

When size matters

Dr Alexander Grabowski, give his opinions on the decontamination of sensitive equipment

THE decontamination of sensitive equipment in the wake of a CBRN incident has gained considerable momentum over the last few years. Gone are the times where contaminated items were either able to withstand very rugged decon procedures or, if not, were just replaced.

Today's tactical environment leaves the warfighter with less material resources and less logistic capacities than ever before; hence numerous pieces of mission-critical equipment, which were formerly considered expendable, are now in absolute need of being decontaminated. If not, the mission is over; it is as simple as that. Not convinced? Take away contaminated night-vision goggles from a recon platoon; render unusable a recon Tornado's aerial reconnaissance pod; put out of action a mobile communication facility. Then what? You can't see, you don't know where the enemy is, you can't communicate – you're out of business.

To counter that threat, several systems have been developed. Here, we will deal with two of the three German systems, which are: the Decon Module Sensitive Equipment of the Main Decon Station (DSSM); the Joint Services Decontamination System (JSDS, TEP90

in German) and; the Airborne/Special Forces Decon System.

These three systems each can be seen in action in different scenarios. In large-scale military conflict, born from the concepts of the Cold War era, systems have been developed where capacity takes priority over mobility. Typically, forces which have undergone a CBRN attack would have been extracted from the battle field, replaced by fresh forces, and moved to the rear of the theatre of operations. The mission environment typically is in an area that is both readily accessible and not under imminent enemy threat. The Decon System for Sensitive Materiel (DSSM) was constructed with this large-scale war scenario still in mind, and was built to decontaminate the sensitive equipment of 54 personnel per hour, operated by two individuals. This scenario's importance has diminished over the last couple of years; hence, we will not deal with it in this article.

For low-to-medium-scale military operations, such as typically encountered in peace enforcing and peace keeping missions, as well as in operations due to the war against terrorism, we are looking at the situations our forces are encountering on a daily basis. There are no large

backup forces, so decontamination has to be quick and the system providing it has to be highly mobile and versatile. Furthermore, capacity gives way to tactical mobility and mission flexibility.

Operations of highly mobile forces, including Special Forces, operating without external support or logistic train, face a situation with no backup forces at all. While the spectrum of equipment might be narrowed, and its number limited, nearly every single item is mission critical because there is no resupply available. Strategic mobility and deployability, as well as the need to be totally self-contained, take precedence over capacity and capability. Let's have a look at the systems.

Joint Services Decon Station 90, JSDS90 (TEP90)

The overall capacity of the JSDS90 system allows for the decontamination of four tanks or six wheeled vehicles, plus 20 personnel and their sensitive equipment per hour. In addition, the interior surfaces of vehicles and aircraft may be decontaminated by the system. The complete system is mounted on an 8x8 truck and is composed of four modules for the decontamination of large equipment (B), clothing and sensitive equipment (C), personnel (D),

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and interior surfaces (E). Modules C and E, respectively, are dedicated to the decontamination of sensitive materials and surfaces. With respect to the sensitivity of the material to be decontaminated, only physical methods or the use of mild decontamination media are applicable.

The first procedure based on physical methods uses the combined application of heat and vacuum. The material (eg electronics/avionics, small arms equipped with scopes) is put into the decon chamber. The chamber then is evacuated to a residual pressure of 1Pa and the material inside the chamber is heated by means of infrared radiation to a temperature of 70 degrees Celsius; a temperature, which is by no means beyond the limit specified by applicable specifications. The low pressure in combination with the warmth of the material causes the evaporation of chemical warfare agents

(CWA), even those with a very low volatility such as VX or thickened agents. The decon cycle lasts for 30 minutes. The second physical decon method is applied to the decontamination of protective clothing and rugged equipment. Such equipment is placed in a chamber where it is submitted to a mixture of superheated steam and hot air at temperatures between 130 and 170 degrees Celsius, thus dramatically accelerating the degradation process of chemical and biological agents and performing thorough decontamination within 30 minutes.

The use of the decon-chamber is, evidently, limited to BC-decontamination; when it comes to R/N-decon, classic technologies have to be used, albeit taking advantage of new formulations. The formulation used for RN-decontamination is called RDS2000, an extremely effective chelating agent

combined with a completely biodegradable carrier. The R/N decon procedure is performed using the decon tub, where the items in question are sprayed with RDS2000 and rinsed with water. This tub may also be used to perform B/C decontamination on items too big to fit into the vacuum chamber. The decontaminants used are BDS2000 (for BioDecon) and GDS2000 (for chemical decon), respectively.

