KEE
ISSUE 1
THE SOLUTION TO WATER POLLUTION NEWSLETTER
INSIGHT

LARGEST RBC PLANT IN HONG KONG

TO BE INSTALLED BY KEE PROCESS

KEE PROCESS WON THE CONTRACT to provide ten RBCs to form the biological stage of wastewater treatment plant for a brand new residential development in Hong Kong. KEE will be working with the project engineers, Nexus and Royden Engineering Co. Ltd of Hong Kong. The first two phases of this massive project will be completed during summer and autumn 2001 with the third and fourth phases scheduled to be completed during 2002/2003.

Photograph:- Hong Kong Tourism Board

KEE Process install RBC plant for new residential development facing the Tsing Ma Bridge, Hong Kong.

The residential development is in the new territories region of Hong Kong. The development faces the Tsing Ma Bridge, which is the primary route to the new Hong Kong airport and is too remote for access to the public sewer. This highly dense residential building project will serve a population of 10,000 residents.

THE KEE & NEXUS TEAM

The KEE/Nexus team was chosen because they could offer the well-proven RBC technology to fit into the limited space available and provide the added benefit of modularising the plant construction for expansion later. Such a flexible option proved to be ideal for circumstances where it was difficult to anticipate future demands on the system. Each phase of the installation is designed to treat wastewater flow of 1200m^3/day to produce final effluent with BOD < 20 mg/litre and SS < 30 mg/litre.

The plant is designed to be located in the basement of this huge multi-storey development and is located in a built-up area where KEE already have other systems successfully employed for treating sewage and wastewater from smaller communities. ❖

THIS ISSUE

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A Case Study extract:

water & SEWERAGE JOURNAL

ARNCROACH WWTW - size does matter!

Jeremy Cox

Senior Consultant, Entec

WITHIN THE WATER INDUSTRY, many accounts are written glorifying the magnitude of the 'larger' construction projects - and rightly so! Many logistical achievements involving huge finance and massive structures are truly awe inspiring. However, what about the poorer cousin of the multi-million pound project?

Arncroach is a small farming village in the eastern region of Fife, Scotland, approximately ten miles south of St. Andrews (renowned for the birth of golf and its respected university). Like many other small communities, Arncroach has its own, now dilapidated, sewage treatment works, serving a population equivalent of 175. The existing works consisted of a storm side weir, spilling flows in excess of 2.4 litres per second, two rectangular primary settlement tanks and a percolating filter with an integral humus tank. The existing arrangement suffered from the following problems:

- Unscreened storm sewage discharge.
- Insufficient hydrostatic pressure to rotate the filter distribution arms.
- Failure to achieve compliance to the new discharge consent.
- Generally poor condition.

Various retrofits to the works attempted to solve the problem with the filter distribution arms, including the provision of a siphon to create a 'pulse flow' and the addition of 'sails' to the arm extremeties, both additions encouraging rotational movement of the arms.

An effective and economic replacement of the existing works was required. East of Scotland Water, the project sponsors, appointed Entec UK Ltd as Consultants and Project Managers to replace the works.

Initially, several treatment processes were considered, including Sequencing Batch Reactors, Biological Aerated Filters and Rotating Biological Contactors. Following analysis of the treatment options and responses from further queries, The Rotating Biological Contactor (RBC) option offered by KEE Process Limited was accepted.

The offer from KEE Process Limited comprised an inlet measurement flume, flow splitter chamber, a 30m^3 storm water holding tank, an RBC and storm water screen chamber with associated civil, electrical and ancillary works. The proposed works would also be fully automated with telemetry to reduced operational visits.

Several problems associated with the small treatment flows became apparent, which had to be overcome to ensure an effective treatment process. These problems included the inlet flume dimensions being marginally within those advised by the current British Standard; peak daily dry weather flow being almost too low to flush out any solids regardless of pipe/channel gradient and size; RBC flow control 'v' notch being choked with solids.

