



Consol Nigel

a state-of-the-art glass factory takes shape



THE NEW CONSOL NIGEL N1 factory is rapidly taking shape and nearing completion. The factory is a flagship facility which will produce approximately 400 t of glass bottles per day. Earthworks began on 18 April 2010, and the factory will be in full production by 1 September 2011. With the civil and structural work virtually complete, mechanical and electrical engineers are now working round the clock to complete the installation of the furnace, power supplies, raw material supply systems and other associated works.

THE PROJECT IN BRIEF

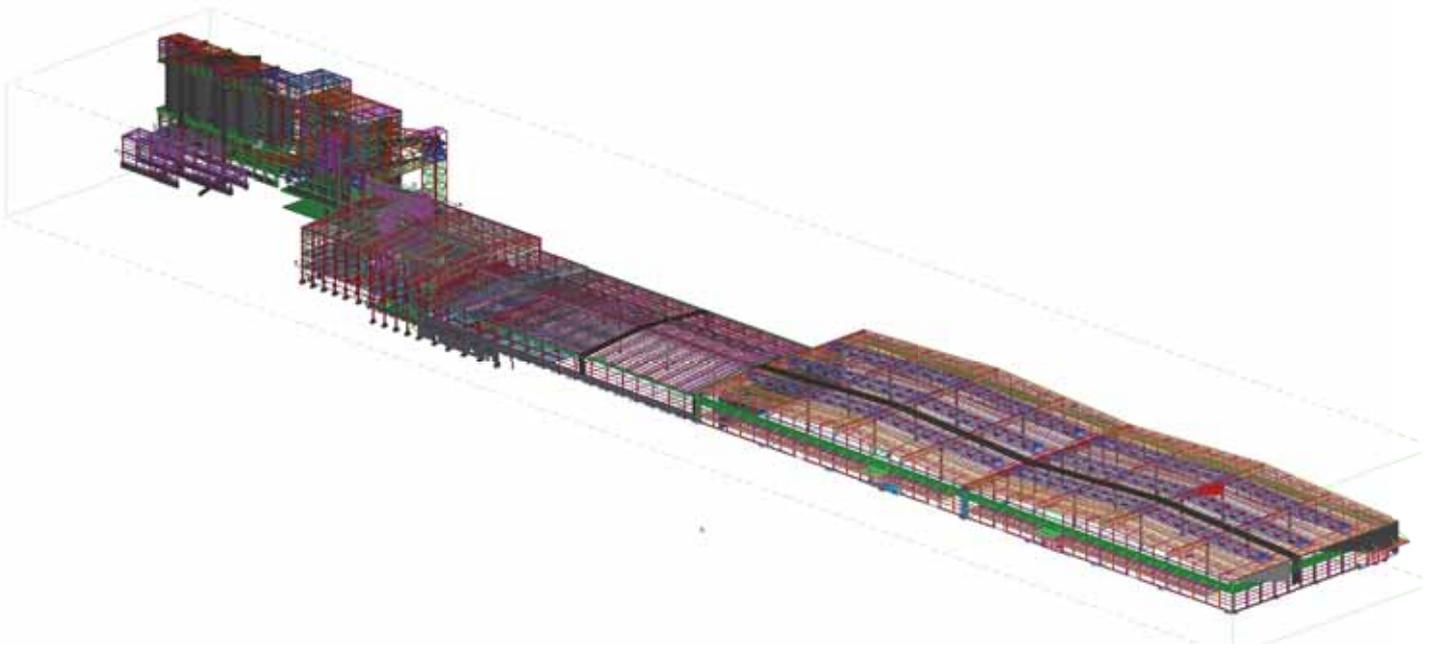
BSM Baker Consulting Civil and Structural Engineers designed all structures and civil works for the project. Tight deadlines, difficult ground conditions, numerous changes, as well as the complex mechanical and electrical systems which have to be housed in these structures, made the design and construction of this new facility particularly challenging, but thanks to the company's extensive experience in serving the glass and heavy industrial sector, a facility of an exceptionally high standard is nearing completion. The use of the latest 3D structural engineering software also assisted in addressing the three-dimensional nature of this facility during the design process (Figures 2 and 6).

