



## *Geosynthetics in Hydraulic Projects*

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Hydraulic structures comprise the geosynthetics market segment with arguably the largest growth opportunities. The term “hydraulic structures” includes dams and canals. Hydraulic structures interact with water, which can be one of the more destructive forces in the environment. Geosynthetics are often used to limit the interaction between the structure and water. Geosynthetics can increase the stability of the hydraulic structures.

For hydraulic structures, geosynthetics can be used to:

- Reduce or prevent water infiltration through the use of geomembranes
- Reduce or prevent bank erosion of canals through the use of geomembrane liners
- Provide drainage and/or filtration through the use of geotextiles and geonets
- Provide reinforcement for the structure’s foundation or the structure itself by using geogrids.

Geomembranes are practically impervious to water infiltration and are commonly used to create a hydraulic barrier on the upstream face of dams. The geomembranes can either be left exposed or covered up using materials such as concrete panels or rip-rap. The use of geomembranes has proven particularly useful in the retrofitting of ageing concrete dams. Exposure can shorten the life-span of the geomembrane due to UV-radiation degradation, but repairs can be made more easily than with covered geomembranes. Covered geomembranes can also be prone to damage, such as puncturing caused by the overlying and/or underlying materials. Geotextiles are often placed underneath, and sometimes over the geomembrane to protect the material from puncturing, serving as cushions to minimize stress concentrations.



Leaking dam<sup>(\*)</sup>



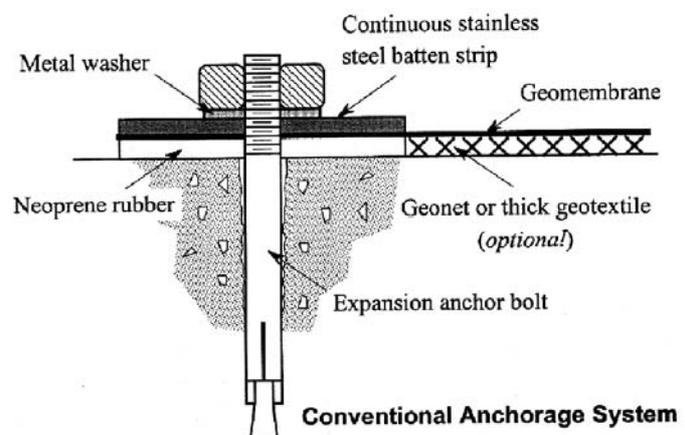
Geomembrane-lined dam<sup>(\*)</sup>

Leakage through a geomembrane occurs mainly through defects at the seam joints, and puncture holes. Generally, the defects are minimized through CQA/CQC programs at the project site. However, leakage is inevitable especially as the geomembrane begins to age. To protect the structure, geonets or geonet/geotextile geocomposites are typically used as drainage behind the geomembrane. The leak water is collected and deposited downstream through a conduit in the dam or back into the reservoir.

The geosynthetic system is affixed to the dam facing by mechanical means, often through the use of anchor bolts and steel batten strips. Gaskets and sealants are used to waterproof the connections and joints. Dams with complicated geometries are more apt to have defects at the seams and joints.



Lining the upstream face of a dam<sup>(\*)</sup>



Mechanical fastening details<sup>(\*)</sup>

The components of the geosynthetic system selected for use with a hydraulic structure are highly project- and site-specific. If properly specified and installed, geosynthetics can be cost-effective and prolong the service life of a hydraulic structure.

(\*) Courtesy of the Geosynthetic Institute (GSI).

## About the IGS

The **International Geosynthetics Society (IGS)** is a non-profit organization dedicated to the scientific and engineering development of geotextiles, geomembranes, related products and associated technologies. The IGS promotes the dissemination of technical information on geosynthetics through a newsletter (IGS News) and through its two official journals (Geosynthetics International - [www.geosynthetics-international.com](http://www.geosynthetics-international.com) and Geotextiles and Geomembranes - [www.elsevier.com/locate/geotextmem](http://www.elsevier.com/locate/geotextmem)). Additional information on the IGS and its activities can be obtained at [www.geosyntheticsociety.org](http://www.geosyntheticsociety.org) or contacting the IGS Secretariat at [IGSec@aol.com](mailto:IGSec@aol.com)

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