KAYDON FILTRATION

POWER GENERATION

STEAM, COMBUSTION AND HYDROELECTRIC FACILITIES

Making the world safer, healthier and more productive®

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For over 80+ years, Kaydon Filtration has provided innovative fluid conditioning solutions across the globe for power generation companies.

For each project we offer products, expertise and experience in conditioning oils and fluids to keep your plant operating at peak performance.

To achieve long-term, predictable and profitable performance for your power plant equipment, Kaydon Filtration technologies effectively keep contamination out.

The need for clean, dry oils and fluids is a necessity for long-term power plant equipment reliability. Recognizing that downtime is the ultimate enemy of power plant facilities, Kaydon Filtration has developed application-specific filtration technologies to minimize downtime and maximize performance for steam, combustion, and hydroelectric power plants.

Turbine manufacturers worldwide trust Kaydon Filtration to keep their turbines functioning properly, which is a testament to our experience and expertise.

Kaydon Filtration understands the specific needs of every phase of your plant's operation. From super-clean turbine oil to varnish-free components, we can provide solutions to meet your demanding and varied oil and fluid conditioning needs.

In the end, we offer more than long-term, predictable, and profitable performance for your plant equipment; we offer assurance that your plant stays online.

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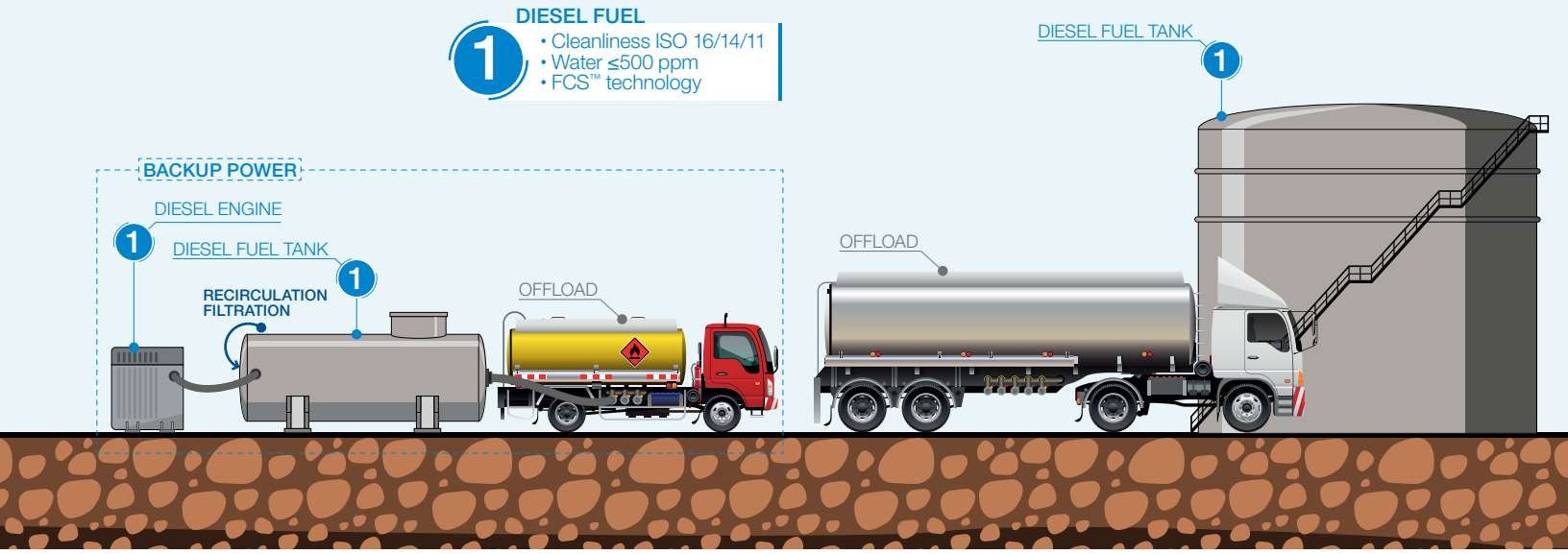
Steam turbines

Operating in high-temperature and high-humidity environments, steam turbine equipment faces the risk of rapid water contamination in lubricant oils.

