



APPLICATION EXAMPLE

ECOsine™ Active
Good power quality for
maximum ride comfort

SCHAFFNER

energy efficiency and reliability

Good power quality for maximum ride comfort

In winter 2006 the five-star Tschuggen Grand Hotel in Arosa, Switzerland inaugurated its “Tschuggen Express” rail taxi. This unique, exclusive service takes guests directly from the hotel to the skiing and hiking area of Arosa.

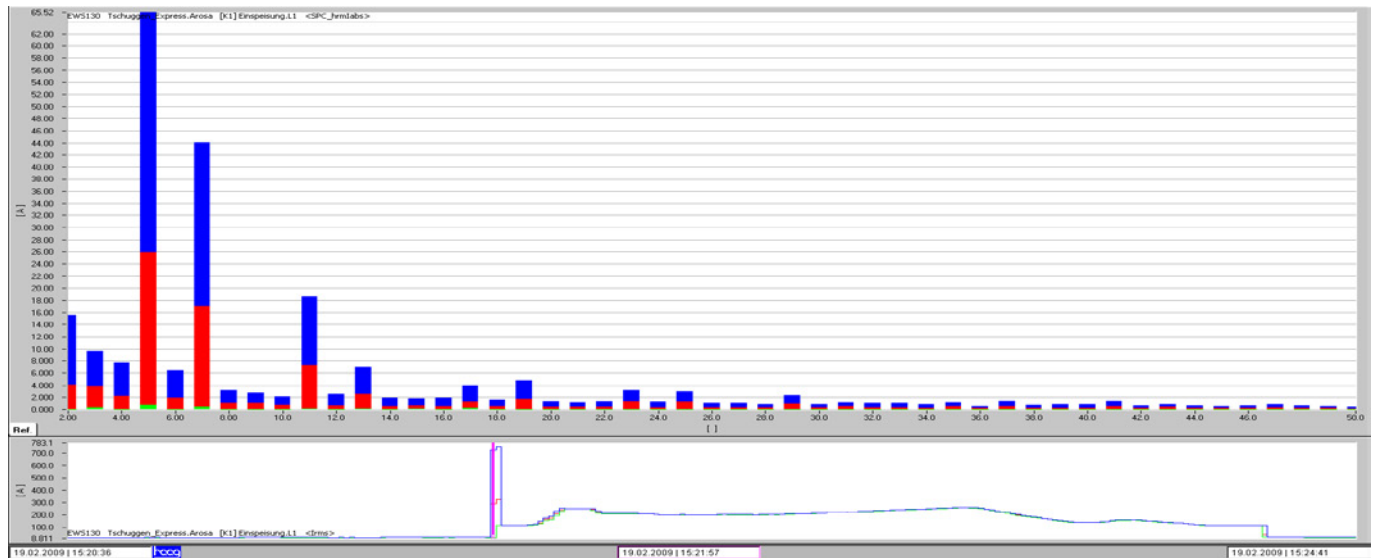
Unexpected system perturbations from rail taxi propulsion drives

Just a short time after commissioning it became clear that the rechargeable batteries of the “Tschuggen-Express” were subject to malfunctions. For this reason the drive was converted to three-phase asynchronous motors in 2008. To avoid having to route a new power line from the energy provider to the rail taxi station the voltage was stepped up at the energy supplier and stepped down at the station. This solution did not consider, however, that when the soft starters are started up, significant harmonic currents and excessively large voltage dips occur, leading to thermal overloading of the transformer.



The grid analysis subsequently performed by an independent measurement institute revealed the following:

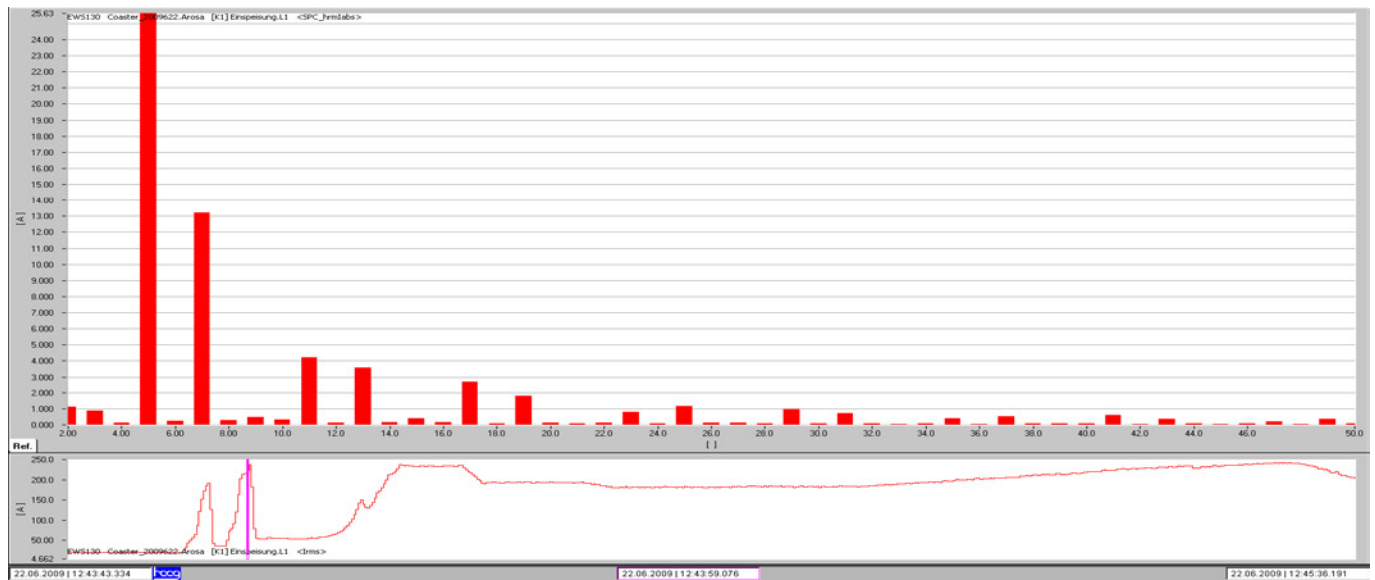
- During the start-up phase the harmonic components of the current exceeded the permissible limit values according to D-A-CH-CZ
- During operation the reactive-power component of the asynchronous motors resulted in excessive penalty rates from the local power utility.



Spectrum of the harmonic currents without filter (5. = 65A, 7. = 44A, 11. = 18A, 13. = 7A)

ECOSine™ Active provides a remedy and good power quality

On the recommendation of the measurement institute, a Schaffner active filter of type ECOSine™ Active with 100A compensation current (FN3420-100-480-3) was installed. During the start-up phase of the soft starters this corrects the harmonic component of the current to a level that complies with the applicable standard, and which eliminates the thermal overloading of the electrical infrastructure.



Spectrum of the harmonic currents with ECOSine™ Active (5. = 26A, 7. = 13A, 11. = 4A, 13. = 3.5A)

During operation, as soon as the bypass of the soft starter is active, no more system perturbations are generated, and the entire compensation current of the ECOSine™ Active can be used for reactive-current compensation.

- Without filter: $\cos \phi = 0.6$
- With filter: $\cos \phi = 0.9$

If necessary the $\cos \phi$ could have been improved even further to a value of 1 using additional filter capacity.

The versatile characteristics of ECOSine™ Active filters made it possible to solve several power quality problems simultaneously. They ensure reliable, economical operation of the system, as a result of which the hotel guests can enjoy comfort whatever the season.

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