

FOR IMMEDIATE RELEASE

NEU-TRI™ E Trichloroethylene – The approved grade at BAE Systems Samlesbury

Environmentally compatible, safe and reliable degreasing in aircraft manufacturing

Trichloroethylene had been used at BAE Systems Samlesbury (UK) since the early 1980's for degreasing aircraft components. In order to improve quality, sustainability and safety of the cleaning process, the company looked for an alternative cleaning agent. Pretty much all options had been investigated during a period of nearly four years, but none could offer advantages similar to those of NEU-TRI™ E Trichloroethylene offered by SAFECEM Europe GmbH. It is supplied in the SAFE-TAINER™ closed-loop transfer system and with services to extend the lifespan significantly. In combination with a new state-of-the-art degreaser the consumption of solvent could be reduced significantly from around 5 tons a year to less than half a ton.

BAE Systems is the second largest global defence company and a security enterprise with approximately 100,000 employees worldwide. The company delivers a full range of products and services for air, land and naval forces, as well as advanced electronics, security, information technology solutions and support services to customers in more than 100 countries. At the site in Samlesbury (UK), BAE Systems provides manufacturing and support capabilities to a number of internationally important aircraft programmes including Eurofighter Typhoon and F35-Lightning II in addition to work on unmanned air vehicle demonstrators. Like in all BAE Systems sites around the world, reducing the impact on the environment by cutting Volatile Organic Compound (VOCs) emissions during manufacturing processes and improving the work conditions regarding safety and health, these are just some of the main targets at Samlesbury.

Installing a remarkably high quality cleaning solution

The site has a history of forming and fabricating aluminium components for a range of civilian and military aircrafts. A critical step in the process is the adequate removal of contaminations during manufacture to allow subsequent surface treatment of the components. To ensure that the necessary level of cleanliness is achieved, BAE Systems Samlesbury used trichloroethylene in an

open top degreaser for many years. This required not only that the maintenance operator had to wear breathing apparatus but also the use of significant quantities of the chlorinated solvent, which made BAE Systems one of the UK's largest users of the chemical. Concerned about the high consumption of the chemical and the VOC emissions caused by the cleaning process, the company wanted to look for alternatives. It also wanted to increase quality, performance and EH&S (Environment, Health & Safety).

During a period of nearly four years the company investigated all possible options. These included water-based cleaning agents and other solvents such as hydrocarbons and n-Propyl Bromide (nPB). They were bench-marked against NEU-TRI™ E trichloroethylene in the SAFE-TAINER™ system from SAFECHEM Europe GmbH (SAFECHEM), a wholly owned subsidiary of The Dow Chemical Company (Dow). BAE Systems found from its testings that NEU-TRI™ E was capable of reliably removing all the contaminations which occur through the use of up to 16 different oils and greases during the manufacturing process thereby ensuring the quality needed. This resulted in an approval for NEU-TRI™ E trichloroethylene by BAE Systems.

The chlorinated solvent is used in a modern, closed cleaning facility which operates under vacuum. It is designed to clean 12 aluminium sheets of 2,000 x 2,600 mm or a mass of 700 kg in one cycle. With this capacity the new degreaser is one of the largest machines of its kind in Europe, and potentially the world. The cleaning process is carried out fully automated and includes high pressure spray washing, vapour degreasing, and vacuum drying. At the end of the 30 to 40 minute cleaning cycle the trichloroethylene is collected, distilled, condensed and absorbed into a carbon bed within the facility, so virtually no solvent fumes occur when the door opens.



Figure 1: Modern closed cleaning machine at BAE Systems

Virtually emission-free solvent use

In combination with the new cleaning plant the SAFE-TAINER™ closed-loop transfer system can enable an emission-free cleaning process. This state-of-the-art delivery and handling system for solvents consists of two separate, specially designed containers, one for fresh and one for used solvent. Each container is delivered with a standard drum inside. The steel container protects the drum, preventing damage or spills. They are easy to handle and to store and help allow a safe

management of chlorinated solvents on site. During the solvent transfer to the cleaning machine a special leak-free, dry-break coupling prevents spills and vapour emissions. When transferring used solvent from the cleaning machine to the SAFE-TAINER™ container, a dry-break coupling adapter and a vapour return connection prevent emissions. This protects the operator and environment from potential contact with the solvent.

Solvent maintenance for reduced consumption

In addition to the SAFE-TAINER™ system, SAFE CHEM offers simple and efficient solutions to monitor and maintain the quality of NEU-TRI™ E trichloroethylene. Due to the rising concentration of oils and greases and their decomposition products, which are removed from the aluminium surfaces in the cleaning process, this can slowly degrade the chlorinated solvent. The MAXICHECK™ test kit and business logbook can enable the operator to check the alkalinity level and the acid acceptance of the solvent regularly in an easy and quick manner and plot the results. If necessary, MAXISTAB™ stabiliser can be added to keep stabiliser concentration at the optimum level. This offers not only a maximum cleaning quality, it also helps BAE Systems to protect their cleaning facility against acidification and corrosion and minimise solvent usage by means of an extended life-span. It has generated impressive results. Since the newly purchased cleaning system and NEU-TRI™ E trichloroethylene have been in use the consumption has dropped from around 5 tons per annum to less than half a ton and the system meets all specifications of the Solvent Emissions Directive (SED). Furthermore, BAE Systems has achieved a high performance as well as minimised risk to operators and the working environment.



Figure 2: The SAFE-TAINER™ System with service elements

NEU-TRI™ E trichloroethylene, SAFE-TAINER™, MAXICHECK™ and MAXISTAB™ are trade marks of The Dow Chemical Company (Dow) or an affiliated company of Dow.

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About SAFECEM

SAFECEM Europe GmbH was founded in 1992 and is a wholly owned subsidiary of The Dow Chemical Company. SAFECEM is an experienced provider of services and solutions related to the safe and sustainable use of solvents in industrial cleaning. This includes the closed-loop SAFE-TAINER™ system for the safe and emission-free supply and take-back of solvents. SAFECEM is committed to the principles of Responsible Care® and Product Stewardship and develops new business models and services like Chemical Leasing for the sustainable and innovative use of chemicals.

With offices in Düsseldorf, Paris and Midland, MI (USA) SAFECEM serves in close cooperation with a network of responsible distributors over 7,500 customers worldwide. Expert know-how around the entire cleaning process is offered by SAFECEM via the information platform CHEMAWARE™. www.safechem-europe.com, www.chemaware.org.

About Dow

Dow (NYSE: DOW) combines the power of science and technology to passionately innovate what is essential to human progress. The Company connects chemistry and innovation with the principles of sustainability to help address many of the world's most challenging problems such as the need for clean water, renewable energy generation and conservation, and increasing agricultural productivity. Dow's diversified industry-leading portfolio of specialty chemical, advanced materials, agrosiences and plastics businesses delivers a broad range of technology-based products and solutions to customers in approximately 160 countries and in high growth sectors such as electronics, water, energy, coatings and agriculture. In 2011, Dow had annual sales of \$60 billion and employed approximately 52,000 people worldwide. The Company's more than 5,000 products are manufactured at 197 sites in 36 countries across the globe. References to "Dow" or the "Company" mean The Dow Chemical Company and its consolidated subsidiaries unless otherwise expressly noted. More information about Dow can be found at www.dow.com.