

PYRENEAN TUNNEL

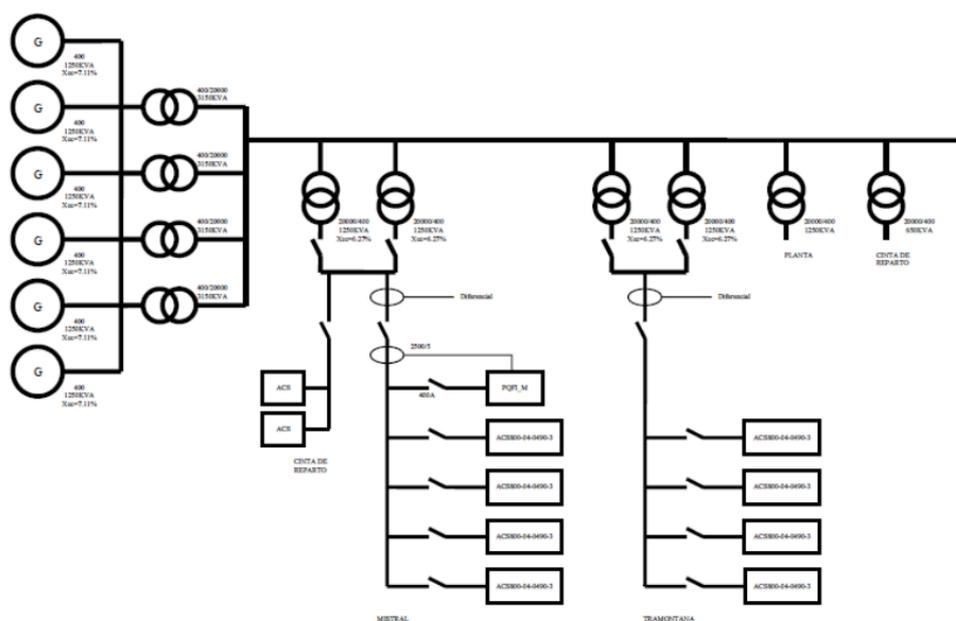
WE JOIN SPAIN AND FRANCE THANKS TO THE REDUCTION OF HARMONICS

Removing materials from a tunnel is decisive in order to move forward. In a newly constructed tunnel, there were problems in an installation with frequency converters for conveyor belts, which prevented the removal of materials from a tunnel boring machine. Finding where the problem was, was the key to continue the work.

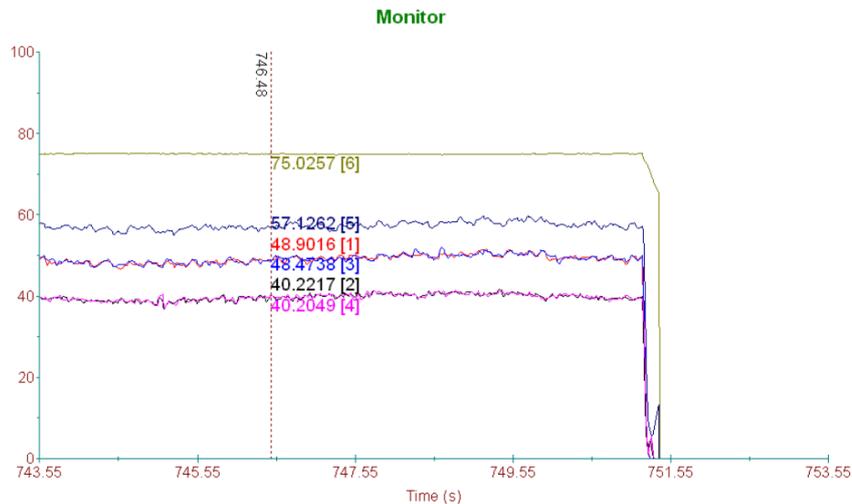
The repetition of random failures in the installation caused the line earth protections to trip. The problem increased as the tunnel boring machine progressed, and the transport belts became longer and longer; soon it was not possible to work with it because the failures were increasingly repetitive.

The installation is composed of the following elements:

- (6x) 1250 kVA Generators.
- (4x) Transformer 400/20000 V, 3125 kVA.
- (4x) Transformers 20000/400 V, 1250 kVA.
- (10x) ABB converters.



We carried out different tests with the inverters in order to verify their correct operation; until the earth fault trip, the converters worked perfectly; therefore, an error in these was disregarded.