Recent studies have shown that a water content of 200 ppm and above can reduce bearing life by as much as 50%.

Kaydon Filtration technologies offer solutions that can reduce water content to less than 100 ppm in a single-pass filtration process. This ensures maximum bearing and journal life for your steam-powered turbines.



Kaydon Filtration specializes in keeping oils and fluids in your steam turbine plant clean and dry.

We have technologies to support oil and fluid conditioning in steam turbine units ranging from 1 to 1,000 MW.

Utilizing our optimized turbine oil conditioning systems, featuring our patented Turbo-TOC® coalescing technology, we ensure comprehensive protection for crucial components including:

- Main turbine system
- Boiler feed pump
- Primary, forced draft, and induced fans
- Fluid drive

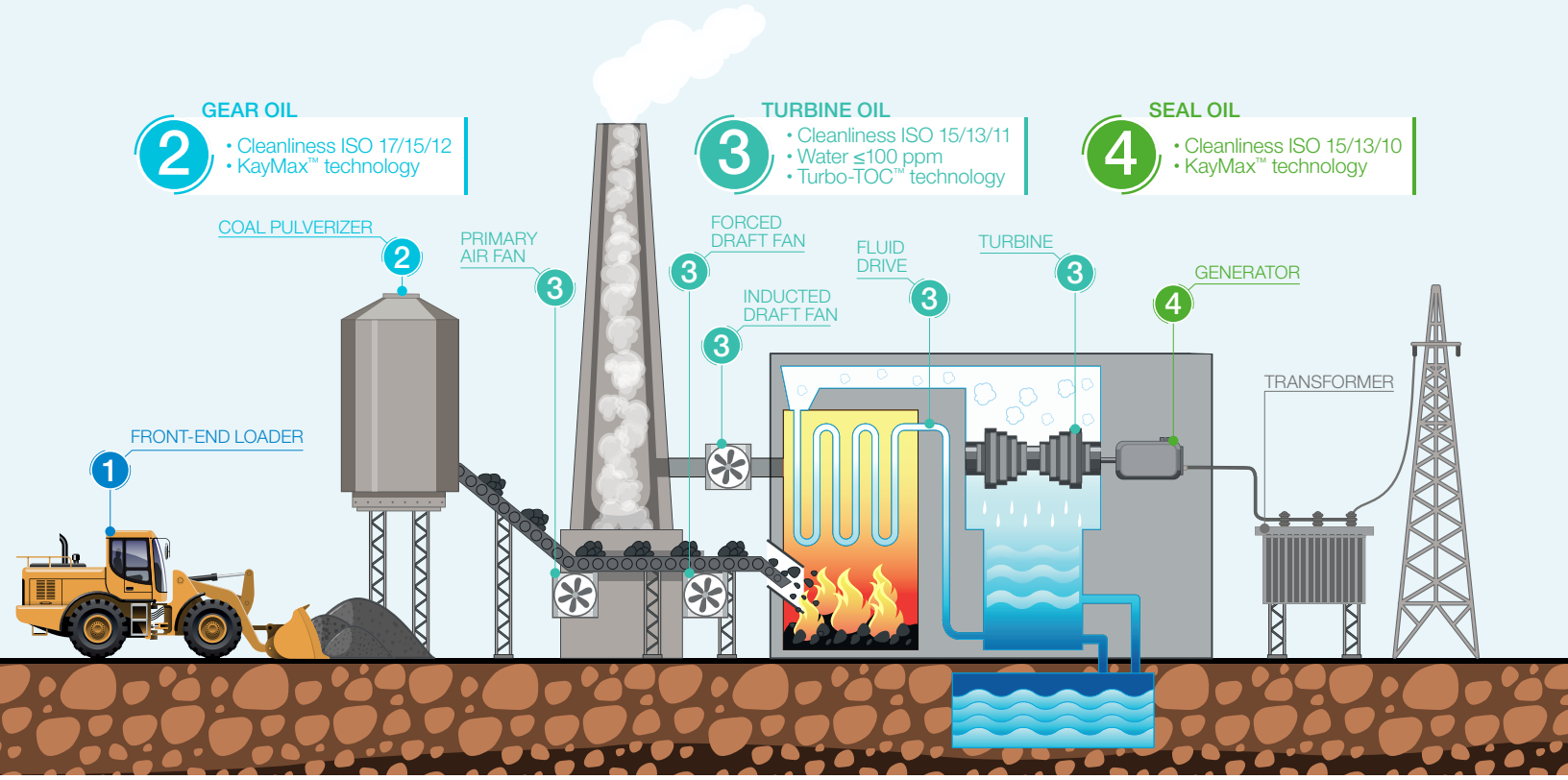
Our advanced technologies for oil, fluid, and fuel conditioning in steam power plants include:

