

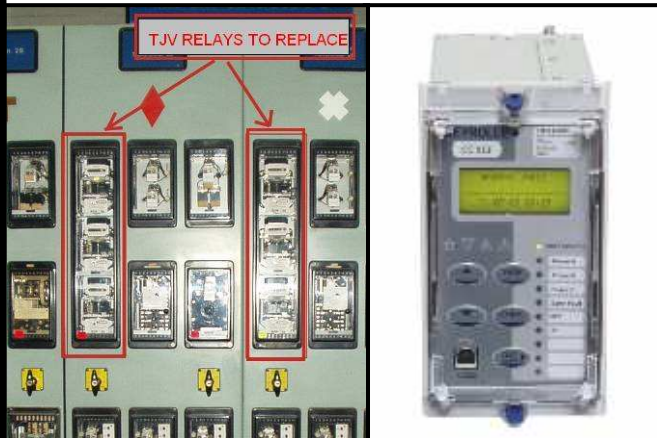
ELECTRICAL ENGINEERING SOLUTIONS FOR HIGH VOLTAGE NETWORKS

CONTRACT:	TPPS-12
SCOPE OF WORK:	LV Switchgear & Protection Relay Upgrade
END CLIENT:	Drax Power Limited
LOCATION:	Drax Power Station, Selby
DURATION:	35 days
VALUE:	£ 69,600 GBP



SUMMARY:

Drax Power Station is the largest, cleanest and most efficient coal and biomass fired power station in the United Kingdom with a generation capacity of 4000 megawatts from its six turbines, and supplies over 7% of UK's electricity needs alone. TP Power Services Ltd was asked to tender for the contract to upgrade electromechanical protection relays with modern digital equivalents in March 2011, and was awarded the contract for completion during their statutory summer outage, with seventeen low voltage panels to be upgraded, each to take less than a day in order to support other work on site. Drax engineers were impressed with the quality and flexibility of our engineers in delivering the works and extended the contract to include the repopulation of redundant equipment to be re-instated. TPPS Ltd has completed works on 20 circuits so far with further works being discussed.



PROTECTION RELAY UPGRADE:

The design specification given to TPPS required the upgrade of obsolete 'TJV' IDMTL electromechanical overcurrent relays manufactured by Reyrolle in the 1970's, with new modern, digital protection relays incorporating a 'high-set instantaneous trip' function. We elected to use Siemens Reyrolle Argus-C 7SR11 as the digital equivalent to replace the relays on seventeen 11 / 3.3 kV circuits, coupled these with RMLG tests blocks that would allow isolation, upgrade and commissioning on one circuit within one day as was requested by Drax to support their outage plan. Our design engineers worked closely with the client to ensure direct interchangeability of the relays through detailed design studies which would account for existing settings and considered any future upgrades to other relays in each panel.

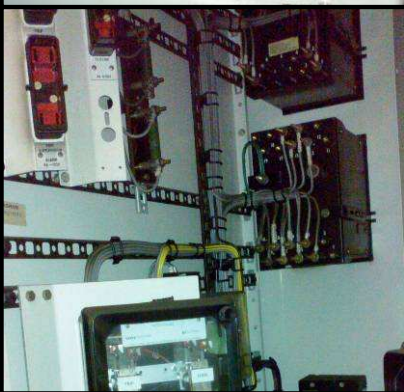
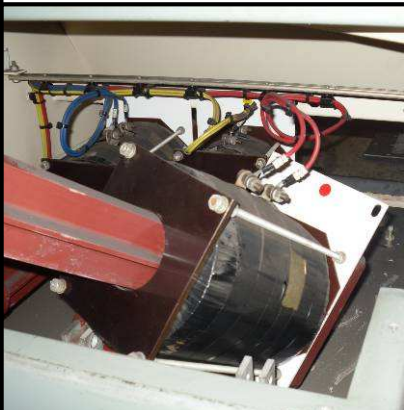
SCOPE OF WORKS:

