Klarwin® Automotive &
Industrial Technology

Filtration, Separation, Purification in Industrial Applications

Engineering the perfect process

www.klarwin.com

Klarwin®
Fluid Perfection®

LET KLARWIN® HELP YOU IMPROVE YOUR PROCESS TO MAXIMIZE YOUR EFFICIENCY

Klarwin® is the emerging **European company** specialised in **technical consultancy**, **systems** and **services** in the field of applied **engineering for filtration**, **separation** and **purification** of **fluids** and **treatment of water.**

- **Complete** range of products manufactured by world leading technological **partners**
- **On-site** services and support
- **Top** engineers
- More than 10 years of **experience**
- Cross-industry **expertise** and **know-how**

Klarwin® represents a technical partner, present on-site, offering:

- Fluid filtration/separation/purification equipment and spare parts
- Reliable laboratory cleanliness analysis of fluids and components
- Process optimization recommendations
- Equipment rental services
- Customized trainings

Klarwin® provides technical solutions and trustworthy services to ***more than 250 clients*** in more than ***9 countries***, with
offices in **Romania**, **Hungary** and **Slovenia**.

Engineering
the perfect process

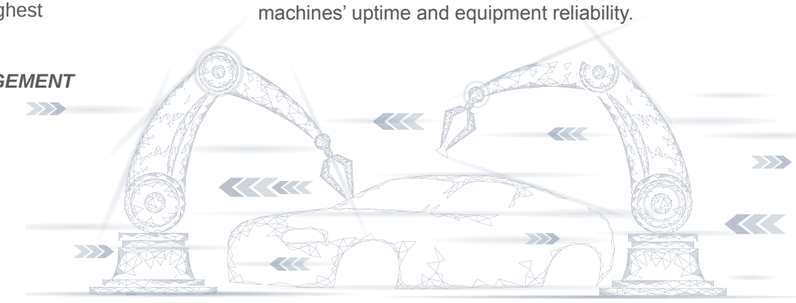
KLARWIN® AUTOMOTIVE & INDUSTRIAL TECHNOLOGY

specialises in providing ***filtration, separation and purification solutions*** that ensure the ***desired level of cleanliness of all the fluids*** involved in ***industrial applications***.

Our activities incorporate developing and implementing technical solutions with complementary products and services, properly selected to yield the highest productivity at the lowest cost.

This is reflected in the ***TOTAL FLUID MANAGEMENT*** concept that we implement.

Our technologies are primarily improving reducing the cost of ownership, product quality, production machines' uptime and equipment reliability.



INSIDE BROCHURE, YOU WILL FIND SOLUTIONS TO YOUR FILTRATION CHALLENGES, NOT JUST PRODUCTS

PARTS WASHING

Advanced technical products in automotive or other industries require high cleanliness specifications on components, therefore these are washed at several moments in their manufacturing process. The effectiveness of the washing process depends highly on the cleanliness of the washing fluid. In all washing processes, reducing particle and oil content from washing fluid is a must.

Solution: filtration/purification and oil separation.

Outcomes:

- Cleaner components
- Less waste
- Reduced frequency of water change
- Reduced detergent use
- Less maintenance
- Reduced re-washes
- Cost savings

COOLANT

In manufacturing, the coolant helps to transfer heat and transports chips from the machining process, that would cause defects on the surface finish or reduce tool lifetime. Maintaining the performance of coolant includes filtration of chips and swarf, separating tramp oil and adding pure make-up water. Tramp oil causes increased bacterial growth, emulsion degradation, smoke and mist in the air.

Solution: filtration based on the application requirements and fluid type (oil, oil-water emulsion) and tramp oil separation.

Outcomes:

- Increased tool life
- Increased fluid life
- Increased tool accuracy
- Better surface finish
- Reduced scrap rate
- Cleaner components
- Less waste
- Less maintenance
- Cost savings

SUCCESS STORY

APPLICATION PROBLEM SOLUTION BENEFITS

Final washing for diesel pumps and injectors

High ingression of contaminants in the washing process causing measured cleanliness tests to exceed limits

Profile pleated and Bos Max

3x lifetime, improved Cleanliness to meet the specs and Customer saved >30k € from detergent, waste water and less maintenance. Scrap on the assembly (following process) has been reduced

Coolant filtration

Dirt load exceeds capacity of on-machine filters causing frequent maintenance

Mobile Filtration Unit with cleanable pre-filter, FSI BNMO and Athalon

Less outage of the tool-machines, less oil changes, less maintenance, less scrap rate and increased tool lifetime

SOLUTIONS

Depending on the application we propose a variety of filtration solutions, like cartridges, bag filters, multi-cartridge filter housings, rollers (with magnetic separators) or press filters.

Melt-blown filters*, ensure constant performance and high removal efficiency in a wide range of ratings and configurations: depth, tapered or symmetric pore structure, fan pleated, laid-over-pleated (Ultipleat).

Profile Coreless, Ultipleat High Flow or **Marksman** cartridge filters ensure high filtration efficiency over a variety of filter ratings.

SUPRAdisc filters are stacked disc modules, with high adsorption capacity, large filtration area and excellent mechanical strength.

FSI filter bags are available in a lot of different sizes and materials, from basic to high capacity, absolute rating, making it compatible with a lot of fluids and filtration grade requirements.

Complex filtration systems ensure clean coolants using media and media-free vacuum filters, magnetic roll separators or cellulose precoated elements.

Contamination Monitor can measure the cleanliness of low viscosity fluids by proven mesh technology.

