An Efficient Approach to Metalworking Fluids Disposal

Using wastewater treatment for cost effective, sustainable metalworking.

The metal working sector is currently valued at around £100 billion in the UK, split across approximately 80,000 metal machining companies and providing almost 1.5 million jobs. The majority of these businesses rely on metalworking fluids (MWFs) in the machining process and disposing of the resulting wastewater can be problematic. Not only must companies dispose of waste responsibly but there are many factors to consider including the type and volume of waste, different methods of treatment or disposal, the cost of those methods and the environmental impact. This myriad of considerations often means a solution can be difficult to determine and a bespoke approach is required.

Alongside this, increasingly stringent regulations governing wastewater discharge and greater quantities of wastewater being produced means there is a growing need for more efficient and cost-effective methods to remove metals and other contamination from process wastewater.

Legislation such as the Integrated Pollution Prevention and Control Directive (IPPC) has also sharpened the focus for companies to dispose of their waste in a more environmentally-aware way. As part of the guidelines, it is now a requirement to take all measures necessary to ensure the safe collection and disposal of waste oils. As a result, businesses need to treat spent waste MWF before the water component can be discharged to sewers.

Metalworking fluids and waste treatment options

MWFs are a complex mixture of oils, detergents, surfactants, biocides and anti-corrosion agents used for a variety of applications. They can be used as coolants, lubricants and swarf or metal chip removers during machining. They are usually supplied as concentrates and diluted with water before use to produce an emulsion of (generally) 2-10 per cent by volume oil in water. After a period of time, the fluid needs to be replaced and disposed, mainly for contamination reasons or for something as

simple as the fluid has become to oily or smelly.

One of the most common methods for the disposal of MWF is to use an external waste management company to dispose of the contaminated wastewater rather than treating it on-site. Whilst discharging the responsibility to waste disposal specialists can be the simplest method, it can be prohibitively expensive, with haulage costs rising. It also means water cannot be recycled, which is one of the biggest disadvantages from an environmental and financial standpoint. The main factors to consider with this option are the type of waste and concentration, the volume of waste and the distance to the disposal site. If limited amounts of waste are produced (less than 10,000 litres p.a.) and the facility is close to a disposal site, this can be an effective option. However on the most part and especially for larger volumes, there are now more efficient solutions available, both from a financial and environmental point of view.

For larger volumes, investment in a form of water treatment equipment will result in a waste stream that is less hazardous and, therefore, cheaper to dispose of or is easier to treat downstream.

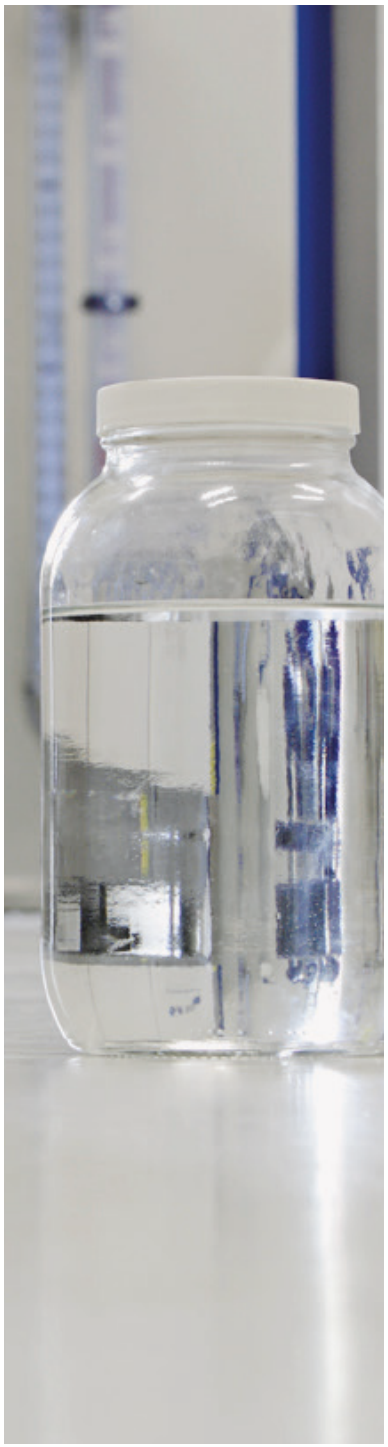
Investment in water treatment equipment, while expensive in the short-term, can offer significant payback opportunities in the long-term, as well as being beneficial to a business' environmental policy by reducing the environmental impact of the metal finishing processes.

There are three categories of water treatment:

• **Primary Treatment** - disposal of two waste streams, categorised by hazard level

• **Secondary Treatment** – disposal of water and oil separately

• **Tertiary Treatment** – further improvements to the quality of the waste water stream



Primary treatment typically is not a suitable option for many metalworking companies as it consists of holding waste in a quiescent basin to allow oil, grease and lighter solids to float to the surface and heavy solids can settle on the bottom. These materials can then be removed but the remaining liquid may require a secondary treatment before discharge.

