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Canadian Company Embraces Environmental Changes Required for Future Use of Solvent Degreasing

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History

Donmac Precision Machining is a growing organization providing various metal components "made to order" for the Aerospace, Medical, and Defense customers around the world. They are a well-respected member of the Precision Machined Products Association – an international trade association.

Most of the manufactured parts are used in critical applications where failure is not an option. These components must perform reliably 100% of the time. Donmac has built its reputation on its history of precision quality and ability to deliver what is promised.

As a provider of various types of assemblies and components, some lubricants used in the manufacturing processes are more thoroughly and easily removed when using a solvent versus an aqueous process. Donmac had an older generation degreaser that used 1-Bromopropane (nPB) – a bromine-based solvent.

Due to evolving changes in environmental issues in Canada and other areas of the world concerning the use of 1-Bromopropane solvent (better known as nPB) – Donmac decided to address the existing use of this solvent from several aspects.

First, they wanted a solvent that would provide a more environmentally favorable application for their parts requiring solvent degreasing. A major item was safety for their employees. Any new solvent selected had to provide increased levels of safety (operator exposure limits) over the old nPB solvent as well as meet Canadian Environmental Protection Act for Air Pollutants. nPB solvent has been targeted for more stringent regulations. In fact, this solvent was banned in Europe in July 2020.

Next, Donmac wanted a solvent that would provide flexibility for various types of lube while being compatible with different machined materials. They needed a solvent that was stable and operated at medium temperature range for energy conservation.

When broken down, the replacement criteria included:

1. Be safe for the workers
2. Meet Canada environmental regulations
3. Be a long-term, sustainable chemistry
4. Clean as effectively as current processes - nPB
5. Not interfere with the following processes or inspection methods
6. Could be used in existing degreaser system

The Cleaning Process

Donmac utilizes a vapor degreasing cleaning process using a solvent for contamination removal prior to the following processes or inspection. These contaminates include cuttings, fingerprints, oils, and particulates. Total contamination removal is required on the substrate surface. To provide a thorough part inspection, a very robust cleaning process, ensuring 100% soil removal is required. Environmental regulation has forced Donmac to find an alternative solvent for the degreasing process.

Donmac selected KYZEN METALNOX M6900 as their new solvent. This solvent offers the following features:

- Non-flammable
- Not a HAP (Hazardous Air Pollutant under USA EPA definition)
- Personnel Exposure Limit (PEL) of 200 ppm vs 0.10 for nPB (2,000 factor)
- No additive stabilizers required.
- Boiling point temperature of 112º F vs. 160ºF for nPB = energy savings
- Environmentally friendly rating

To further improve Donmac's process, they purchased a new state-of-the-art vapor degreaser to replace their existing older generation degreaser. The new degreaser has improved solvent conservation due to design efficiencies including a rotating work basket system that provide improved solvent cleaning and drainage from the parts.

New Solvent Technology

KYZEN METALNOX M6900 is a new solvent that offers exceptional cleaning power in vapor and immersion applications while satisfying environmental and safety requirements. It is non-flammable according to ASTM-E681. As per USA EPA and OSHA ratings, the following is noted:

Ozone Depletion Potential = 0.03 rating

Global Warming Potential= 148 rating – 100 years – Integrated Time Horizon (ITH)

Flash Point = None (closed cup flash point test method)

Personnel Exposure Guidelines (8 hr. TWA) = 200 ppm

VOC Content = 896 g/L (t-DCE content)

Reportable Quantity for accidental release or spill = 1000 lbs (t-DCE)

Regulated if emitted into water = Yes

Hazardous Air Pollutant = No

Annual Reporting – SARA – Section 355 = No (t-DCE)

OSHA list of toxins / carcinogens = No (t-DCE)

Cleaning Performance

- Excellent cleaning ability with common soils
- Superior wetting – penetrates / cleans tight spaces
- Compatible with metals (such as aluminum, copper, titanium, magnesium, aluminum alloys, and others)
- Recoverable or recyclable by simple atmospheric flash distillation
- Very stable – Resistant to thermal and hydrolytic breakdown

