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***Đorđe M. Čolaković, MSc<sup>1</sup>***

CONFERENCE REVIEW

## **FIRE PROTECTION DEVELOPMENT TRENDS AT THE SIXTH INTERNATIONAL DITUR CONFERENCE**

The sixth international conference of the Union of Engineers and Technicians for Risk Management (DITUR), a member of the Confederation of Fire Protection Associations Europe (CFPA-E) and the Confederation of Fire Protection Associations-International (CFPA-I), comprised of associations from 60 countries, was held on 17<sup>th</sup> and 18<sup>th</sup> October in Sava Centre, Belgrade, with more than 300 participants from the country and abroad, representatives, sponsors and guests. The Conference was also attended by many participants from Dunav Insurance Company, the biggest national insurance company, that has had a years-long successful cooperation with DITUR.

Keynote speech was delivered by professor **Milovan Vidaković, PhD** who greeted the participants, after which **Boban Stevanović** from the Sector for Emergency Situation of the Serbian Police (MUP), on behalf of the main sponsor of the Conference, shortly addressed the audience. Prof. emeritus **Miroljub Adžić** from the Mechanical Engineering Faculty, the department for combustion, opened the Conference.

The main topics of this, already traditional gathering convened every second year since 2007, were: quality assessments of projects of fire engineers, tendencies in architecture, public and industrial objects, assessment of financial efficacy of projects of fire engineers, working expenses during life cycle of the fire protection equipment, occupational health and safety, how to define goals of fire engineers, ratio of fire protection levels and cost price; fire protection prevention; fire-fighting tactics in the function of available equipment; technique of insurance risks management.

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<sup>1</sup> Author of the review is a journalist with a MSc in Political Sciences

E-mail: djcolakovic@gmail.com

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**1. Srpko Adamović**, director of Department for Preventive Engineering, Risk Survey and Control in Dunav pointed out that since the beginning of this year, in respect of fire policies Dunav Insurance Company solved the total of 2.214 insured events and paid around 337 million Dinars, adding that attending the Conference is a good chance to gather knowledge and get insight into global practice in the field of fire protection. According to him, conferences of this kind are an opportunity to learn about European and global experiences and raise knowledge, which contributes to the better job performance by Dunav employees and competitiveness of this company at our market. As regards risk management, Dunav Insurance Company is ahead of other companies in our country since it not only gives special importance to this business segment in particular, but to training of employees as well, Adamović added.

**2.** DITUR is the Union of Engineers and Technicians for Risk Management in Serbia and a member of the Confederation of Fire Protection Associations Europe (CFPA-E) and the Confederation of Fire Protection Associations-International (CFPA-I). DITUR conferences are dedicated to the latest achievements in the area of fire prevention, fire-fighting tactics, novelties in fire-fighting equipment and influence of Serbian insurers on the development of technical management of fire risks. DITUR lectures may help in creation and control of standards in Serbia relative to the EU, and draw attention to the current problems of special requirements from the field of fire protection and risk management.

First day of the conference speakers, who were mostly from abroad, gave their speeches in English, while the second day Serbian experts had the floor. Since there are no laboratories for performing tests in this exact area in Serbia, experiences from foreign speakers put forward at the Conference are precious, said **professor Milovan Vidaković, PhD**, a DITUR president. This year, experts from England, Switzerland, Germany, Sweden, Egypt and other countries attended the Conference.

**3.** Of foreign lecturers, particularly interesting lectures were held by a Swiss **Toni Arvidson**, a CFPA-E director, an English **Neil Gibnis** from Morton o Match college where huge polygon for testing fire-fighting equipment and means is located, and **Katrin Jerebek** from Germany.

