

Electrical services at Gloucester's Energy from Waste Plant



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In the summer of 2016 PTSG completed the full lightning protection and earthing installation works at the Severnside Energy Recovery Centre (SERC) in Avonmouth, working alongside VVB Engineering and Sir Robert McAlpine.

Given the success of the installation carried out at SERC, we were approached by Urbaser and Balfour Beatty (a joint venture referred to as UBB) to provide a proposal for a similar project in Gloucester Javelin Park, which would later turn into an Energy from Waste (EfW) project.

The Gloucester EfW plant generates energy in the form of electricity via processing and burning waste. After supplying 2.9 MW for the facility's own needs, the remaining 14.5 MW of electricity is exported to the national grid which is enough power to support around 25,000 homes. The electricity is stepped up to 33Kv through a transformer on site and passes via a substation into the local grid.

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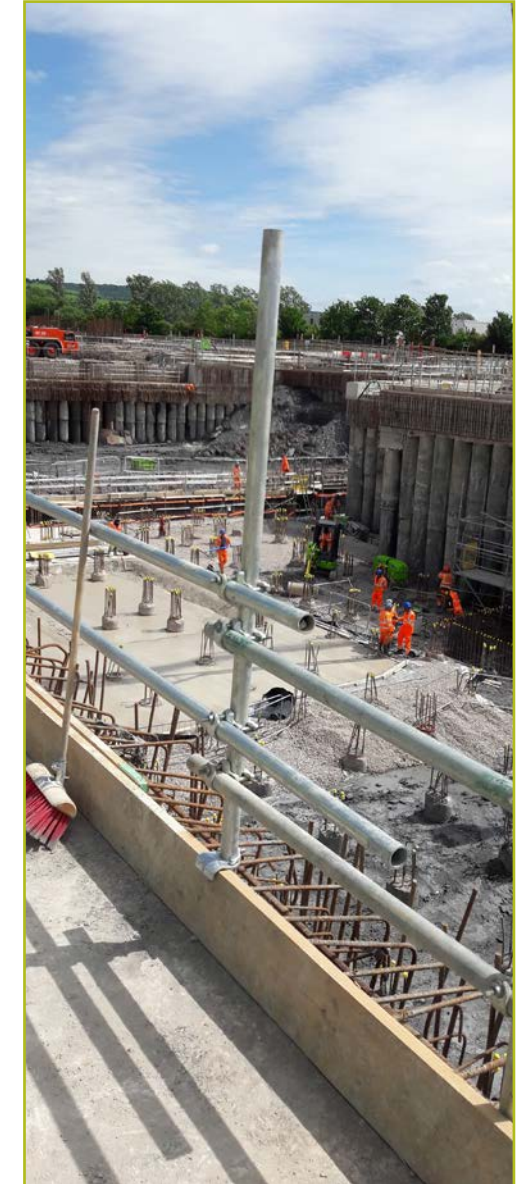
PTSG was awarded the project at the end of December 2016. During the tender stage we were able to offer guidance and advice on what could be expected when working on this type of project, given that this would be the fifth energy from waste plant worked on by the West Midlands and South West Branch of PTSG Electrical Services Ltd.

Scope of work

As the structure was primarily composed of a steel frame and metal clad, it is in essence a self-conducting building; therefore, we had to ensure that every item of metal work within the facility was suitably earthed. We started with the largest section of metal, which was the roof and external cladding, and reviewed all of the associated drawings and details to ensure there was a continuous path from roof to ground. Once that was agreed, we looked at ensuring everything at roof level, that was not part of the direct structure, had an electro-mechanical connection back to the steel work so that in the event of a direct strike to the isolated metal item, it had a path to earth.

In order to ensure all connections were installed, every steel connection was itemised and logged and the table updated for UBB to plot into their model.

The amount of steel framework within the facility was monumental. The amount of support steel work and secondary steel work that was required to support the internal parts of the facility was a main focal point and a big priority in ensuring that every steel column had a direct connection to the floor slab reinforcing. This was made via a dedicated copper tape, clamped and tapped connection to ensure the floor slab reinforcing and the steel work were at the same potential to ensure step and touch potential differences were eliminated.



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In order to ensure all connections were installed, every steel connection was itemised and logged and the table updated for UBB to plot into their model. There was close coordination between the concrete pourers the steel frame erectors and the UBB project managers to make sure that the connection to the floor slab was installed in time for the concrete to be poured and the connection to the steel to be made in the correct order and timing to ensure that there were no delays to any trade and more importantly to make sure it did not affect the overall contract programme.

The buried copper ring conductor was exothermically welded throughout all areas.

At the ground level and basement levels we utilised over 100 structural pile foundations as part of the overall earthing system. These were tested in isolation prior to connecting onto the ring beam, with copper tape connections being made onto the reinforcing bars prior to the concrete being poured. From these piles there were connections coming out to be extended up through the pile cage onto the main structural columns and also copper tape connections coming out sideways to the external buried copper ring conductor which also formed part of the overall earthing solution.

The buried copper ring conductor was exothermically welded throughout all areas, which involved a lot of input from all parties to ensure the hot works were done safely and correctly. Given the complexity of the design and the amount of connections that were being welded onto the ring tape, there were hundreds of welds that were all built into the overall programme and documented throughout.

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Inside the facility every metal item and piece of plant and equipment was connected back to the structure via the installation of dedicated tapes to the floor slab reinforcing and metal work. Again, every item was documented and photographed with over 600 connections being made internally.

Once the main installation had been completed, the next challenge was ensuring we could test the overall earthing system accurately. Given the sheer size of the complex, this meant that we had to run our long leads out almost two kilometres away to ensure we were far enough away from the building so that the resistance value was not influenced by the natural earth of the building. We collaborated with the site team to look at the surrounding areas and agree a route. On one side of the facility, there was the M5 motorway – therefore, we were forced to run the leads out diagonally away from the facility in the opposite direction across two large fields.

Close coordination and discussions took place with the local farmers and they finally agreed to let us run our leads through their fields. However, on the day of the test we came to the second field and were quickly welcomed by a herd of Friesian cows impeding our route. The test was rescheduled for another date so that we could run out our leads so not to disturb the cows and once at our agreed test point, we carried out the calculations and completed the works.

These sort of projects come along every couple of years and you need to have a keen eye for detail on site and off. We completed our project works around December 2019, some three years after receiving the order. A real sense of achievement is felt when signing off a project so large and so important for the area.

