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THE PURPOSE OF FIREENGINES AT FIRES IN ENVIRONMENT

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ABSTRACT

The paper deals with the issue of possible deployment of the fire engine at interventions in natural environment, especially at wildfiress.In the first section the basic points for driving in natural conditions are mentioned.The external conditions which affects the possibility of deployment of the fire engines are stated and also the internal conditions which determines the options of deployment of the fire engine. In the last part, the types of fire engines appropriate for interventions in natural environment are mentioned.

KEY WORDS: *natural fire, fire engines, availability of fire engines, fires in environment*

Introduction

Firefighters have to be prepared to intervene in any conditions.Incidents do not occur only on territories accessible on paved roads but also in terrain, the most typical are forest fires.The biggest lack for interventions in nature is theunavailability of territories with fire engines, because the density of forest roads is low. Logging roads are broken and impassable after the area is clear-cut.During spring passing is worse because of soakedterrain from melting snow in higher altitudes, in the autumn months it is because of ice coating.Driving through a glade can handle only the engines with high ground clearance and approach angle of the chassis.To execute an effective intervention, firefighters need to be equipped with theproper engines for interventions in such conditions.

1Driving in natural conditions

While driving fire vehicles in more difficult terrain conditions and at conditions of forest fires,it is necessary for the vehicles to overcome terrain with different segmentation and steepness.An important factor is that the engines fulfils the following properties, which belongs to the specification of slope availability for every fire engines.
Such properties are:

- possibility of driving up the slope (longitudinal stability),
- possibility of driving on contour line (lateral stability).

With required properties and thus longitudinal and lateral stability, is the biggest possible angle of steepness for fully loaded vehicle specified, in order not to lose the stability of the vehicle and thus making impossible to continue the driving of the vehicle through terrain. [1]

1.1 Passability of vehicle

The possibility of motion of the vehicle in environment with more difficult terrain conditions is presented by the passability of the vehicle.The vehicle have to be constructed in order to be able to face the following obstacles of the terrain such as segmentation of terrain, field and forest roads, sand, gravel, snow, damaged roads, rivers and streams.[1].

Pic. 1 Fire engines in hard terrain (photo: Milan Dermek)

Passability is divided according to two factors on:

- Passability of the vehicle in cross country terrain.What means the disposition of the vehicle to face different obstacles on accessible ground.
- Passability of the vehicle in inaccessible terrain. What means the disposition of the vehicle to face the obstacles in inaccessible ground.Prevention of the vehiclewith stuck wheels in mud.

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1.2 Vehicles grade-ability

The ability of vehicle with its own activity to overcome the biggest longitudinal fall of terrain also with full load describes the grade-ability of the vehicle. The interpretation of grade-ability of the vehicle is in percents[1].

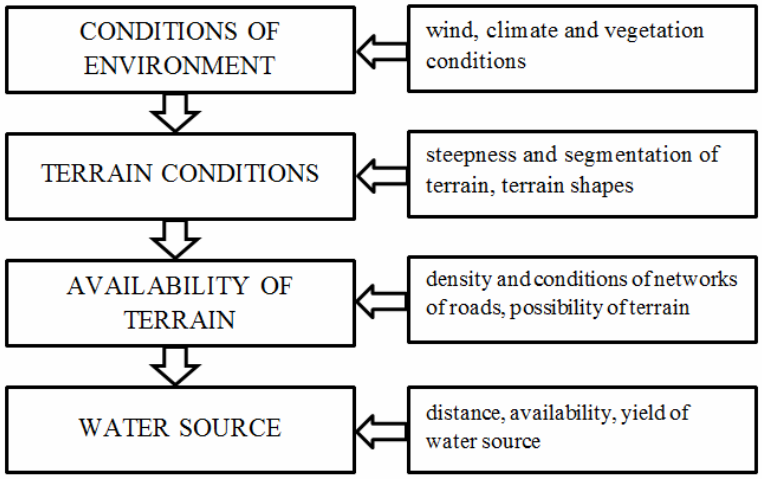
2 The deployment of fire engines

The deployment of the fire engines in natural environment is affected by external and internal factors.External factors forms the area in which the fire engines had to be deployed. Internal conditions are technically-tactic options of each fire enginesused for driving in the real conditions of the environment.
Dividing the terrain according to the availability for extinguishing with fire engines into categories:

- common terrain – paved road,
- easy terrain – field, forest road,...
- hard terrain – unpaved, damaged road and difficult movement in terrain,
- extreme terrain – complicated and extremelydifficult terrain, terrainunavailable for ground engines – steepness more than 100%, very complicated terrainconditions, only aerial engines is possible to use.

