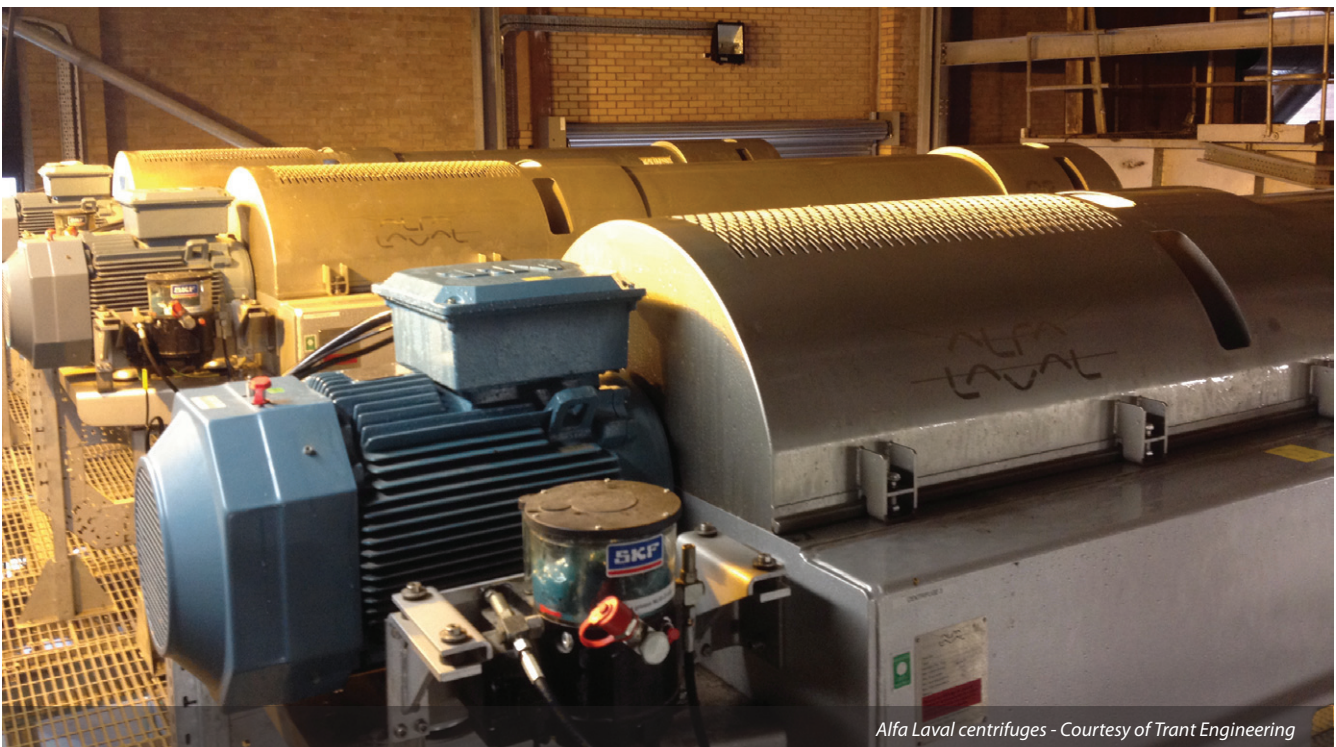


Peel Common WwTW

replacement of inlet works and upgrades to sludge dewatering facilities at a wastewater treatment works near Portsmouth

by Wayne Broadbent MEng (Hons) CEng MICE

Peel Common WwTW treats wastewater from the Fareham and Gosport catchments in Hampshire, with a total population equivalent (PE) of approximately 250,000; full flow-to-treatment limited to 1,424 l/s; total flow to the inlet works is 5,500 l/s. As part of a site-wide effort to improve odour treatment and site performance, Southern Water contracted Trant to replace the inlet works and upgrade the sludge dewatering facilities. The £5.3m project involved the design and installation of new sludge dewatering centrifuges with associated feed pumps, polymer dosing and cake handling system. The centrifuges, cake skips and centrate pipework will be fully covered with all odour treated in a new odour control system. All aspects of the treatment works had to remain fully operational and compliant throughout the 18-month construction programme as it was not practical to bypass the inlet works and logistical constraints meant off-site sludge dewatering was not viable.



Alfa Laval centrifuges - Courtesy of Trant Engineering

New sludge dewatering system

3 (No.) Alfa Laval decanter-type centrifuges, capable of processing 20,477kg/dry solids/day were installed to replace failing existing belt presses. The new dewatering system will provide sufficient capacity to dewater all indigenous sludge, reducing the risk of poor effluent quality, and additional sludge imported from other local sites, relieving the pressure on Southern Water's sludge treatment programme.

The centrifuge installation was designed to provide maximum ease of operation and the access and lifting facilities were installed in such a way to allow for easy installation of a fourth centrifuge if required in the future.