**3.1. Toni Arvidson** presented the role of the Confederation of Fire Protection Associations Europe:

- The confederation of national organisations primarily deals with the issues of fire protection, safety, natural hazards and other related risks. It was founded in the early seventies by a few European fire protection associations, at first for the exchange of information on fire risks, and later for the cooperation on the matters of training and creation of fire protection recommendations. The association connects nationally recognised fire and safety organisations from 19 European countries. It deals with raising knowledge on issues related to fire-fighting, fire protection, safety

and security, emergency situations and other associated risks; it encourages exchange of information on life and property protection; facilitates cooperation among members for organisation of joint programmes; encourages development of fire protection organisations in the new EU member countries - Arvidson pointed out. According to him, the Confederation boasts of significant human resources such as engineers and technicians with competencies in fire protection, safety, prevention, response in case of natural disasters and hazards, education and training, laboratory research, review and audit services.

- Our goal is to raise awareness about security and safety risks. National associations offer courses and certified training with award of the CFPA European Diploma, recognised throughout Europe. The training includes around forty fire protection and safety courses. In 2016 only, 1.337 course takers were awarded diplomas and 1.066 were awarded certificates, whilst a year before 1.207 diplomas and 882 certificates were awarded – Arvidson underlined.

Talking about the aims of this organisation, he pointed out that more than 50 different guidelines were developed and ratified, adding that all of them are posted on the CFPA-E website. As many as 36 ratified guidelines refer to fire protection, 10 to safety measures and 6 to emergency situations. The list of ratified guidelines on fire protection includes: fire protection management system, fire safety in adult foster care homes, fire safety in restaurants; fire safety in ports and marinas; fire protection in camps; fire protection at construction sites; fire protection in laboratories; waste and fuel processing and storage; fire safety in warehouses. Guidelines on emergency situations include: flood protection, protection of buildings against damages due to wind, protection against lightning strike; control of heavy snow load on roofs, stated Toni Arvidson.

**3.2.** On the first day of Conference, prof. Milovan Vidaković, PhD delivered the lecture, titled “Protection of facades against fire” He spoke about the same subject ten days earlier in Zurich and the topic was a very pressing one considering the recent fire in a London residential tower block.

Talking about standards for facade construction, prof Vidaković stated that external walls of building structures have to be designed in such a way as to: a) have satisfactory fire resistance and b) that storeys are sufficiently separated from one another to prevent possible spread of fire from one storey to another. For facade construction, materials which after installation and processing are categorised as flammable must not be used. The speaker defined a fire as a set of physical and chemical occurrences, the basis of which is the process of uncontrolled combustion, and added that the following is necessary for the fire to occur a) presence of fire loading – flammable substance; b) presence of ignition source and c) combustion speed.

Talking about experiences from foreign countries, professor Vidaković pointed out that a series of experiments on spread of fire across facades was carried out on

office buildings, factories and schools, and that the most prominent experts in this area were from Great Britain, France, Germany and Japan. Fire experiments on real models showed that the length of flame coming through a window directly affects the possibility of fire spread into upper storeys. The speaker presented equations, on the basis of laboratory tests, that can determine the height of parapet necessary to prevent fire spread from one window to another. Beside fire loading and combustion speed, vertical flame spread depends on the moment of occurrence of window cracking on the storey above the one where the fire occurred and curtains catching fire – said prof. Vidaković.

He pointed out that facade part of the wall (parapet) of massive construction and height between the openings on the storey of 1-1,2 meters cannot stop the spread of flame to upper storeys for sure.

Fire spread also depends on the following factors: a) height and width of a window (the wider window the lesser probability of fire spread); b) fire loading; c) structural solution; d) inflammability of materials used for facade construction; e) manner of fixing facade on the structure (mandatory fixing on every storey); f) non-weather stripped rift between facade and structure; g) weather conditions around facade and direct strike of wind.

When talking about the effect of materials covering the facade, it was pointed out that inflammable materials on the facade cause disastrously rapid spread of fire to upper storeys.