THE STRUCTURES OF NIGEL

The main furnace building contains a gas-fired 400 t per day furnace. Roof trusses span 50 - 60 m to provide large open areas for machinery, while carrying under-slung gantry cranes, platforms

1 The production building and warehouse of the new Consol Nigel N1 glass factory under construction

2



3



4



and numerous services (Figure 1). Floors were designed to carry the very high loads experienced during furnace rebuilds.

Sophisticated bottle testing equipment occupies a 70 m length of the structure, where bottles are thoroughly inspected for flaws and other defects to ensure quality. Reject bottles are passed into the basement where a conveyor system recycles them. This means that there are numerous penetrations through floors, beams and walls which made structural design and draughting a process requiring meticulous attention to detail.

The batch plant has four large concrete silos for sand and soda ash, each with a capacity of 1 200 m³ (Figure 3). Additional steel silos contain a variety of ingredients and crushed glass. Mixers, bucket elevators, fans, kilometres of cabling and conveyors criss-cross this state-of-the-art raw material storage and mixing structure. It is equipped with cullet processing facilities for the recycling of glass, in line with Consol's environmental policies.

A 20 000 m² warehouse provides a storage facility for all the packaged crates of bottles. An extensive marshalling yard has been constructed to allow for the streamlined loading and off-loading of trucks as bottles are transported around the country. Administration buildings, compressor houses, substations and various storage facilities are dotted around the site, with numerous services gantries connecting them.

A hardpan ferricrete layer across the entire site in Nigel has created a perched water table. Water and earthworks have thus been a challenge throughout the project. Numerous drains had to be cut to allow the soil to drain during bulk earthworks (Figure 4). Sump pumps have been in operation continually. Also, the 500 mm of rain which fell across the 2010 Christmas holiday period flooded many areas and caused extremely muddy conditions.

AND WHAT DO THE PEOPLE GET?

The new factory will employ roughly 180 permanent workers, with some being sourced from current operations. In addition, for most of the outsourced services on site local people could be employed. The economy of Nigel is receiving a boost through

local involvement and investment. The council of Ekurhuleni has strongly supported the entire process, through the EIA application, energy supply application and other processes. Generally, their support provided the foundation for the construction process to proceed smoothly.

WHAT NEXT?

This, the first phase of the Nigel factory, is nearing completion. Design of the N2 production line will begin soon and be in operation in the near future. These two furnaces together will increase production for Africa's largest glass manufacturer by 220 000 t per year. The site has a capacity to accommodate three times the capacity of the current N1 furnace. ■

- 2 3D model of the main buildings at the Consol Nigel glass factory
- 3 The batch plant nearing completion – concrete silos house sand and soda ash, while numerous steel silos contain various ingredients and crushed glass
- 4 A hardpan ferricrete layer on the site has resulted in a perched water table. Groundwater has been a major challenge and numerous drainage channels had to be cut to assist earthworks
- 5 The N1 production building in progress – the main structures are 500 m long in total
- 6 Combined Tekla Structures steelwork and Revit concrete model of the batch plant



CONSOL NIGEL N1: CONSTRUCTION STATISTICS AND INTERESTING FACTS

Construction period	18 April 2010 (earthworks) 1 September 2011 (fully operational)
Budget	R1,3 billion for Phase 1
Structures constructed	Batch plant, production building, 20 000 m ² warehouse, compressor house, substations, numerous administration buildings, services gantries, weigh-bridge, marshalling yards, and numerous service or supply structures
Construction materials	3 000 t of steel 27 000 m ³ of concrete 200 000 m ³ of bulk earthworks 2 000 000 bricks
Furnace size	400 tons per day

PROJECT TEAM

- Civil and structural engineers** BSM Baker
- Project management** Meprotech
- Industrial architecture and ancillary project management** Capex Projects
- Bulk earthworks contractor** Roadline / Akhane JV
- Civil contractors** Abbeydale / Akhane JV, JT Son Construction
- Steelwork contractors** Churchyard & Umpleby, Omnistruct Nkosi
- Mechanical engineers** Washtech, EME, Makeway
- Electrical engineers** Marcus Kneen (Pty) Ltd

Source:

http://www.saice.org.za/downloads/monthly_publications/2011/2011-Civil-Engineering-july/#/0