

# PENSTOCK+ - AUTOMATIC MONITORING OF WATER QUALITY AND REAL-TIME CONTROL

## AIRPORT GLYCOL PENSTOCK MONITORING SOLUTION

### THE PROBLEM

At airports, when low temperatures lead to freezing conditions, de-icing an aircraft is standard. Frozen contaminants can affect the aerodynamic properties of the aeroplane, and loose ice can damage engines.

De-icing fluids typically consist of a glycol-water solution containing a dye and agents to protect the metal surface.

A range of glycols is employed usually through sprayers. Classified as non-toxic; it pollutes waterways as during decomposition it consumes large amounts of oxygen, causing aquatic life to suffocate.

When applied, most de-icing fluid does not adhere to the aircraft surfaces and falls to the ground. Airports typically use containment systems to capture the used liquid to not seep into the ground and watercourses.

The Environmental Agency closely monitors how airport operators deal with spillages of aviation de-icers. This airport engineering team approached Ham Baker because, in their dispersal area, rainwater runoff enters the local waterway. Should a spillage be noticed, the penstocks that control the underground water flow would be manually operated to divert the contaminated water to a holding tank for treatment. This reaction relies on human observation and intervention.

### AIRCRAFT GROUND DE/ANTI ICING PROCEDURES SERVE THREE PURPOSES:

- Removal of any frozen or semi-frozen moisture from critical external surfaces of an aircraft on the ground before flight
- Protection of those surfaces from the effects of such contaminant for the period between treatment and becoming airborne
- Removal of any frozen or semi-frozen moisture from engine intakes and fan blades. Protection of external surfaces from subsequent contamination before takeoff.



+44 (0)1782 202 300

sales@hambakergroup.com

Garner Street Business Park, Etruria, Stoke on Trent | ST4 7BH



## THE SOLUTION

Ham Baker, recognised as the leading expert in penstock design, manufacture and installation, was approached to review the problem and deliver a fully automated Penstock Water Monitoring and Control Solution. The solution is known as **Penstock+**.

Penstock + has three parts:

1. Actuated Penstocks or Valves
2. A control panel
3. An analyser system or probe(s).

Depending on the availability of the analyser system or probe, this system can monitor most types of water conditions and contamination, examples

of a few of the monitored parameters are below:

1. Hardness & Alkalinity
2. Nutrients such as Ammonium, Nitrate, Nitrite, Phosphate, etc.
3. Organics such as Total Oxygen Carbon (TOC) & Chemical Oxygen Demand (COD)
4. Inorganics such as Chloride, Chlorine, Cyanide, Fluoride, etc.
5. Metals and Trace Metals such as Arsenic, Boron, Lead, Iron, Mercury, etc.
6. Various Chemicals

## OPERATION

The probe is inserted into the water drain point from the apron and constantly evaluates the water quality monitoring for levels of contaminants.

If the level of contamination increases in its potency above the acceptable levels, the probe triggers a signal to the control panel, which initiates the actuators to open the Penstock to the holding tank and simultaneously closes the Penstock to prevent flow into the main drain.

The actuated Penstock utilises the new S Series fabricated stainless steel technology. The holding tanks had limited height meaning the penstocks had to be mounted horizontally rather than the traditional vertical orientation. The S Series is lighter due to their new design was chosen as this weight reduction facilitated a smaller actuator enabling a quicker positive sealed closure and open of the penstock doors when triggered.

## OUTCOME

With the introduction of an automated monitoring system, Penstock+, there is no need for valuable airport engineering personnel to monitor the dispersal constantly.

Therefore, the likelihood of a spillage being missed and entering the local water table is reduced to negligible levels.

