New means for fighting forest fires

Integral Concept

A new firefighting procedure is to use tracked vehicles for firefighting and rescue missions and quick-assembly containers as mobile water withdrawal spots. According to the producer of these single hightech components, they combine into an integral concept for fighting forest fires.

The ultra cross-country armoured infantry tank Marder 3A was turned into a special vehicle for fighting forest fires. Picture: Airmatic GmbH

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Forest fires in some respects pose a special challenge for firefighters. Rough terrain, problems with fire water supply as well as string and shifting winds can significantly influence mission success. Often there is no time for the forces deployed to rescue themselves from the approaching fire fronts, and also there is hardly any leeway for the specific evacuation of endangered persons, as it showed in last October in the vicinity of Los Angeles.

Problems galore

Fighting emerging fires off the streets, in hilly or mountainous terrain as well as fully developed fire spots pose a contrasting challenges to the means of firefighters. On the one hand, the naturally cross-country vehicles should be rather small and versatile in order to operate on small and unpaved roads. On the other hand an effective intervention requires a certain amount of fire water supply which can only be transported by big and heavy vehicles. These vehicles should also be capable of evacuatuating far-off hamlets and farmsteads as well as providing passenger transportation and be equipped with facilities for self-protection.

Target identified

In order to accommodate these normally irreconcilable differences, the company Airmatic Ltd., that is present Europe-wide with high pressure cleaning systems, came up with something totally new. In order to apply their self-developed vortex-extinguishing procedure productively to the sector of fighting forest fires, they converted a tank of the type Marder A3, decommissioned by the German Armed Forces, into a polyvalent forest firefighting vehicle. With 35 tons of total weight the track vehicled tank is certainly no lightweight, but is is extremely cross-country, can surmount and clear obstacles, and thanks to the tracked drive can turn 360 degrees on the spot. The vehicle developed under the

Two extinguishing nozzles in front support advance movements. A self-protection facility envelops the vehicle with a water mist and enables to advance straight to the fire source across burning rubble.

designation RED (Rescue – Extinguish – Defend), from which a small batch series of ten units is under construction, carries a respectable fire water supply of 7.500 litres in foldable tanks, which enables the vehicle to operate autonomously between two and three hours, due to the extremely modest water consumption, plus a high extinguishing effect.

Polyvalent concept

Extinguishing missions are provided for by an extinguishing launcher mounted at the roof and operated from inside the vehicle, that equally can be used for post-extinguishing duties. Two extinguishing nozzles in front support advance movements. A self-protection facility envelops the vehicle with a water mist and enables to advance straight to the fire source across burning rubble. After depletion of the foldable tanks the vehicle offers space for 20 persons. The armour shields the occupants from heat and flames as well as from being injured by falling branches or toppled trees. With the help of the front-mounted dozer blade obstacles like toppled trees or broken-down vehicles can be cleared.

Covering all the bases

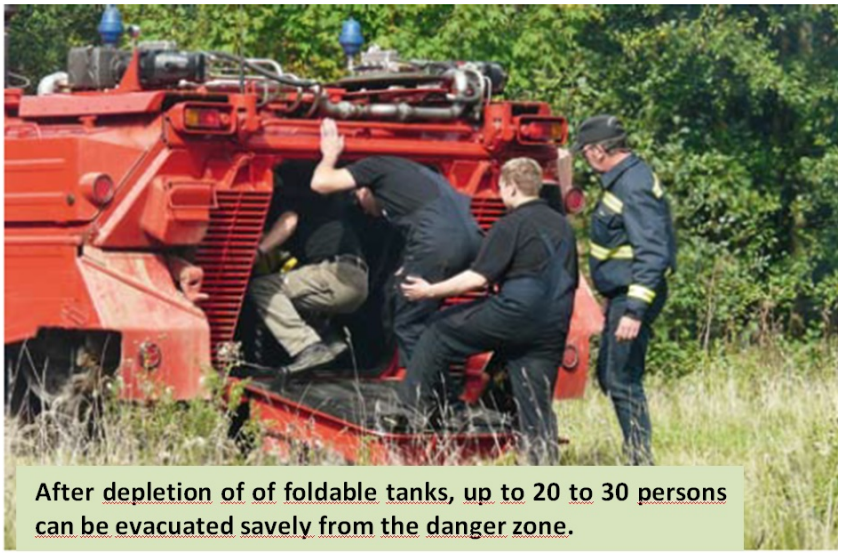
To ensure that the vehicle can unfold its overwhelming extinguishing power in direct proximity to the front of the flames and that rescue missions in smoky areas can be conducted safely, the provisioning of engine and personnel with respirable air had to be considered. For this reason a sufficient supply of breathing air is carried in pressure cylinders. Measuring instruments control the oxygen content of the ambient air and alarm the crew optically and acustically of a potential lack of oxygen. For this contingency the crew is provided for with joint filter masks. A special control was developed for the engine which guarantees a constant oxygen concentration for rescue missions through the fire, by default of an oxygen sensor installed into the intake pipe.

