



Into the Fire with RED

The new firefighting vehicle Airmatic / SK TEC RED is part of a concept of fire fighting and rescue of people. With high pressure extinguishing technique and extreme off-road capability it can be operated in places where conventional extinguishing techniques finds their limits.

Steffen Korthals

Indirect fire fighting is a well-known attempt by fire and backburn. A dangerous endeavour that needs expert knowledge and equipment often not present. Indirect fire fighting only plays a minor role and is only partly suitable for handling large-scale fire disasters. Techniques of direct fire fighting have gained acceptance, given that those responsible and experts are well aware that in the interplay of fire-fighting helicopters with outside load tanks and ground fire fighting technique, it mostly depends on firefighting forces on the ground. Air support strongly depends on weather conditions and fire-extinguishing water capacities, is cost-intensive and suffers from strike inaccuracy while firefighting. Despite a certain extinguishing effect it is almost impossible to extinguish fires in the undergrowth in near-ground fires and under high trees. Hot spots cannot effectively extinguished from the air. Flying sparks and winds can rekindle new fires at any time. Large-scale wildfires make it difficult to protect settlements entrapped from fire and to rescue people isolated from evacuation routes. Fighting fires on the ground in direct proximity to the fire source is imperative. For this other problems need to be solved like difficult to access terrain, high water consump-

tion, extreme danger for the operational personnel, limited access to people enclosed by fire, etc. It must be equally possible to approach the fire source, be able to effectively extinguish the fire and evacuate persons under threat. This is impossible to do with conventional vehicle and firefighting technique.

Special technique for extinguishing fires

The company SK TEC GmbH from North Rhine-Westphalia in the city of Menden has developed a new special vehicle, the SK TEC RED, for extreme situations. The double-armoured disaster management vehicle equipped with high pressure vortex-extinguishing technique and multifunctional rescue equipment enables for a new way in the fields of firefighting, rescue, protection and recovery. For this tanks, as they are known from military use, are equipped with with innovative special technics.

As a flexible tracked vehicle for towing and swath-cutting the former armoured personnel carrier Marder A3 is used. To increase the operational capability of the vehicle, a dozer blade is attached to the front.



KEY TOPIC

SCHWERPUNKTTHEMA

FOREST FIRES

Extinguishing technique: a high pressure pumping facility conveys the extinguishing water with a pressure of up to 200 bar. The spray beam is brought out by an extinguishing monitor.

Conversion: the basic vehicle of the firefighting vehicle Airmatic RED is a Marder A3 of the German Armed Forces. Beside the extinguishing technique it has been equipped with a dozer blade to remove obstacles.

Evacuation: Through the hatch at the rear the interior of the vehicle can be reached. It can accommodate up to 20 persons.

Self protection: All around the vehicle a spraving equipment protects the vehicle in direct proximity to the fire by a water spray, preventing fire impact.

Thus burning obstacles, cars, debris, logs etc. can be cleared out of the way easily. Additionally a strong cable winch serves for recovering heavy objects or removing obstacles. The vehicle is equipped with high pressure vortex extinguishing technique. The high pressure pumping equipment conveys the fire-extinguishing water (7.500 litres) with a pressure of up to 200 bar. To support the extinguishing effect additives can be admixed. The spray beam is brought out by an extinguishing monitor, that can be easily operated by joystick from the operating personnel from inside the vehicle. All functions including vehicle operation can be radio-controlled. The extinguishing monitor is incorporated into a turret on an opening on the upper side of the disaster management vehicle. Thus fires can be combated unimpeded and a protection against mechanical outside effects, like falling trees, is secured.

More economizing than an airborne operation

The multi-function vehicle can be fueled within three minutes by low-pressure pumps and filled from hydrants or flexible quick-assembly tanks on site. Distinctly lower water throughput, less manpower requirements and financial expenditure compared to airborne firefighting procedures and longer extinguishing times, given immediate operationability without set-up time of the vehicles as with conventional firefighting procedures are further features of the new

Vehicle concept. Attached at the vehicles is an all-encompassing spraying facility that envelops the vehicle in a water mist, when it is close to the fire source, thereby protecting from fire effect. This self protection facility consists of small, rotating nozzle beams that through an outward steel tube produces a large-volume fog.

For the smooth use of all transport routes with up to 75 km/h, the vehicle tracks are equipped with rubber cushions. While operating in darkness or mist, the environment can be illuminated with an extendable light pole equipped with a high performance beamer and its own generator. The vehicle interior is equipped with an oxygen self supply to provide relief forces, potential evacuated persons as well as the engine with sufficient oxygen.

High mobility, off-road capability and robustness permit the operation close to large-scale, difficult to access fire sources while at the same time protecting the crew. Equipped with an autarchic oxygen supply, large space inside the vehicle and the ability to compress the tank after depleting the carried water supply, enables the evacuation of victims. Up to twenty persons can be saved in rescue missions by an easy to access entrance into the vehicle interior and brought out of the danger area.

KEY TOPIC

Ground observation: the drones are immediately deployed when signals are coming in. They fly fast to the deployment site and provide exact information on location and expansion of the fire.



FOREST FIRES

With a new concept of operation the devastating effects of forest fires are to be prevented.

