Physical Protection Systems and Critical Infrastructure Protection in the Czech Republic

NECESAL LUBOS, HROMADA MARTIN
Department of Security Engineering
Tomas Bata University in Zlin, Faculty of Applied Informatics
nam. T.G.Masaryka 5555, 760 01 Zlin,
CZECH REPUBLIC
necesal@fai.utb.cz http://www.fai.utb.cz

Abstract: - The issue of protection of critical infrastructure is of considerable interest, not only EU countries for several decades. However, in the context of changes in today’s world and the privatization of products and services that the state has to provide its citizens, the elements of critical infrastructure protection are changed. This paper presents systems that belong to the physical protection area and that are used in the protection of critical infrastructure element. The most commonly used systems, their brief definition and delimitation of their contribution to the protection of critical infrastructure are introduced.

Key-Words: physical protection system, critical infrastructure, protection, alarm system

1 Introduction

The matters concerning critical infrastructure have been dealt with on European level since the beginning of the second millennium. The obligatory legislative document regulating the matters of critical infrastructure protection is a EU directive 2008/114ES “On the identification and designation of European critical infrastructures and the assessment of the need to improve their protection” (hereafter “directive”) passed on December 8, 2008. This directive represents the first stage of the European programme for Critical Infrastructure Protection (EPCIP).

The Czech Republic, as a member state of the EU, implemented this directive in its legislation in December, 2010 by creating the amendment 430/2010 Coll. of the act 240/2000 Coll. (Critical Act) and determines new obligations when dealing with critical infrastructure protection (CIP).

Currently, in the context of this amendment, the process of identification and designation elements of critical infrastructure is completed. The provisions that the protection of critical infrastructure owner/operator should accept (even for European critical infrastructure - ECI, even for critical National Infrastructure - NCI) are not regulated/defined by the existing legislation (whether European or national). This article presents a system of physical protection which uses both private and public sector for protection of critical infrastructure elements.

Protection of critical infrastructure as a priority to ensure the society operational continuity from the economic and social terms is considered. The essential elements, links and streams of the state system which are the basis ability of state to achieve stability in every situation and start further development under normal, abnormal and critical conditions in operation have to ensure an observance of these functions. The specific interests in protecting critical infrastructures are as follows:

- reduce vulnerability,
- to protect people and critical resources and systems on which the existence of society is depended,
- creating conditions for prevention and ensuring preparedness to manage disruption of critical infrastructure as part of the development program,
- the security of citizens' rights to fair assistance in case of disruption of critical infrastructure and ensure their awareness of the proposed provisions to solve crisis situations, their responsibilities and how they could help in the prevention and how they should react to the situation.

To ensure all of these interests, the deployment of elements and system of physical protection could be used. The specification of these systems in the next chapters is presented.
2 Physical Protection Systems (PPS)
Physical protection in the CIP area by businesses
from commercial security industry – CSI (in some
cases, the physical protection by the owner/operator
separately is provided) is mostly provided. The
physical protection of any property (buildings,
equipment, object, etc.) combining and mutual of
these three basic components: physical protection
systems, physical security, measures regime in CSI
is created.

1. Physical protection systems – are divided
into two basic areas of mechanical barrier
systems and technical protection systems.
   a. Mechanical barrier systems in
      object concepts as the building are
      walls, roofs, floors, doors and
      windows objects.
   b. Technical protection systems are:
      Intruder and / or Hold-up Alarm
      System (I&/orHAS); Security
      Camera System (CCTV system,
      CCTV surveillance system); Fire
      alarm system (FAS); Access
      Control System (ACS); Mechatronics System.

2. Response team/activity - can be carried out
   by own resources, security, private security
   service employees or by police or army.
   This type of protection is expensive but
   very active and effective. Core is a response
   of a human element to impulses related to
danger / security disruption / object
   protection such as: breaking in,
technological breakdown etc. Impulses for a
   response team reaction are carried out by an
   alarm system.