Pick from an embarrassment of riches

The high pressure vortex-extinguishing technique developed by Airmatic Ltd. allows for throwing finest droplets of water at far range. The water pressure of several hundred bar forms finest large-surface water droplets that enable the system to effectively combat the fire by simultaneously cooling and suffocating it. The water, under high pressure, streams through rotating nozzles, where it is given a spin – like a projectile. This spin stabilizes the trajectory of the drop and yields a higher range. The extinguishing monitor mounted at the roof is operated by a joystick from inside the vehicle. It can be inclined and turned around by 360 degrees. The high pressure vortex extinguishing technique promises an distinctly improved extinguishing effect by providing a lower water consumption at water-throwing distance of up to 50 meters. For improving the extinguishing effect a moisturing device can be added to the extinguishing water.

High pressure extinguishing technique: high extinguishing capacity by low water application enables high autonomy.

The dozer blade clears the path.



After depletion of of foldable tanks, up to 20 to 30 persons can be evacuated savely from the danger zone.

Not just forest fires

Armoured fire engine vehicles offer the mission forces additional protection from explosion effects and enable an advance even in debris conditions of fires in industrial complexes, refineries and in fires of pipelines. Especially for operation in fuel depots and industrial complexes a telescope arm was developed to extend the extinguishing monitor to up to ca. 15 meters. Video cameras and lighting units can be equally attached to the telescope arm just as an IR-camera for operation in thick smoke. The vehicles are equipped with rubber-buffered tracks and can be operated on normal roads with a top speed of 65 km per hour and a range of approx. 450 km, given a tank capacity of 400 litres of Diesel.

Integrated concept

Along with different partner companies an integrated concept was developed, that incorporates everything needed in large-scale events in inaccessible terrain, containing everything needed from early detection to alerting up to the operation of appropriate means. Air reconnaissance by means of helicopters is equally part of the concept as provision of quick-assembly containers for water supply with a holding capacity of 10 to 70 cubic metres, which can be erected by two persons in a quarter of an hour. The containers, consisting of aluminium support walls and a hooked-in folio of layered polyester fabric, can be deployed for processing and distribution of drinking water.

Great interest

Both the vehicle concept and the newly developed high pressure extinguishing technique and the integral approach for firefighting and rescue missons in forest and industrial fires find great interest all over the world. This showed at the 4th congress for disaster mitigation from 8th – 9th October 2009 in Bonn as well as at the Intersec from 18-20 January 2009 in Dubai, where the new technology was introduced to a large number of experts from all over the world. Of course the vortex extinguishing technique can be mounted on all current truck chassis, which will give new impulses to the industry sector.

Technical data SK TEC RED

Deadweight: 26,5 tons
Overall weight: 35 tons
Length: 6,90 m
Width: 3,38 m
Height incl. Monitor: 3,20 m
Engine: MTU-Diesel-V6
Power: 441 kW/600 HP
Automatic transmission: 4 forward/4 backwards
Speed: 65 km/h
Tank capacity: 400 litres
Range (road): 450 km

Operating times
Full jet 100 litres/min: 1,5 hours
Vortex jet 300 litres/min: 0,5 hours
Front extinguishing facility: 2,0 hours.
Quick attack 50 litres/min: 3,0 hours.