Several of these problems were investigated further. The choking flow control 'v' notch arose as the theoretical dimensions of a notch passing less than 1.2 litres/second (the RBC was rated at a maximum of 1.2 litres/second) was insufficient to efficiently pass solids, this resulted in a build up of solids behind the notch. Eventual blinding of the notch leads to premature overflow to the storm water holding tank. Possible solutions to this problem included:

- Increasing the internal angle of the notch (making the rate of pass through flow more sensitive to top water level).
- Providing a macerator upstream of the notch to reduce the dimensions of solids.
- Providing a non choking pump rated at 1.2 litres/second to pass flows to the RBC.

Business Philosophy that is KEE

KEE BUSINESS PHILOSOPHY is to provide solutions to wastewater treatment and this includes domestic, trade and industrial discharges. KEE are also actively engaged in maintenance, servicing and on-site operation of wastewater treatment installations. Historically KEE have focused their solutions on fixed-film reactor technology and this includes RBCs and submerged aerated filters. Both these processes are aerobic and are well proven for treating wastewater with a BOD strength of up to 2000 mg/l.

However, in order that KEE can offer solutions for all categories of wastewaters, it was necessary to have other technologies in their portfolio. This would enable KEE to tailor the solution to meet customer expectations and also provide the correct technical solution for the challenge in front of them. To acquire anaerobic and compressed air-based aerobic technologies, KEE have taken on a licence from Herding Abwassertechnik of Germany and now have fixed film anaerobic and suspended growth aerobic technologies, in addition to the RBC and submerged aerated filters. The suspended growth aerobic technologies include extended aeration and sequencing batch reactor (SBR) processes.

Herding Abwassertechnik specialise in biological treatment of industrial wastewaters with high organic pollutant concentration. Their success is based on providing high-quality reliability and customer satisfaction and the performance of their bio-reactor systems is based on a unique patented porous media. The media is compounded from hydrophilic clay and hydrophobic polyethylene.
Amongst their reference lists are organisations such as Coca Cola, Brauerei Lowenbrau, Seto Winery, Fuji Chemicals, Hoechst Guben Chemical Fibres, Mercedes Benz, Daimler Benz, BAT and many other industrial organisations involved in soft drinks, brewing, wine making, slaughterhouse and meat processing, dairy and ice cream production and chemical systems.

The industrial wastewater is treated using anaerobic reactors and/or aerobic reactors, depending on the character of the wastewater to be treated and the final effluent discharge required. KEE are now able to offer a complete range of technologies for their clients and the solution is tailored to suit the technical and commercial expectations and requirements of the customers. KEE services include evaluation, characterisation of the wastewater, proposals and supply of the system including installation and a post-installation maintenance/operation programme. The customer can choose the extent of KEE involvement in a project and if necessary KEE can offer a complete turnkey solution. ❖

An additional powered motor required for the second and third options was not a preferred economic or operational solution, leading to additiona operating and capital cost. The internal angle of the notch was increased and the final effluent monitored to assess any impact on the treatment process because of slightly higher pass through flows.

A further problem arose when the storm flows were returned from the storm water holding tank. Stored storm flows are typically returned at periods of low flows, since for centrifugal submersible pumps the flow of 1.2 litres/second is already considered a small flow to pump. Even with a restricted pump performance, the returned storm water flow would exceed the 1.2 litres/second which would eventually cause overflowing and re-circulation into the storm water holding tank. Possible solutions to this problem included:

- The use of positive displacement pumps, capable of pumping smaller flows.
- Inhibiting the pump motors.
- Inhibiting flow through the delivery pipework by valves or bushes.
- Installation of an electrical inverter on the power supply to the return pumps.

The use of inverters was the preferred solution and the first option involved additional captigal cost and the second and third options would likely have a detrimental effect on the life span of the motors.

