

CHALLENGE DESCRIPTION



A fruit juice plant in Mozambique underwent power quality supply problems which caused the following abnormalities to their standard equipment:

- Switchgear: tripping and contact damage.
- Motor: loss of control, winding heating and insulation degradation, increased hysteresis losses.

- VSD: tripping, diodes damage, earlier failure.
- Lighting: lifespan reduction, flickering, continuous ballast failure.
- Electronic: erratic and less efficient operating mode, components damage, computer lockup, data losses, errors.

Power Quality event logs were measured over a 6-week period without the Rotabloc to better understand the conditions faced by connected loads:

- Black outs (failure ranging from 2 sec to 5 hours): 18
- Short cuts (failures from 100ms to 2s): 6
- Micro-cuts, dips and swells: not monitored but causing regular disruptions as described above.

The total unavailability of some equipment due to all these disturbances represented $\pm 23\%$ of the workable days!

ROTABLOC SOLUTION

The RBT was selected to solve these problems because of its numerous capabilities:

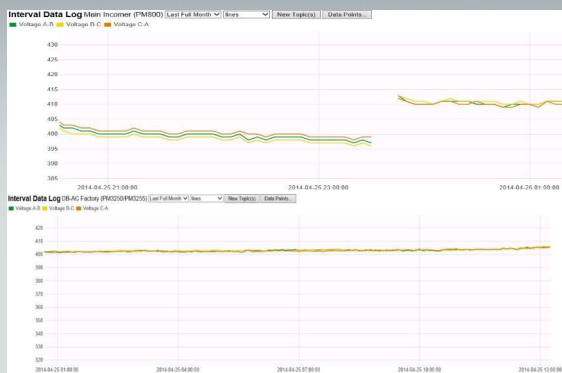
- Capacity to sustain continuous voltage variations of $\pm 12.5\%$ as well as sags & swells and even short power cuts up to one second before calling on the alternative energy source, e.g. genset.
- Inherent inertia of a synchronous generator providing high fault current of 16 times rated current to allow for switchgear discrimination to be performed without switching to bypass.
- In normal operation RBT system is designed for a robust overload capacity of 50% for 2 minutes.
- A small footprint: typically 10 m² for RBT-1000, allowing big savings on housing.
- Its high full load range efficiency and integrated power factor correction, avoiding the use of sensitive capacitor type PFC banks.
- Its natural harmonic filtering and high step load capability (up to 100%).



A Rotabloc of 630kVA was installed for Power Quality protection and as a RUPS with a connection to a diesel generator of 900kVA for the longer cuts. The upstream Genset will handle the 100% single step load as well since it is supported by the RBT. Because of the separated generator/accumulator design topology, the generator can be oversized to supply essential loads whilst a smaller RBT can supply only the critical loads making the system feasible without jeopardizing the operational requirements.

KEY FIGURES

The Rotabloc does not only avoid the loss of the load but also improves the load voltage.



Top image shows before the RBT Dynamic UPS - Blackout experienced (Mains side).
Bottom image shows after the RBT Dynamic UPS - Unaffected (Load side).

	Mains	Load
Max Voltage	425V	405V
Min Voltage	380V	402V
Voltage variance	45V > 10%	3V



Top image shows before the RBT Dynamic UPS - Typical voltage conditions on Mains side.
Bottom image shows after the RBT Dynamic UPS - A voltage variation of less than 0.5% is experienced on the load side.

It is also capable of erasing spikes.



Top image shows before the RBT Dynamic UPS - 3000V voltage spike (Mains side)
Bottom image shows after the RBT Dynamic UPS - UNAFFECTED. The choke suppresses the spike to a manageable state and is then dealt with the RUPS accordingly (Load side).

Some numbers recorded during the first 4 years of RBT operation:

Power failures avoided	1588 (>1 per day)
Frequency failures	172
Voltage failures	1416
Failures without genset start	720 (45%)
Direct electrical utility bill saving (PF correction)	8%

These numbers do not take in account the numerous brown-outs avoided because of the RBT.

OTHER SUCCESS STORIES IN THE SAME ACTIVITY SECTOR

Dairy plant in Zambia (2250kVA with 1000kVA RBT)

Numbers recorded during the first 3 years of RBT operation:

Power failures avoided	522
Frequency failures	96
Voltage failures	426
Failures without genset start	275 (45%)
Direct electrical utility bill saving (PF correction)	8%

Mill factory in Mozambique (1600kVA RBT)

Numbers recorded during the first 3 years of RBT operation:

Power failures avoided	1144 (>1 per day)
Frequency failures	114
Voltage failures	1030
Failures without genset start	635 (56%)
Direct electrical utility bill saving (PF correction)	14%

Brewery in Mozambique (3 x 1000 kVA with 800kVA RBT)

Numbers recorded during the first year of RBT operation:

Power failures avoided	243 (>1 per day)
Frequency failures	27
Voltage failures	216
Failures without genset start	110 (45%)
Direct electrical utility bill saving (PF correction)	14%



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