CASE STUDY:
MANAPOURI POWER STATION

In 2014 Wilson Transformer Company (WTC) was awarded a contract to manufacture, deliver and supervise the installation of three 135 MVA power transformers based on the very tight delivery time. This project was crucial for both Meridian Energy and WTC due to the urgency of the work, technical challenges and transport constraints. The first unit was delivered in 4.5 months while all three were commissioned within 6 months. In 2016 WTC was awarded the contract to upgrade the remaining 4 units thanks to the excellent performance during the first contract.

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PROJECT DETAILS

Client:
Meridian Energy, NZ

Location:
Manapouri Power Station

Products:
7 x 135MVA 220/13.8kV power transformers

Challenges:
Technical challenges and transportation constraints

PROJECT BACKGROUND

In February 2014 during the HV bushing replacement, aluminium particles were found on the tank side of the HV bushings. An investigation found the source of aluminium to be the cooling fins in the heat exchanger (transformer oil cooler) – the aluminium cooling fins surrounding the copper cooling tubes had dislodged, fractured and fretted. This resulted in aluminium particles being distributed throughout the transformer. Such contamination introduced an operating risk in the underground Manapouri power house.

A complete inspection of all in-service units resulted in the removal of two of the seven 135MVA transformers from service on the basis of the high levels of contamination discovered during inspection.

This resulted in lost generation capacity at Manapouri power station, the largest hydro power station in New Zealand.

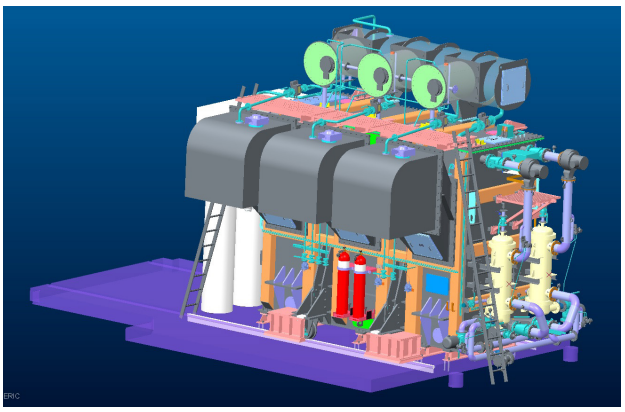
Meridian Energy nominated to procure two replacement units plus one additional unit to replace the station spare. Wilson Transformer Company had been awarded a contract to manufacture, deliver and supervise the installation of these three transformers. This project was crucial for both Meridian Energy and WTC due to the urgency of the work, technical challenges and transport constraints. Wilson Transformer Company guaranteed a fast track delivery, with the first unit being delivered in December 2014, and the other two in February 2015.

DESIGN AND MANUFACTURE: TECHNICAL CHALLENGE

The new 135 MVA 220/13.8 kV power transformers were designed and manufactured in WTC's power transformer plant in Melbourne. A special attention was paid to the physical dimensions of the transformers to meet the delivery constraints, including traveling down a narrow tunnel. In order to reduce the transformer's size and weight, the engineering team came up with the solution to fit a 135MVA winding set into a 105MVA tank.

The project was faced with many other technical challenges to match numerous interface criteria. The existing transformers on site were to be replaced and all mechanical interfaces for the ease of a seamless transition to replace the old with new were to remain untouched.

The existing high voltage oil filled cable boxes, low voltage bus ducting, seismic footings, and cooling pipework were measured during site visits, and the WTC Engineering team was in constant communication with the customer throughout the design process to ensure this was performed without a hitch.



The first unit had been designed and manufactured in a record time - the Factory Acceptance Testing took place fifteen weeks after the contract was signed.

DELIVERY & TRANSPORT CONSTRAINTS

The delivery was scheduled at pre-Christmas time and the original route included a shipment from Port Melbourne to Deepcove. However, it was decided to divert from the original plan due to the vessel delay on its way to Port of Melbourne via Port of Brisbane. To save three days and meet a pre-Christmas delivery, a road transportation to Port of Brisbane had been organised.

The transformers followed the route the original transformers took in the 1960s. First, by track to Brisbane, then by ship via the most challenging part of the journey was getting from Deepcove to the undeground power station on a challenging gavel and inclined road. The transformers were shipped on a part chartered vessel to Deep Cove in the Fiordland National Park (World Heritage site). To preserve the unique marine environment, the Environment Southland representatives were on board throughout the journey in the Sound to ensure all the requirements of a resource consent were met.

In 2016 Meridian Energy awarded the contract to WTC to upgrade the remaining 4 units that were successfully delivered in November 2017. The excellent cooperation between the two companies and project teams enabled Wilson Transformer Company to meet the exceptional delivery requirement with superior technical support.

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