**All synthetic – reduced waste (incinerable)*

Several technical solutions can be used to separate oil-water mixes depending on the fluid type, state of the oil in emulsion and specifics of the industrial application.

Coalescers removes free oils from machine tank, by passing it through oleophilic media plate packs, that causes the tramp oils to separate from the fluid.

Centrifuges remove both free and emulsified oil to 0.5% or less, and particles down to 5 µm in one pass using a disc bowl high speed centrifuge.

Belt skimmers remove free oil from a settled water sump, using an oleophilic belt that collects the oil from the surface of the sump.

Oil purifiers are available in different sizes and flow rates to remove free and up to 90% of dissolved gases and water, as well as solid contaminants.

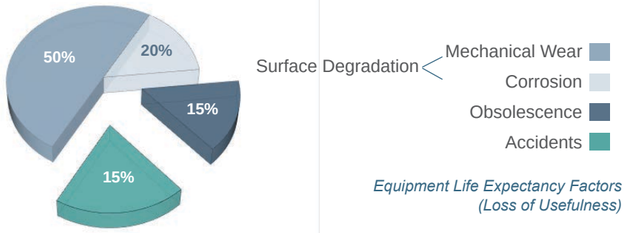
Crossflow systems remove tramp oils, suspended solids and bacteria from water-based fluids with the use of ceramic membranes.

Looking for rental options?
Turn to page 15

HYDRAULIC & LUBRICATION FLUID FILTRATION

Studies show that equipment failures are 70% of the times due to surface degradation, either mechanical wear or corrosion [Rabinowicz, 1981].

Hydraulic and lubrication systems' lifetime is, therefore, a reflection of the cleanliness of their fluids.



Equipment Life Expectancy Factors (Loss of Usefulness)

HYDRAULIC CONTROL SYSTEMS

Contaminants may be self-generated within the system by the chain of wear, or may come from manufacturing processes, maintenance operations or carried by air. Abrasive contaminants, which circulate in the system, accelerate wear and may cause rapid failure of hydraulic equipment, especially of servo-valves and HP pumps.

Solution: filtration and oil purifiers.

Outcomes:

- Less wear
- Reduced corrosion on components and pipelines
- No clogging of jets, nozzles and orifices
- No valve jamming
- Less oil degradation (precipitation of additives, varnish) and waste.
- Cost savings

LUBRICATION SYSTEMS

Contaminants in the lubrication oil lead to increased wear of gears, rolling and sliding element bearings or seals. Particulates reduce bearing life significantly through fatigue and abrasive wear, especially for rolling element bearings where dynamic clearances can be as low as 0.1 – 1 µm.

Solution: filtration and oil purifiers.

Outcomes:

- Less wear
- Proper lift effects
- Increased tool accuracy
- No vibration
- No nozzle blockage
- Reduced machine failure
- Less oil changes
- Cost savings

SUCCESS STORY

APPLICATION PROBLEM SOLUTION BENEFITS

Calibration oil filtration

High dirt load from flushing and testing pumps and injectors

Profile II, and multiple stages of Athalon with Particle Counting Monitor

>60k € savings from less consumption of High Pressure Valves, more uptime for testing lines, achieving Cleanliness specs

Hydraulic system of large multi-stage press for automotive body panels

Piston pump jamming with varnish causing expensive repairs, short service life of filters

2 modules of SUPRAdisc

No more pump failure, longer service life of on-line filter elements, increased press operational availability

NO SYSTEM HAS FAILED BECAUSE THE OIL WAS TOO CLEAN

HYDRAULIC & LUBRICATION FLUID FILTRATION

SOLUTIONS

ATHALON

Athalon filter, with laid-over pleat geometry, maximizes filtration area in a stress-resistant filter media with a fixed, tapered pore structure to provide consistent filter performance. With ratings down to 3 µm @ removal efficiency $Beta_x(c)\geq2000$ (CST), Athalon cartridges are the best hydraulic filters in the market.

CORALON

Coralon filter, with pleated stress-resistant filter media, is an upgrade for *Ultipor* filter elements, with significant performance improvements, at ratings down to 3µm @ removal efficiency $Beta_x(c)\geq1000$ (CST). Available also in Dirt-Fuse media in a non-bypass filter housing, with up to 210 bar collapse pressure.

SUPRADISC

SUPRAdisc filters are stacked disc modules, made of cellulose fibres coated with adsorptive additives (perlite, diatomaceous earth, activated carbon) and resins, which offer large filtration area, with high adsorption capacity, and excellent mechanical strength.

UPGRADES (RETROFITS) - RED_{1000}

Our filtration solutions can be implemented at any stage of the process, as upgrade in most filter vessels (*Parker, Hydac, Cuno, PTI, Mahle, Schroeder, Hilliard Co., Kaydon Corporation, Baldwin, Donaldson, EPE, Hayward, Hilco, Hypro, Internormen, MPFiltri, Stauff etc.*) having same pleated stress-resistant filter media as Coralon.

OIL PURIFIERS

Mobile Oil Purifiers can be used for different capacity oil tanks, and it is able to remove by vacuum dehydration techhnology:

free water and as much as 90% of dissolved water
free and entrained gases and up to 90% of dissolved gases
solid contaminants, with efficiency of $Beta_x(c)\geq2000$ (down to 3 microns).

Can treat, without heating, oil up to 1000cSt or more.

CONTAMINATION MONITOR & WATER SENSOR

The fluid cleanliness monitor measures solid particle contamination either by using calibrated meshes or laser technology.
Results format: ISO 4406, SAE AS4059, SAE AS4059.
Measuring accuracy: ± ½ class acc. ISO4406 code.