**3.3.** The second day of the Conference, lectures were held by the speakers from Serbia, and one of the most interesting presentations called “Innovative earthquake risk management”, that captured the most attention, received much praise but also provoked many controversies, was given by **prof. Milorad Ristić, PhD**, a former dean of the Faculty of Architecture. The professor presented the calculation that shows which parts of the Serbian National Assembly in Belgrade would be affected in case of an emergency situation caused by earthquake. An entire lecture could be summarised in a statement that earthquake as a natural occurrence represents a dangerous area in which risks can and must be managed. The professor emphasised that the structural protection against risks in structures of a great cultural, historical and artistic i.e. architectural value constituted a special field. Those building structures were constructed more than a hundred years ago, long before the introduction of appropriate technical regulations and adoption of knowledge about the possibilities of risk management against the consequences of seismic earthquakes, the speaker warned. For present day designers, the implementation of risk protection measures, not visible either from the outside or from the inside, poses a huge challenge.

**3.4. Nikola Kleut**, a years-long chief of the Belgrade Fire Brigade and a member of the management board of Ditur, gave a speech titled “Explosions of explosive mixes”.

The significance of this topic is reflected in the fact that, although gasification of residential buildings in Serbia is not wide-spread, natural gas and liquefied petroleum gas (LPG) are still present in a huge number of buildings, with all the weaknesses that lead to accidents with many casualties. There is a rising number of explosions in the industry as well. The speaker said that flammable gases were hydrogen, methane, ethane, propane, butane, acetylene and other, whereas flammable liquids were those with ignition temperature below 60°C and which evaporated easily even in the ambient temperatures. Also, for a potential cause of ignition he stated fumes that beside vapours contain tiny drops of up to 0.05mm that can float and be obtained from e.g. spray device and the like. There is also dust of combustible substances - usually less than 0,1 mm, such as dust, powder of wood, plastics, coal, sugar, some metals, fibres/flock of yarns, paper. For the occurrence of explosion, homogenous mix needs to be formed.

Powdery semi-finished products are used in many industries (wood powder, metal dusts, food is being chopped (pepper, sugar, grains etc are grinded), paper is cut hence dust is formed, rubber and plastics are grinded, textile fibres break to create flock, coal is grinded; many chemicals are in a powdery state. Domino effect occurs in the explosion of grain and coal dust – explosion creates another mix.

As regards prevention, the speaker stressed the following: a) studying explosions in the reallest possible conditions is expensive but only worthwhile, b) proper selection of location is important, c) gasification of households should be avoided (due to inadequate installation of big consumers in all conditions), d) quality and regular maintenance of gas installations is necessary, e) application of explosion suppression and f) application of architectural/construction measures. What is specially worrying is the fact that the ban of constructing structures above the gas pipeline is not observed in Serbia, which results in a trencher tearing the gas pipeline when digging for the foundation. Explosions of gas transport tanks during welding would also occur. Explosion occurs as a consequence of ignition of gas or liquid, so there is a real danger both for the fire-fighters and for the other persons in the vicinity. It is important to stress that, prior to occurrence of explosions, certain period of time for gas and air homogenisation had to pass, which leaves time for the application of gas detection, alarm and evacuation. For explosion prevention, serious scientific and laboratory work, catching up the latest literature and cooperation with similar institutions in Europe is necessary.

**3.5. Mile Jovičić**, a commander of the Firefighting and Rescue Brigade Belgrade, within the Sector for Emergency Situations of the Serbian police spoke about fighting the fire in the building in Kosovska street. In the speech called "Experiences from practice – tactical approach to fighting fire in the residential building in Kosovska 39", he stressed out that the lack of financial means for reconstruction and maintenance of older residential buildings, the construction of new ones without

