



“Solstice PF degreases our heat transfer products better than we imagined it could. It has certainly improved the quality and productivity of our degreasing process, while helping us comply with changing environmental regulations.”

– **Robert Greenwood, President, TEMP, Inc.**

Removing the Oil While Ramping Up Productivity

Solstice® Performance Fluid (PF) Adds Value to Degreasing Operation



THE CHALLENGE

Concerned about evolving environmental regulations, a world leading manufacturer of heat transfer products wanted to proactively switch from an HCFC-225 solvent to an alternative product that would comply with regulations while meeting stringent quality standards for degreasing complex parts prior to vacuum brazing.

THE SOLUTION

The company tested and converted to Honeywell's Solstice® Performance Fluid (PF), an innovative solvent that offers exceptional cleaning performance and efficiency while satisfying long-term environmental needs.

The Project

Thermally Engineered Manufactured Products (TEMP, Inc.), headquartered in Gardena, Calif., is a world leader in the design and manufacture of high-performance heat transfer products to the aerospace, defense and electronics industries. As a vertically integrated facility that includes in-house welding, machining and vacuum brazing, TEMP specializes in heat exchangers, cold plates and fins forming. To help optimize quality, they use a Baron-Blakeslee vapor degreasing cleaning process to decontaminate metal parts prior to the vacuum brazing process.

Vacuum brazing is a technical process in which two base metals are joined together using a filler material that has a melting point below that of the base metal. This yields parts with extremely strong joints and with no residual corrosive flux. High-quality brazed joints, however, must use base metals that are exceptionally clean and contamination-free to ensure good wettability and filler flow, and to draw a vacuum of 10^{-6} Torr.

TEMP Criteria to evaluate Solstice® Performance Fluid:

- Cleans at least as effectively as the existing HCFC-225 solvent
- Does not interfere with the vacuum brazing process
- Meets California's South Coast Air Quality Management District (SCAQMD) volatile organic compound (VOC) regulations
- Is safe for its intended use
- Meets long-term safety and environmental requirements



Vapor Degreasing System



Vacuum Braze Furnace

"Without proper decontamination, the brazing will not properly adhere to the substrate surface, so it's critical that we have a reliable yet efficient process in place," said Robert Greenwood, president of TEMP, Inc. "With ongoing regulatory change, we needed a solvent that could satisfy our needs long-term."

Searching for a New Solvent

TEMP was using HCFC-225 solvent to remove a variety of contaminants prior to vacuum brazing, including a broad range of soils, such as fingerprints, oils, water soluble oils and particulates. Concerned about regulations and phase-out, TEMP determined it was time to replace HCFC-225 with a high-performance alternative having a low global warming potential (GWP). Consequently, after researching available options, they decided to evaluate Solstice® Performance Fluid (PF). Evaluation included an on-site test with Solstice PF to validate its ability to meet expectations.

Conducting On-Site Testing

Due to the size of TEMP's parts and other restrictions, TEMP decided the best way to judge the cleaning effectiveness of Solstice PF was to test it on site, in their own vapor degreaser. Parts were degreased and then immediately placed in the vacuum braze oven, mimicking the current process.

The vapor degreaser at TEMP holds approximately 280 gallons of solvent and is fitted with an automated lift system to introduce parts into the solvent. The degreaser is also fitted with primary and secondary cooling coils to ensure proper solvent management. Production parts were processed for several days using the Solstice PF process to ensure proper cleaning as determined by the effectiveness of the final vacuum braze.

How Solstice PF Delivers

According to TEMP, test results show that Solstice PF meets and exceeds their expectations, cleaning better than the HCFC-225 solvent. Equally important, they are also able to significantly enhance productivity and quality. Previously, they had to wipe parts by hand with solvent after the degreasing process, and clean the parts again due to oil residues. This required extra time and labor for parts processing, and caused additional worker exposure. With Solstice PF, however, TEMP is experiencing superior vacuum brazing results, so parts do not need to be wiped down by hand.

“Quite often, when you ask for one requirement, you have to sacrifice something else – but this was not the case with Solstice PF,” said Greenwood. “Instead, we are able to get the best of both worlds – improved performance AND outstanding processing efficiency.”

TEMP has successfully incorporated Solstice PF into its degreasing process. They have discovered that Solstice PF offers exceptional cleaning power while satisfying long-term environmental and safety requirements, as shown in Table 1.

As companies like TEMP seek to proactively comply with changing regulations and get ahead of the curve, many are turning to the power of Solstice PF.



Basket of Parts in Post-Degreasing Process



Final Assembly



Final Assembly

Table 1: Solstice PF Performance Highlights

Cleaning Performance	Environmental Performance
<ul style="list-style-type: none"> • Excellent cleaning ability with common soils • Superior wetting; cleans tight spaces • Very stable – resistant to thermal and hydrolytic breakdown • Compatible with metals (such as aluminum, copper, titanium, magnesium/aluminum alloys)¹ • Recoverable or recyclable by simple flash distillation or through carbon adsorption with steam desorption 	<ul style="list-style-type: none"> • Non-flammable² • Low global warming potential (GWP) of 1 • Workplace Environmental Exposure Level (WEEL) value of 800 ppm (8-hour time-weighted-average)³ • Non-VOC classification by the U.S. Environmental Protection Agency (EPA) and the SCAQMD • Listed under the EPA’s Significant New Alternatives Policy (SNAP) • Registered in Europe under REACH for tonnages of more than 1,000 tons per annum, in addition to other countries (Canada, Japan, South Korea, China and Australia)

¹As with any product, compatibility testing is recommended prior to use.

²Solstice PF is a UN class 2.2 nonflammable liquefied gas. It is designated as nonflammable by ASTM E-681.

³Per the Occupational Alliance for Risk Science (OARS)

Contact Honeywell to Learn More

To learn more about the benefits of Solstice PF, call Honeywell at 1-800-631-8138 or visit

honeywell-solvents.com

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