PCM: measures dark fluids, not effected by bubbles

Laser: fast measure, wide range of sizes

Water sensors: measure dissolved water content in % saturation or PPM

WATER TREATMENT

Klarwin supports the sustainable use of natural resources and safe discharge into the environment.

In manufacturing plants, water treatment plays an important role in providing the water quality necessary to maximize process efficiency and minimize costs, as well as reducing waste.

SYMBOL LEGEND:

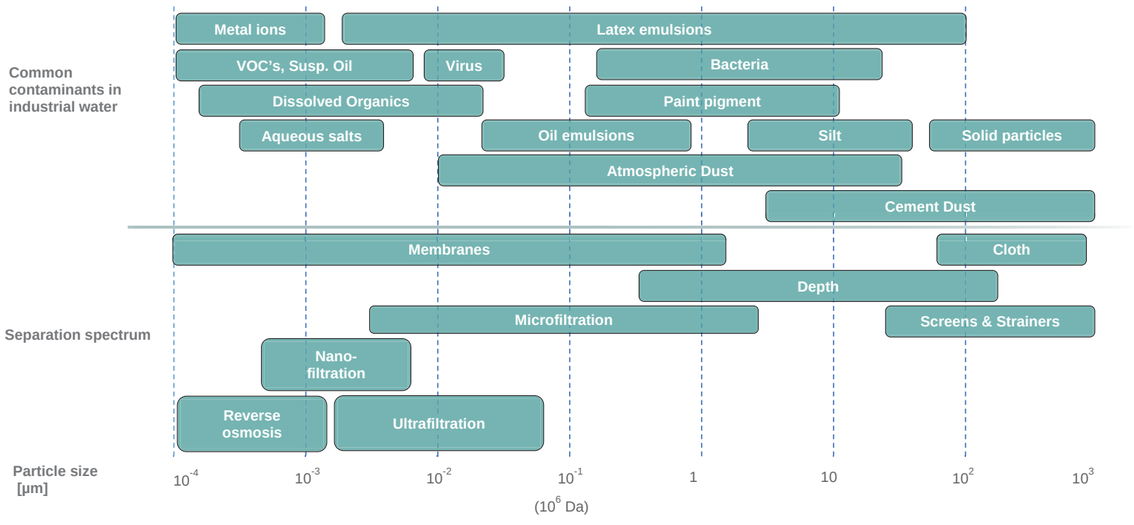
Cartridge filters · Bag filters · Separators · Automatic filters · Evaporators · Deionizers / ion-exchanger

MF Microfiltration/ ultrafiltration

RO Reverse Osmosis

Oil Separator

CONTAMINANT VS. POSSIBLE SOLUTION

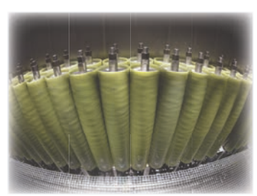


SOLUTIONS

ARIA MICROFILTRATION / ULTRAFILTRATION (MF/UF) SYSTEM

Aria is an automatic system made of homogeneous, high mechanical and chemical resistance PVDF tubular fibres of 0.1 µm, packed in modules, with a high surface area (50m²/module). Pall Aria systems are designed to ensure consistent water quality, for water potabilization, removing all solid particles, reducing by 6 log giardia and cryptosporidium, with recovery rates ranging between 90-99%.

DISC TUBE REVERSE OSMOSIS (DTRO) SYSTEM



The DTRO System is a membrane modular system, designed to ensure molecular and ionic separation of the whole spectrum of pollutants in all aqueous environments: from suspended matter to the smallest ions, including colloids, bacteria, viruses and organic matter. The module is used for reverse osmosis of difficult-to-treat waters, as well as for the recovery of concentrate from other traditional systems.

IMPRO REVERSE OSMOSIS (RO) SYSTEM

High recovery reverse osmosis systems are made of spiral-wound membrane modules, designed to obtain DI/demi water and for industrial wastewater treatment. The system features a special reverse osmosis system, that reduces energy consumption, offering highest recovery (up to 95%), reducing waste streams by 50-80%, and protecting the integrity of crucial equipment, such as boiler, heat exchangers, turbines etc.

EVAPORATORS

Evaporation systems produce clean water, free of salts, solid or tramp oil contamination. Evaporation technology offers the simplest and most versatile approach to industrial wastewater minimization. Evaporators recover and recycle wastewater as distilled water for reuse or to be discharged to the sewer.

ION – EXCHANGER

Custom made ion-exchangers (IX) use ion-exchange resins to remove dissolved metals, minerals or salts from incoming water. Water softening, by removing Ca++ and Mg++, is necessary to protect pipes and boilers from deposits or fouling.

AUTOMATIC SELF-CLEANING FILTERS

Automatic self – cleaning filters, with large flow rates and a wide range of filtration degrees, have a reliable operating mechanism and simple construction. Alternatively, custom made filtration systems, either with sand, meshes, multimedia or activated glass, can be designed.

SEPARATORS

Since emulsions are widely used in industrial applications, oil-water separation is necessary for reuse, waste management or upstream of other equipment. *Coalescers*, centrifuges offer simple, effective and low-cost tramp oil removal.

CARTRIDGE FILTRATION

Cartridge filters like melt blown filters (*Profile, Marksman, Vector, Nexis etc*) offer high efficiency prefiltration or final filtration of water in a wide range of removal ratings, down to 0.1 µm.

