

## CASE STUDY

### LUJERI TEA ESTATE, Mulanje, Malawi

The Lujeri Tea Estates has 2 power houses situated on the Lujeri and Ruo rivers with 5 turbines in total, 4 of which are original Gilkes manufacture. The first Gilkes turbine was installed in the Ruo powerhouse in 1934 to supply power to the factory and for domestic use. With a further 2 turbines being installed in 1946 and 1957. The 4th Gilkes machine was installed in the Lujeri powerhouse in 1957.

In 2010 Gilkes were approached by the present owners of the tea estate, PGI, with a view to modernising the Gilkes supplied equipment in both powerhouses. Many parts were over 25 years old and in need of replacement, with extensive wear to 1 runner, and oil pressure governors in completely non functional conditions. Excessive wear meant more water flow was required to generate power and the full power output was not maintainable.



Original Lujeri powerhouse



Lujeri Powerhouse after modernisation

#### LUJERI POWERHOUSE

**Turbine type:** Francis  
**Power (kW):** 134kW  
**Net Head:** 30 m  
**Flow:** 541 l/s  
**Speed:** 1000 rpm  
**Original Installation:** 1957

#### Modernisation of equipment

- Both oil pressure governors in completely non-functional condition. Manual attempts at regulating speed by main inlet valves.
- Outside expertise (Gilkes) decided upon to ensure work carried out properly.
- Replacement of worn parts.
- Gilkes carried out in-depth refurbishment, returning machines to original tolerances and performance.
- New electro-hydraulic governing system.
- End result was a fully functioning set of equipment left in a clean and tidy condition.
- Cost of rehabilitation was 17% of whole new replacement.

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# GILKES

## CASE STUDY

### LUJERI TEA ESTATE, Mulanje, Malawi



Ruo Turbine before modernisation



Ruo Powerhouse after modernisation

#### RUO POWERHOUSE

**Turbine type:** Turgo  
**Number of Turbines:** 1  
**Power (kW):** 224kW  
**Net Head:** 108 m  
**Flow:** 203 l/s  
**Speed:** 1000rpm  
**Original Installation:** 1957

**Turbine type:** Turgo  
**Number of Turbines:** 2  
**Power (kW):** 173kW (each)  
**Net Head:** 111 m  
**Flow:** 198 l/s  
**Speed:** 1000rpm  
**Original Installation:** 1934 & 1946

#### Modernisation of equipment

- Both oil pressure governors in completely non-functional condition. Manual attempts at regulating speed by main inlet valves.
- Worn parts for 250kVA machine replaced.
- Electro-hydraulic governing fitted to all machines.
- System of using a droop set point allows two separate stations to operate in synchronisation without direct communication.
- Machines subsequently proven to be capable of generating to full alternator capacities.
- Grid now more stable.
- Cost of rehabilitation was 17% of whole new replacement.



Original Lujeri Runner



Replacement Lujeri Runner

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