
OPERATION, MAINTENANCE AND SERVICES

Shaping our world



Operation, Maintenance and Services

For dams, hydropower plants and other hydraulic structures the planning, design and construction processes are just the first stages in their overall life cycle

The experience with various projects which, in recent decades, have progressed from construction into operation has confirmed that. In order to ensure that the performance of such facilities is reliable, economic and safe, great care is required in achieving a high quality of training for the staff responsible for operation, inspection and maintenance, and surveillance of the facilities.

Today the Owners and Operators of large hydraulic structures are confronted with a growing public awareness related both to the safety

of their dams and hydropower plants, and to the sustainability of the operational benefits they provide. This is influenced by the development of new technologies in the fields of dam construction, rehabilitation and monitoring. However, they are also facing an increasing body of obligations related to technical and legal requirements, which may nevertheless not uncommonly be accompanied by budget restrictions.

A prime requirement is that the Clients facilities should be managed, operated and maintained in a professional and efficient way, in compliance with internationally accepted standards as well as the statutory regulations or agreed rules applicable in the Clients country.

Irrespective of the level of services provided, it is normally a major objective to ensure that the responsibilities are gradually transferred to the staff of the Owners/Clients in order to strengthen the independent capabilities of the permanent operation and maintenance organisation.

For meeting these challenges, the approach developed by Tractebel is to provide services to our Clients in support of the operation and maintenance of their facilities and related activities.

The Tractebel team of multidisciplinary specialists, with a wide international background, represents an extensive resource of hands-on experience over many decades in the operation and main-tenance of large hydraulic structures and major water resource systems.

This operation and maintenance team is supported by the full complement of engineering and specialist expertise in all related fields of civil and hydraulics, geotechnical engineering, water resource management and hydropower engineering.

The services offered by Tractebel in the field of hydraulic facility operation and maintenance cover a broad range from:

- temporary consulting support to the Owner/Client on any issue related to operation and maintenance of his facilities; to
- provision of staff resources who assume full responsibility for the operation of a hydraulic structure or water resource system on behalf of the Owner/Client.



Operation

The scope of activities involved in the operation of any major hydraulic structure or water resource system is broad, and includes: the physical operation of the plant itself (including gates, valves, etc.); fundamentally important monitoring, control and communication functions utilising specialised integrated electronic systems; and the implementation and management of all necessary precautions for the maintenance of the health and safety of the personnel, the public and the environment.

Nevertheless the operation of a water resource system can also include associated technical issues such as forestry management, water quality, erosion and sedimentation problems, as well as extending to a number of other activities related to such

aspects as land administration, tourism, public relations, recreational and professional fishery, boating and inland navigation. Not all Owners or Operators have the human resources at their disposal, at least in the early years of operation, to cover all these issues.

One important key to the safe operation of hydraulic structures is the availability of easily accessible written instructions, which is already a legal requirement in many countries. In case there are shortcomings in the available operation organisation or technical material, the appointment of operation and maintenance specialists from Tractebel can be the first step to putting the operation of a facility on a sound basis.

Services

- Design of operation manuals
- Preparation of annual safety reports
- Preparation and implementation of health & safety plans
- Preparation of environmental protection plans
- Establishment of hydrological databases
- Development of reservoir operation rules
- Advice on the optimum operation of water resources systems
- Advice on the management of sediment problems
- Management of procurement of equipment and services
- Support of organisation, staffing and budgeting
- Assistance in solving technical and operational problems
- Bathymetric surveys



Inspection and Maintenance

A long serviceable life cannot be expected of any facility without a rigorous regime of inspection and maintenance. Insufficient maintenance inevitably leads to a gradual deterioration and ultimately to failure of important functions or even the entire facility. While the need for regular inspections has in general always been recognised, the application of maintenance strategies has undergone substantial changes during recent decades.

Breakdown Maintenance is performed when damage has occurred. This was the principle form of maintenance prevailing until a few decades ago. It may make sense under some circumstances, however applying this approach as the basic strategy has more disadvantages than advantages. Reliable performance of a facility cannot be guaranteed, production losses can not be planned, repairs must often be performed under time pressure or conditions of adverse supply or demand, spare parts may not be available in time, and there can even be problems with the non-availability of staff.

