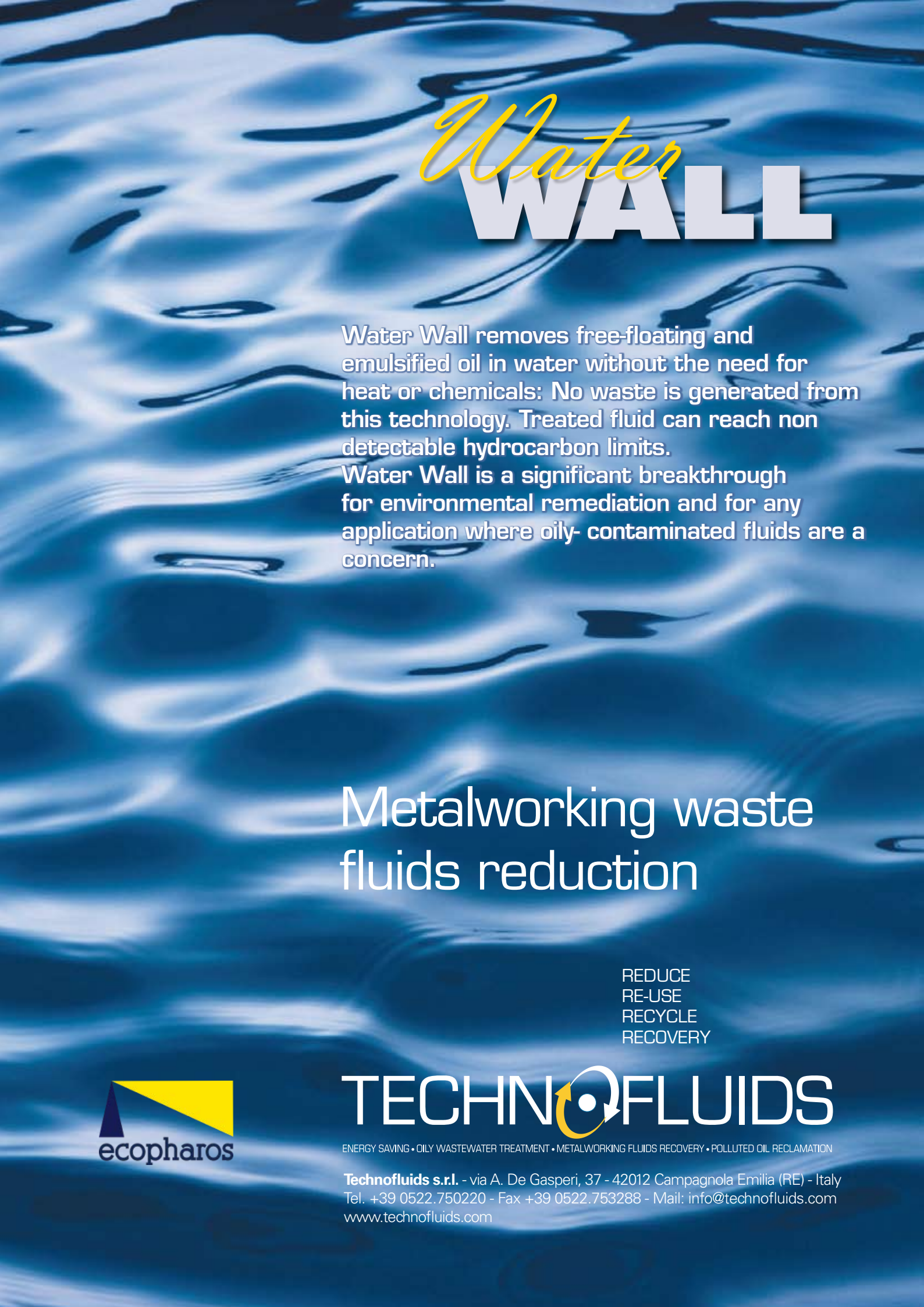

Water
WALL
Water Wall removes free-floating and emulsified oil in water without the need for heat or chemicals: No waste is generated from this technology. Treated fluid can reach non detectable hydrocarbon limits.
Water Wall is a significant breakthrough for environmental remediation and for any application where oily- contaminated fluids are a concern.
Metalworking waste fluids reduction
REDUCE
RE-USE
RECYCLE
RECOVERY
ecopharos
TECHNOFLUIDS
ENERGY SAVING • OILY WASTEWATER TREATMENT • METALWORKING FLUIDS RECOVERY • POLLUTED OIL RECLAMATION
Technofluids s.r.l. - via A. De Gasperi, 37 - 42012 Campagnola Emilia (RE) - Italy
Tel. +39 0522.750220 - Fax +39 0522.753288 - Mail: info@technofluids.com
www.technofluids.com