Early in the design stage Trant Engineering's design team identified an opportunity to provide multiple operational, financial and safety benefits by changing the location of the centrifuges from the proposed design. Through innovative design, close coordination with the client (and a meticulously delivered staged construction/installation programme regarding the centrifuges relocation) the following benefits were delivered:

- Eliminated health and safety concerns related to the proposed installation.
- Accelerated construction and programme delivery.
- Uninterrupted use of the existing sludge dewatering system.

Sludge feed: A complete sludge feed pumping arrangement was installed with new dedicated sludge feed pumps to each centrifuge and an installed 'standby' pump. Over 200m of new 200mm epoxy coated carbon steel delivery pipework was also installed through an existing service tunnel spanning the entire building. All of the above was installed and tested whilst the existing press feed pumps remained in service.

Polymer make-up, storage and dosing: A design, incorporating careful integration with the existing polymer dosing system and dewatering systems, allowed for the installation of a new fully automated polymer make-up and dosing system supplying two days storage capacity to be installed in the same location as the existing presses while maintaining continual polymer dosing availability. The polymer system was installed in two stages. The day

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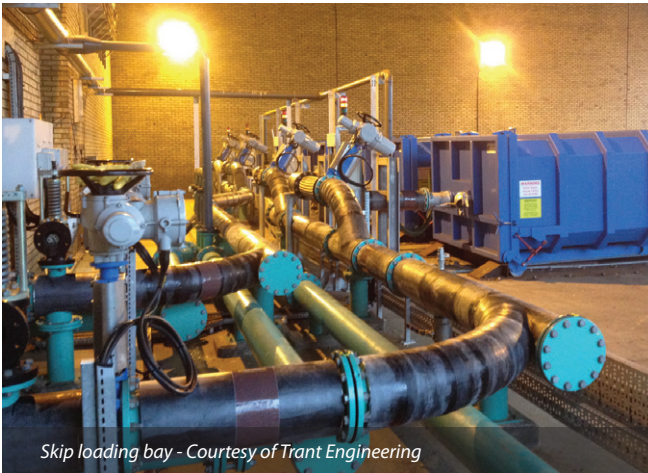
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Skip loading bay - Courtesy of Trant Engineering

tanks were installed in the first stage being fed from the existing makeup system. Once the two centrifuges were in service, the existing belt presses were removed and the new polymer make-up system was installed.

Washwater supply: To enable a sufficient FE supply to the centrifuges, polymer dosing, odour control unit and auxiliary hose points throughout the building, a three-pump booster set and local control panel were installed, providing 26l/s @ 5bar and discharging to 40m of delivery pipework.

Fully enclosed cake collection system: A cake handling system comprising of 2 (No.) fully enclosed and odour controlled, auto sequenced, RORO containers per centrifuge fed via 75m of new pipework, was installed to provide efficient removal of the cake without the generation of odour. The installation of the RORO bases and weigh cells was staggered in programme to allow the existing open conveyer system to operate prior to the removal of the existing presses.

Odour control unit: A new two-stage bio scrubber and secondary carbon filter odour control unit (OCU) has been installed within the remit of the project. The filtration unit draws and treats foul air from 3 (No.) centrifuges, centrate main, 6 (No.) RORO and liquor return manholes.

Strainpress: A new Strainpress was installed with a capacity of 60m³/hour and the ability to process indigenous and imported sludge with up to 6% dry solids content. The existing pipework and steelwork were also modified to improve operability and access.

MCC: TSE was contracted to design and manufacture the MCC required for the operation of the works, which was to be fed by means of a busbar bridge from an existing MCC. The cable entry into the MCC was is through existing slots in the concrete floor running the length of the MCC from the undercroft below, so correct design of the busbar bridge and MCC was critical.

The busbar bridge and main incomer of the MCC were installed and tested over two time-limited night shutdowns when the flows were at their lowest. This allowed installation of the remainder of the MCC to be carried out during normal working hours.

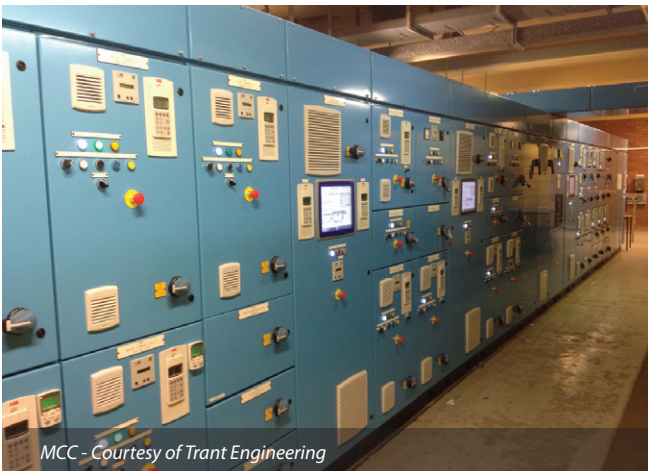
The overall length of the completed MCC was 14m, and it contained all starters for the operation of the works including the Alpha Laval centrifuges. Working closely with Alpha Laval, their schematic design was incorporated in to the main MCC. Overall control of the plant was achieved utilising a Mitsubishi Q series PLC and E1151 touch screen HMI. PLC and HMI programming, and SCADA integration was carried out by TATA Control Systems under TSE and Trant Engineering's direction.

