Winnington Combined Heat & Power Plant

Client :
Alstom Power Plants Ltd

Location :
Northwich, Cheshire

Date :
1999 - 2000

The Winnington Combined Heat and Power Plant was commissioned by Brunner Mond Ltd to provide electricity and steam for its Northwich operations. It engaged Powergen Ltd to provide and run the necessary plant. In turn Powergen Ltd awarded a contract to Alstom Power Plants Ltd for the design, manufacture, supply, civil construction and electrical erection and commissioning of the plant.

The CHP plant has a maximum electrical output of 140MW. The Brunner Mond process requires steam at two pressures: intermediate pressure at a nominal 12.5 bar and low pressure at a nominal 1.55 bar. Primary generation is from the two gas turbine units producing 80MW. The steam turbine then uses the waste heat to produce the other 60MW. There are various contingencies built into the plant to accommodate maintenance and alternative energy supplies.

BAM Nuttall was appointed by Alstom Power Plants Ltd as contractor for the civil works package of the Winnington CHP Project.

The primary areas of construction were:

- the power island
- water treatment works area
- steam turbine hall
- transformer compounds
- cooling tower foundation
- auxiliary boiler bases
- site waste water sump
- central control building
- site drainage.

As part of the contract there were a number of contractor designed elements which included: structural cladding, elements of the structural steelwork and HVAC and building services. The site area was approximately 250m x 150m with restricted access from one point.

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Power island

This area has a number of large bases, up to 250 cubic metres, with close tolerance inserts, to act as foundations for the main generation plant. A number of the pours required thermal control to prevent cracking.

Water treatment plant area

This provides water of the required quality for the boilers and treats condensate from the Brunner Mond plant as well as water from local storage.

The area required the construction of various bunded reinforced concrete bases for the storage of chemicals for the process, a building to hold the treatment plant and large below ground neutralisation tanks to hold liquids during the demineralisation process.

The building was a typical steel frame industrial unit, with a reinforced concrete floor containing numerous plinths and troughs to accommodate the plant and liquids from the process.

The neutralisation tank was constructed in a 50m x 10m x 6m deep steel sheet pile cofferdam. The construction required the placing of some 1000 cubic metres of reinforced concrete in a water retaining structure. When complete the tanks were lined with an acid resistant coating to protect the concrete.

Cooling tower foundation

A water retaining structure to support the cooling towers.

Auxiliary boiler bases

These were reinforced concrete bases and plinths. The main pours were approximately 120 cubic metres.

Site waste water sump

A large water retaining structure to hold the flows from the oily water and chemical drains. The structure was built within a 25m x 25m x 9m deep cofferdam and required the placing of over 650 cubic metres of reinforced concrete.

Steam turbine hall

A steel frame industrial building with a substantial reinforced concrete foundation to house the steam turbine generator. Nuttall designed the cladding to the building to a performance specification.

Transformer compounds

Reinforced structures to hold high voltage electrical equipment

Central control building

A steel frame building to house the control equipment

Site drainage

This required the installation of four types of drainage and a buried 160mm diameter HDPE fire main. The surface water and oily water drainage was a mix of clay and concrete pipes with sizes from 100 to 600mm, laid at up to 5m deep. The outfall was through an oil-bypass interceptor into the river. The foul drainage flowed into the local sewers. The oily water and ductile iron chemical drains outfall into the site waste water sump for storage and eventual removal by tanker.

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