

OXY-DEP® VSA TECHNOLOGY

Reaching new heights in Corchevel



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Change from traditional aeration

A stand-alone system of wastewater oxygenation – **OXY-DEP® VSA**

When the popular ski resort of Courchevel in the French Alps found its wastewater system could no longer cope with the huge surge of visitors in the winter, the local authority turned to Air Products. The solution was a change from traditional aeration - a stand-alone system of wastewater oxygenation – the **OXY-DEP® VSA** process – that provides a simple and cost-effective solution for industry or local authorities with the problem of recurrent overload.

A brief overview of the change

During the winter months skiers and snow-lovers from the world over flock to the famous French ski-resort of Courchevel, transforming the small idyllic village into a thronging town.

Whilst the local tourist industry has enjoyed the influx of visitors, the local waste treatment facility reached a point where it could no longer treat all of the wastewater generated in the winter season. As a result the local authority – the Syndicat Intercommunal d'Assainissement de la Vanoise (SIAV) – responsible for wastewater services in the St Bon, Courchevel and Bozel areas - decided to build a new, more modern and better-equipped wastewater treatment facility. However, with the new plant not due for completion until 2007, the SIAV needed another solution – and fast.

The answer came in the form of Air Products' OXY-DEP® VSA process, an innovative oxygen treatment system. Unlike traditional oxygen systems an on-site generator means that Courchevel and the surrounding area are free from tankers delivering liquid oxygen – an operation that becomes increasingly difficult in the crucial winter months.

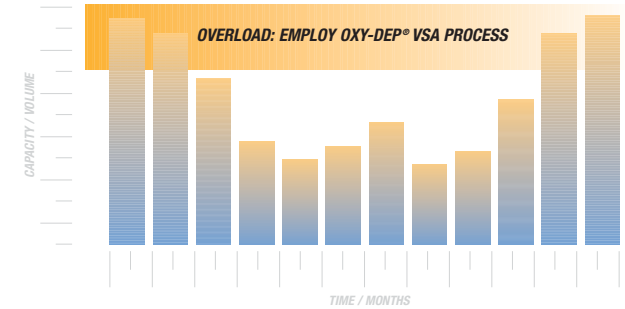
Today the facility's processing capacity has increased by almost 30% meaning it can cope with all the resort's wastewater and meet standards right throughout the year, even in the busy tourist season.

Because the system was simple to install and get running, no civil engineering works were needed, and the existing facility did not need to be modified. The OXY-DEP® VSA process therefore provided a quick and cost-effective solution to the problem before more substantial investment came through in the medium term.

A change from traditional wastewater treatment

For the last 30 years, the wastewater authority – the Syndicat Intercommunal d'Assainissement de la Vanoise (SIAV) has relied upon the Bozel treatment facility to handle effluent from the St Bon, Courchevel and Bozel areas. The facility is equipped with four basins treating biological waste and waste sludge, each with its own surface oxygenator. The facility's oxygenation limit peaks at 2,400kg of oxygen a day, the equivalent of 26,000 inhabitants. Put another way, this is enough for the summer, but not the winter - the tourist high-season - or other peak periods. To cope with this demand, the oxygenation capacity would need to be 3,180kg of oxygen a day. In other words,

Fluctuating wastewater demand



on average all the basins needed a further 780kg of oxygen every single day. The result of this under-capacity was that 30% of the flow was being bypassed to meet waste standards.



The old way

The three possible options for the St Bon facility were as follows:

1. Expand the facility, a long term plan not effective until 2007, would not overcome the problem in the immediate future
2. Oxygen treatment with oxygen stored on site, involves engineering works and still requires tanker deliveries
3. Oxygen treatment using oxygen produced on site. A new approach to wastewater aeration developed and pioneered by Air Products.

Innovation

The new way - OXY-DEP® VSA solution

The OXY-DEP® VSA (Vacuum Swing Adsorption) system is a completely new way of approaching wastewater treatment. It consists of an oxygen generator mounted on a frame, alongside a low energy mixer-oxygenator which is submerged in the basin. Installing the system is a simple operation and can be done without interrupting the normal operation of the facility. The equipment is easily maintained and can deliver dissolved oxygen into any biological basin or storage container.



