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MPE showcases leading-edge EMC & EMP filter applications on DVD 2012 Stand 24 in Concept 2

From its 40,000 sq ft dedicated engineering facility in Liverpool, the DVD 2012 exhibitor MPE Ltd has specialised for many of its 85 years in the design and manufacture of EMC (Electromagnetic Compatibility) and EMP (Electromagnetic Pulse) filter and capacitor solutions for the Western World's defence forces. That has included protection against Electromagnetic Interference and Pulses for fighting vehicles, fixed and mobile tactical shelters, ground stations, power supplies, communications and C4ISTAR facilities, not to mention acoustic booths and screened rooms. Many thousands of MPE's EMC filters and feedthrough capacitors have been successfully deployed and proven in the field, for almost every major OEM in the defence sector.

The radical differences of MPE's EMC filters over the standard offerings to Western defence forces are twofold. Firstly, the coupled circuit design featured by MPE is far easier for inspection and maintenance and creates a much more compact unit for installation – about a quarter of the size of the usual systems available worldwide, in which each line is wired up with a separate filter.

Secondly, in place of oil-filled units which can heat up and ignite when subjected to high voltages, for reliability and safety all MPE feedthrough capacitor designs incorporate self-healing, metallised plastic film capacitor material, utilising a solderless capacitor assembly technique to avoid heat damage to the plastic dielectric material.

As a longstanding supplier to the UK MOD, NATO and defence forces around the world, MPE holds the relevant defence and international standards approvals and has the knowledge, experience and products to protect all types of equipment on military vehicles. That includes alternators, HVAC, power supplies and power management systems, generators, motors for windscreen wipers, washers and blowers, oil cooler fans

and communications systems. All of MPE's EMC protection solutions are RoHS compliant where applicable and come with full technical support and application advice.

More recent programs and projects for the British Army have comprised vehicles such as the Challenger 2 main battle tank, Coyote Jackal, Foxhound, Husky, Panther, Ridgeback, Terrier, Titan, Trojan and Wolfhound. Other leading-edge programs involving MPE EMC solutions are the Watchkeeper tactical UAV (unmanned aerial vehicle) system for all-weather ISTAR (Information / Intelligence, Surveillance, Targeting Acquisition and Reconnaissance) use, Skynet 5 military satellite communications and a battlefield broadband communications system.

Meanwhile uses on special-purpose equipment to meet the latest defence challenges have included NBC / CBRN threat detection and protection technologies, minefield breaching ploughs and IED detectors.

To quote an example, high-performance feedthrough capacitors from MPE are installed in the power supply unit (psu) of the Self-Protection Adaptive Roller Kit, known as SPARK. SPARK is fitted as an IED Countermeasure System to many of the Mine Resistant Ambush Protected (MRAP) all-terrain armoured vehicles deployed by the US Army in Afghanistan. Fixed to the front of the vehicle, SPARK takes the full brunt of any blast. Soldiers are protected from injury, and their vehicle is left intact, so they can drive away from the "hit zone" rather than suffer further attacks by insurgents.

For these many and varied applications, MPE's filter and capacitor solutions are widely recognised for their undiminished performance and reliability over time. The MOD recently reported that MPE power line filters installed over 20 years ago for the EMP protection of a well-known UK communications facility were still in perfect working order.

Safeguarding vital electronics against pulse threats

As acknowledged by the Shield Act now pending in the USA, the February 2012 House of Commons Defence Committee Report and the 2010-2011 Electric Infrastructure Security Summits in London and Washington, the intense electromagnetic pulse (EMP) from a single nuclear weapon detonated between 25 and 500 miles above the Earth, possibly

delivered by rogue nuclear states, could disable civil and commercial infrastructures as well as defence computer and communications networks. A large solar flare or geomagnetic storm, which may occur at any time, could also produce a similar catastrophic result. The specific resultant pulse from any such event is known as a High-altitude ElectroMagnetic Pulse or HEMP.

Such a HEMP event could disable or destroy a significant portion of the national grid, along with local substations, unprotected items of electrical equipment and electrical controls for public utilities, services and process industries over a wide area. Much equipment containing unprotected microchips would be rendered inoperative within milliseconds. Such a pulse may equally destroy the electronics within military command and control centres as a precursor to further assault or terrorist activities.

MPE's High-altitude ElectroMagnetic Pulse (HEMP) filters have been designed, independently tested and fully meet the pulse current injection requirements of MIL-STD 188-125. They incorporate metal oxide varistors as a front-end transient suppressor giving an ultra high-speed response to arrest the incoming pulse. Then, with secondary and tertiary suppressors separated by inductors at later stages, these units give highly effective protection to the cable entry points of AC mains power, telephone and data control lines against induced pulse currents.

Since 2004 MPE has been designing and manufacturing custom HEMP filters, compliant to MIL-STD, that counter the effects of the pulse types defined as early-time E1 (50 kV/m within 10 ns) and intermediate-time E2 (100 V/m between 1 microsecond and 1 second). Most importantly, the MPE filters have been designed for pulse performance not insertion loss, and the transient suppressors, input inductors and filter are treated as an integrated solution. MPE tests the pulse currents and voltages at each stage within the circuit to confirm the operating function of each component, prior to arranging testing of the whole under full load conditions, ensuring that the highest levels of product reliability are consistently achieved.

In-house engineering & test facilities

In Liverpool MPE's Engineering Department provides a rapid prototyping service utilising specialist test facilities, a dual chamber screened room, proprietary filter and capacitor design software and a portfolio of over 20,000 custom product designs on the common industry platform AutoCAD.

Furthermore MPE provides a mobile, pre-compliance EMC test service, utilising a Rohde & Schwarz model ESL6 EMI test receiver operating from 9 kHz to 6 GHz frequency. The earlier that product deficiencies are identified during the development process, the easier, less expensive and less time-consuming it is to rectify problems. Having quickly pinpointed sources of radiated or conducted noise, individual pieces of equipment can be tackled, even down to bench level, to define the appropriate screening or filtration solution. Thereby MPE helps to define the optimal choice of EMI/RFI suppression to meet stringent military EMC standards such as DEF STAN 59-411 and MIL-STD 461.

Such comprehensive engineering and test facilities, reflecting the company's long accumulated experience and expertise, mean that MPE Ltd is well equipped to satisfy the EMC and EMP protection needs of defence forces anywhere in the Western world.

For more information on MPE products and services, visit Stand 24 in Concept 2 at DVD 2012, June 20-21 at the Millbrook Proving Ground, Bedfordshire. Alternatively contact Paul Currie, Head of Sales & Marketing, MPE Ltd, Hammond Road, Knowsley Industrial Park, Liverpool, L33 7UL, U.K. Tel +44 (0)151 632 9111. Fax +44 (0)151 632 9112. Cell +44 (0)7850 200 705. Email pcurrie@mpe.co.uk. Website www.mpe.co.uk