- Turbo-TOC® Technology for single pass[2], high flow water removal in turbine oil
- Kaymax™ Technology: Ensures maximum cleanliness levels in lubricating fluids
- FCS™ Technology: Designed for conditioning diesel fuels during off-load, storage, and fueling

Our primary oil condition systems offer a seamless solution, combining particulate and water removal into a single skid-mounted, fully automatic setup.

With processing rates exceeding 100 GPM (380 LPM), these systems achieve total water removal to less than 100 ppm and an ISO cleanliness level to 15/13/11 or better.

They continuously condition turbine oil reservoirs during operation and scheduled downtimes.



Maintaining proper oil condition not only keeps turbine systems operational but also facilitates quick and efficient restarts after shutdowns.

Kaydon Filtration technologies are globally recognized for their ability to:

- Prolong steam turbines' online availability
- Improve predictability of downtime scheduling
- Meet peak demand requirements
- Reduce maintenance and replacement costs
- Extend lubricant life

In addition to turbine and lubrication oils, we offer fluid conditioning systems to effectively purify other fluids used in power plants, including hydraulic oil, gear oil, seal oil, and transformer oil. Preserving the condition of these utility system oils and fluids not only extends their useful life but also minimizes unscheduled maintenance and equipment failures.

Furthermore, Kaydon Filtration provides conditioning technologies and systems to safeguard diesel fuel during offload, storage, and distribution. Modern diesel engines, especially those equipped with high-pressure injection systems, are vulnerable to contaminated fuel, which can lead to:

- Unscheduled maintenance
- Power loss
- Decreased fuel efficiency
- Injector and high-pressure pump failure
- Expensive downtime

With our experience and advanced technology, we ensure critical application diesel-powered equipment remains operational.

