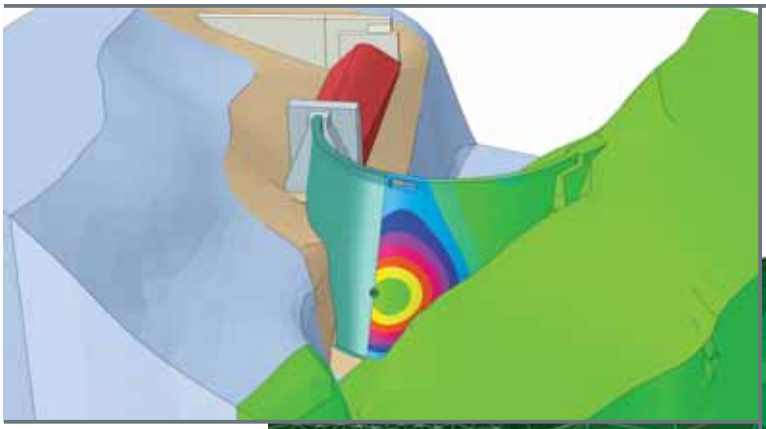
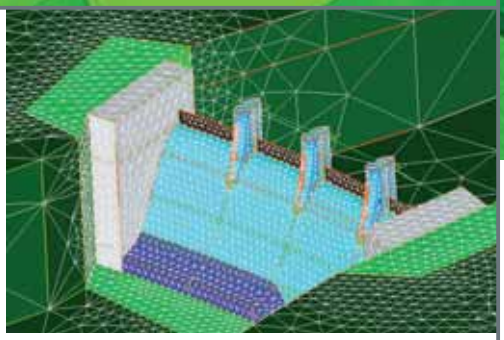
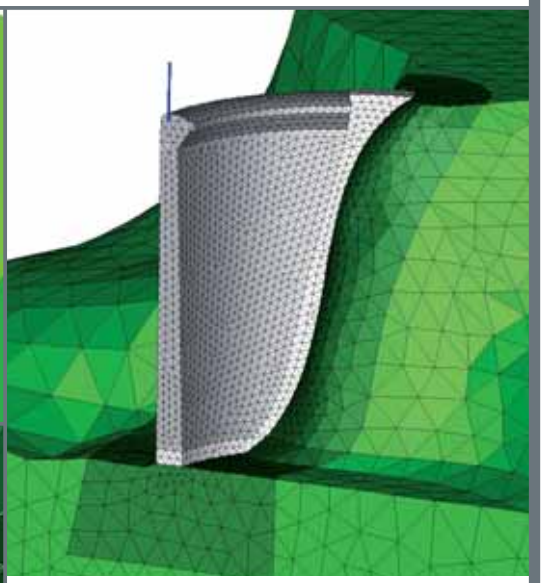
A complete Check up for any Dam

Riskless living with a complete Dam safety assessment.

CESI's Dam Safety approach – providing the best predictive models based on investigation, Hydrological and Hydraulic studies and Engineering consulting to assess Dam stability along with Operation & Maintenance Procedure – allows to develop specific and reliable methodologies suitable for any Client's needs.







CESI is a key player in consulting services related to Dam Safety, Structural Engineering, Environmental Management of Industrial Plants, Natural Risks Mitigation and Environmental Impact Assessment. CESI's services cover both new plants construction and existing plants management/revamping: from environmental impact studies and permitting to emergency and risk mitigation plans and remediation design.
Monitoring campaigns are carried out to assess air and water quality, electromagnetic field and noise pollution. Modelling techniques are applied to identify polluting sources and to evaluate the effects of different polluting scenarios.
CESI can perform seismic and static monitoring of civil structures (e.g. dams) and protection of monumental heritage, numerical analysis to verify the behaviour of the structure with operating loads and loads associated to hypothetical scenarios of interest (e.g. earthquake).

CESI

Trust the Power of Experience

Testing • Consulting • Engineering • Environment

CESI's expertise

The Dam Safety Assessment is a complete "checkup" performed time to time by experts in order to verify the real safety condition of the structure, and consequently to identify any improvement and remedial action.
Specific programs and related actions are needed to ensure the protection of the people living and working next to or at dams' downstream.
With its Dams' Safety assessment, CESI is working to define and reduce static, hydrologic (flood) and seismic (earthquake) risks for Client's dams.

