

Improving productivity through voltage stabilization with STATCOM solution

Sector: Steel/EAF Load

Background

A steel company has the capacity to produce 1,930,000 tons of steel bar and rod, with one Electric Arc Furnace, one Ladle Furnace and a Rolling Mill.

Reactive power compensation was provided by passive harmonic filters. 2nd, 3rd, and 4th harmonic filters at 34.5 kV in the furnace circuit. Also, one 7th harmonic filter at 13.8 kV in the rolling mill circuit.

Problem

The customer had several processes causing voltage fluctuations and affecting the grid.

The utility required compliance with power factor, harmonic, and flicker limits.

Solution

With passive compensation alone, it was impossible to comply the required limits, especially for 2nd harmonic and flicker (P_{st} and P_{lt}).

After power flow analysis, a **100 Mvar STATCOM** was specified. ± 80 Mvar SVG + 20 Mvar 2nd harmonic filter.

Project implementation



The main challenge was to install the equipment in a small footprint where actual harmonic filters were installed without affecting production.

With great logistics and coordination with the customer, the project was implemented on time with the following power quality results:

Parameter	Before	After
TDD (95 th percentile)	9.15%	3.34%
2nd harmonic (% IL)	3.5%	2.05%
P_{st95}	2.09	0.97
P_{lt95}	1.72	0.77
Power Factor	60% of the time < 97% 27% of the time delivering reactive power to the grid	3% of the time < 97% 0% of the time delivering reactive power to the grid

Economic Benefits for the customer

Apart from achieving grid connection compliance, additional benefits were derived from improved voltage regulation in the EAF circuit. **Productivity was increased** by having more stable voltage and more active power available, hence Power On time of the furnace was decreased.

Not only was productivity improved, but the customer also saw an **incremental improvement in refractory material life, as well as a significant reduction in electrode consumption, and energy/TON.**

As shown in the chart below, voltage regulation was significantly improved at the 34.5 kV level.