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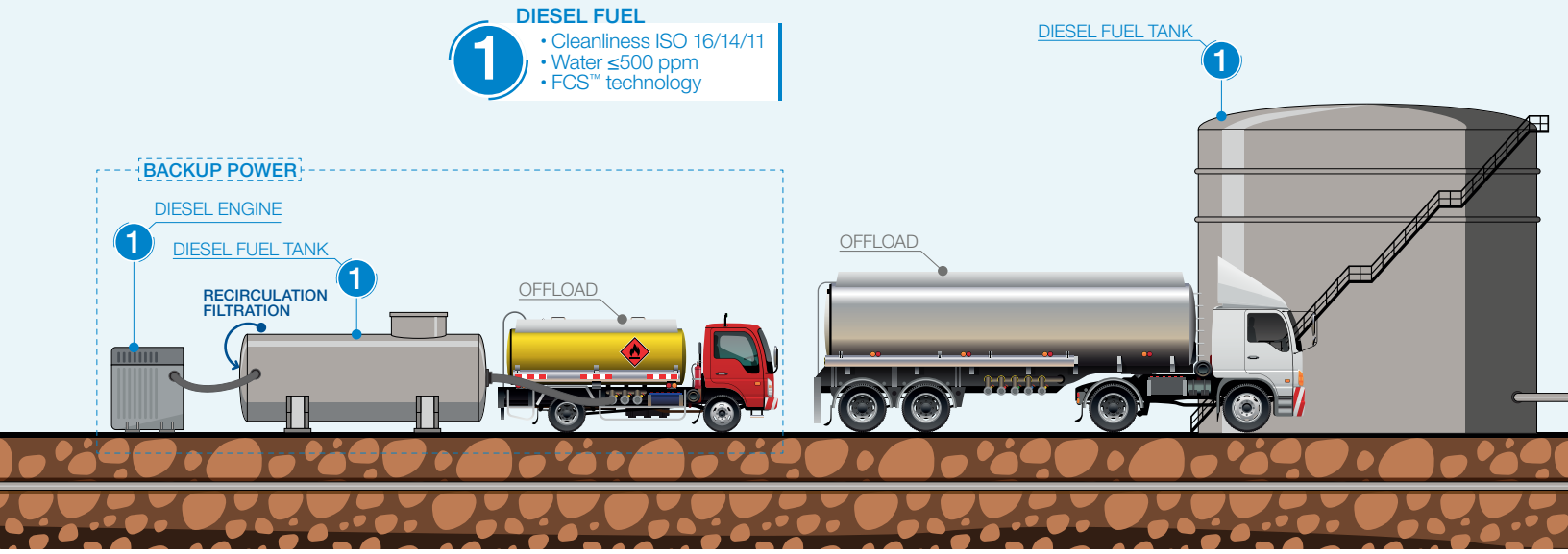
Combustion turbines

Power plants using combustion turbines face unique challenges for oil and fluid contamination. Beyond the traditional turbine oil contaminates of dirt and water, sub-micron particles (varnish) can adversely affect the operation of servo valves and other internal metal components causing unscheduled downtime.

Kaydon Filtration technologies can remove these varnish components suspended in your lubrication oils and over time can clean those lubricated surfaces experiencing varnish build up.



We specialize in keeping oils and fluids in your combustion turbine plant clean and free from varnish and other harmful contaminates.

Our solutions support oil and fluid conditioning in combustion turbine units from 1 to 500 MW.

Kaydon Filtration specializes in ensuring the reliability and longevity of combustion turbine systems by minimizing failure rates, extending time between repairs, and facilitating successful lube oil system inspections.
With extensive experience in this field, our technologies are designed to keep turbine systems operating reliably and free from damaging lubrication contaminants.