TECHNOFLUIDS

ENERGY SAVING • OILY WASTEWATER TREATMENT • METALWORKING FLUIDS RECOVERY • POLLUTED OIL RECLAMATION

ecopharos

About TECHNOFLUIDS

TECHNOFLUIDS owns the intellectual property of the water walltechnology, this patent is important because embody novel properties and affinities previously not available in OIL/WATER SEPARATION thereby allowing optimization of existing systems and performances in areas previously inaccessible to incumbent O/W separation technology. Water Wall is dedicated to facilitating the creation of a totally green and closed loop manufacturing and operations by enabling efficient removal of hydrocarbons from waters.
In the broad applicability and need for unique Water Wall properties and performance has resulted in Technofluids Corporation being involved at the highest level of product and closed loop operations development across a broad spectrum of high-tech and manufacturing industries.

Water Wall process description

The process underlying the Water Wall system is based on the observation that an additional interface tension between oil droplets and water arise from the mutual interaction between oil,water and the water wall interface support. This additional interfacial tension leads to the rejection of oil droplets on the top of the liquid-liquid interface support (Water Wall) eventually ending into a surface coalescence of oil drops. Rejection take place only when the relative velocity between oil droplets and the two-phase filtering layer remain below certain threshold which is directly dependent on the flow-rate, on the droplet size distribution and the physical properties of oil and water.
An additional deep bed filtration effect on sub-micrometric droplets which may be able to pass through the interfacial tension barrier has been observed. An average purity of nearly 99,9% can be achieved. However, Technofluids, if required, is in position to install an additional "polishing" treatment that can allow to reach a residual oil content in the separated water of less than 1 ppm. And…. the water wall unit uses no filter cartridges or other disposables to increase costs and cause disposal problems.
A threshold flow rate is therefore determined and verified at design level for the required separation efficiency, given the size distribution and the physical characteristics of the oil dispersion to be treated. In any case, as the pressure drop introduced by the liquid-liquid interface support is minimal (les than 0.01 bar), separation can be usually performed at high flow rates: in some applications, flow rates up to 40 m^3/h per square meter of two-phase filtering layer can be adopted.

WATER WALL typical applications

Since Water Wall process package strongly repels free oil as well as suspended solids, it offers advantages over currently used technologies for a wide variety of applications, such as.

Mechanical Industry

- Metal working: water soluble, semi synthetic, synthetic and bio stable fluids used in grinding, turning, and general machining operations;
- Metal finishing: water soluble acid, alkaline and neutral cleaners containing free and mechanically dispersed tramp oils;
- Screw machines: tramp oil from water soluble fluids used in screw machine reservoirs;

Marine Applications

- Bilge water separation;
- Tank Ballast water de-oiling,
- Sea water de-oiling;
- Desalination plant protection.

OIL & GAS

- Produced water – Reinjection and Disposal;
- Completion fluids recovery;
- Refinery run-off water;
- Seawater injection.

Food Chemical & Pharmaceutical Industries

- Process water recovery;
- wastewater treatment.

Hazardous metalworking fluids reduction

Fluid waste is hazardous when it contains substances or has properties that might make it harmful to human health or to the environment. The term "hazardous" does not always mean that waste is necessarily toxic, although some can be. Major hazardous fluid waste types include wastes such as chemically contaminated fluids, oils and oily wastes and organic chemical process fluid wastes.
The key options for hazardous oily waste fluids disposal are high temperature incineration and use as a fuel in a cement kiln. Raising costs and recent reduction in sites accepting hazardous waste have highlighted the need for a shift towards more sustainable solutions that reduce reliance on incineration. Minimizing the amount of waste produced should be regarded as a business imperative. When waste production is unavoidable however, treatment to recycle/recover hazardous fluid wastes into useful process fluid should be considered. The costs and benefits of waste treatment are becoming more favourable as incineration prices increase and available capacity reduces. Disposal should always be the last option.
Council Directive 91/689/EC on hazardous waste (amended by 94/31/EC) seeks to achieve integrated national waste policies in all member states that improve the control, handling, recovery, re-use and disposal of hazardous wastes and ensure that such activities are undertaken in a manner that does not pose risks to the environment.
The European Commission proposed on 21° December 2005 a new strategy to ensure the prevention and recycling of waste. The main aim of the strategy is to primarily avoid the generation of waste and secondly where this is not possible, use the waste as resource.
Rapid deterioration of metalworking fluids during prolonged use requires machines to be drained down of fluids, cleaned and refilled in order to maintain consistent product quality. Installation of TECHNOFLUIDS metalworking fluids recycling unit reduce concentrate consumption by more than 75% and