3. Regime protection/measure – consists of a
   compilation of administrative and
   organization measures for securing
   protected interests and values. Generally
   considered the most important are:
   a. Input and output mode of persons
      and vehicles that the access control
      of employees, clients, visitors and
      foreigners to the building and its
      parts, control of persons and
      vehicles leaving the building, the
      eligibility of objects and materials
      exporting is included. Mode
      movement of employees in the
      building that the designation of part
      of the building with restricted
      accessibility for employees to
designation membership of a
      particular premises, workplaces, etc.
      is included.
   b. The procedure for receipt, storage,
      moving expenses materials
      according to the material and
      shipping arrangements is
      determined. The property against
      theft, damage and degradation is
      protected by this procedure.
   c. Operating mode by which the
      smooth and safe operation and
      activities in emergencies is ensured.
   d. Key operation mode by which the
      marking, assignment, transfer keys,
      their mode of application,
      production of spare keys,
      replacement locks in important parts
      of the building, etc. is determined.
   e. The operating mode that with the
      operation of technical protection
      systems is connected.

2.1 Function of PPS
In connection with the use of a complex system of
physical protection three main functions of these
parameters and its subsystems are considered:
   Detection - intruder detection using technical
   protection devices (AIR, PIR, MW Bistatic,
   Monostatic MW, dual sensor ... etc.) and verify the
   alarm information using a camera system (CCTV),
   parameter - the probability of correct detection, the
   time required for verification of alarm information
   and the probability of successful communication.
   Delay - slow intruder using mechanical barrier
   systems (fences, gates, grilles, security doors,
   windows and other) parameter - breakthrough
   resistance.
   Response - response of physical security of
   buildings - prevention, interruption or arrest of the
   intruder using the regime measures, parameter - the
   time required to transfer physical security from
   point A to point B.
   These basic functions are useful consequently
   and formulate the structure of the physical
   protection of elements of CI significantly.

2.2 Mechanical Barrier Systems (MBS)
The term MBS mean all the mechanical elements
and components that make violent intrusion difficult
for perpetrators into the protected space. Mechanical
protection is a set of mechanical and technical
equipment, facilities and components that by their
structure or mechanical strength prevents intruders their easy overcoming. Each barrier system is beatable, however it differs in time that the offender has to spend in overcoming it, especially the amount of spent energy, time and technical level of tools or instruments for overcoming them. MBS are the basic structural element of building security from which other concept of protection is further depended. MBS is divided into three categories according to the subject, object or a perimeter.

The concrete MBS are as follows: safety locks, grilles, security film, security and toughened laminated glass, safe, safety deposit boxes.

2.3 Intruder and / or Hold-up Alarm System (I&HAS)
I&/orHAS was earlier called as Electronic Security System in the Czech Republic. Alarm system can have a function as an Intruder Alarm System (IAS) or Hold-up Alarm System (HAS). Mostly it combines both these features together so that we talk about Intruder and Hold-up Alarm System (I&HAS). Intruder Alarm System is an alarm system designed to detect and indicate the presence, entry or trial of entry of an intruder into guarded areas. Hold-up Alarm System is an alarm system that allows purposeful creation of alarm situation if attack comes.

The purpose of a security alarm and emergency systems is to increase the safety / protection of guarded objects / items against theft, damage, attack, etc. It should be noted that I&HAS only "detects indicates signals and transmits the information" however is not able to implement action against perpetrators of such crime. Therefore, it is necessary to establish on the I&HAS components of physical protection to implement a robust.

By combination of the I&HAS and MBS it is possible to extend the possibilities of intrusion detection of the protected area / object etc., to the level of the pre-alarm. Namely the state where it could be highlight on physical protection component of non-standard situation and thus to prepare it for possible intervention even before the perpetrator for example enters the building. This option is significant by I&HAS higher security levels.

I&/orHAS is usually composed of at least the following components: control panel (with backup power supply), detectors, signal elements (equipment) and elements for the transmission of alarm information. The current systems manage well the problems of false alarms and allow the remote management and integration with other systems of technical protection.

In the field element protection of CI it is possible to use I&HAS mainly in property crime prevention and protection against terrorism. In these areas risk of critical infrastructure facility could be minimized to a minimum by appropriate combination with other alarm systems. By deployment of I&HAS could be eliminated internal and external risks disruption of CI associated with human influences.

2.4 Security Camera System (CCTV system, CCTV surveillance system)
There is still used the old name "CCTV system" or "CCTV surveillance system in the Czech Republic. Abbreviation CCTV means Closed-circuit television. This technology has almost not been used yet. Security Camera Systems underwent huge development in recent years - in the acquisition, processing, transmission as well as store visual information. The main contribution to this has the IT branch with which are the Security Camera Systems more and more interconnected in recent years.

