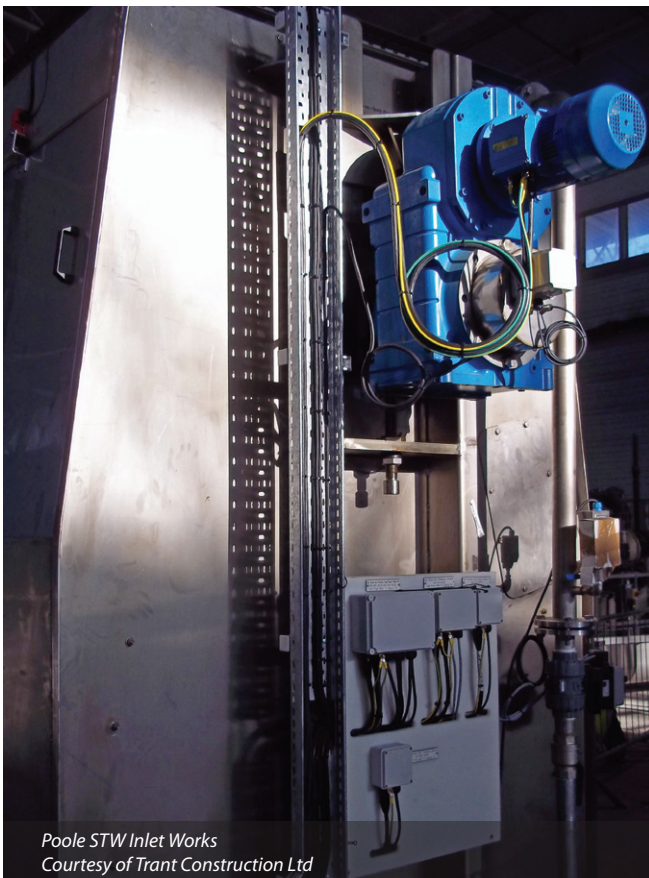


Poole STW - Inlet Works

new inlet works to prevent compliance problems

by Simon Whaley CEng FIMechE

Poole, a large coastal town in the county of Dorset has a population of around 170,000. Sewage treatment is provided at a site located approximately 1km north of Poole Harbour. The existing inlet screens and screenings handling equipment was nearing the end of the asset life, causing frequent breakdowns which regularly resulted in effluent compliance problems, caused by carry over of rag/screenings into downstream processes (e.g. BAF, UV disinfection). In October 2011 Wessex Water commenced a £2.4m scheme to replace the existing inlet works at Poole STW.



Poole STW Inlet Works
Courtesy of Trant Construction Ltd



Poole Inlet Works: CF200 fine screen installation
Courtesy of Trant Construction Ltd

Working on a live site

It was recognised that a successful project delivery would depend on the quality of liaison with the Operations team due to the inability to divert inlet flows during construction. Installation and commissioning had to take place whilst ensuring the works remained fully operational at all times, and so a detailed changeover programme was generated and agreed with all parties.

The equipment would be housed in the existing, odour controlled, covered inlet works building.

Key Partners

- Wessex Engineering & Construction Services (WECS) undertook project management, design management, operations interface, ICA and commissioning, as well as demolition and construction.
- Trant Construction Ltd, an AMP5 framework contractor for Wessex Water, were appointed principal contractor. As well as carrying out the detailed design for the mechanical,

electrical and ICA, Trant was also responsible for the mechanical & electrical procurement, installation and commissioning.

- Trant Systems Electrical (TSE), designed, manufactured, installed and commissioned the new inlet works and screenings handling intelligent motor control centre.

Inlet screens

The existing plant screened incoming flows with 6 (No.) 1,500mm wide, 6mm aperture 1D screens, situated in three channels, separated in each by a 720mm wide concrete plinth. 3 (No.) Ovivo CF200 6mm aperture 2D band screens, with a design capacity of 1,750l/s per screen, were installed to replace the existing screens, working on a duty/assist/assist basis.

By isolating one channel at a time, 2 (No.) screens were brought offline, decommissioned and removed. The replacement screen was then installed in the existing channels which were made wider by the removal of the dividing wall between each pair of old screen channels.

Due to load restrictions of the overhead crane, the screens were manufactured and delivered to site in halves to allow erection and installation in situ. The replacement screen was then commissioned and performance tested, before moving to the next channel.