CESI integrates documental analysis with onsite investigation data in order to provide the best predictive models. Furthermore it performed dam break calculations for a large number of dams (i.e. many Italian Hydro Plants) and Finite Elements Models for concrete and earthfill dams for static and seismic verification.
CESI's long time experience along with its skilled engineering team allowed to develop new methodologies to be used for any Client's needs.

The International standards require the propagation analysis of dam break flood downstream. The Italian legislation in force for hydraulic safety downstream of the dams is represented by the Italian Directive on Dams "Letter of the Presidency of the Council of Ministers n. DSTN/2/22806 of 13.12.95: Implementing provisions relating to dams," as well as by the Ministerial letter 1125 of 28/08/86 and 352, 4/12/87.

CESI's services are:

- definition of the general requirements of the project and preliminary risk classification;
- geological survey and investigation;
- hydrological studies;
- analysis of flood risk due to natural causes (definition of areas liable to flooding, etc.);
- evaluation of the artificial flood wave resulting from voluntary maneuvers of discharge outlets of a dam and from dam break;
- maximum floods calculation and hydraulic verification of spillway and outlet discharges;
- topographic / topobatimetric surveys;
- geotechnical surveys programming and execution for the dam and the foundation;
- assessment of foundation conditions / dam stability;
- analysis of operation & maintenance procedure;
- emergency actions plan.

CESI provides consulting services for the entire Assessment Analysis process and offers specialist services (e.g. investigations, measurements and monitoring systems, modeling, hydrologic and hydraulic analysis, Operation and Maintenance Procedure, risk assessment design of intervention and remedial action).

Furthermore CESI has developed GIS products able to facilitate and ensure the reliability in the tracking of flood areas and has performed Dam Assessment studies for about 30 projects over the last five years.

The introducing of new safety regulations and evolution of Earthquake risk map, with the ageing of existing dams, requires the safety reassessment of existing dams.
In the legal framework of dam surveillance in Italy, dam owners have to conduct seismic assessment studies of their dams based on the new guideline.

CESI's services supports the Clients across the whole seismic verification process by:

- seismic input definition;
- dams structural stability in seismic conditions verification;
- compliance verification with Ultimate Limit State (ULS) and Serviceability Limit State (SLS) criteria;
- dams behavior analysis based on structural monitoring system data (data are also used to calibrate the FEM);
- dam structural and geotechnical characteristics assessment by design and execution of on-site and Lab investigation;
- Clients' support in solving problems jeopardizing the safety of the dam (e.g. lowering permanently the reservoir water level; strengthening part of the dam; intervention and remedial actions).

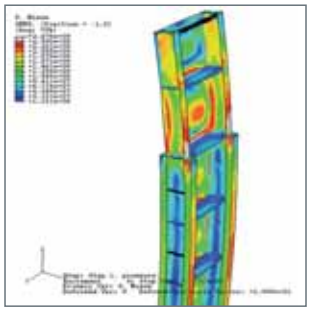
Transformer Explosion Studies

Explosion of large power transformers can be a major source of injuries/damages for the surrounding people and environment due to the sudden release of the gas energy causing:

- high peak pressure in confined spaces (very dangerous for small sites);
- high strain rates in protection structures.

CESI assess the transformer explosion effects and supports the Client in defining the strategies for damage reduction by means of:

- Analysis of transformer explosion effects in order to assess the risk level for the personnel and the surrounding equipment and structures. The use of CFD and FEM tools to analyze the explosion scenarios and the relevant structural response, makes it possible to design or upgrade the protection structures.
- Design of safety upgrade in order to improve the explosion overpressure resistance (i.e.: reinforcement design for components crossing the transformer cell boundary, cooling system, oil collecting basin, etc.).
- Overview of damage reduction strategies, also including cost/benefit evaluation for the different solutions.



The confinement design can be verified against the blast pressure pulse using real-time dynamic analysis to check the maximum stresses and strains.

CESI's Business Areas:

- Testing, Inspection and Certification services for HV, MV and LV electrical components;
- Engineering and Consulting services for power systems and markets, transmission and distribution grids, generation plants, renewable and hydro plants;
- Environmental Consulting and Structural Engineering services for Energy, T&D, Industry and Transport sectors;
- Production of Solar Cells for Space and Terrestrial (CPV) applications.

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