

PROJECT SUMMARY

DATE	March 2017	LOCATION	Luano, Zambia
SUBJECT	Gas turbine LV Switchgear replacement		

Overview

Copperbelt Energy Corporation (CEC), Zambia owns and operates a number of Avon powered standby generators which provide emergency power to local copper mines in the event of loss of supply from the national distribution network. These gas turbines are also used for peak load control and it is therefore essential that these sets are available for operation and have high start reliability.

The Problem

The gas turbine control system had been replaced by TCL in 2004, however this project did not include upgrading the low voltage switchgear or MCC (motor control centre) boards. This switchgear had become unreliable and was suffering from obsolescence issues associated with obtaining spare parts. In particular, the DC switchgear uses 120 Vdc supplies and the heavy-duty contactors required for switching this voltage have become very difficult to source.

The Solution



Figure 1 Luano MCC panels at TCL works

TCL were contracted by CEC to replace the existing MCC boards with new AC and DC switchgear designed to the latest standards and employing the latest technology. The new boards were designed to have the same footprint as the old switchgear to simplify the installation and enable the existing field cables to be re-used. A form 4 type 2 construction was used to allow maintenance of individual drives, whilst others are still live.

The switchgear replicated all the existing drives. The AC boards utilised direct-on-line starters, whilst the DC boards used soft-starters based on the TCL SmartStart technology. The TCL SmartStart was also supplied for the RR Avon starter which has

been installed on many RR Avon and Olympus installations. The original DC starters used resistors to limit the starting current. This method not only relies on the use of 110 Vdc contactors but also puts large electrical and mechanical stresses on the drive train as the resistors are switched out of circuit. Using the TCL SmartStart not only means that 110 VDC contactors are no longer required but also the stresses on the drive components are greatly reduced.

Remote I/O, PLC modules were fitted in the boards to provide the interface with the main control system. This included starting contacts and feedback from the drives for monitoring and fault finding. The remote I/O modules were connected together on a local Ethernet communications ring which will be connected to the main gas turbine control system at site.

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The switchgear was designed and manufactured in our Leicester works and was subjected to a thorough works test. Each drive was functionally tested using suitable electric motors which allowed full and part load conditions to be simulated.

All switchgear is designed and manufactured to BS EN 61439.

As with the supply of all control equipment TCL provide a very flexible approach to the design. The switchgear is very much designed to the requirements of each client. Amongst the many options that can be accommodated are: -

- Form factor, depending upon maintenance requirements
- Pull-out or fixed drawers
- Soft-start or DOL
- Serial communications, Ethernet, Modbus etc.
- Intelligent starters

TC are able to provide LV switchgear, up to 600 Vac and 240 Vdc. This can be designed to replace existing boards or for new installations.



Figure 2 TCL SmartStart DC drives