eliminate lost-time in machine "downtime" and labour costs for maintenance, increasing productivity.

Metalworking activities hazardous input /output

ACTIVITIES

Cutting, forming, pressing and machining of metallic components, assembly and finishing.

HAZARDOUS INPUTS

Cutting oils and lubricants, polishes, solvents oils (hydraulic and mineral/synthetic)

HAZARDOUS OUTPUTS

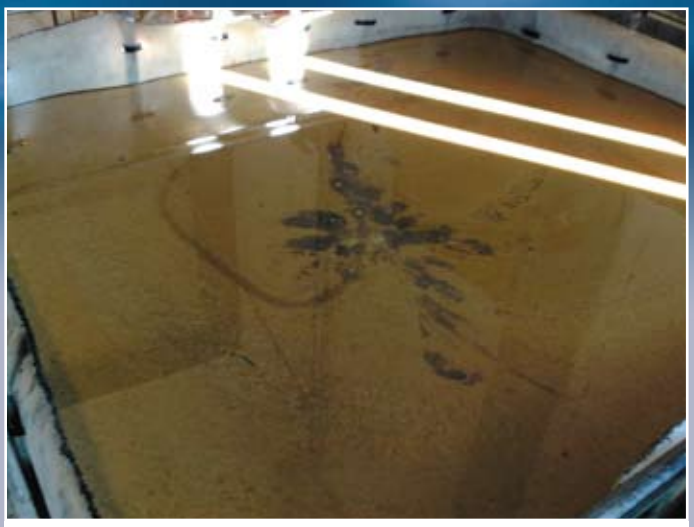
Contaminated cutting oils, metal cutting swarfs and contaminated metal wastes.
Spent chemicals and acids, used oils and polishing agents, spent solvents and waste paint/powders.

Technofluids' integrated custom engineered metal working fluids recovery system

An extremely cost-effective coolants and oily wastewater recycling system

Waste metal working fluids are very common throughout world-wide industry.
The disposal of these fluids can contribute to water pollution and to solid, and sometimes hazardous, waste streams.
Pollution prevention for metal working fluids or coolants should be practiced whenever possible to reduce the amount of coolants that are disposed prematurely.

The metal working process creates much heat and friction. If the heat and friction are not reduced, the tools used in the process are quickly damaged or destroyed. Also the quality of the products made is diminished because of inefficient tools and damage to the product while it is being manufactured. Coolants reduce friction at the tool/substrate interface and transfer heat away from the tools and the material being processed, reducing the time to process the metal, increasing the quality of the workmanship, and increasing tool life. The ability to transfer the heat away from the metal working process is why the metal working fluids are often called coolants.
There are several methods for removing residual oil from metal working fluids or coolants. For example several filtration techniques are known, screen type filters, and the like, for removing the suspended oil particle contaminants, several coalescing techniques are also known in which a porous media is used to enhance oil droplets growth and gravity separation. However these filtration and coalescing methods suffer from several disadvantages including the requirement of back-washing and/or frequent removal and replacement or cleaning of coalescing or filtration media which lead to down times and high maintenance costs that are also associated with the use of centrifuges.



Before treatment

During treatment

After treatment

TECHNOFLUIDS' coolant recycling system
TECHNOFLUIDS' system continuously remove suspended contaminants that do not respond favorably to conventional separation techniques.

BENEFITS INCLUDE:

- Automated operation: reduce maintenance, monitors system performances automatically;
- Portable system: able to be moved from one location to another in order to recondition multiple tanks/batches;
- Operational cost savings: reduce waste disposal costs up to 95% and new fluid purchases by up to 90%;
- Quality and productivity: cut machine down time for sump clean-out and improve tool efficiency and product quality.

