

Use of CAD in modeling of a forest fire extinguishing process

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Abstract - Necessity of the use of specialized CAD system by projection of the optimal strategies and tactics of forest fire extinguishing is based. Availability by using of software tools of CAD system, DSS, GIS in case of taking the optimal decision by the leader of unit are examined.

Keywords - a forest fire, CAD, GIS, DSS, management of process of extinguishing of forest fire.

I. INTRODUCTION

Thus, the experimental studying of mechanisms of spreading of forest fires is quite expensive and not always experiment is successful. The computer modeling is decided the problem of extinguishing of forest fires in our country and abroad. At present, there are some works which show the development of most effective computer-aided design (CAD systems): systems of the fire warning [1], infrastructures of monitoring of forest fires [2]; project of transport routes of delivery of technical equipment and staff to the spot of fire, dimensional modeling and visualization of dynamics of development of forest fires [3], operative management of fire and rescue subunits [4].

II. MAIN PART

Designing of adequate strategies and tactics of forest fire extinguishing remains the least studied in this segment at the moment.

The main objective of an optimal strategy of forest fire liquidation is to localize it as soon as possible and to extinguish solid and separate fire sources at minimum of total material costs and environmental damage in terms of limited possibilities of involving forces and fire extinguishing facilities.

For successful implementation of fire extinguishing strategy it is required to concentrate forces and facilities in time in conceptual forest fire areas, to choose final directions of tactical tasks' implementation, to perform active attacking activities taking into account various extinguishing tactics.

The process of forest fire liquidation is often complicated by presence of wide areas impassable for forces and fire extinguishing facilities, lakes, marshland, stocked timber stand areas etc., which should be interpreted as prohibited areas for transportation of involved forces and facilities. A dynamic edge of fire area is also such an area prohibited for transportation of involved forces and facilities. Configurations of prohibited transportation areas are individual for all involved forces and facilities and depend

on tactical tasks, they have to perform and their fire extinguishing facilities.

Besides, various area relief, as well as for safety reasons of staff of fire and rescue department, makes their movement impossible in some directions, which are equipped with main automotive machinery and supplementary facilities. Taking into account these and many other factors, it leads to differentiation of movement directions of involved forces and facilities, depending on their location and tactical and technical specifications of available fire extinguishing facilities.

In order to solve this task, development of a decision support system (DSS) by management of involved forces using CAD systems of location of involved forces and facilities and geographic information system (GIS) is required. An important thing is that, nowadays, a combined use of CAD system and GIS tools is possible.

We would like to offer three stages. On the first stage, we digitalize of maps, create the thematic layers, calculate the area of forest fire and its perimeter by GIS tools. On the second stage, we plan the transport routes which deliver the technical equipment and personnel to the spot of fire; design and visualize the dynamics of development and consequences of forest fire; write the recommendations as to the place of location, straight and descriptions of the created of forest fire breaks and barriers; discuss of fire-prevention measures; plan the routes of personnel during localization and extinguishing forest fires; calculate the fire losses etc by CAD tools. On the third stage, we choose the optimal strategy and tactics of forest fire extinguishing by Computer-aided design system.

III. CONCLUSION

One of the directions of improvement such systems are increasing the quality of evaluation of incoming information about character and features of fire and generating of possible scenarios of its development depending on the current condition of situation.

REFERENCES

- [1] S. I. Prohorenkova, "Security Fire Alarm: design and modeling in CADdy", magazine "Computer-precc", N 3, 1997, pp. 255-260.
- [2] D. Kochkar, A. Porubyansky, A. Orekhov. Designing infrastructure terrestrial system monitoring a forest fires // Radio electronic and computer systems. - 2012. - № 6 (58). - P.197-201.

- [3] Patrick S. McCormick, James P. Ahrens "Visualization of Wildfire Simulations". IEEE Computer Graphics and Applications. March/April 1998, pp. 17-19.
- [4] V. Titova. Informational and analytical decision support for operational duty services // Artificial intelligence - Donetsk Institute of Artificial Intelligence, 2006. - № 4 - P. 504-509.