

## HYDRO UNIT REFURBISHMENT Case Study



The adapted Mirage MM1875ie being moved into position.



The machine is rested onto a support platform and clamped into position using the 8 legs and adjustable jaws.

### REQUIREMENTS

Benmore is New Zealand's second largest hydro station and generates enough electricity each year to power around 298,000 average New Zealand homes.

As part of a major refurbishment project, the customer wanted to machine wear plate areas within a Francis turbine, returning them back to the original specification from when the power station was commissioned in 1965.

### SOLUTION

To carry out the required machining tasks, a Mirage MM1875ie flange facing machine was adapted to use with a milling head, providing a stroke of 200mm. The machine also needed to be capable of machining 2 parallel faces located 750mm apart.

Mirage provided an on-site technician to oversee machine set up and offer hands-on support.

#### Set up and operation

- The machine was lowered into the turbine cavity and rested onto a purpose built support platform.
- It was then clamped into position on the turbine housing vertical faces.
- The unit was centralised and adjusted using the jaws on each leg and checked using laser alignment.
- The machine's spindle was powered hydraulically and the vertical auto feed driven by pneumatics.

# HYDRO UNIT REFURBISHMENT

## OUTCOME

The machining project was a success, with the wear plate areas being returned to their original tolerances and a surface finish of 1.6 – 3.3Ra achieved.

## REFURBISHMENT SUCCESS

The whole refurbishment project included replacement of the station's six turbine runners, resulting in 2.8 percent more energy being produced while using the same amount of water.

This equates to nearly 70GWh per year of electricity, enough to power 7000 average New Zealand homes and avoid 14,000 tonnes of CO2 emissions.

### More about the Benmore Dam

- Machinery: 6 x 93,000 kW vertical Francis turbines coupled to 6 x 90,000 kW 112,500 kVA generators. 6 transformer banks totalling 1,150 MVA
- Nominal annual generation: 2,200 GWh
- Installed capacity: 540 MW
- Head (hydraulic): 92 metres
- Average river water flow: 340 m<sup>3</sup>/s
- Lake Benmore area: ~ 75 square kilometres
- Dam crest length: 823 metres
- Dam crest height: 100 metres
- Dam width at base: 490 metres
- Dam width at crest: 10.6 metres

Source: Wikipedia



The purpose built assembly designed to accommodate a milling head and 200mm stroke.



The Benmore Dam in New Zealand