

How Sustainability Improves Worker Safety

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Better, sustainable solvents help improve worker safety.



Vapor degreasing using modern fluids is a safe alternative for cleaning.



Many companies are switching to sustainable precision cleaners. For manufacturing businesses, sustainability means developing both long-term and short-term production strategies that balance profits with environmental protection and worker safety. Businesses must decrease emissions, improve energy efficiency, protect natural resources, reduce waste and protect the health and well-being of their workers. The sustainability objective is to meet today's short-term goal of commercial success without overlooking the long-term impact operations might have on workers and the planet.

Meeting Sustainability Standards

In many instances, governments set standards, rules and regulations to help manufacturers reach their sustainability goal of protecting both the planet and their workers. An example is the Montreal Protocol agreement, an international, collaborative treaty devised to protect the ozone layer. The purpose of treaty, adopted in 1989, is to phase out the production and use of ODS (Ozone Depleting Substances). It identifies a list of ODS that threaten human health by lessening the earth's protective stratospheric ozone layer. Some ODS are strictly controlled for their use. Others are targeted for phase-down and others were completely phased out.

The Montreal Protocol made a lasting impact in many industries, but particularly within the metalworking industries where solvents clean parts. For example, in the 1990s many metal working shops used chlorofluorocarbon (CFC) and hydrofluorocarbon (HCFC)-based solvents inside vapor degreasing machines to clean parts. These included CFC-113, 1,1,1-trichloroethane, HCFC-141b and HCFC-225. They effectively removed grease, oils and other industrial soils from parts. However, they also had very high ODP (Ozone Depleting Potential) ratings. By the mid-1990's their use was highly regulated and ultimately, they were banned for metal cleaning altogether.

Finding Alternate Solutions

At that point, many manufacturers switched to aqueous, or water-based cleaning methods. However, aqueous cleaning scores low for environmental sustainability. It uses water, a finite and in many areas, non-renewable resource, to clean. It also requires large amounts of energy, either electricity or natural gas, to remove impurities, balance pH and then heat the water for cleaning. Plus, it produces wastewater that requires treatment to remove soils and detergents before being reintroduced to the environment.

In other instances, some industries moved to high-solvency chlorinated and brominated solvents such as TCE (Trichlorethylene) and nPB (n-Propyl Bromide). But those alternatives are now facing scrutiny due to their air quality concerns. In addition, they are suspected toxins for plants, fish and animals.

These concerns resulted in the establishment of REACH (Registration, Evaluation, Authorization and Restriction of Chemicals) legislation. REACH is a European Union regulation, established in 2006. It controls the production, import, and use of chemical substances within the European Union. REACH regulation Article 59(10) discourages both TCE and nPB use. Currently, TCE has a carcinogen classification. It has not been available for vapor degreaser cleaning in Europe, without special authorisation and stringent controls on

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factory emissions, since 2016. And under EU REACH regulations, nPB needs special permission for use in Europe after July 2020.

Air Quality Impacts Everyone

As a result, safer solvents and sustainable precision cleaners are now available. Many of these modern metal cleaning fluids are HFO (hydrofluoroolefin)-based. This gives them a combination of a good environmental sustainability along with excellent worker safety profiles.

For example, the modern cleaners have a low GWP (Global Warming Potential). The GWP of a cleaning fluid is a measurement of the atmospheric lifetime of the fluid or its gaseous vapors. The longer a trapped gas absorbs infrared radiation in the atmosphere, the more it may contribute to global warming and climate change. The new cleaning fluids typically have a low GWP of 3 or less. By comparison, the old HCFC solvents had average GWP ratings in the thousands. Plus, the ODP of modern cleaning fluids is zero, meeting all EU air quality emissions regulations.

Sustainable and Worker Safe

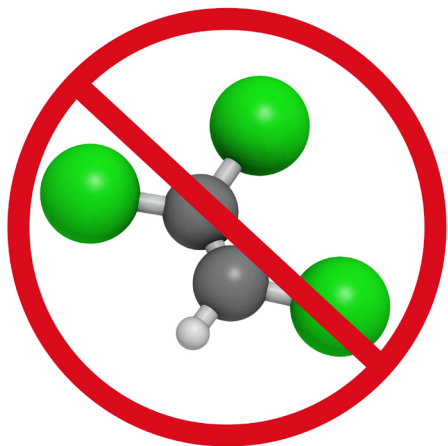
In addition to preserving air quality by producing fewer emissions, the modern sustainable cleaners offer worker safety benefits. First, unlike legacy solvents, modern cleaning fluids are nonflammable. This is an important benefit to plant environmental health and safety managers since it helps protect their workers from burn injuries if an accident, such as a sudden arc flash, occurs.

Second, modern sustainable cleaning fluids have very high marks for worker exposure limits. The PEL (Permissible Exposure Limit) or designated time limit that workers are exposed to a chemical is much higher for sustainable cleaning fluids. Permissible exposure levels for sustainable fluids are about 200-250 ppm. Compared with TCE (100-ppm PEL) or nPB (just 0.1 ppm), the sustainable cleaning fluids are significantly better for the safety of exposed workers.

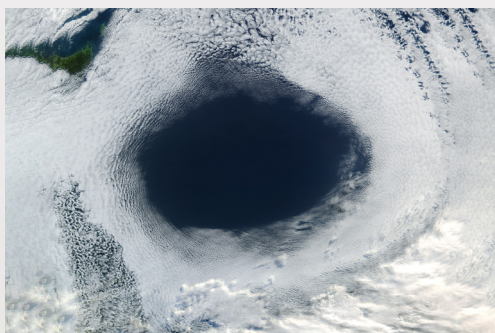
The Next Steps for Sustainability

Leading manufacturing companies are setting ambitious goals to produce their products more sustainably. This means they are developing ways to meet company goals of customer satisfaction and economic success in the short-term. But also respecting environmental limits and ensuring the long-term health and safety of the planet and their workers.

For companies looking to change to sustainable precision cleaners, it is essential to work with a partner that has sustainable cleaning fluid and vapor degreasing expertise. Based on specific parts make-up and the contamination encountered, they can recommend the sustainable fluids and cleaning methods that will work best.



TCE use is under tight scrutiny from regulatory agencies.



CFC and HCFC-based cleaning solvents deplete the Earth's ozone layer.



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About the Author:

Venesia Hurtubise is a Technical Chemist at MicroCare which offers precision cleaning solutions. She has been in the industry more than 6 years and holds a MS in Green Chemistry from Imperial College. Hurtubise researches, develops and tests cleaning-related products that are used on a daily basis in precision cleaning and medical applications.

For more information, visit www.microcare.com.



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