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Case study on a performance-based approach to wildland-urban interface (WUI) fires

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Abstract

The PBD approach in building fires is very often based in fire scenarios simulations, allowing to evaluate the effectiveness of the egress design and the fire protection means. This is normally an interactive process in which several fire protection strategies can be tested through simulations. This process allows more freedom in the definition of the fire protection systems but also a scientific design validation. The same approach can be applied to WUI fire. Our case study is a 150 hectares wildland resort in Portugal, with 130 buildings and more than 500 sleeps. The terrain is located in a natural reserve nearby the sea, covered with shrubs and pines. Since it is a natural reserve, cutting or pruning trees and shrubs to lower the fire load and create firebreaks it is not an option. The closest firefighter headquarters is 45 minutes away in the fire season, when there are more tourists, so more people exposed to WUI fires. The resort will have three trailers in different locations with wildland firefighting self-protection equipment (portable pumps, etc.), a network of fire hydrants with dedicated water supply and a small team of forest fire wardens. The assessments in the preliminary design have shown that a self-protection based in standard means of detection (visual detection by employees and occupants), standard communications (walkie-talkies and mobile) and standard fire warden team management (onsite evaluation) would not be able to contain the fire until the arrival of the firefighters. The final design solution is based on an automatic fire video detection (4 clusters of 9 cameras with real time video analysis). The system is able to detect a fire in a very early stage even without direct sightline to the fire and give an alarm for human confirmation through PTZ high-definition cameras and a drone. Once the fire is confirmed, the alarm is provided to the fire warden team through a mobile application with the fire location and video live feed from the cameras and drone. To help the firefighting management, there is software that based in the location of fire and weather conditions provides a real time prevision of the fire development in the following hour with 15 minutes isocurves. That prevision is overlapped in the resort plan, with the location of the fire hydrants and real time fire wardens GPS location (using the mobile app).

Keywords: WUI, PBD, video fire detection

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