Case History: Hoechst Industrial Park STP, Frankfurt, Germany

Initial Situation

The Hoechst Industrial Park Sewage Treatment Plant in Frankfurt is the second largest industrial wastewater treatment plant in Germany. Wastewaters from a broad variety of chemical production processes are treated in a biological treatment facility.
The treatment process includes a biological high load stage, a low load stage and an intermediate clarifier. Bottom mounted jet aerators were used for aeration.

Reasons for the change to fine bubble aeration:

The jet aeration system caused severe process problems. The acceleration of the water inside of the jets resulted in excessive shear rates causing a significant loss of biomass in the intermediate clarifiers. The inefficient jet aerators required high air flow rates to achieve the required oxygen transfer. In addition to a high power bill, these high air flow rates made the off gas cleaning system (compulsory in Germany) one of the most expensive process steps. After examining various options, the operators concluded that retrofitting the plant with an aeration system which treats the sludge gently and would reduce the air flow rate was necessary.

Fine bubble aeration is known as a technology that offers low (if any) shear rates and low air flow rates. These features were essential for the choice on the aeration system. However, due to the chemicals contained in the waste water, the life time of the diffuser, the change in oxygen transfer efficiency, increased pressure loss over time, and the change of the mechanical characteristics were considered as vital criteria, too.

Pilot Testing:

The plant operators conducted extensive field tests of the most renowned brands available in Europe. Diffusers from six manufacturers were installed on test racks in both the high load and low load stages. The test installation provided the same conditions for each diffuser type. The change in pressure loss of each diffuser was monitored over a six-month period. After a few weeks it became obvious that the ceramic and porous HDPE diffusers had an unacceptably high increase in pressure loss. The porous HDPE diffuser was taken out of the test before the tests were completed due to its excessive increase in pressure loss.

After the test run was finished, additional tests were conducted on the diffusers to measure the changes in efficiency and the change of the mechanical properties of the membranes. Oxygen transfer tests and material tests were conducted with new diffusers and those which had been in operation for six months.

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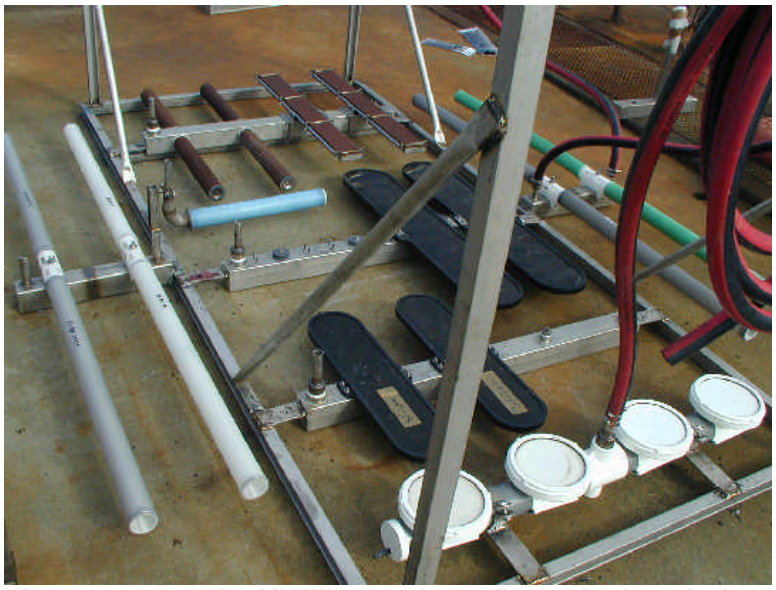

Picture 1: test rack with diffusers of OTT (long tubes), and other European diffuser technologies including rectangular plates, short tubes, discs and oval plates

The Result:

The evaluation of the SOTE test data and the physical property test data showed clearly that the OTT System GmbH MAGNUM HE diffuser equipped with the FLEX*SIL*™ proprietary silicone-based membranes achieved the best results. The FLEX*SIL*™ membranes showed the lowest increase in pressure loss, the highest efficiency and the lowest change in efficiency over the six-month period of operation.

In November 2003 the plant owners decided to use the OTT MAGNUM 2000 HE diffuser with the approved FLEX*SIL*™ membranes. In the summer 2004 the OTT aeration system passed the oxygen transfer test with an SOTE of 48%. The diffusers were set at 7.1 meters (23.3 ft) submergence with a 50% density. Start up of the aeration system was in September 2004.

Operating results exceeded expectations. Data generated during the first four months of operation was used to design the aerations system for a plant expansion scheduled for the second Quarter, 2005. Based on the operating results, OTT System GmbH of Langenhagen, Germany was awarded the design and installation contract.

OTT System technology, design and engineering services are available in North America from Hydro-Logic Environmental.

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