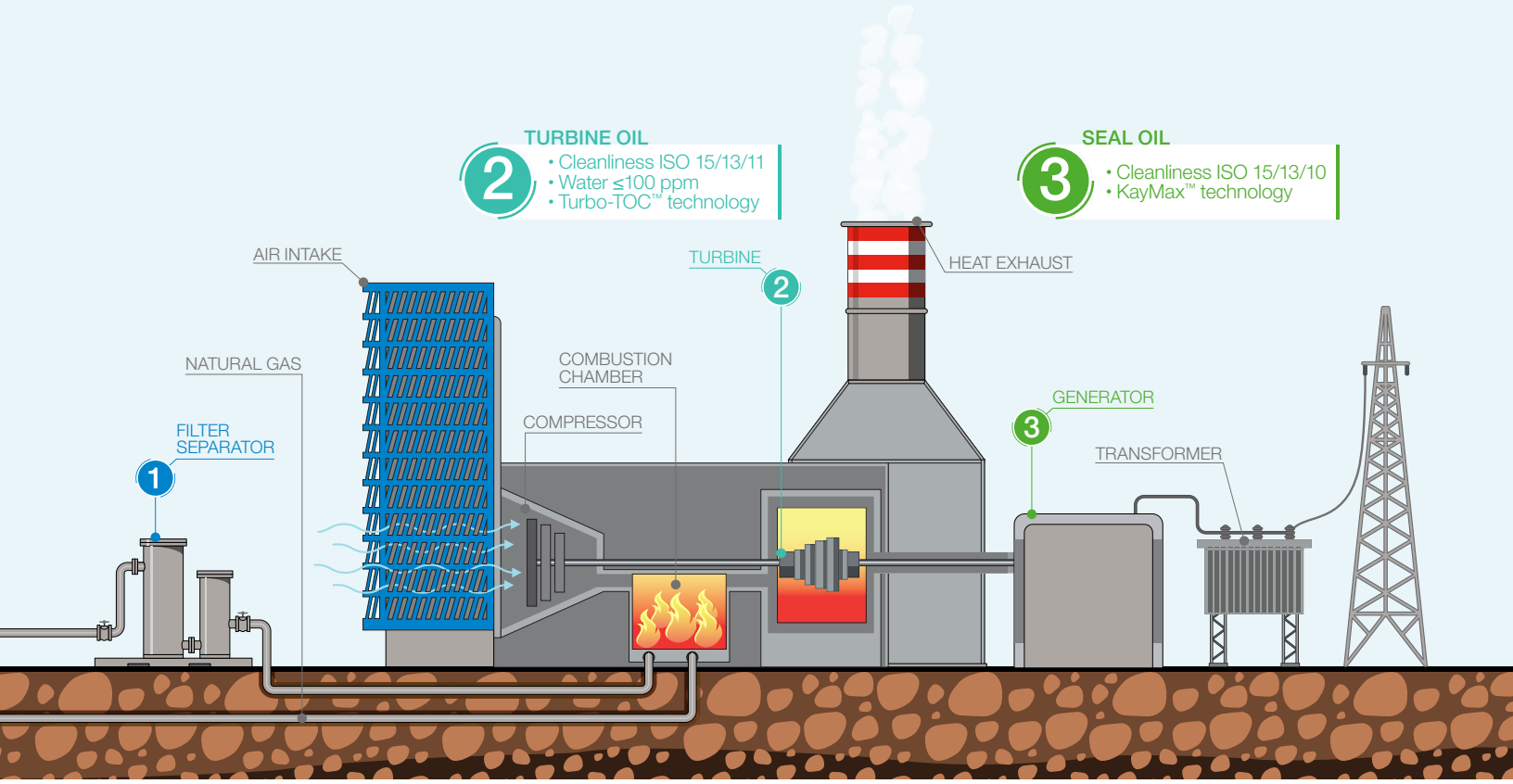
Our innovative technologies include:

- Kaymax™ Technology: Ensures maximum cleanliness levels in lubricating fluids
- Turbo-TOC® Technology: Facilitates single-pass, high-flow water removal in turbine oil
- FCS™ Technology: Conditions diesel fuels during off-load, storage, and fueling

Our solutions achieve cleanliness levels to ISO 15/13/11 or better for turbine oil and maintain water contaminants to 100 PPM or less.

Specifically geared to protect main turbine systems, servo valves, heat exchangers, and bearing surfaces, our technologies optimize turbine oil conditions.

We also offer fluid conditioning systems for other utility fluids, such as seal oil, transformer oil, hydraulic oil, and gear oil. Maintaining these fluids in peak condition increases their useful life and reduces unscheduled maintenance and premature equipment failure.