Steffen Korthals

Early Fire Detection

The topic of forest fire fighting for a considerable time occupies not only the world of firefighters, but the public at large. Spectacular and tragic pictures of fire disasters from around the world, for example in Indonesia, Australia, Greece, Spain or California demonstrate the considerable rise of devastating forest fires over the last years. To date there is no comprehensive and elaborated effective compound system that can manage the threat structure of forest fires effectively. The requirements, however, are clear: required is an integral approach to handle the numerous challenges and threats during a wildfire early and efficiently. Concerning tactics the German fire service association proposes the so-called RRLS-rule: Radio, Retreat, Lookout and Surveillance. A concept that more than fulfills the integral solution to forest fire fighting of the initial project of the company AIRMATIC / SK TEC, RED-Division from Menden, Germany.

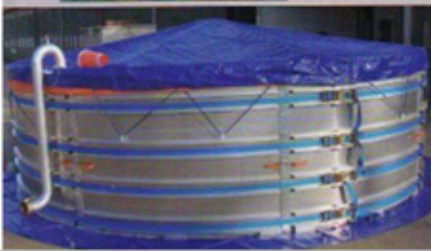
The forest fire fighting system registers through sensor cameras that are placed extensively at observation points, automatically and early emerging fires and reports the smoke development to the forest firefighter operation centre. The terrestrial digital distant observation transfers the exact coordinates and documents of the smoke development in clear pictures. To prevent a false alarm and a subsequent large scale operation, to gain an exact assessment of the situation an unmanned drone is sent from the observation point to the assumed fire source. It can reach the possible deployment site even very quickly in rough terrain.

The drone takes off and lands vertically so that no runway is required. Because of the ability to hover, autonomous collision-prevention and diverse behaviour patterns for approach, return, lack of energy, third-party intervention, radio and other disturbances, the drone can reconnoitre exactly and with short distance to the deployment site.

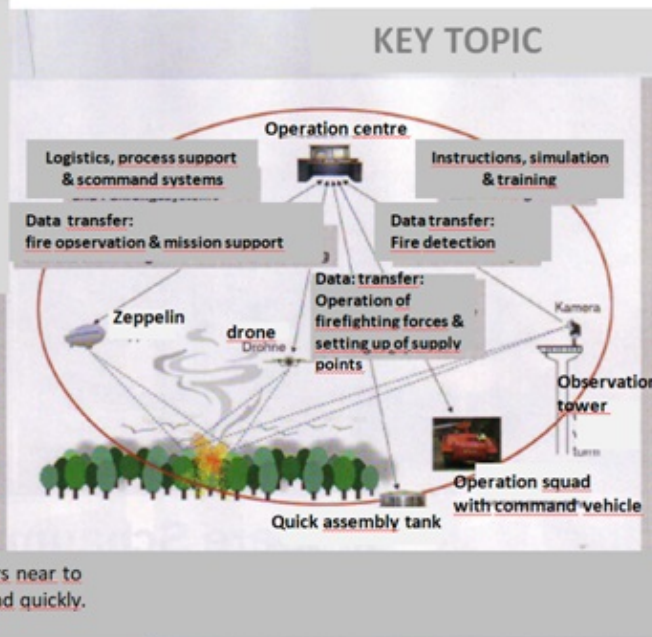
Extinguishing water supply

In the event of an alarm the firefighting forces are directed from the operations centre to the fire source and provided with data concerning vegetation, meteorological conditions like wind speeds, further weather changes and expected fire developments. Meanwhile the unmanned drone continues to observe the fire source and provides permanent actual pictures to the operations centre, the command vehicles of the firefighting squads and the other fire engines. As required the operations centre provides for the necessary supplies of fuel and extinguishing water. For this at suitable, fire-near locations depots in the form of quick-assembly tanks are erected. They consist of corrosion-resistant components in half-shell shape which are stuck together, have a capacity of 70.000 litres and can be transported by Europallets. They can be erected easily within fifteen minutes and dismantled again after use. A subfloor treatment for construction is not necessary. The containers can be filled according to the respective location either from the air or with conventional fuel tankers.

Camera: widely attached cameras observe the endangered area. When smoke develops they inform the operations centre.



Storage: the fire water is stored in big containers near to fire. The single tanks can be assembled easily and quickly.



Impossible to do without instruction

Conventional fire engines are limited in their operability by difficult terrain. They cannot enter fires because of a lack of protection and tyres. Therefore it takes a protected and cross-country special vehicle like the armoured fire fighting vehicle SK TEC RED. The double-armoured disaster management vehicle is fast and nimble and can operate in extreme terrain and close proximity of hot and ultraenergetic fires (see example p. 26).

The basic fire engine platoon inside SK TEC, RED DIVISION consists of five basic fire fighting vehicles and one further vehicle that turns to tasks of clearing. A firefighting squad is coordinated by a command vehicle equally equipped with latest firefighting technique, and additionally carrying a drone for the surveillance of fire development.

For aftercare fixed flying objects like a zeppelin equipped with camera and sensors can be applied as a means for an observation strategy to prevent fires from flaring up again.

The operating and command forces of the consortium are trained by a special multifunctional simulation platform. In the KLF-simulator real operating instruments are incorporated into a virtual simulation, while 2D- and 3D-situation reports, the prognosis of situational developments, the preparation and assessment of preventive measures as well as the management of operation are trained. The operational maturity is further guaranteed by thorough logistics management of material and EDP-systems.

A combined system that is more than just a vision of the future. The digital long-distance observation system e.g. was already tested successfully. The handy concept to combat wildfires excels by providing an integral approach for early detection, surveillance and extinguishing of forest fires.

A synergistic use of innovation, product development and simulation system can be provided by the project SK TEC, RED DIVISION and can securely prevent and effectively combat fire disasters.