The complete JSDS90-system is designed to decontaminate four tracked vehicles, six wheeled vehicles or one small aircraft within one hour. In addition, the thorough decontamination of 20 soldiers plus their clothing and sensitive equipment have to be treated. Finally, the system has to also decontaminate the interior compartments of four tracked or six wheeled vehicles, or of one aircraft. The system is to be operational for six hours per day – the first hour of each mission



Tep90 provides the Bundeswehr with a modular decon system ©Bundeswehr

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autonomously. As for the fielding of the actual system, it can be stated that the Federal Office for Defense Technology and Procurement recently signed a contract for the procurement of 73 systems.

Lightweight Decon System for Sensitive Materiel

While the JSDS90 is highly mobile on any terrain, it requires more than one cargo aircraft fielded with the German forces to be deployed by air. For theaters or missions that do not allow the use of large cargo aircraft another, smaller and even more mobile set of systems has been developed. While this degree of mobility perfectly fits the tactical and strategic requirements related to peacekeeping and peace-enforcing missions, there are operations that require even higher mobility. When on your own in Indian country you can't just call in for decon capacity if the need arises, so you better take along everything you need. Special Forces, for instance, require lightweight equipment which must be deployable by nothing larger than a helicopter in order to be deployed with the same speed and at the same time as the troops.

Germany's answer to this need is the Decon System, Lightweight, which consists of three modules – one for the decontamination of personnel, rugged equipment and clothing, one for the transport of water and one for the decontamination of sensitive equipment (the Decon System for Sensitive Materiel, lightweight" (DSSM-L). While the first and the second unit have already been delivered and are undergoing acceptance testing at this time, the module for sensitive equipment is under construction right now.

This system is designed to be deployable by helicopter or small vehicles. The technologies used are basically the same as in the JSDS; they include, among others, vacuum, spray-extraction and aerosol-disinfection. The real engineering challenge here, however, was downsizing technologies originally fielded in a 20-foot container to a size manageable by helicopters and small vehicles. By applying these technologies, the DSSM-L is able to:

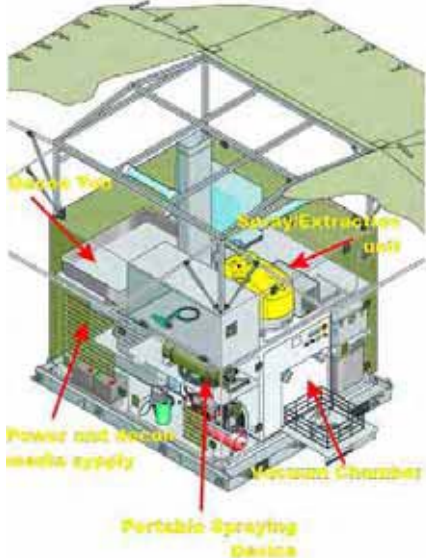
decontaminate all known CBRN-agents; decontaminate toxic industrial materials (TIMs), to include toxic industrial chemicals, biologicals and radiologicals); to reach compliance with federal regulations governing disinfection of and prophylaxis against infectious materials; to obtain residual contaminant levels that allow for the unrestricted handling and repatriation of treated materiel and; to operate autonomously for three hours

The capacity of the DSSM-L allows it to decontaminate, within three hours, the sensitive equipment of 100 personnel, plus within one hour, the interior compartments of three vehicles or in the space of six hours, a complete aircraft including the interior.

Looking at the three systems

presented, it is evident that there is a price to be paid for mobility and miniaturisation in terms of the specific capacity – i.e., the amount of items processed per operator and per hour, decreases. This is not surprising, and it takes quite a considerable amount of engineering skills to compensate for this process. The German forces and German industry, however, seem to have been quite able to develop two systems on the cutting edge of technology while still keeping the performance advantage of proven technologies.

Dr Alexander Grabowski is the Head of Decontamination Directorate at WIS, Germany, and has been a chemist for over 20 years.



DSSM-L will allow extremely mobile forces, such as Special Forces, with an expeditionary sensitive decon facility ©Bundeswehre