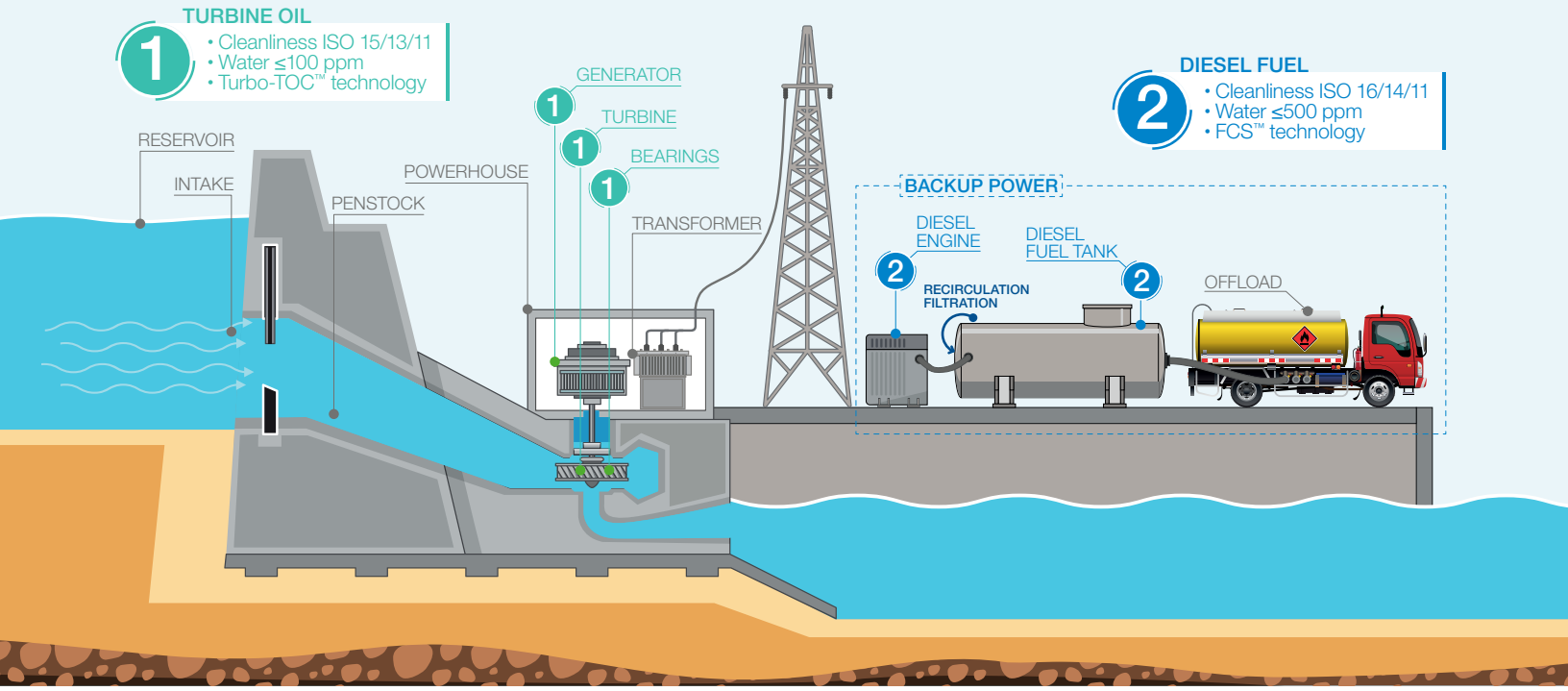


Additionally, we provide conditioning technologies to protect diesel fuel during offload, storage, and distribution. Diesel engines with high-pressure injection systems require clean, dry fuel to prevent unscheduled maintenance, power loss, decreased fuel efficiency, and component failure.

Kaydon Filtration has the experience and technology to keep critical diesel-powered equipment operational, ensuring minimal downtime and optimal performance

Hydraulic turbines

Failures of the wicket gate mechanism, turbine governor, and turbine bearings are among the top 25 causes of forced outages within a hydroelectric facility. Through improved fluid management and conditioning these failures can be significantly reduced.



Clean, dry oils and lubricants are essential for turbine performance and equipment longevity in hydroelectric power plants.

Our solutions for these facilites ranging from 1 to over 1000 MW.

Our patented technologies effectively:

- EXTEND the service life of oils
- PROTECT expensive equipment
- REDUCE premature failures

The elimination of water, particulates, varnish, and other harmful contaminants from lubricating oils and fluids is Kaydon Filtration's expertise.

Our solutions safeguard various components in hydroelectric power plants, including turbine governors, valves, bearings and pumps.

Advanced Technologies for Hydroelectric Power Plants:

- Turbo-TOC® Technology: Provides single-pass, high-flow water removal in turbine oil.
- Kaymax™ Technology: Ensures maximum cleanliness levels in lubricating fluids.
- FCS™ Technology: Conditions diesel fuels during off-load, storage, and fueling.

