“ Statiflo GDS irons out the problems in Frankfurt”

Introduction

Wasserwerk Allmenfeld is a drinking water treatment plant located near Frankfurt in Germany. The plant which is owned by Hessenwasser GmbH produces around 36 mld of potable water per annum. Water is drawn from a number of 40 metre deep boreholes and is of good quality before entering the plant with very low turbidity and only trace soluble salts to remove.

Pretreatment comprises aeration of the oxygen depleted water with air to oxidise soluble iron and increase dissolved oxygen levels. The resultant water then passes green sand biological filters which remove precipitated iron oxides and biologically oxidise permanganate to acceptable levels.

The water is then disinfected prior to distribution – a very simple and effective process resulting in high quality water for public consumption.

The Problem

Apparently little to improve on then, however, historically, the aeration stage had been carried out in large oxidation towers with the air being provided by conventional compressors. In a programme of refurbishment, replacement of the oxidation towers and compressors was planned.

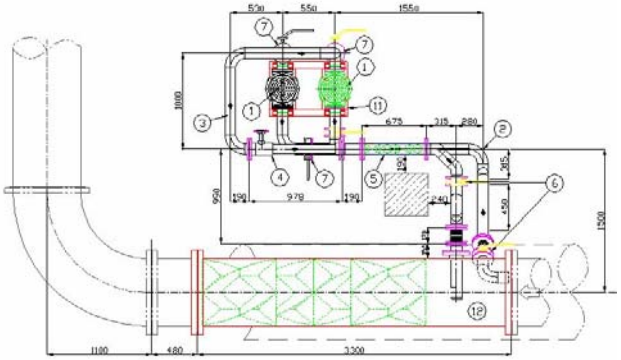
The oxidation towers were reaching the end of their useable life and the compressors (each drawing 37kW) proved expensive to run with reliability issues resulting in frequent outage. Additionally, an oxygen transfer efficiency of around 12% was considered to be a limiting factor in the effectiveness of the downstream biological manganese oxidation stage.

The Solution

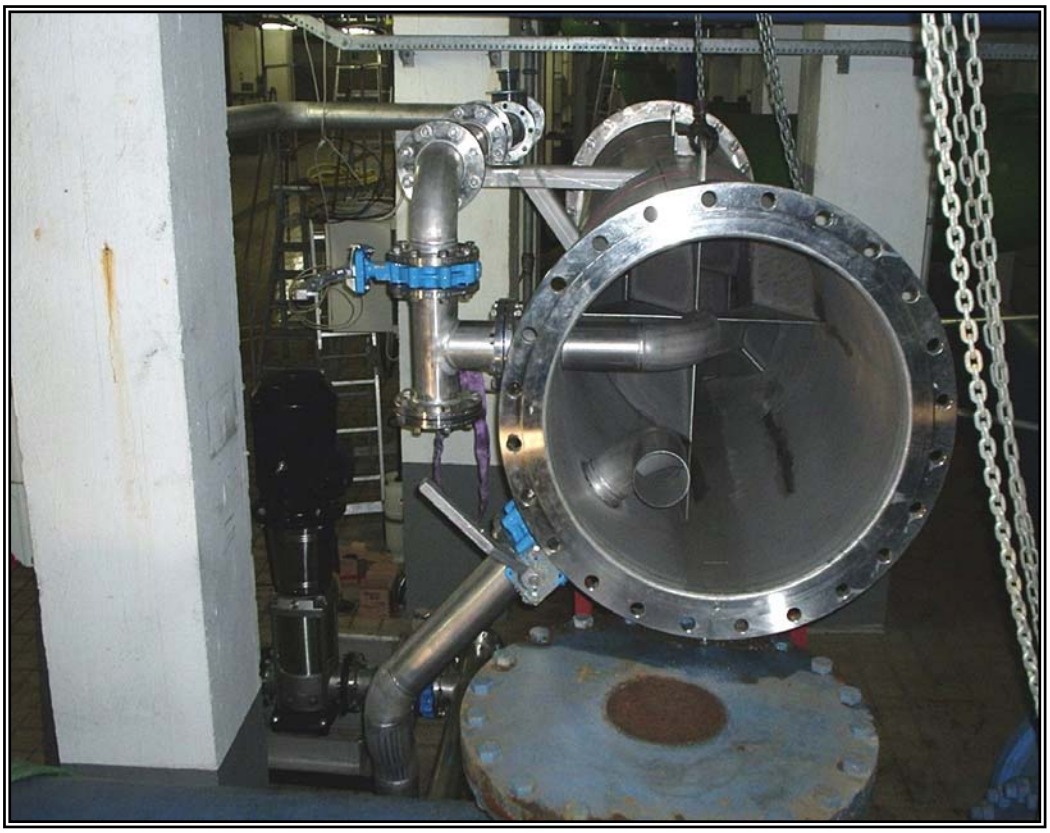
Engineers at Statiflo were asked to provide proposals to replace the ageing redundant equipment with state of the art Statiflo Gas Dispersion Systems. (GDS)