Although the SIAV had commissioned a new purification plant, it was not due to open before 2007. In the meantime a technical solution was required to improve the performance of the current facility.

The challenge:

To increase the facility's treatment capacity by 30% between December and April each year.

To avoid noxious odours, given that Bozel is located in a small settlement and is immediately opposite a hamlet on the other side of the valley.

Tackling the issue of transporting and delivering liquid oxygen (which is classified as a hazardous substance), in winter was also an important factor.

Furthermore, with the treatment facility being dismantled in the autumn of 2007 at the latest, SIAV ruled out a major investment, and was keen to keep costs, as well as engineering work, to a minimum.

How the OXY-DEP® VSA process works

Because it works on demand the VSA is much more versatile than a traditional system. The generator produces oxygen at up to 90% purity from the surrounding air. This means there is no need to install a pressurised liquid oxygen reservoir which would involve expensive civil engineering work and carries with it significant security implications. The system is also mobile and easy to put into place, not to mention the fact that no planning permission is needed.

Available in three sizes – 150 and 500 litres per minute and 5 tonnes per day – the OXY-DEP® VSA process can treat around 250Kg per day, 900kg per day or 5 tonnes per day of COD respectively. The mixer-oxygenators submerged in the aeration basin operate on their own or in conjunction with the existing aeration system. Using these units linked to





the oxygen generator, the mixer stirs continuously at the bottom of the basin.

As far as a viable solution for the medium to long term was concerned, there seemed no question that this was the one.

The impact of the OXY-DEP® VSA process on the treatment system

As an effective change from traditional wastewater treatment, an on-site oxygen generation system brings a host of benefits including:

Fewer emissions: compared to air-based oxygenation systems that have an oxygen transfer coefficient of less than 20%, the OXY-DEP® VSA process lowers the amount of gas wasted by around 99%. This in turn reduces the amount of VOC, and therefore odours, emitted.

Better defence against biological impact and overload: the higher output and fast dissolution of oxygen often generates improved sludge.

This improves the wastewater facility's resistance to biological impact and overload, which, in an air-based system, tends to make the system unstable.

Increased levels of oxygen transfer to the environment: the level of oxygen transfer from an OXY-DEP® VSA process is better than 1kg/kWh. In air-based systems this rate can be achieved in clean water, but efficiency is significantly reduced in wastewater and at normal effluent temperatures.

Increased treatment volumes: pure oxygen systems enable up to 10kg of COD/m³/day to be treated; the limiting factor is often aeration. This means that overloaded plants can 'go into overdrive' whenever necessary. As a result when new plants are being built, OXY-DEP® VSA process plants can be more compact.

Quick and simple installation: the only requirement is a flat surface near the treatment basin. The VSA is easily unloaded with the help of a truck-mounted crane and a standard electrical supply is all

that is needed to get it up and running. The mixer-oxygenator can be inserted without emptying the basin; in fact the entire unit can be installed in two hours without interrupting the treatment process.

The OXY-DEP® VSA process at the St Bon / Bozel plant features the following:

An extremely compact generator with a capacity of 875kg per day (1.85m long, 1.85m wide and 1.54m high).

Two 5.5kW mixer-oxygenators.

The delivery and installation of the OXY-DEP® VSA process was completed within two days between October 11 and 13, 2004. The system started up on October 19, but not before three members of the treatment plant staff had undergone thorough training on the use of equipment.

More capacity and more flexibility

Thanks to the new system the processing capacity of the wastewater facility has increased by 30%. What's more there has been no need for investment

or modifications to the existing equipment. And, because the system could be installed and put into action easily, it was possible to carry out tests to ensure the equipment worked properly and would provide an answer to seasonal variations.

The OXY-DEP® VSA process represents a new alternative to traditional wastewater treatment solutions. As all the oxygen is produced on site, the SIAV no longer needs bulk liquid oxygen deliveries, reducing the environmental impact and risk associated with heavy tanker movements in winter. And to top it all, a monthly rental charge means that costs are fixed and are kept to a minimum.

Courchevel's OXY-DEP® VSA process has been running since November 1 2004. During the February school holidays – a peak time - the unit was in use 24 hours a day and managed to treat all of the waste coming into the plant – there was no need for any of it to be bypassed.

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