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COUNCIL OF DOCTORS

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**Possible ways of defense of facilities against
blast attacks**

Official and author's review

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Budapest
2013.

THE SCIENTIFIC STATEMENT

As it was declared at the Washington NATO summit in 1999, security policy of the Alliance takes into consideration global correlations, like organized crime, terrorist acts and sabotages, as well as interfering critical infrastructure.

The turning point for engineers, scientists and researchers to stimulate them to face new challenge was the event of 9/11. Since that date all over the world several practices, methods and materials had been developed to defend buildings against explosive devices, Hungary should at least recognize the problem, admit its existence, and adapt some of these foreign solutions.

My point of view concerning my professional field is that we do not take the menace and the risk of attack seriously; we do not take technical, architectural measures to protect our buildings. We hold the society of safety engineers responsible to solve this problem and there are no architectural criteria to strengthen building structures. Originated from this, there is no national standard or law to regulate it. There is no design manual in which the risk factor of different kind of buildings' function can be found. Based on this chart designers could be state whether his building is in the danger range. In case his construction is in moderate hazard, he can select the applied material or method of protection.

Since 1996 we present in different missions and up to now we do not own comprehensive specialized instruction where the obligation of defending military camps is written down. The routine way is using only HESCO bastions so we risk our soldiers' life. We can neglect this threat in case of an attack against domestic barracks- because the risk is quite low, but not zero- but in theater this kind of incidence is frequent.

AIMS OF RESEARCH

- Examine the defense level of our built surroundings mainly government buildings, military facilities, military missions abroad and camps against terrorist blast attacks.
- Draw civil and military expert's attentions to the necessity of managing this potential threat.
- Testify that Hungary has insufficient civil or military legislation background in building regulations to defend facilities against blast attacks.
- Demonstrate different type of explosives and IEDs and foresee their development through some of well-known outrages

- Summarize characters and possibilities of procurement of this kind of explosives within civil and military circumstances.
- Collect all designing technical viewpoints to apply which are helpful in reducing terrorist threat both in new construction and in existing one.
- Enumerate so called regime measures suggested to lead in operation that serve prevention besides of designing concept.
- Organize all those points of view that can be the basis of a risk analysis what shows the vulnerability of the given facility and the necessity of its reinforcement. I present one suitable risk analysis method.
- As a Safety Engineer present the possibilities given by mechanical and electronic devices.
- As an architect demonstrate new building materials and technologies that are used in more and more countries nowadays.
- As an officer suggest utilization of defensive methods well known in civil spheres in government buildings, high security demanding sites and military bases- especially in the hardened structures.
- Expose the defensive areas that helps increase our safety level.

My study does not extend to the whole spectrum of infrastructure. My main interest is buildings of that defense human life can be saved, injuries can be avoided.

Designs of building structures are out of my research since much software are in use by structure engineers.

It was not my intention to analyze motivations of terrorism or various type of reconnaissance as a preventive defense system.

METHODS OF RESEARCH

During research of this theme I have applied general scientific methods e.g. analysis, synthesis, induction, deduction and mathematic and historical comparison. In favor of achievement of pointed goals I have studied Hungarian and foreign technical literature and up to present the unique PhD dissertation of dr. Othmár Mueller, I have used his collection of publications and books concerning explosives as a basic source. Publications of Prof. Dr. László Lukács were also determining in my work.

I have translated several English publications, STANAGS, standards, handbooks and product flyers.

I have consulted foreign experts, and colleagues working in NATO C-IED program and officers experienced at theater.

I have participated Hungarian and international conferences held on the latest explosives, its effects and methods of preventions.

Based on a contract I am working in the TÁMOP-4.2.1.B-11/2/KMR-2011-0001 project was realized through the assistance of the European Union, with the co-financing of the European Social Fund. The Óbuda University and the University of National Public Service have gained this 2-year-long project for research defense of critical infrastructure. Among others my responsible is preparing papers about characteristics of blast outrages, domestic and foreign legislations, recommendations of risk analysis of buildings as a part of critical infrastructure and proposal for enhancing defense level of buildings.

SUMMARY OF MY RESEARCH

In spite of terrorism is real threat of our surroundings still not everyone takes seriously this menace.

Chapter I

I have introduced NATO, EU and domestic strategies and legislation dealing with terrorist blast attacks. I have nominated that within armed forces which organization is responsible for fighting attacks executed by explosive devices.

I have concluded that many people deals with terrorism although from different point of view since it is complex problem netting through our life.

In Hungary lots of thesis, essays are published from this topic but most of them deal with the phenomenon of the terrorism, searching the reasons of it and concentrating to the prevention.

In the USA after the tragic event several steps have been taken in the field of fighting against terrorism. In spite of similar attacks (Madrid 2004, London 2005, Oslo 2011) have happened in Europe Hungary, as most of the European country, neglect this serious problem.

I have examined basic Hungarian laws and regulations in design of constructions and military manuals. My concern is that Hungary has insufficient civil or military legislation background.