BAG FILTRATION

Bag filters come in a variety of media and sizes to fit your filtration needs - from low cost bags for prefiltration, to absolute rating high efficiency *FSI BOS Gradient, BOS Max.*

TOTAL CLEANLINESS CONTROL

Total Cleanliness Control (TCC) concept integrates the **technologies** for filtration, separation and purification of factory fluids together with **monitoring systems** and **services** for continuous process improvement.

FILTRATION TECHNOLOGY

Cartridge filters for process fluids or hydraulic & lubrication fluids offer high efficiency with a wide range of removal ratings to ensure the required fluid cleanliness.

Bag filters come in a variety of materials and designs that ensure high dirt holding capacity at low costs.

Reservoir air breathers prevent contaminant ingression in reservoirs, fuel tanks, lube oil systems and other vented systems.

Microfiltration systems are designed to meet the water purity requirements, from treatment of water used for plant processes to potabilization applications.

SEPARATION TECHNOLOGY

Portable Coalescers for oil-water separation are available in different sizes and designs for simple, effective and low-cost removal of oil in water based liquids and emulsions.

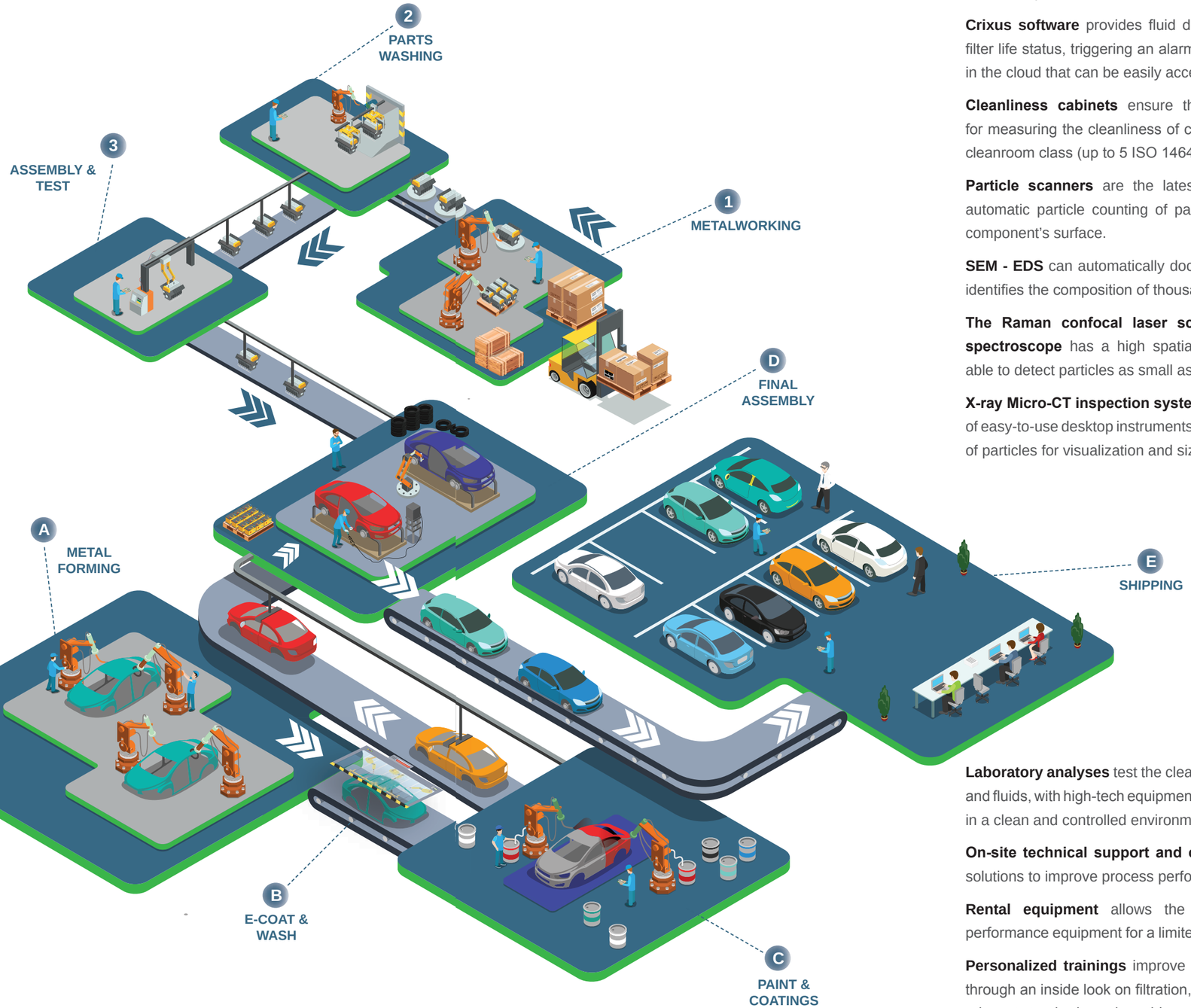
Ceramic filters ensure oil-water separation and fluid recovery in degreasing baths, wash and rinse water and other water based liquids.

Coalescers separate **liquid/liquid** and **liquid/gas** phase to provide improved high purity end-product.

PURIFICATION TECHNOLOGY

Mobile Oil Purifiers ensure high removal of solids and free and dissolved water and gases from hydraulic, lubrication and mineral/synthetic oil fluids.

Reverse osmosis systems with Spiral Wound or **Disc Tube modules** are a reliable solution for polishing and purification of water based fluids, to obtain demi-water / de-ionized water or to treat rejects from other water treatment processes.



MONITORING SYSTEMS

Particle Contamination Monitors and **Water sensors** help plant operators to control and monitor contamination in different liquids.