Diesel Engine Protection:

Diesel engines used in modern heavy equipment, backup power generators, and other diesel-powered operations require clean, dry fuel more than ever.

Kaydon Filtration has the solutions to prevent issues like power loss and decreased efficiency in diesel-powered equipment, ensuring uninterrupted operation.

Kaydon Filtration Technology

TURBO-TOC® TECHNOLOGY

Kaydon Filtration patented Turbo-TOC® coalescing technology keeps turbine rotating components protected by providing quick and efficient water removal from turbine oil.

Studies have shown that bearing life can be reduced by 50% with water contamination of 200 ppm when compared oils conditioned to 100 ppm[1].

As a result, our Turbo-TOC® technology was developed to remove water to less than 100 ppm in a single pass[2] at process rates exceeding 100 GPM (380 LPM).

COALESCER/SEPARATOR DESIGN & TECHNOLOGY

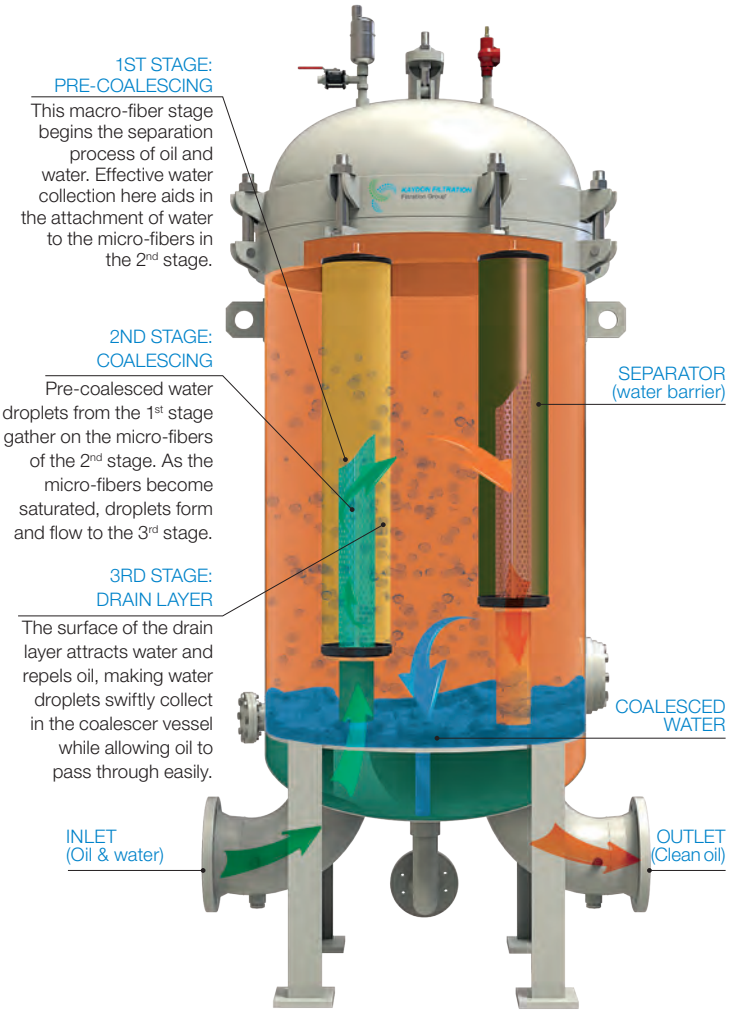
The combination of the coalescer and separator stages delivers water removal in oil to less than 100 ppm and polishing to <5 microns.

Coalescer Element

The core component of the technology is the patented coalescer element. The coalescer element utilizes three stages to coalesce (grow together) droplets of water from turbine oil.

Separator Element

The final component of the technology is the separator stage. The separator provides a hydrophobic screen that acts as a water barrier to prevent smaller water droplets from flowing downstream. In addition, the separator element includes a micro-fiber component that acts as a final polishing filtration stage for particulates. This polishing affect eliminates the need for the expensive final filter stage found in traditional oil conditioning systems.