I have found most valuable the UFC DoD Minimum Antiterrorism Standards for Buildings that shows administrative tools and prevention techniques. For materials applicable in military missions the (invalid) JFOB Force Protection Handbook gives remarkable examples. At least these two issues should be adapted for Hungarian circumstance to provide better chance in

fight against blast attacks. In favor of effective prevention laws determinative in creation and design of buildings should be reviewed. To create and publish one complex regulation, handbook would be ideal to ease the everyday work of engineers and facility managers, owners.

Chapter II

I have dealt with the tool of threat: the explosive and devices made of it. I have demonstrated physical, chemical characteristics of different type of explosives and specific gadgets in making IEDs. I have overview experiments of some well-known outrages and concluded development concerning used materials and techniques.

I have also summarized characters and possibilities of procurement of this kind of explosives within civil and military circumstances. I see necessity of applying more severe rules in controlling their production, guarding and transport. Of course we should not forget to install the latest technique of detection.

I have ordered effects that impact the structure in case of inner or outer explosion. I have evaluated the vulnerability of buildings built with various materials and technologies in function of the applied explosives. I have analyzed predicted behavior of load bearing and not-load bearing reacting to explosive loads.

Chapter III

I have summed up – in order of cost effectiveness – tools can serve increasing security and blast resistance of our buildings. Starting from administrative ones e.g. risk analysis, site selection, building layout and materials concerns. I have introduced some reinforcing methods for load-bearing (site-plate, composite wrap, fiber-reinforcement), non load bearing structures (micro-reinforced concrete, polyurea-coating) and for other elements like windows (catcher bars, louvers).

I have showed some of the wide variety of mechanical and electronic devices used in safety techniques. I have also mentioned – mainly in working mechanism – some detector devices.

To make pick up the most appropriate one I prepared charts to show different categories all these equipments.

Chapter IV

I have analyzed possible ways of prevention against outrages perpetrated most often with VBIED (Vehicle Borne Improvised Explosive Device) against military camps. As I have

mentioned before (in Chapter I.) I could not find any national regulation to defend camps. I have found an invalid Force Protection Handbook and introduced its structure and still useful prescriptions.

I have showed some military practice and new materials – developed for operational use – for enhancing security of sites. At the end I proposed that in military legislation how to get enforced these criteria and I have pointed the exact line where designing requirements should appear.

FINAL CONCLUSIONS

Previously separated terrorist acts have been widened for international phenomenon. Terrorist groups with adequate financial background, human resources and professional knowledge commit their blast actions all over geographic borders causing more and more damage. These events can happen anywhere in the World, even in tranquil surroundings.

As influence of all these tragedies international organizations try to find appropriate answer to cope with this challenge.

During my research I could not find any Hungarian either civil, nor military regulation deals with the defense of buildings under threat of terrorist blast attack. As a conclusion of this my original hypothesis proved to be true, that in Hungary not enough attention is given to this problem.

Adapting partially or entirely foreign methods, standards would lead us a significant enhancement in the field of buildings' defense.

Based on the European Council directive of the identification and designation of European critical infrastructures and the assessment of the need to improve their protection Hungary has started to draw basic rules. Along this moment, I see opportunity to speed up the process that gives us sufficient manuals.

In relation of my thesis I have translated numerous materials about this theme that are widely available. All of my work would have tangible value if it reached decision makers and convince them of necessity taking steps.

NEW SCIENTIFIC RESULTS

- 1. Through investigation and grading of NATO, EU and domestic strategies and legislation dealing with terrorist blast attacks, I have testified that Hungary has insufficient civil or military legislation background and I have made suggestions to adapt foreign regulation.**
- 2. I have evaluated the vulnerability of buildings built with various materials and technologies in function of the applied explosives. I have analyzed predicted behavior of load bearing and not-load bearing reacting to explosive loads.**
- 3. After testifying that Hungary has insufficient civil or military legislation background I have pointed the exact line where designing requirements should appear.**
- 4. I have analyzed feasibility of defense of military facilities, camps against blast attacks and its result I have determined the field of enforcing of regime measures and organizations to execute it.**
- 5. I have methodized administrative, technical solutions that serve defending buildings and military sites and I have made suggestion methods that help increase the safety level.**

RECOMMENDATIONS FOR FURTHER USE

My thesis is useful for technical-, safety-, civil protection engineers and architects. During their study they highly unlikely met these design criteria since this narrow field is not sufficiently represented in higher education.

For facility managers it is also very valuable document to get wide range solution to protect their government or 'high security demand' sites or buildings.

It is suitable to draw the leaders of Ministry of Defense and Hungarian Defense Forces' attention how urgent to take steps forward increasing defense level of our buildings and soldiers' life.

It can be a source document in preparation of doctrines, standards and other education materials for training of officers, NCOs.

It helps to teach (PhD) students at the university and it can stimulate them to choose this field of research for further work.