AUTOMATED PROCUREMENT SYSTEMS, COMMUNICATION NETWORKS AND INFORMATION MANAGEMENT SYSTEMS FOR PROCESSING AND EVALUATION IN HYDROTECHNICAL CONSTRUCTIONS BEHAVIOR TRACKING

PhD student Eng. Adrian Moisescu
Șef Sistem Hidrotehnic Mărăcineni din cadrul Administrației Bazinale de Apă Argeș Vedea
Email: adrian.moisescu@yahoo.com

Abstract - The paper aims to analyze, automatic data acquisition, communications networks and interpretation of risk parameters and their management within, behavior hydrotechnical constructions.

Keywords: monitoring dams, automatic acquisition systems, communication networks, information management systems for processing and evaluation, tracking behavior hydrotechnical constructions.

1. Introduction

A data acquisition system is an interface between analog world, represented by the sensors and signal conditioning blocks and the digital world, represented by analog converters and digital processing and control blocks made microprocessor.

These data acquisition systems are complex circuits, with the role to perform analog to digital conversion of one or more analog quantities, to temporary storing, transmission, processing and visualization of information acquired.

- sensors are transducers that convert physical phenomena into an electrical signal that can be measured;
- adaptive circuits for signal isolation, conversion and / or amplify the signal from the transducer;
- data acquisition subsystem (which may include multiplexers and analogue - digital);
- a computer system;
- software for data acquisition;

The essential element of a data acquisition system is the analog-digital converter, around which are grouped other analog blocks in various configurations depending on the application type. Data acquisition system is the combination of devices and programs that enable the measurement of parameters, storing their values and primary processing (graphic data), as well as staff.

Most modern data acquisition systems using a personal computer. The typical structure of a data acquisition system which is based on a PC is next and is shown in the figure below:

Plant architecture data acquisition in hydraulic constructions behavior tracking provides the following functions:
- purchase electrical quantities supplied by sensors and convert them into digital information;
- converting numerical size information engineering;
- following measurements storage and display engineering units their local computer;
Automated procurement systems, communication networks and information management systems for processing and evaluation in hydrotechnical constructions behavior tracking

- engineering exports following measurements to the local database;
- local view of the database and display risk parameters;
- database connection information center at the headquarters dispatcher;

The system measures the physical quantities relevant for risk monitoring.

Sensors are specific for each physical size mounted dam structure and the relevant areas of construction safety standpoint.

Communication system is the set of interconnected communications networks with functional links between them. The communications network is composed of nodes and point-to-point links between nodes. Each node includes one or more devices. Exchange of information between functional blocks is done through a communications network. The following are components of the communication network.

Local communications network is located at the dam and connects the unit data acquisition and processing plant in the house dam. The links are relatively short and are positioned in front of the dam.

Technologies used to support fiber optic connections are or radio channel.

Network communications between the dam and the dispatcher is located in the dam. Connects the house dam and dispatcher. Technologies used to support fiber optic connections are channel narrowband radio or satellite.

Network communication between the dispatcher and external systems is carried out on a large area due to positioning the external connection points. Make connections between the computer monitoring system parameters and risk of the dispatcher: IJSU; INFP; Owner dam officials decision, others.

Fig. 2

Fig. 3
Plant for processing data and risk assessment parameters is located at the dispatcher's planning and provides the following functions:

- accessing data for the parameters that define the behavior of the dam from the database managed using computer applications UCC and size (level, flow) collected in the dam section managed by electronic application;
- risk getting data from the computer system of the National Institute for Earth Physics;
- accessed data processing and display measured;
- calculation of risk parameters and display results from the processing of the following measurements with specific behavioral functions of each dam;
- alert persons with decision-emergency;
- data on the threshold of attention, alert and danger for the operation of the alarm system;
- data storage and preparation of summary reports.

![Diagram of the plant for processing data and risk assessment](image)

Currently, the transmission of data from instrumentation acquisition system is achieved mainly through electrical cables or extension by radio. Use of cables around the dam presents problems because large distances, rugged terrain and other factors logistics, very easily destroyed.

Using radio waves can overcome these problems but are limited due to cost and operational safety because of the many disruptions that may occur. The development of new techniques in radio, such as the transmission spectrum and lower costs can lead to their increasing use in the future.

Currently there is a low degree of standardization of the transmission of digital signals by radio waves. Therefore more intensive development of wireless data transmissions in many branches of industry, will lead to the development of standards for the format and protocols for data transmission and radio systems to lower prices. Using mobile and satellite technology will foster the development of increasingly large data transmission via radio waves.

Data acquisition can also use fiber optics. Because it is made of glass fiber-optic cable is not affected by electromagnetic interference or radio frequency interference. The most important advantage of fiber optics is the frequency that is higher transmission and lower transmission losses. In any coaxial cable or twisted-pair band varies inversely with the square of the length of the optical fiber while it only varies in inverse proportion to the length. Resulting possibility of long lengths of fiber section.

Nowadays aims to achieve mathematical models of dams and foundations, adapted complete automation, data storage of up to treat them with a model of interpretate. Such a system is used as a filter, letting pass only information showing atypical behavior or dangerous. An automatic tightening and filtering data in real time is considered theoretically feasible.
Department approached the modern world practice consists in the direct analytical investigations on a number of significant parameters using interpretative methods based methods or mathematical logic. This approach would highlight the automatic and human system can not give the best response, each separately, but together they form the most effective combination.

Management system (tracking) and warning of dangerous situations on a dam consists of four components.

UCC component (tracking behavior construction) provides the following functions:
- data acquisition relevant physical size of the risk and turn them into size computer engineering;
- displaying and storing engineering following measurements in the form of databases;
- engineering data processing and interpretation at the dispatcher in order to facilitate decision making in emergency situations;

Component AA (alarm- warning) provides the following functions:
- electronic sirens drive by radio communication channel;
- transmit warning signals and voice messages;
- recording and storing events in the system;

A warning system - alarm includes the following components: control unit, electronic siren systems and repeating. Central control system warning alarm performs the function of collecting, analyzing data and control warning system - alarming.

Component Interconnection dispatcher-ISU command center provides the following functions:
- display operational risk parameters ISU center;
- channel voice and data communication between dispatcher hydro and ISU;
- drive electronic sirens in case of emergencies at dams;

Component to alert persons with decision-emergency messages to alert the emergency situation to mobile terminals.
- display information on the mobile terminal;
- dam dispatcher communication through mobile terminals;

Fig. 5

Fig. 6
Safety is regarded increasingly more as risk management and can best be characterized as the state in which the risk to people, property and / or the environment is reduced and maintained at or below an acceptable level. (Stematiu).

Conclusion
Observations and measurements during construction and during operation are only able to reproduce an image of the actual situation of construction safety. Noting as actually required materials and different parts of the building can verify the correctness of the design and safety of the work in question.

References: