

ENHANCING SAFETY AND COST-EFFECTIVENESS IN HIGH PRECISION COMPONENT CLEANING WITH SOLSTICE® PERFORMANCE FLUID

“In Solstice® PF, we have found a solvent that gives comparable cleaning performance to TCE, but with significant safety, operational and cost of ownership advantages.”

*Steve Halfpenny
Safety Manager, Hymatic Engineering Coy Ltd*

Case Study





Hymatic Engineering Coy Ltd, part of Honeywell Aerospace, based in Redditch in the UK, specialises in the design, development and manufacture of cryogenic and fluid control systems, sub-systems, and precision engineered products for aerospace and defence applications.

A key part of Hymatic's production process is the cleaning of manufactured component parts using solvent-based vapour degreasing. Up until April 2016, the company had used trichloroethylene (TCE) as the solvent, but the EU now classifies TCE as potentially carcinogenic and has banned its use in degreasers. As a result, Hymatic contacted Honeywell to investigate alternative and safer solvent options capable of providing equivalent cleaning performance.

The Needs

- Hymatic needed an alternative solvent to TCE to meet exacting cleaning standards required for small electronic components destined for aerospace and defence applications
- The solvent needed to be easy to handle with low levels of waste
- Hymatic required a solvent with minimal impact on the environment, both in usage and in disposal
- The solvent needed to present a low risk to operative health

The Solution

Having been contacted by Hymatic, Honeywell conducted desk and laboratory research into alternative solvents based on contaminant information provided by the company.

Solstice® Performance Fluid (PF) was recommended for field testing, based on its exceptional cleaning power, low environmental impact and significant workplace safety advantages over TCE. In addition, the new generation solvent had the potential to deliver cost savings through lower energy consumption.

Solstice PF is non-flammable (according to ASTM E-681 testing), with a global warming potential (GWP) of 1, and an Occupational Exposure Limit (OEL) of 800 ppm. The Honeywell solvent has been designated as VOC-exempt by the U.S. Environmental Protection Agency (EPA), is registered under the European Union's REACH regulation and listed under the EPA's Significant New Alternatives Policy (SNAP).

The Benefits

- **Ultra-precise Cleaning Performance:** Low surface tension and high degree of solvency allows Solstice PF to deliver the ultra-precise cleaning performance in tight spaces required by Hymatic
- **Improved Energy Efficiency:** Solstice PF's much lower boiling point consumes 12kW less power annually and saving an estimated 6,000 euros in energy costs

- **Significantly Enhanced Operator Safety:** Solstice PF is non-toxic, has an OEL of 800 ppm compared to 10 ppm for TCE, and has less onerous storage requirements than TCE
- **Faster, More Efficient Cleaning:** Solstice PF's low boiling point of 19°C – compared to TCE at 87.2°C – means no need for cooling down periods
- **Waste Reduction:** Solstice PF generates virtually no waste and its chemical structure means no degradation or acidification in service, unlike TCE
- **Cost Neutral:** Total cost of ownership for Hymatic of the Solstice PF system is comparable to the TCE system, even at low throughput levels, leaving aside health and safety, and storage and handling benefits

Hymatic – Implementing a safer, more efficient component cleaning process

When EU regulations banned the use of TCE in precision cleaning in semi-open degreasers in April 2016, Hymatic needed a replacement solvent that would meet its cleaning requirements for its small electronic components, while ensuring as safe an operating environment as possible.

The company contacted Honeywell for advice on potential alternatives and, following detailed analysis of contaminants resulting from the manufacturing process, Solstice PF – a new generation fluorinated solvent offering exceptional cleaning power – was recommended for testing.

To enable Hymatic to validate the solvent performance, Honeywell provided a prototype degreasing unit, along with training both for the equipment and the use of Solstice PF, enabling the company to assess the performance of the solvent across the entire cleaning cycle.

In addition to the cleaning effectiveness, the company also assessed the relative cost factors associated with energy consumption, solvent storage, handling, disposal of empty drums and PPE arrangements for operator safety.

One immediate benefit was a reduction in the cleaning cycle period. With the new Solstice PF system, the vapour point (19°C) was achieved in approximately 10 minutes from start-up, compared to around one hour for TCE, which boils at 87.2°C. This more energy efficient solution also translated into significant energy savings, with the Solstice PF system consuming 12kW less power annually (10kW compared to 22kW for TCE), using the same basket size – equivalent to around 6,000 euros a year.

Hymatic's test and validation exercise proved the effectiveness of Solstice PF and the company has now adopted the solvent for its component degreasing process. The operating environment is safer; storage and handling requirements are simpler; and energy consumption for the degreaser unit has more than halved.

As a result of this change, the people at Hymatic now work in a safer and healthier environment and the overall cost of ownership looks set to reduce.

The service team now works in a safer and healthier environment and circuit cleaning is more effective and efficient than before.

The Solstice® PF advantage

Solstice PF's ability to clean components at room temperature offers benefits in energy efficiency, operator safety and productivity even in low throughput manufacturing lines. Its low boiling point reduces overall cycle times by removing the need for component cooling periods.

The safety benefits are assured through Solstice PF's nonflammability and its OEL of 800ppm – compared 10ppm for TCE – meaning less onerous personal protective equipment requirements for operatives during the cleaning process, and less costly and regulated storage and handling arrangements. The solvent's ultra-low global warming potential also helps meet long-term environmental goals.

Solstice PF's chemical structure means there is no degradation or acidification of the solvent when in service and, unlike TCE, it does not require regular checks or stabilization. Solstice PF can be distilled and recuperated within degreasers, any residual waste is easily removed, parts turn out without any need for cooling periods, with low fugitive solvent emissions, and the solvent is proven to clean tight spaces quickly and effectively.



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