Modern maintenance is characterised by a preventive approach. The main goal of Preventive Maintenance is to reduce the downtime and production losses due to unforeseen failures by systematically performing the maintenance while the facility is in working order. This guarantees a high availability even though the life span of some components being replaced may not yet have reached their limit.

Inspection and maintenance programmes should commence already during the commissioning process of the facility, in order to confirm that all components of the plant have been brought into service as planned, as well as to enable the maintenance personnel to familiarise themselves with the equipment and the relevant procedures.

There are significant benefits for the performance of a facility from an early involvement of the operation and maintenance personnel, even during the concept planning and detailed design stages. This helps to ensure that the design of the facility will take into consideration the need for good access to the components and allows maintenance to be carried out easily (good „maintainability“).

The regular inspection and maintenance procedures including the management of spare parts should normally be supported by and based upon the application

of specific software tools such as a Management Information System (MIS), which can be developed for a facility by Tractebel.

Services

- Design of inspection and maintenance manuals
- Maintenance reporting system
- Planning, time scheduling and resourcing of inspections and maintenance activities
- Observing and monitoring of the commissioning process
- Recommendations for adequate stocking of spares
- Performance of inspection and maintenance of civil structure, hydromechanical, mechanical and electrical equipment
- Maintenance and technical support of control and communication systems
- Planning and management of major repairs
- Overall operational support by means of a computerised Management Information System, adaptable to Clients' needs



Surveillance, Monitoring and Training

Dams, hydropower plants and other hydraulic structures are subject to changing and adverse conditions – perhaps to an even greater extent than other elements of the modern world's infrastructure.

The performance of a facility has therefore to be closely monitored by means of inbuilt instrumentation and measurement systems. Combined with regular and thorough inspections, the recorded measurement data provide good information on the actual and complex behaviour of the dam or structure, and serve as a means of early warning of any changes that could affect the integrity or safety of the facility.

Since the surveillance of dams has become widely accepted engineering practice, a growing selection of products and monitoring techniques has become available. The hands-on experience of dam safety specialists from long established water resource

system Owners and Operators is a determining factor in the establishment of both technically correct and economical monitoring systems. Tractebel has the capability to support Owners and Operators in this regard.

The level of both skill and motivation of the engineers, technicians and labourers responsible for maintaining a dam or water resource system is of vital importance not only for effective surveillance and monitoring, but also for the goal-orientated maintenance and the ultimate safe operation of the facility.

Establishing this level of skill and motivation requires extensive and continuous training, whether in the classroom, in form of workshops, or simply "on the job", in each of which the relevant specialists of Tractebel will play a key role.

Services

- Design of dam instrumentation systems and monitoring programmes
- Specialist evaluation and interpretation of monitoring data during operation
- Establishing Geographical Information Systems (GIS)
- Establishing Content Management Systems (CMS)
- Establishing filing systems and technical documentation management systems
- Training in all relevant safety and health matters
- Specific training in all related fields like dam safety, hydraulics, hydrology, hydrometry, hydropower engineering, hydromechanical equipment, monitoring and instrumentation
- Administration and monitoring of training activities
- Reviews of training progress and status assessments



We are Tractebel

Tractebel provides a full range of engineering and advisory services throughout the life cycle of its clients' projects, including design and project management. As one of the world's leading engineering and advisory companies and with more than 150 years of experience, it's our mission to actively shape the world of tomorrow. With about 5,000 experts and presence in more than 70 countries, we are able to offer our customers multidisciplinary solutions in energy, water and urban.

Since December 2014, Tractebel Engineering GmbH (former Lahmeyer International) belongs to Tractebel and thus is part of the international ENGIE group headquartered in Paris. Tractebel (Brussels, Belgium) and Tractebel Engineering GmbH (Bad Vilbel near Frankfurt, Germany) cooperate on numerous international projects as one company.

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