Ideal solutions would include the reduction of typical standard dimensions of solids produced by humans, or implementing a baby boom and increasing the population of Arncroach tenfold. Both of these solutions could be discarded at an early stage due to humanitarian and political implications.

At the time of writing, the project is in a commissioning and testing period, with substantial completion imminent and successfully achieving the required 95 percentile discharge consent of:

- Suspended Solids - 30 mg/l
- Biochemical Oxygen Demand - 20 mg/l
- Ammoniacal Nitrogen - 5 mg/l

So, the next time you pass through a small country village on your travels throughout the British Isles, stop and ponder, as you might for a majestic dam, and consider the time and effort that went into the treatment of those villagers waste products. ❖

NEW PROCESS ENGINEER AT KEE

KEE Process are delighted to welcome Anselm Jacobs.

BUCKINGHAMSHIRE domestic and industrial wastewater treatment company, KEE Process Ltd, are delighted to welcome Anselm Jacobs as a Process Engineer to their team. Anselm, who has over 30 years background and experience in municipal and industrial waste water treatment is based at the company's Welsh office.

A qualified Chartered Chemist and Member of the Chartered Institute of Marketing, Anselm's early career involved development work with various process options such as extended aeration, anaerobic reactors and packaged treatment plants using fixed film technology.

Later he moved to Severn Trent Water and GLC where he operated sewage treatment plants. His flair for marketing was brought to good use at BOC where he was responsible for marketing and process engineering, using pure oxygen for treatment of high strength wastewater.

His role at KEE coincided with their signing of a license agreement for marketing the Herding Abwassertechnik anaerobic and SBR technology. One of his key roles will be to oversee the implementation of the new technology in the UK for KEE and, no doubt, he'll also get involved in promoting it! ❖

Littlecote House, Wiltshire.

15TH CENTURY HOTEL GETS 21ST CENTURY TREATMENT

HENRY VIII WOOED Jane Seymour there, Queen Elizabeth and Oliver Cromwell both resided there and the previous owner was Peter De Savary.

KEE Process designed, manufactured, delivered and installed and now operates a modular RBC plant on the estate.

KEE's management of the plant includes a once a week visit to check readings, test systems, change flow meter chart, take samples and test and generally make sure that everything is in tip top condition and running smoothly. Preventative maintenance and fortnightly de-sludging is also part of the service. ❖

East of Scotland Water Choose KEE for the Second Time

Wastewater treatment experts - KEE - are just about to complete their second project for East of Scotland Water (ESW).

The newly installed DC17 RBC system at Auchtertool, UK.

THE JOB CONSISTS of design, installation and commissioning of a domestic sewage treatment plant at Arncroach, a small village located near St. Andews, Fife. This followed from a similar project completed earlier in the year at Auchtertool less than 30 miles away.

At Arncroach, ESW were faced with consistently high levels of ammonia caused by low flow (1.2m/sec). The solution was to use packaged RBC designed, supplied and installed by KEE. Designed to produce final effluent with less than 20mg/litre BOD_5, 30mg/litre suspended solids and 5mg/litre NH_4-N. Samples taken since mid-June show BOD, suspended solids and ammonia levels consistently being better than standard set by SEPA.

KEE are now in the process of completing groundworks - new road, fencework and landscaping. They will then provide on site training for ESW operational staff as well as an operation and maintenance manual.

Project managers for the installation were Entec UK Ltd who have worked with KEE on a number of similar projects at other sites within the UK including Lodora Swiss Hotel.

These projects at Auchtertool and Arncroach show KEE's strength as solution providers. Not only able to design, install and operate projects they also offer additional sales support by training customer personnel and providing comprehensive plant operation and maintenance materials. ❖

KEE

PAS 99
Process : *IMR 512239*
Services : *IMR 517921*

BS EN ISO 9001
Process : *FM 515540*
Services : *FS 517918*

OHSAS 18001
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Specialists in Domestic & Industrial Wastewater Treatment

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