Using intelligent Siemens variable speed drives, each new screen operates at two different speeds depending on the flow into the works; 34Hz (in normal operation) and 50Hz (in high flow operation). Flow monitoring is via a Pulsar *Ultra Twin* differential system. Each screen has a washwater feed to the internal spray bar and its associated launder channel, each launder channel directs flows to one of two compactors via a manual hand stop arrangement.

Kuhn compactors

3 (No.) Kuhn KWP 400/800 wash press units including a hopper were installed at an intermediate mezzanine level. Each screenings handling unit is sized to handle 8m³/hr of screenings. Each screenings handling unit is provided with a discharge pipe to deposit screenings into the receiving skip at ground level.

The new launder troughs are arranged such that, during normal operation, screenings from each inlet screen are transferred to its dedicated screenings handling unit. However, in the event of a screenings handling unit failing, screenings may be diverted to an adjacent screenings handling unit by manual operation of horizontally mounted handstops in the launder troughs. Each of the screenings handling units is provided with an inlet hopper to allow connection of one or more launder troughs.

Each compactor also requires direct washwater feed at a minimum pressure of 2.5bar; each compactor has its own dedicated local control panel.

Washwater

A duplex dual basket filter has been installed to filter final effluent washwater to 0.5mm in two dimensions, before entering the washwater booster set break tank.

A Grundfos washwater set has been installed to supply the 3 (No.) inlet screens and associated launder troughs, 3 (No.) screenings handling units and a number of hydrants on a ring main. The washwater system is designed to achieve a duty at the washwater set outlet of 35 l/s @ 4.1 barg.

The set consists of 3 (No.) booster pumps, which transfer final effluent from the break tank to the inlet works equipment and hydrants connected to the washwater mains. The pumps are variable speed driven and operate on a duty/assist/standby basis, based on the pressure in the delivery main. An accumulator is utilised to pressurise the washwater main and limit the number of stop/starts of the booster pumps.

Inlet works MCC

A new intelligent motor control centre (IMCC) based upon a form 4a Type 2 construction, utilising a certified distribution system (busbars, rated at 400 amps, fault rating 30kA/1 second), was designed, manufactured and installed by Trant Systems Electrical (TSE). The mechanical design process encompassed the clients specification, WIMES 3.01 specification, BS7671 and the requirements of BS EN 60439 (& BS EN 61439) with regards IP rating requirements, clearances and creepages, protection against electric shock, temperature rise & mechanical operations.

The Poole STW site has recently undergone a complete Siemens S7 400H control and monitoring system upgrade, therefore the new control equipment was required to interface directly with this.

The panel consisted of:

- 100A incomer.
- 3 (No.) 2.2kW VSD screen drives.



*Inlet screens installation nearing completion
Courtesy of Trant Construction Ltd*



*Poole Inlet Works: 3 (No.) Kuhn KWP wash presses
Courtesy of Trant Construction*



*Poole Inlet Works - CF200 fine screen installation
Courtesy of Trant Construction Ltd*



*Inlet works and screenings handling intelligent MCC
Courtesy of Trant Construction Ltd*

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- 3 (No.) 7.5kW reversing DOL compactor drives.
- 2 (No.) TP&N 32A feeders
- ICA section containing Siemens remote I/O PLC interface, ABB Flowmetering, and Pulsar level control.

The screen drives, compactor drives and PLC I/O were connected utilising dual PROFIBUS networks with active terminations to the existing Inlet works MCC. Trant Systems Electrical worked closely with the WECS ICA & Automation team to deliver the project to the client's requirements.

Project handover

Trant oversaw the production of Operation and Maintenance manuals from Arlosh Ltd. These are available online and on CD to the operational and maintenance team for ease of access and provide a simplified route to drill down to information required without having to leaf through multiple folders. Specialised graphics were also produced providing an overview of the inlet works in an easily digestible format for anyone without the detailed knowledge of the workings of the site.

Sequencing of the changeovers and subsequent successful reliability trials of the new equipment required very careful programme management to ensure a seamless transition from old to new equipment.

The project, completed under budget and on programme, was achieved through multi-disciplinary teamwork and close integration on and off site between Trant Construction Ltd and the WECS Project Management Team.

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