The considerable difference in size between the relays meant that adaptor plates needed fabricating to mount the modern digital relays and test blocks in place of the existing electromechanical sets. With the adapter plates fabricated and powder coated, engineers mounted and wired the new sets at TPPS's workshop and started preliminary programming of the relays before any site works began; this would save four hours on site ensuring each panel would be upgraded in a day; which included:

- Removal of existing TJV electromechanical overcurrent relay and associated wiring
- Insulation Resistance test between protection CT's, earth and associated DC control cables
- Mounting of adaptor plate holding pre-programmed Argus-C 7SR11 relay and RMLG test block
- Connection of existing wiring and Installation and termination of new wiring
- Current Injection testing for AC input, high-set, pick-up and drop-off and operating curve verification
- Confirm operation of alarm and trip signals to local circuit breaker and station control room
- 'Event history' cleared from new relay and 'as-installed' wiring schematics updated.
- Handover of the upgraded panel to the system owner to be energised.



Whilst some circuits were released as planned, most circuits were isolated sporadically due to works being completed by other contractors; meaning engineers were given as little as twelve hours to mobilise to site and complete each upgrade. Panels either side of each circuit being upgraded would remain energised to feed station services during the outage and engineers underwent additional assessments by Drax to hold the safe working permit throughout the site works. The seventeen circuits were upgraded and commissioned in 17 days over a period of 5 weeks, and relay calibration certificates, testing and commissioning records and as-built wiring schematics were transmitted to the client upon completion of the final circuit.



LV SWITCHGEAR REFURBISHMENT:

The 3.3 kV Whipp & Bourne AKV switchboard was a partially equipped spare that needed refurbishing for use as a transformer feed protection panel. TPPS were asked to refurbish the circuit breaker control panel ready for a new CB to be installed and repopulate the switchboard protection panel with new relays. The protection panel needed new overcurrent protection relays installing in empty housings, and TPPS chose the Siemens Reyrolle Argus-C 7SR11 relay as it incorporated type 50 and 51 protection settings. The panel was also fitted with a RMLG test block, new Redspot fuses and interconnecting wiring installed to fully populate the panel, and revised wiring schematics given to the client for records.

The CB control panel needed refurbishing ready for a new breaker to be installed. The first task was to remove the protection and metering CT's mounted on the bushings in the back of the panel and four new CT's ordered for replacement. The wiring in the panel had to be inspected and modified to the relevant schematics, new multicore cables installed and terminated, new ammeter installed along with new door locks and equipment labels. The new CT's were re-installed in the back of the panel and handed over to the client and underwent secondary injection testing along with the new protection relays.

Engineers were on site for three days completing these works as well as general inspection and maintenance of the panels ready to receive the Circuit Breaker, and the circuit was fully commissioned and operating the following week.

REPOPULATION OF LV SWITCHGEAR:

The development of a new processing plant required a spare auxiliary switchboard to be repopulated to protect the 2MVA cast resin transformer that would feed part of the plant, which would recycle spent coal ash and turn it into Lytag to make lightweight construction materials and aggregates.

Repopulation of the switchboard required significant design studies to ensure system integrity and included the supply, installation, wiring and commissioning of a Main Fuse Operated Relay, Trip Lockout Relay, Trip Circuit Supervision Relay and Over Current Protection Relay, and multiple auxiliary components such as Current Transformers, Varistor, Ammeter, Wire Wound Resistors and mounting components. With similar preparation, pre-commissioning and testing as had been completed on other units, TPPS engineers completed the works in two stages and took four days to complete.

CLIENT TESTIMONIAL:

"The TP Power Services staff who attended Drax Power to carry out the protection relay modification works were courteous and friendly as well as efficient and knowledgeable. They were a pleasure to work with and I would not hesitate to use them again"

Stuart Anderson – Lead Electrical Engineer, awarded a KPI score of 89%