Secondary treatment methods involve the separation of the emulsified oil from the spent MWFs. This has the effect of substantially reducing the Chemical Oxygen Demand (COD) and sometimes the Biochemical Oxygen Demand (BOD) in the fluid, which are contamination standards and measures. If these elements are sufficiently low following treatment, then it may be possible to dispose of water as waste water with correspondingly low charges. The final treatment stage is tertiary treatment to further improve the effluent quality and there are many different methods including filtration and disinfection.

The latest technology uses evaporation (vacuum distillation) for the treatment separation of MWF's from water. Installing a specialist wastewater evaporation system can virtually eliminate the need for regular wastewater collection and disposal by separating the MWF waste to leave only a very small volume for disposal, which significantly reduces carriage costs. The leftover water can then be either disposed of via the sewer network or recycled internally.

The main advantages of this method are that it is effective for all types of MWF, it is unaffected by fluid variations and contaminates and it produces quick results, meaning payback on investment in equipment takes typically less than two years.

It works by heating spent MWF in a specially-designed vessel to drive off water, typically leaving around five per cent volume of hazardous waste. Additional tertiary water treatment techniques for the end stream water following secondary treatment can also be applied to reduce the COD level further. This allows recovered

Get a comprehensive wastewater treatment solution with NHE:

- Water Filtration
- Metal Recovery
- Rinse Water Recovery
- UV Disinfection
- Vacuum Distillation
- Laboratory Testing
- Chemicals and membrane cleaners
- Servicing and Maintenance

water to be reused on site within a manufacturing process or for low grade use such as floor washing or toilet flushing.

Alternative techniques to evaporation include reverse osmosis, nanofiltration and ion exchange, however these typically add cost to the treatment of MWF's that would render them economical or viable in only very particular circumstances.

Payback

Recycling wastewater can have a significant environmental and financial impact. As well as ensuring water entering the system is not hazardous and in a lot of cases can be recycled by the business itself, the return on investment can mean this can be a viable and beneficial MWF treatment option for many companies. Disposal costs can be drastically reduced, up to a factor of 100 and the average payback period following investment in wastewater evaporator equipment is two years.

The product can also comply with the Enhanced Capital Allowance (ECA) Scheme in certain circumstances. The ECA scheme means that a business can invest in energy-saving plant or machinery that might otherwise be too expensive. The first year allowances let businesses set 100 per cent of the cost of the assets against taxable profits in a single tax year. This means the company can write off the cost of the new plant or machinery against the business's taxable profits in the financial year the purchase was made. An ECA is claimed through a business's income or corporation tax return in the same way as any other capital allowance. HM Revenue and Customs is responsible for the tax-related aspects of the ECA scheme*.

The Vacudest wastewater evaporator system

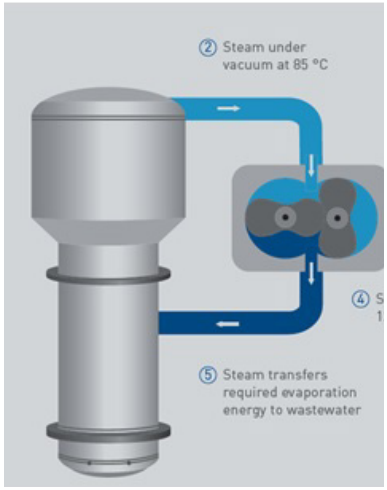
As part of NHE (Norman Hay Engineering), Lancy Technology provides a single resource for process water recycling requirements, including effluent treatment, wastewater processing

and metal and chemical recovery. Lancy Technology is the UK and Ireland partner of H20, the company behind the innovative Vacudest wastewater evaporation system. The Vacudest system uses no expensive chemical for cleaning wastewater and has much lower energy consumption when compared to other types of product on the market – up to 95 per cent less when compared to atmospheric distillation and five times less than heat pump distillation. Typically this equates to around a £15/m^3 cost saving compared with alternative treatment methods. Average annual savings can equal more than £70,000, with typical disposal costs reducing from more than £100,000 to just over £8,000**.

Each unit is based on a modular design which enables it to be tailored to meet precise installation requirements. Additional factors such as a maintenance-friendly design and simple control systems, including internet connection for remote diagnostic purposes, are other properties which help to produce the highest quality distillate from each Vacudest facility. The process is also clean and effluent free.

The Vacudest system forms part of the Lancy Technology solution to treat, recover and reuse waste water within the user's own premises, thereby removing the high cost and inconvenience of off-site disposal. Additionally, operational cost savings are delivered by helping customers to guarantee that discharge consent criteria are met, effluent streams are minimised and valuable materials reclaimed.

Cost Savings Example



Cost type	VACUDEST evaporator	Disposal
Interest for raising of capital	£4,240 pa	
Operating cost (Electricity, consumables, man-power, spares, wear and tear parts)	£25,250 pa	
Fresh water	£420 pa	£6,350 pa
Disposal of evaporation residue/spent coolant	£8,500 pa	£106,000 pa
Total	**£41,410 pa**	**£112,350 pa**
Annual savings	**70,940 pa**	
Return on Investment	**1.9 years**	

Contact us now to discuss your wastewater treatment requirements

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