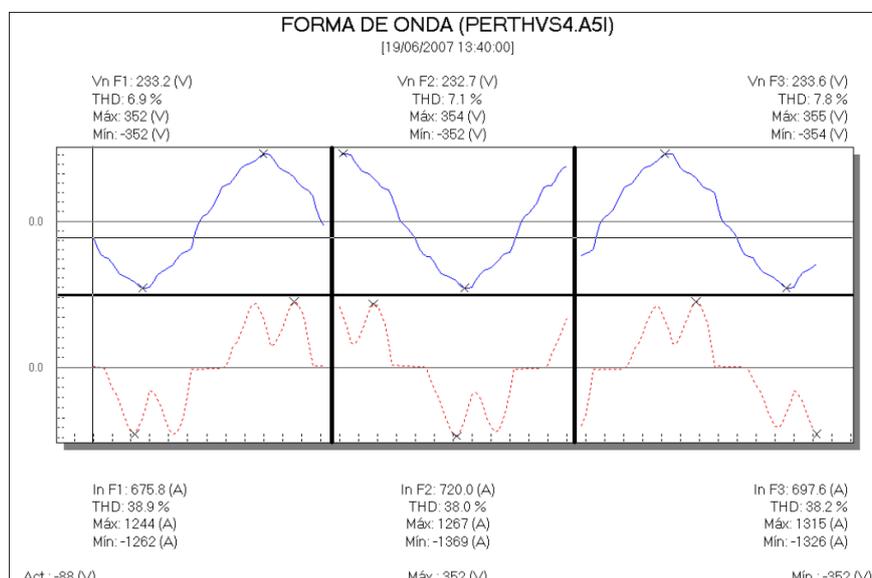


where,

01.07: MOTOR TORQUE FILT [%]	{0}{3}	Main MASTER
01.07: MOTOR TORQUE FILT [%]	{0}{1}	Second MASTER
01.07: MOTOR TORQUE FILT [%]	{0}{4}	Main SLAVE
01.07: MOTOR TORQUE FILT [%]	{0}{2}	Second SLAVE
01.06: MOTOR CURRENT [A]	{0}{3}	= 0,15 * x + 0,0
01.02: SPEED ESTIMATED [rpm]	{0}{3}	= 0,05 * x + 0,0

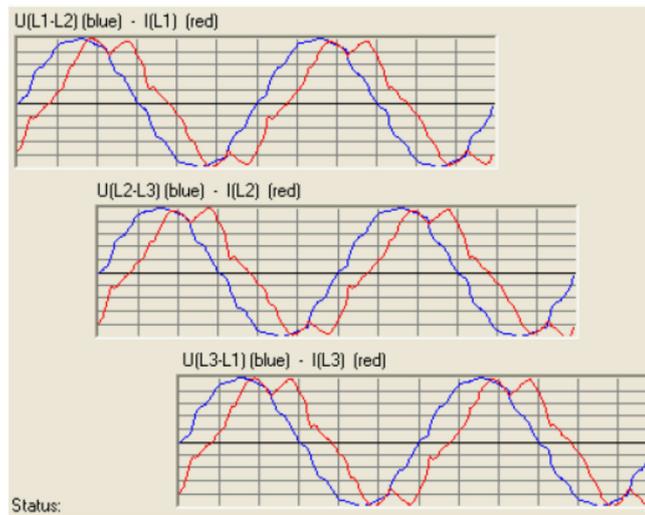
We met with the manufacturers of the generator sets and the conveyor belts, and both parties agreed that their installation is correct.

After collecting and analyzing all the data, at EXEL we found out that the problem was the high level of harmonic distortion in the installation and that it was due to a bad sizing of the supply power (generators) or a bad choice of the installed equipment.



After studying the different possible options and due to the urgency of the start-up of the installation, we decided to supply and install an active filter to compensating part of the harmonic level of the installation and thus be able to continue with the construction of the tunnel.

In a week we installed the filter, starting immediately with satisfactory results. The reduction in the harmonic distortion level in current was more than 60%.



Thanks to the rapid intervention of EXEL, the construction of the tunnel could continue, until its completion, without any further incident.

In conclusion, when it comes to sizing frequency converters and their installation, the correct calculation and definition by professionals is very important. This will reduce possible definition failures and future installation problems.