2.1External factors of deployment of the fire engines

The development of a fire is affected by topography of environment itself, current weather and available combustible material.The humidity of the air and soil, wind conditions, slope steepness, natural obstacles, whether it is windward or leeward side of the relief are also important.Simplified diagram of the environment conditions, which affects the choice of engines into natural environment is on picture 2.



Pic. 2 Simplified scheme for interventions in natural environment (author)

Forest network is often insufficient or completely absent.Logging roads are unmaintained, damaged and impassable. Forest roads are narrow.They are often soaked with rain water.Their surface is muddy.Into this kind of terrain not only specific fire engines is necessary, but also the driver should have experience with driving in difficult terrain[2].

Pic. 3 Driving in terrain (photo: Milan Dermek)

The specific deployment of the engines is determinedby the intervention commander based on the actual conditions at the intervention scene.

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2.3 Internal**factors of deployment of the fire engines**

The second important factor for deployment of the engines in natural environment areinternal factors, i. e. inherent properties of vehicles.It is usually the solution of the construction and its technically-tactic parameters, which affects the driving in terrain.Requirements for motion of the fire engines in terrain are clarified in table 1.

Tab. 1 Requirements for the fire engines into terrain[3, 8]

Passability of vehicle	Mobility of vehicle	Maneuverability of vehicle
• Longitudinal and lateral passability • Specific pressure on terrain • Approach angles • Stability • Ground clearance of chassis • Location of centre of gravity	• Overcoming of long distances in hard terrain • Speed of vehicle • Consumption ofvehicle	• Ability to change direction in more difficult conditions • Acceleration • Speed • Turning radius • Specific power • Type of chassis

Based on the requirements on the fire vehicles designed for driving in more difficult terrain conditions it is possible to state, that high demands are being set on them.The main part of dealing with the given task is on the level of training and theskills of the driver.It is important to make regular training in more difficult terrain conditions for the drivers.

3 Fire engines

In the Fire and Rescue Corps we have a lot of engines available with different application and different construction solution.There are two vehicles which are the most optimal for motion in terrain, which fulfil the requirements stated in table 2 the best and they are on every fire station:

- POLARIS RANGER XP 900 4x4 a XP 800 6x6 (together 224 pcs)
- CAS 30 TATRA 815-7 6x6 (together 160 pcs)

POLARIS RANGER

Firefighting quad Polaris Ranger is designed for deployment at interventions in hardly accessible terrain and during floods.Its construction allows driving in road traffic and also using in difficult terrain.On the back of the quad a high-pressure extinguishing device is set, which if it is necessary can be removed and use the back for carrying useful technical equipment for extrication and rescue, providing first aid for victims on the scene in hardly accessible conditions. For driving in snow the quad could be equipped with snow tracks[4].

Pic. 4 Polaris Ranger 4x4 a CAS 30 TATRA 815-7 (photo: Milan Dermek)

CAS 30 TATRA 815-7 6x6

Water tender truck belongs between heavy tankers for extinguishing fires with water or foam.The vehicle is built on terrain chassis ofTatra T815–731R32, which allows deployment in harder terrain and climate conditions.The vehicle is equipped withcentrifugal fire pump THT TO3000 with power of 3000 l/min at low pressure and 400 l/min at high pressure, with tanker capacity of 9000 l of water and 540 l of foam concentrate. The crew of the vehicle is 1+3 firefighters[4].

CONCLUSION

Fires and other interventions in natural environment represent difficult interventions for firefighters.The deployment of fire engines in natural environment is affected by external and internal/ factors. The deployment is also affected by topography

of the environment itself, a simplified model of decisive conditions is clarified in the work. The second important factor for the deployment of fire engines in natural environment is specific construction design of the engines, which affects its passability, mobility and maneuverability. Into this kind of terrain not only specific fire engines is necessary, but also a driver with experience of driving in difficult terrain.Only the deployment of proper engines which takes into account the conditions of the environment, guarantee for firefighters good availability and in case of it the possibility of fast and effective intervention.

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