Inlet works

The existing inlet works provided screenings of the incoming raw sewage via 3 (No.) bar raked screens. The screenings were transported to the 2 (No.) compactors via a conveyor system, which then discharged to a skip for disposal off site.

The key drivers for the works were to increase the reliability of the site, which had been impacted due to the poor condition of the inlet screens and subsequent rag build up throughout the system resulting in increased maintenance costs and potential risk to final effluent compliance.

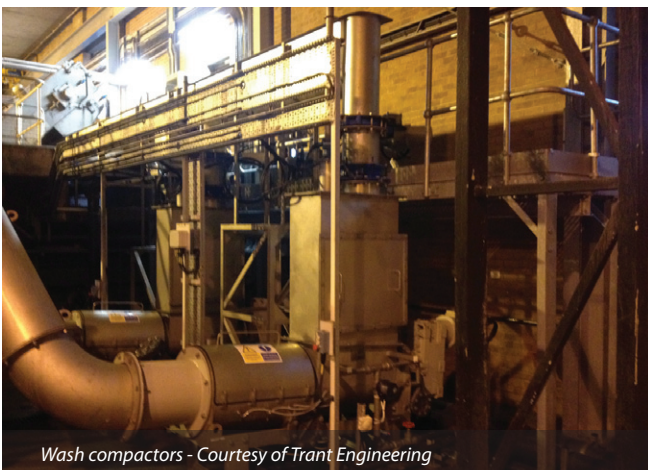
Inlet screens: 3 (No.) 6mm 2D escalator screens capable of handling a peak flow of 1,833l/s each were installed to replace the existing bar-raked screens. Working closely with the supply chain Trant designed the screens to handle the large incoming flows while retaining the robust operation and impressive screens capture rate of 79%.



MCC - Courtesy of Trant Engineering



New inlet screens - Courtesy of Trant Engineering



Wash compactors - Courtesy of Trant Engineering

Trant was able to incorporate a late change in the works design flow requested by the client. Modifications were made to each inlet channel to enable the 7m by 2m screens to pivot into place and improve access for maintenance.

New instrumentation was installed to allow the screens to be automatically controlled by the new MCC requiring minimal operator input. New Washwater pipework, electrical cabling, and handrail finished off a very neat installation.

Combined wash compactors: To efficiently handle more than 15m³/hour of screenings entering Peel Common WTW, 2 (No.) combined wash compactors (Combi-Wash) utilising a combined conveyor spiral, wash worm and compaction zone were installed to replace the existing compactors. The units were installed with automatic control with the ability to operate at increased speeds to process the increased screenings load during storm conditions.

Screenings launder: A new 30m stainless steel launder chute was installed in order to transport the captured screenings to the Combi-Wash units. The launder is fed with a new wash water connection and can discharge directly into either Combi-Wash unit.

Trant's in-house design team created a fully automated stone and grit trap chute which seamlessly connects to the existing grit removal conveyor reducing operator intervention and creating a fully automated system. A Trant-designed bespoke platform was installed to providing easy access to the full length of the launder, actuated valves and Combi-Wash hoppers allowing for much improved maintenance facilities.

Overhead gantry crane: A new 5-tonne SWL overhead travelling gantry crane was installed on a bespoke steel support frame spanning the full width of the inlet works giving operations a plethora of options when conducting maintenance tasks.

Washwater system: A complete washwater system sized to efficiently produce the required 24l/s @ 5.5Bar was installed for the sole use of the inlet works; this included a washwater booster set and a 120m-long cross-site pipe run.

The cross-site pipe run was carefully designed with special consideration given to allow safe and easy access for maintenance in an already congested service tunnel network.

Specific points relating to the contract

Trant's project team worked tirelessly to deliver a project on-time and under budget, overcoming various challenges including one of the wettest winters in 100 years and exceptionally high incoming flows during the vulnerable commissioning phase of the programme.

The optimisation of the equipment layout within the sludge dewatering building enabled a restricted area of the existing building to be utilised whilst leaving the existing plant operational as long as was required.

A strong working relationship between Trant's project team and the supply chain lead to a successful contract. SWS was so impressed with the outcome that SWS indicated areas of the installation will be used as template for further contracts during the next AMP period.

The upgrade will benefit local residents and the environment for years to come while also greatly improving the operational efficiency of the treatment works.

The Editor & Publishers would like to thank Wayne Broadbent, Mechanical Design Manager with Trant Engineering, and Deep South Media, for providing the above article for publication.

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