Crixus software provides fluid degradation information and filter life status, triggering an alarm and storing 1 year of data in the cloud that can be easily accessed on-line.

Cleanliness cabinets ensure the environment necessary for measuring the cleanliness of components and liquids in a cleanroom class (up to 5 ISO 14644-1).

Particle scanners are the latest technology for fast and automatic particle counting of particles from membranes or component's surface.

SEM - EDS can automatically document the size, shape and identifies the composition of thousands of particles per hour.

The Raman confocal laser scanning microscope and spectroscope has a high spatial resolution and sensitivity able to detect particles as small as 100 nm.

X-ray Micro-CT inspection systems are available in a range of easy-to-use desktop instruments, which generate 3D images of particles for visualization and sizing.

SERVICES

Laboratory analyses test the cleanliness of your components and fluids, with high-tech equipment and specialised personnel, in a clean and controlled environment.

On-site technical support and cleanliness audits identify solutions to improve process performance and productivity.

Rental equipment allows the opportunity to use high performance equipment for a limited time and with small costs.

Personalized trainings improve the processes optimization through an inside look on filtration, the latest technologies and relevant standards on the subject, with practical applications in production processes.

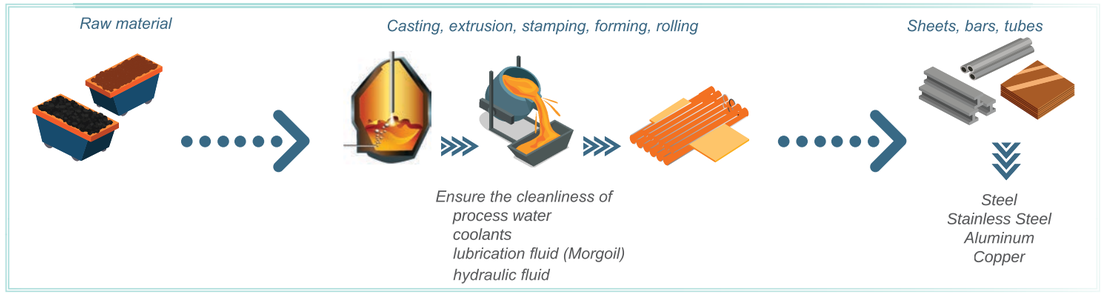
PRIMARY METALS

Primary metals processes (casting, extrusion, stamping, forming, rolling etc.) are sensitive to the presence of contaminants.

The performance and service life of bearing lubrication fluid and hydraulic fluid of metal rolling systems are affected by gases, water and particulate contamination. Also, particles in the process liquid, used to cool down the metal sheets, can cause defects on the final product.

Solution: filtration and separation technologies

Outcomes:
- Enhanced product quality
- Increased uptime
- Lower scrap rate
- Reduced liquid waste
- Reduced maintenance costs
- Increased capital equipment life and reliability



SOLUTIONS

Incoming, process and waste water*

Meltblown filter elements ensure clean water for a large range of applications and are a cost-effective solution for cooling / process water.

Hollow fiber membranes can produce pure water from ground and surface water.

Reverse osmosis systems ensure high purity process make-up water.

Nylon backwash filters are used for stainless steel rolling mills to reduce defect risks from particles.

Cross-flow ceramic membrane systems can treat emulsion / wastewater from cold rolling operation or caustic degreasing solution.

**for more details, please refer to pages 6-7*

Gear Box and Bearing (Morgoil) Lubrication*

Stress Resistant Technology & *Dirt fuse filter elements* ensure high resistance in very stressful operating conditions (extreme temperature and pressure).

Profile and Poly-fine XLD filters combine high flow capacity, low pressure drop, and gel retention capability, which makes it a perfect fit for high-viscosity and high concentration of slurry.

SUPRAdisc is a great fit for highly contaminated liquids, in reduced flow applications to obtain high purity in one pass.

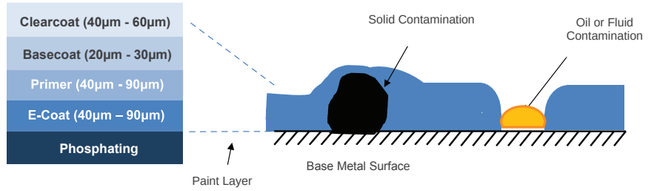
Vacuum dehydration purifiers can remove free gases and water up to 90% of dissolved gases and water.

**for more details, please refer to pages 4-5*

PAINT FILTRATION

Filtration in each step to prevent paint defects on the finished part caused by large/ agglomerated particles or gels, but allowing paint pigments or additives to pass.

Outcomes:
- Reduce defects
- Reduced rework costs
- Decrease production time
- Reduced total operation costs



In spray painting, it's important that airborne particulates are kept under control by high efficiency air filters like HEPA or ULPA. This will decrease or eliminate the risk of surface defects, which can result in scrap or rework.

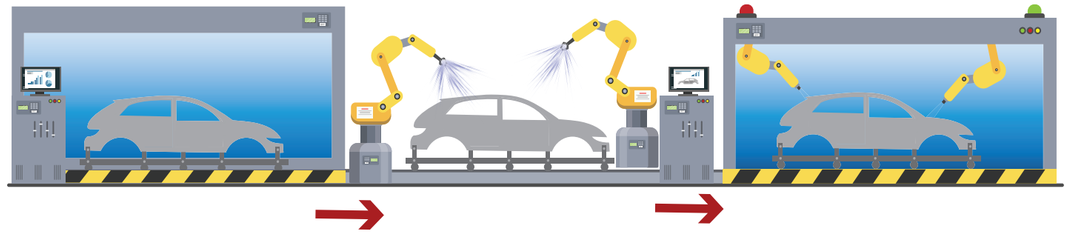
SOLUTIONS

Surface Pre-Treatment (Degreasing – Phosphating, Rinsing)

Meltblown filters (**Coreless, Ultipleat High Flow**) with upstream bag filters ensure suitable washing fluid cleanliness that will result in cleaner components, preparing the surface for e-coating. Cross-flow filtration is used to remove oils and gels etc. and RO can be used to obtain demi water.