Security Camera System includes a minimum: cameras, imaging and other additional equipment needed for signal transmission and in monitoring the operation defined zone, scene, space. Today Security Camera System for example is able to detect the offender, deferred object, etc.; alert service, store and transmit information to other alarm systems, etc.

Camera systems can significantly contribute to the protection of critical infrastructure against property crime, terrorism, technological accidents and also natural disasters. CCTV systems are deployed ideally in combination with other alarm systems, especially with I&HAS and ACS which can compensate some of their weaknesses and extend their capabilities appropriately. By deploying camera systems it is possible to eliminate the risk of security breaches associated with both CI human influences and technological accidents or natural disasters.

2.5 Fire alarm system (FAS)
The basic task of FAS is early detection of the primary symptom of fire, reporting the event operation of the system, warning of the risk incurred and the activation of other fire safety devices that prevent the spread of fire, making it easier to dispose of or carry out the self-destruction. Another task of FAS is the detection of alarms / forwarding
information on the fire people who may be in the building threatened by fire. FAS is the only system of technical protection which reports directly to national supervision under the Law on fire protection.

The usage of EPS is in the field of protection of element CI against the risks associated with technological and industrial accidents and terrorist attack. Therefore, they can provide some protection both from some internal and external risks.

2.6 Access Control System (ACS)
The main aim of ACS is management, control and protection of access to sections, objects and their individual parts. Each person is allowed or denied access to such guarded areas on the basis of various identification signs. The identification of the most commonly used access cards, chips, tokens or biometric data. ACS decide on the basis of access rights which are assigned to the person. These rights allow it, or not allow transit through the access interface (doors, turnstiles, gates, barriers, etc.). Such a passage, but his attempt is recorded in the ACS software. ACS collaborates with other technical systems of protection.

By using the ACS it is possible to protect persons, property both inside and outside of the protected area, information, and it especially against property or other crime, terrorism and other acts of violence. ACS thus reduce the risks associated with both some internal and external challenges of CI elements and systems.

2.7 Mechatronics System
Mechatronics is the combination of Mechanical engineering, Electronic engineering, Computer engineering, Control engineering, Systems Design and engineering to create useful products.

Mechatronics System (in the commercial security industry) uses a combination of mechanical barrier system and Alarm Systems as an integrated complex. Among the Mechatronics Systems belong especially electronic locking doors, barriers, turnstiles, combined electromechanical (electromotive) locks and lock systems, electronic door openers, and a combination of sophisticated extensions using IT and other technical systems of protection.

As already mentioned, mechatronic systems, in combination with alarm systems (I&HAS and for example, ACS) or as separate elements, systems of technical protection are used. It means that the usage in the field of protection of elements CI depends on the system with that are used or other similar alarm systems.

3 Conclusion
Introduced physical protection systems to the commercial security industry are involved. The commercial sphere is mentioned. However, many of these systems to the highest degree of risk are certified. Systems that fulfill the highest safety category levels in banks, military bases, government institutions, etc. are commonly used. Therefore, there is no problem in using these systems in the CIP area on the specific elements of critical infrastructure, for example power plant, transportation system, etc.

They could be on many of these elements commonly use, the protection of buildings or facilities involved in the functioning protection of CI is mentioned. The risks associated with internal problems of CI objects (failures, accidents) and risks associated with external reasons (terrorism, natural disasters) are eliminated by PPS.

However, the requirements for such systems deployed to protect critical infrastructure element CI is not regulated by the current legislation (or technical standards used as guidelines). In practice, each CI subject solves its own security standards. In the Czech Republic subjects of energy area try to reach consensus in cooperation with the Ministry of Industry and Trade at least.

In subsequent phases of the CIP the harmonization of standards, norms and legislation in this area should be taken into account by not only national but also international entity.

4 Acknowledgements
This paper was supported by the Ministry of Interior of the Czech Republic under the Research Plan No. VG20112014067 and by the Ministry of Education, Youth and Sports of the Czech Republic under the Research Plan No. MSM 7088352102 and by the European Regional Development Fund under the project CEBIA-Tech No. CZ.1.05/2.1.00/ 03.0089 and by the Internal Grant Agency of Thomas Bata University in Zlín No. IGA/FAI/2012/010.

References:
the need to improve their protection, *The Official Journal of EU*, December 2008