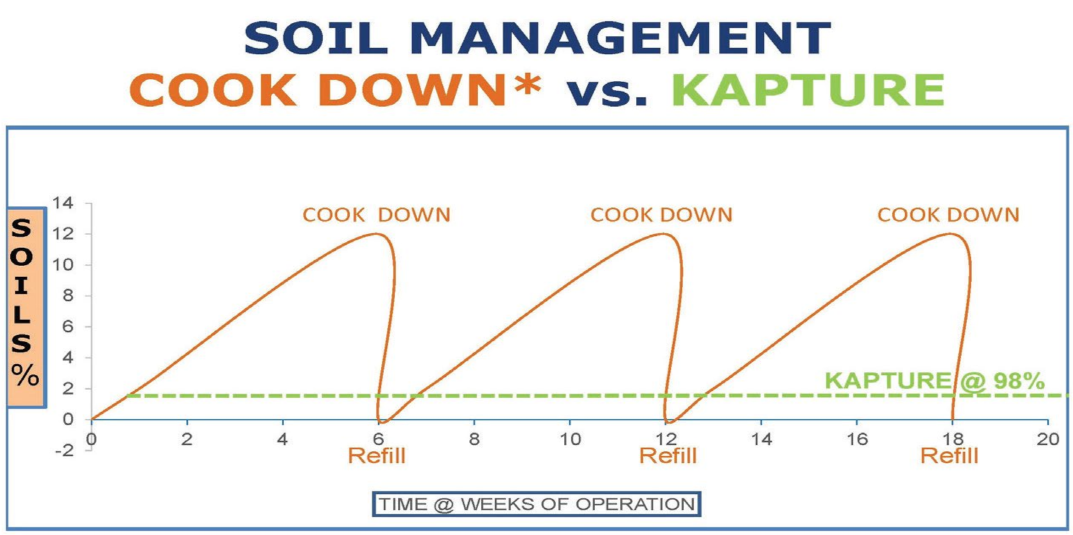
Solvent Purity / Soil Management

When using solvent to clean parts, maintaining an efficient cleaning process requires clean solvent. Purchase of new solvent is costly and proper disposal of waste is regulated as well as costly too.

As the parts are being cleaned / rinsed in the degreaser, the contaminants removed from the parts by the solvent begin to increase in volume in the boil sump over time. To maintain the solvent purity level within acceptable ranges so as not to affect cleaning capabilities and vapor generation capacity, it is necessary to remove the contaminants from this chamber on a regular basis.

An in-house solvent recycle system enhances solvent purity so parts being cleaned are exposed to a higher purity level of solvent – thus improving final parts cleanliness level. It also provides substantial cost savings by extending bath life and consolidating the soils – thus reducing waste volume and cost.

Donmac realized that by incorporating this device into their new degreaser operation, they would enjoy the advantages of improved solvent quality and reduction of waste generated by the process.



*ASSUMES COOK DOWN EVERY 6 WEEKS @ 12% SOIL LOADING

KAPTURE Functionality

- Laboratory testing has proven the KYZEN KAPTURE system to be 98% efficient in removing typical soils found in the industry for solvent cleaning.
- Old school cook-downs occur at roughly 12% soil loading, typically reached every 4 to 6 weeks based on a number of factors. This traditional approach requires downtime and maintenance hours to empty the system and replace the solvent, which all change once you are connected to an autonomous operation KAPTURE.
- By automatically removing the soils from the boil chamber on the degreaser on a continuous basis, the KAPTURE maintains solvent purity at a very high level which provides enhanced cleaning action and extends the bath life considerably.

- By using the KAPTURE, the total waste is greatly reduced. The waste generated is continuously and automatically separated from the solvent for periodic disposal. No maintenance assistance is required other than removing and replacing the provided waste storage container (5-gallon vessel) located inside the KAPTURE cabinet once the alarm notifies you it is time to do so. The KAPTURE, but not your cleaning system unit, will then shutdown while your maintenance staff takes just a few minutes to remove and replace the waste storage vessel while the cleaning system continues to operate.

After photo taken within 24 hours of KAPTURE installation

BEFORE

AFTER

Results

Donmac successfully replaced a solvent and older generation degreaser with a more environmentally friendly system that provides EH&S advantages and performance.

Summary

KYZEN METALNOX M6900 is a safe and effective choice for cleaning parts in the precision machining industry and has been proven by Donmac to be very effective at completely removing all contamination from the parts. METALNOX M6900 has an ideal combination of non-flammability, low toxicity, and high cleaning performance along with the ability to be used to clean tight spaces quickly and effectively.

By adding the KYZEN KAPTURE, Donmac obtained operational cost savings as well as improved solvent quality. If you want more info, please contact Travisd@Donmac.net.

According to Travis Donaldson, “With the KAPTURE distillation system, we don’t ever have to worry about replacing expensive solvent or cleaning parts in a cleaner that’s saturated with oil like we did in the past. Other than the quick bi-monthly dump, we set it and forget it. It’s worry-free and pays for itself in recycled solvent.”