1st Paint Stage (E-Coat)

Reverse osmosis systems ensure pure make-up water for paint bath solution and rinsing tank. **Marksman**, or **Coreless**, with upstream bag filters, ensures high efficiency particulate removal from E-coat paint process



Sealants, waxes & mastic coatings

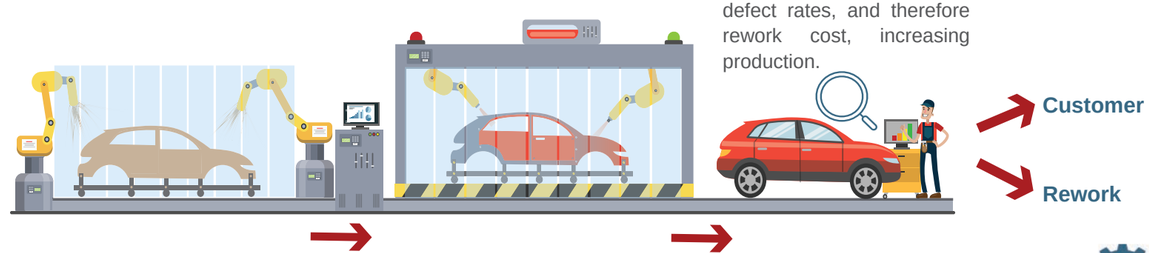
Filseal, made of **Rigimesh** woven stainless steel mesh media is used in high viscosity applications such as PVC sealants, underbody waxes, and high-solids mastic protective coatings.

Paint and Finishes

Meltblown filter elements **(Profile, Nexis)** ensure high performance particle removal in metallic, mica, solvent and waterborne paints.

Inspection

At the end of the paint process, the defects are counted and repaired. By using high efficiency filtration downstream, you will minimize particle related defect rates, and therefore rework cost, increasing production.



AIR FILTRATION

PLANT AIR

Filtration of ambient air will help protect workers and assets from contaminant ingression. Ambient plant air can contain different kinds of contaminants, including smoke, fumes, soot, airborne dusts and mists from various industrial processes.

MACHINE'S EXHAUST AIR

Filtration of fumes, welding smoke or oil mists produced in the manufacturing processes provides visibility that allows visual checking, and a cleaner environment for the health and safety of the operators.

COMBUSTION GASES

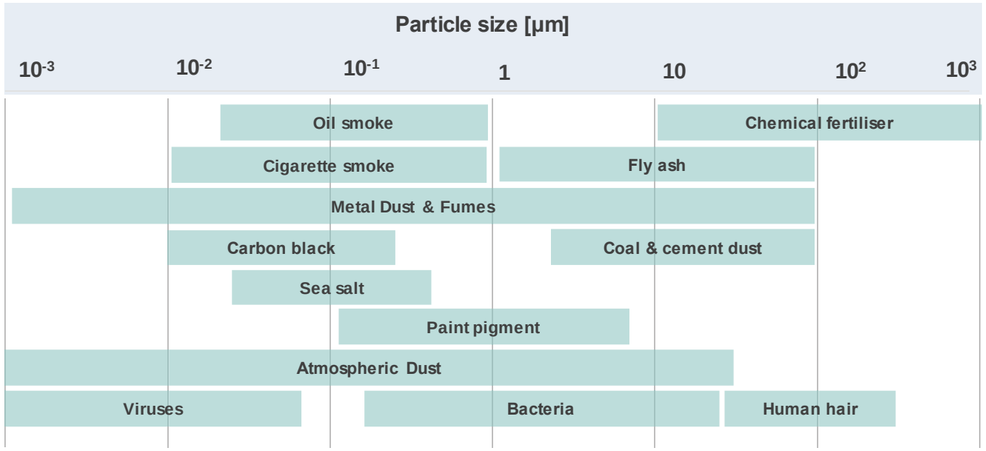
Filtration of particulates in combustion gases used in some thermal processes improves burning efficiency. Reducing VOC and particulates in burned gas will reduce environmental impact.

COMPRESSED AIR

High air quality is required for compressed air in manufacturing processes. This can be achieved by high efficiency air filtration and separation solutions, which eliminate solid particles, water and oil.

AIR FILTRATION APPLICATIONS

COMMON CONTAMINANTS IN INDUSTRIAL AIR



FILTER MEDIA STANDARDIZATION

High-efficiency air filters and filter media for removing particles in air, defined according to ISO 29463/ EN 1822

- **EPA (E10-E121)** **Efficiency** 85% - 99.5%, 0.3 µm
- **EPA (E10-E121)** **Efficiency** 99.95% - 99.995%, 0.3 µm
- **EPA (E10-E121)** **Efficiency** 99.9995% - 99.999995%, 0.12 µm

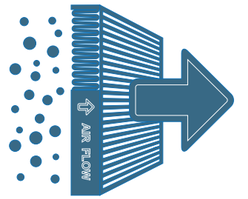
Air filters for general ventilation defined according to ISO 16890

- **COARSE** **Efficiency** < 50%, >10 µm
- **ePM_{10}** **Efficiency** min ≥ 50%, <10 µm
- **$ePM_{2.5}$** **Efficiency** min ≥ 50%, < 2.5 µm
- **ePM_{1}** **Efficiency** min ≥ 50%, <1 µm

SOLUTIONS

AIR FILTERS

Air filters for industrial ventilation and air-conditioning, from coarse prefiltration for high dust concentrations to filters that separate fine dust in HVAC units, can be used in different configurations (in pads, rolls, filter bags and cassettes). Absolute filters, made of glass fiber membranes, provide high particle retention performance (up to 99.999995% at 0.12 µm) and a laminar air flow.
Applications include removing fine dust from multiple plant environments.