implementation of fire prevention measures, progress of technique and use of new materials in contemporary construction, make the measures of fire-fighting and rescue of the people at risk in residential buildings more complex. Such fire-fighting is very complex, strenuous and risky task, that has to be defined with a clear, efficient and tactical approach. The chief of fire-fighting and rescue operation has to take into consideration all relevant factors that affect making the best decision: approaches and entrances into the structure, materials the object is made of, directions of fire spread, places where energy sources can be turned off, priority areas that have to be protected, desmoking of the structure, fire-extinguishing means that can be efficiently and safely used, water supply, as well as special hazards that can significantly affect the intervention flow and the safety of fire-fighting and rescue teams. Due to everything listed, good preparation of the management of fire-fighting and rescue teams on the first place is necessary, through continuous training, creation of fire operations maps and analyses, as well as exchange of experience in fighting fires in building structures. The author talked about experiences with fighting fires in older building structures as well as problems the fire-fighters are facing during fire-fighting operations in the structures. He emphasized that the special attention had to be directed towards intervention flow, concentrating manpower and technics, tactical approach, operating sectors and aggravating circumstances. The fire-fighting operation in Kosovska street was complex due to large number of tenants at risk, roof structure with sheet metal cover as well as large number of public utility vehicles and reporters on the site. According to author's words, past experiences showed that the implementation of fire prevention measures is of crucial importance for the fire and rescue interventions during designing, construction, exploitation, and especially during repurposing of the existing structures. The presented intervention showed how the time of free development of fire negatively affects the intervention flow. Since the fire was in a flare-up stage, with the release of large amount of heat, smoke products and rapid horizontal spread, the start of intervention boiled down to the evacuation of the people at risk and defense of adjacent structures. With the arrival of more manpower, tactical approach to fire-fighting changed from defense to "offence", to reach the centre of fire and localize it as soon as possible. This lecture showed the importance of the implementation of fire prevention measures in residential structures and how it affects the development of fire, intervention flow and the incurred material damage.

**3.6.** A guest from Ireland, **Jim Shipman**, senior business counselor "Patterson Pump Ireland Limited", held a lecture on special water pumps, as a part of reliable fixed fire-fighting network system.

Why do we need a fire pump? It is necessary in all fixed fire-fighting systems where the characteristics of water supply do not provide for the required pressure. A fire pump is the heart of such system – Shipman emphasised and listed available

standards and pump types. He stated that the majority of insurance companies encourages installation of reliable fire pumps by granting discounts to annual insurance premium. Regular maintenance is important for system reliability, hence servicing of pumps once a year is recommended, which is often a requirement of insurance companies. The author underlined the unwritten rule that almost every fire is extinguished with that last drop of water, and adequately chosen and maintained fire pump will enable that such last drop to be utilised.

**3.7. Siniša Ristić** from "Prosmart" company from Belgrade talked about the Internet connection between commanders of units participating in fire fighting operations called "Tesla box-device for reliable and safe communication". It is a protected system of information transfer between certain vehicles, that can be used very efficiently in fire-fighting units. In practice, a commander of fire-fighting brigade would have, by using the mentioned system, a computer protected connection with vehicles assigned to a fire-fighting operation.

- "Tesla Box" a dual, redundant WAN/VPN router intended for Internet traffic management. The device enables successful communication in military and police formation, and it is very useful in communication in fire-fighting formation when fire operations maps are used. The device is dual, which means that it supports two different Internet connections, and redundant, which means that duality enables connection to the same communication server through two different Internet providers/transfer ways; WAN serves for connections towards Wide Area Network (networking of users in spatially dislocated structures and within a single network), while VPN serves for connections to Virtual Private Network (extension of the existing network to users in a spatially dislocated structure) – Ristić explained. According to Ristić, the device provides exquisite security of information that are being transferred, because the encryption is carried out by means of two keys. The asymmetric key is used for encryption of a symmetric 256 bits key, with which the information that is being transferred is encrypted, and the symmetric key is changed by random selection method. Decoding of the symmetric key is carried out by the use of asymmetric key, to further decode the transferred information with a symmetric key. As he explained, the breaking of the 256 bits key, on this level of technology with available hardware solutions, is impossible for now.

**4.0.** The president of DITUR, prof Milovan Vidaković, PhD, closed the two-day Conference and invited the participants to meet again in the same place in two years. He stressed that in the next year all DITUR lectures would pay tribute to the inventions and research work of the leading figure of Serbian and global science – Nikola Tesla.

*Translated by: Jasna Popović*