The benefits of :-

- No moving parts (other than a simple pump)
- Low power consumption (less than 15 kW)
- No maintenance
- A simple pipeline installation
- No costly pressure vessels
- Very high transfer efficiencies
- No compressors to break down
- Chemical free pre treatment



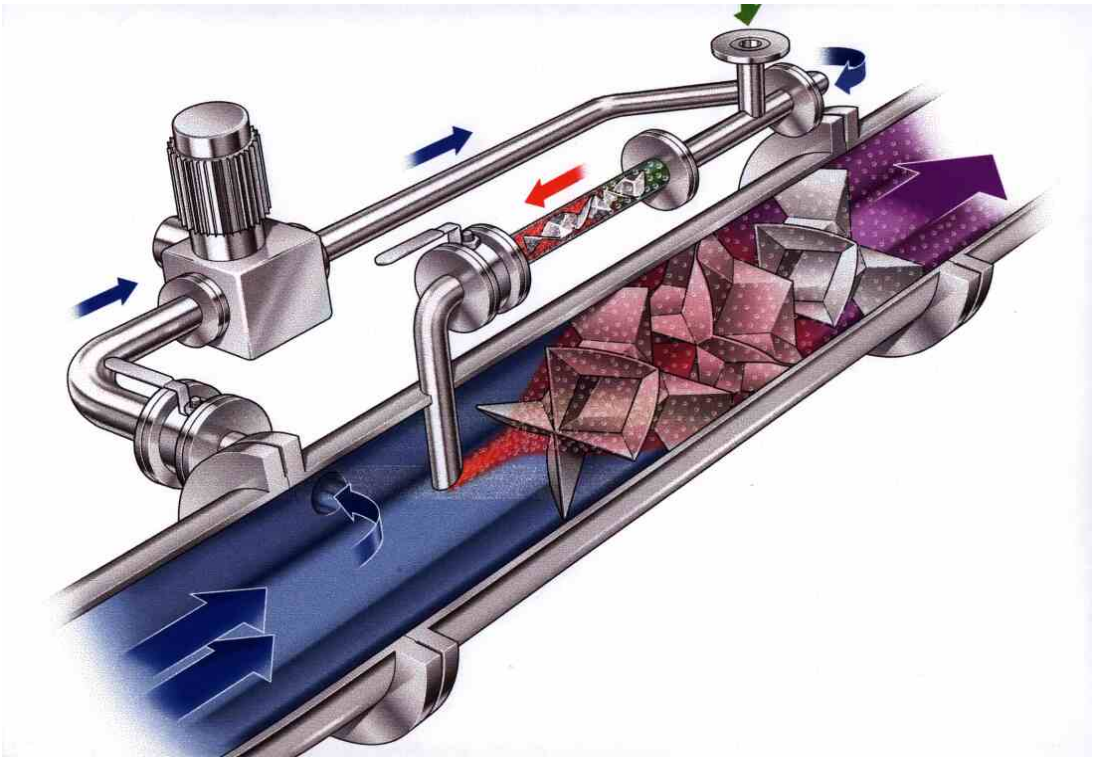
Proved too attractive for Hessenwasser to ignore and two Statiflo GDS were ordered to be installed over two separate Christmas shutdowns- January 2004 & January 2005.



The Result

The Statiflo GDS were supplied with all necessary interconnecting pipework ancillaries and valves required for successful operation and after a complex retrofit installation (due to the location of existing plant) were successfully commissioned.

In service, atmospheric air is drawn into the GDS by vacuum into the predispersion loop where the gas is sheared into a myriad of tiny bubbles. These micro bubbles present a huge gas/liquid surface area for injection into the main mixer contactors for intimate contact with the bulk water flow and optimum gas dissolving.



The DN 700 main contactor mixers each oxygenate between 500 to 1500 m3/hr of water and each feed four filters. There is no requirement for downstream reactor vessels or towers with all gas dissolving being carried out in line.

The performance of the Statiflo GDS units exceeds the expectation of Hessenwasser GmbH. At less than half the power consumption of the original equipment, each Statiflo GDS achieves a remarkable 67% oxygen transfer efficiency (compared with 12% previously). Due to the unique properties of the GDS, this efficiency is sustained over a 5:1 turndown in flowrate. Both iron & manganese removal have improved substantially. Water enters the GDS at a soluble iron concentration of 3.5 mg/l and exits the filtration plant at less than 0.2 mg/l. all in accordance with German drinking water directive - Trinkwasser VO.