CERAMICS

Membralox ceramic membranes are asymmetric multi-channel membranes composed of a porous alumina support and a filtering layer (alumina, zirconia, titania) can filter in the range of micro and ultrafiltration.
Schumasiv is an asymmetric pore, ceramic membrane filter element, used for microfiltration and ultrafiltration that is resistant against most chemicals.
These are efficient solutions for hot gas filtration.

OIL MIST AND SMOKE FILTRATION

Air cleaners/scrubbers remove water and oil-based aerosols such as cooling lubricants, spray mists and similar airborne contamination with an efficiency rate up to 99.9999%.
Applications: smoke, vapours, odours and gas from the exhaust air of processes such as machining, laser engraving, laser marking, laser cutting, heat treatment etc.

LIQUID/GAS (L/G) COALESCER

L/G coalescers (*Medallion, SepraSol*) practically eliminate all free and emulsified water in gases, down to 0.1ppm, improving air quality.
These can be used in applications like removing liquids from combustion gases.

By renting one of our equipment, you can benefit from the same advantages but without the capital cost:

- Testing on-site of the effectiveness and efficiency of the equipment
- Use of high performance equipment for limited time
- Small costs

CLEANLINESS IMPROVEMENT

Fluid cleanliness improvement is essential in cost reduction actions, the extend of which can be estimated based on the machines and plant processes.

- Ignoring cleanliness requirements, will rapidly lead to mechanical components wear, which will affect the production process and cause loses in terms of outage and repair costs.
- Deposits on pipes may lead to jamming or oil starvation.
- Chemical cleaning can result in a very expensive procedure, therefore most of the times filtration is more efficient.
- Our long validated experience has shown that improving filtration is much more efficient than changing the oil due to high contamination .

MOBILE FILTRATION UNIT

Our Mobile Filtration Units (MFU) use high-quality gear pumps and high efficiency Athalon filters ($Beta_x(c)\geq2000$) to clean rapidly the oil.

Available in multiple sizes and flow rates (from a few l/min to thousands of l/min), they can rapidly achieve the desired cleanliness in a short time.

Varnish removal units (Pall VRF) purify oils to prevent oil degradation that can lead to sluggish control and servo valve stiction, causing expensive repairs or unscheduled outages. Using SUPRAdisc technology, you benefit from high efficiency filtration and high dirt holding capacity.

The same technology is successfully used in highly contaminated process water

SUMP CLEANER

Sump cleaners are heavy-duty industrial wet/dry vacuum filtration units that clean virtually any machine tool sump or tank, leading to fewer shutdowns, preventing microbial growth, decreasing chemical use and increasing fluid life.

- Suitable for coolants and oils
- 200 - 3750 litre capacity drum
- Vacuum generator

COALESCER

Coalescers remove free oils from machine fluid, by pumping into a tank where it passes through oleophilic polypropylene media plate packs, that cause the tramp oils to separate from the water-based fluid.

- 3.7 - 37 l/min
- Available also in stainless steel for high or low pH fluids

CENTRIFUGES

Our centrifuges remove both free and emulsified oil from water, down to 0.5%, and particles down to 5 µm in one pass by a disc bowl high speed centrifuge.

- 75-150 l/min
- 5 µm filtration
- Single and dual vessel model

Using a rental equipment can qualify/confirm the effectiveness and efficiency of a solution, as well as helping sizing the equipment

WATER & GAS REMOVAL FROM OIL

Water is considered as the second most dangerous contamination in lubrication systems, after particulate contamination, since it can lead to reduced lubricity, oil breakdown (additive precipitation, oil oxidation), accelerating wear and corrosion.

Removing free water is never enough since dissolved water over 50% saturation can lead to free water when temperature decreases, which, in turn, leads to corrosion and fluid degradation.

Gases in hydraulic oils lead to slow response and control of hydraulic actuators, while gas or air in lubricating oils can lead to loss of load carrying capacity and cavitation.

OIL PURIFIER

Oil purifiers are based on mass transfer by boiling at low temperature in vacuum, which has no damaging effect on oil properties since the oil is not heated.

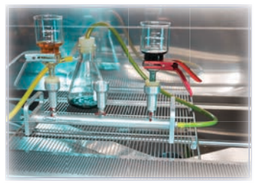
By spraying the oil in thin films with big evaporation area inside a vacuum chamber, water and gases from the oil are transferred to the dry air and eliminated through the exhaust.

Purifiers are available in different sizes and flow rates from 3 l/min - 200 l/min, with different features:

- removes free water and as much as 90% of dissolved water and gases
- removes solid contaminants, with efficiency of $Beta_x(c)\geq1000$ (down to 3 microns).
- water content continuously monitored
- 40% faster dehydration rate than competitor technologies
- no utility required (except power)
- fully PLC controlled (can operate unattended) and low maintenance
- no waste except the incinerable synthetic filter element

LABORATORY EQUIPMENT

Our rental equipment includes also laboratory equipment like microscope, particle counter, water in oil sensor, particle scanners which will help you asses and measure process contamination.