A primary object of the present Technofluids' process is to provide a coolant recycling system that will overcome the shortcomings of the prior art devices;

A second object is to provide a coolant recycling system for efficiently recycling contaminated machine tool coolant thereby extending the useful life of the coolant;

Another object is to provide a coolant recycling system that removes solids, dissolved solids, fines, tramp oil, bacteria, mold , yeast and fungus from machine tool coolant;

A further object is; to provide a coolant recycling system that reduces the need to replace conventional filters

Another object is to provide a coolant recycling system that is mutipurpose which may be utilized within a variety of situations and existing coolant recycling, handling and managing systems,

Finally, a further object is to provide a coolant recycling system that is easy and simple to utilize.

Technofluids, in its process, combine a novel application of gas flotation technique with its proprietary "water wall" separation technology. This system is a once through system i.e. the contaminated fluids are treated only once to completely remove tramp oils, suspended contaminants and bacteria. Bacteria and other microbial organisms thrive in the environment created by the impurities in the coolant. They feed up mineral oils, fatty acids, emulsifiers, corrosion inhibitors, other additives and waxes in oil based and synthetic coolants. The corrosion inhibitors of synthetic coolants, for example, are consumed. Anaerobic bacteria grow in environments lacking oxygen. They feed upon the coolant and produce noxious by products such as hydrogen sulfide, this commonly referred as Monday morning odor.

Microbial action directly affects the coolant resulting on the splitting of emulsions, decreased pH, increased corrosion, degradation of the ingredients in the coolant and less lubricating ability within the coolant itself: Odor may develop including hydrogen sulfide as a product of the bacteria's metabolisms.
Bacteria may also expose workers to pathogens and contribute to respiratory irritation and skin irritation, like dermatitis, work-piece quality decreases resulting in surface blemishes, decreased tool life, and increased down time to treat for bacteria and repair the equipment. The bacteria may also cause increased foaming and oil separation in the system and cause clogged lines, filters, and valves.
In Technofluids' process, bacteria are prevented to proliferate because an ozone generator applies a specific volume of ozone to the coolant, during the mixing into the liquid mixing zone, which kills mold, yeast, fungus, and bacteria.
Technofluids' recovery system includes a first tank where the gas stream is passed into the liquid mixing zone, at a predetermined flow velocity and intimately mixed with the liquid stream to disperse or dissolve the gas stream into the coolant altering the specific gravity differential between aqueous liquid and the suspended contaminants. This novel technology comprises forming a flowing stream of aqueous liquid containing the suspended contaminants and passing the flowing stream into a gas - liquid mixing zone under pressure at a desired flow velocity. A stream of gas is also passed into the gas-liquid mixing zone to intimately disperse and dissolve the gas stream into the liquid phase and suspended contaminants phase to form a multiphase gas-contaminants-liquid stream. The flow velocity of the multiphase stream increased along with a substantially simultaneous decrease in pressure to finely disperse the gas throughout the liquid and suspended contaminants phase of the stream. The flow velocity is then decreased with substantially simultaneous increase of pressure to further finely disperse and intimately dissolve the gas stream throughout the water phase and contaminants phase of the stream. The abrupt alternate fluctuation of the stream flow velocity and pressure results in highly homogeneous multiphase mixture of the liquid, contaminants and gas. The pressurized multiphase liquid-contaminants-gas mixture is next passed into a zone having an increased volume flow area which is maintained at a reduced pressure relative to the stream to cause the dissolved gas to break out of solution and along with the dispersed gas form finely dispersed gravity-density reducing microscopic bubbles that attach to themselves and to the suspended contaminants to increase specific gravity differential between the contaminants and liquid. The contaminants are thus caused to separate and float with the minute gas bubbles to the surface of the liquid, while the water phase is passing through the "water wall " separator for complete and final oil separation.
It is important to notice that just because the final oil separation is not due to some kind of mechanical effect, but solely to natural strong molecular and/or electrostatic attraction/repulsion forces, the dispersed oily phase is inhibited to pass through the "water wall barrier" remaining above the water film until macroscopic droplets are being formed by collision with some other arriving oil droplets, then buoyancy forces bring them towards the upper surface of the separator where they are dispersed into the existing oil layer that is continuously skimmed out recovering the oil phase, while, in the cleaned coolant tank the fresh coolant is mixed with the cleaned coolant in order to "recharge" the coolant prior to dispensing back to the machine tool.