operation and process optimization			
Customer operation training	○	●	●
Operations and process advisory			●
Thickener Optimizer - APC			●
Financing options			
Upgrades & CAPEX deferred payments	○	○	○
Metso Inventory Solutions (MOI)	●	●	●
Payment options			
Fixed monthly billing	●	●	
Performance/KPI based billing		●	●
Cost per ton billing			●

● Recommended | ○ Optional

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LCS levels for CC filters

Level 1
Inspections and technical support

Level 2
Maintenance and reliability

Level 3
Optimized performance

	Level 1	Level 2	Level 3
Spare and wear parts			
Parts inventory management and optimization	●	●	●
Operational and capital spare parts	●	●	●
Assessments and monitoring			
Equipment inspections	●	●	●
Performance assessment	○	●	●
Maintenance and reliability			
Technical support	●	●	●
Customer maintenance training	○	●	●
Maintenance advisory	○	○	●
Maintenance execution		○	●
CC plate management and supply service		○	●
Repairs and refurbishments		○	●
Component recycling		○	●
Operation and process optimization			
Customer operation training	○	●	●
Operations and process advisory			●
Thickener Optimizer - APC			●
Financing options			
Upgrades and CAPEX deferred payments	○	○	○
Metso Inventory Solutions (MOI)	●	●	●
Payment options			
Fixed monthly billing	●	●	
Performance/KPI based billing		●	●
Cost per ton billing			●

● Recommended | ○ Optional

Metso is a frontrunner in providing sustainable technologies, end-to-end solutions and services for the aggregates, minerals processing and metals refining industries globally. By helping our customers increase their productivity, improve their energy and water efficiency and environmental performance with our process and product expertise, we are the **partner for positive change**.