LABORATORY SERVICES

Klarwin®, as a solid provider of fluid filtration, separation and purification technologies, supports their partners through trustworthy laboratory expertise:

- Laboratory cleanliness analysis of fluids and components
- On-site cleanliness evaluation
- On-site evaluation of water content in oil
- Filtration audit
- Qualification analysis (development and validation of fluid/component cleanliness specifications)
- Process analysis/assessment and interpretation
- Commissioning, calibration, maintenance and operator training services for laboratory technologies

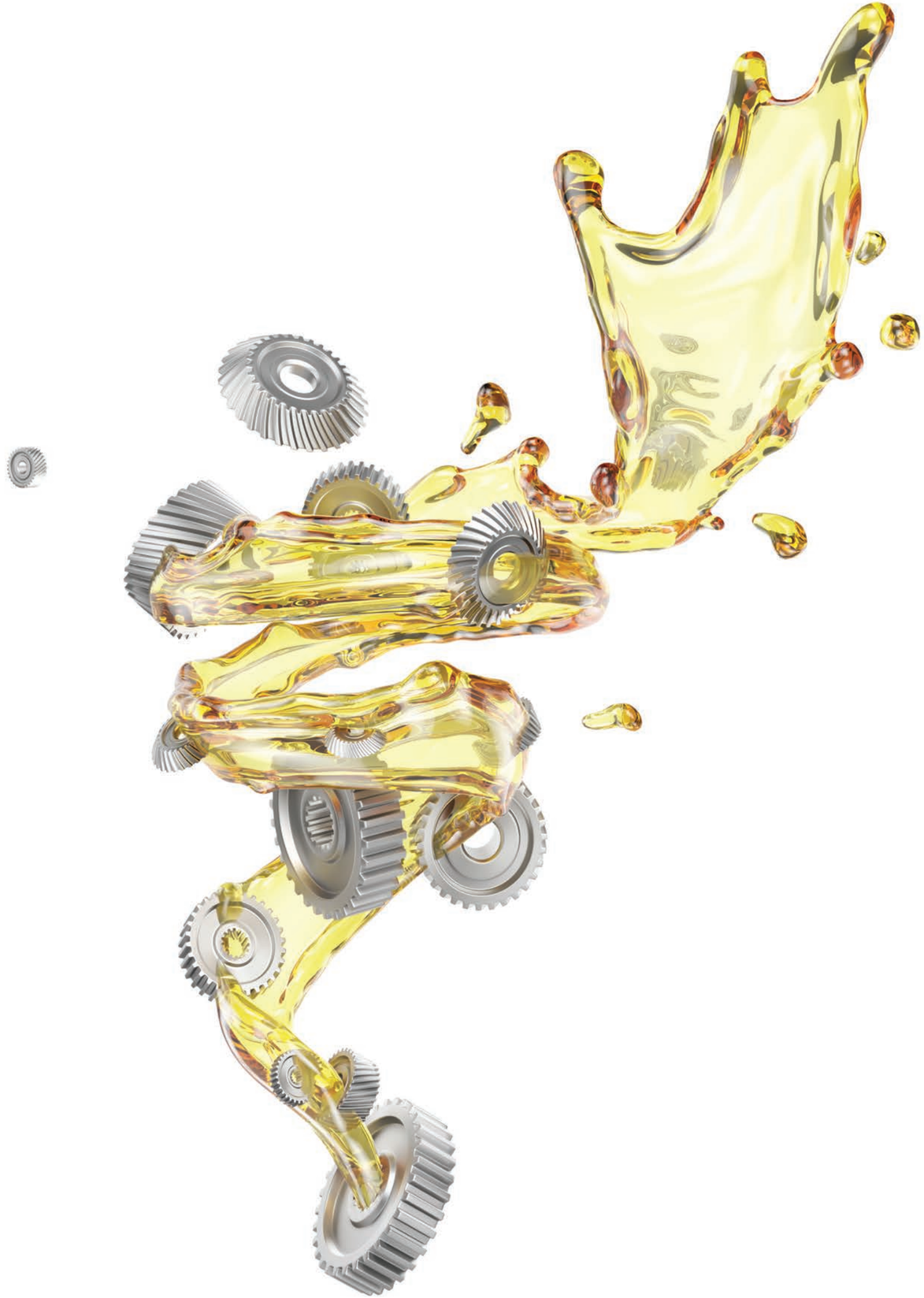
TRAINING SERVICES

Our goal is to ***provide*** you with ***practical training seminars*** and ***workshops***, relevant and adjusted for all levels of experience and qualification.

- Standard or customized ***programs***
- Increasing operating ***efficiency***
- Improving ***knowledge***
- Increasing ***experience*** through practical applications

Based on the ***experience gained along the years***, **Klarwin** delivers ***extended know-how*** related to:

- ***Fluid cleanliness*** measurements
- ***Component cleanliness*** measurements
- Overview on ***ISO 16232 / VDA 19*** and ***ISO 18413*** standard
- How to ***achieve and control*** the desired ***cleanliness level***
- ***Effects of filtration*** on fluid and component cleanliness level
- ***Improving reliability*** of moving equipment
- ***Separation equipment*** in different applications
- ***Success stories***
- ***Cost reduction***
- Other ***customized trainings***



Klarwin®

Fluid Perfection®

Klarwin® Automotive & Industrial Technology

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