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KAYMAX™ TECHNOLOGY

Kaymax™ provides exceptional particulate filtration for oils, fluids, and fuels. It combines meticulous filter media selection and filter element construction methods to produce proven and repeatable filtration performance. It utilizes specially formulated multi-layered, micro-fiberglass fibers to deliver exceptional particle retention and high particle holding capacity.

Kaymax™ construction maintains pleat integrity under high flow and viscosity conditions, eliminating pleat bunching or collapse during high flow, high dirt loading, or cold start-ups. Materials are selected for fluid compatibility and corrosion resistance. Performance meets or exceeds ISO 15/13/11 cleanliness level.

Turbine Oil

Kaymax™ technology plays a vital role in Turbo-TOC® systems, utilized for pre-filtration and polishing filtration. It effectively captures larger particles during pre-filtration, extending the coalescer element's lifespan. Furthermore, polishing filtration ensures turbine oil cleanliness levels below ISO 15/13/11 standards.

Gear Oil

Kaymax™ technology effectively removes particulate contamination from gear oil, safeguarding gearbox operation. Gear oil's susceptibility to contamination, causing abrasive action and mechanical wear on bearings and surfaces, is mitigated. Using Kaymax™ technology equipment reduces failures, prevents downtime, and lowers maintenance costs.

Seal Oil

Kaymax™ technology protects seal oil from particulate contamination, preventing abrasive wear that could lead to shaft repair or seal ring replacement. Contaminants causing gland seal wear may result in shaft sealing failure and hydrogen leakage. By employing Kaymax™ technology equipment, seal oil system failure is prevented, preserving shaft integrity and preventing hydrogen leakage.

FCS™ TECHNOLOGY

Diesel fuel undergoes contamination from water and particulates during transportation and storage from the refinery.
This contamination worsens with each transfer and storage, leading to fuel deterioration. It's particularly problematic for occasional use fuel tanks like emergency power generators, where condensation, microbiological growth, and oxidation occur.
Eventually, this contamination reaches the fuel tank of vehicles or diesel-powered equipment, causing filter overload, power loss, decreased efficiency, and equipment failure.

FCS™ technology offers an effective and economical solution by removing water to levels acceptable by diesel engine manufacturers. It operates through four stages: pre-conditioning, coalescing, drain layer, and barrier layer, reducing water content to less than 500 ppm with a cleanliness code better than 16/14/11.

This technology is available in two system configurations: in-line for single-pass filtration during fuel distribution or transfer, and recirculation for fuel storage tanks.

Applications:

- Tank storage
- Transfer and distribution
- Equipment refueling
- Backup power
- Combustion turbines

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Services

At Kaydon Filtration, our reputation is built on decades of dedication to outstanding service and efficient filtration systems. We prioritize our customers' needs above all else, ensuring that our services remain at the forefront of everything we do. This commitment enables us to produce industry-leading products that meet full international standards.

ENGINEERED SOLUTIONS

Application consultation

Standard and/or custom designs based on customer input

Project management

In-house product manufacturing

CONSULTING & PROJECT MANAGEMENT

Project Full Assessment: initiation, planning, execution and closure

Product evaluation and feasibility analysis

Product testing and inspection

Post-review

FIELD ENGINEERING ASSISTANCE & TECHNICAL SUPPORT

Technical assistance for system placement, piping, and installation

On-site maintenance support

Troubleshooting advice

Operators training

[1] The Effect of Water in Lubricating Oil on Bearing Fatigue Life, Richard E. Cantley The Timken Company, Asle Transactions, Volume 20, 3 244-248
[2] Nominal results with influent at <=5000 ppm and <=18/16/13 cleanliness. Actual results may vary.
[3] The Benefits of Diesel Fuel Filtration ©Kaydon Filtration 2008
[4] Statistical information from the North American Reliability Council Kaydon Filtration specifications are subject to change without notice

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