

CASE STUDY

Capa Roma Movie Studio Rome, Italy

Facility Description

Capa Roma studio in northern Rome is one of Italy's largest movie production campuses.

Challenge

In the summer of 2002, PQI received an urgent call from Thelma Schoonmaker, film editor extraordinaire, who was involved in the production of a Martin Scorsese movie – Gangs of New York, at the Capa Roma studio in Italy. PQI had successfully resolved a number of serious power quality issues at two of her New York City studios on earlier occasions.

Thelma described her current problem as follows: The editing equipment, which she was using at the Capa Roma studio, had been brought over from her New York City studio. To use the equipment in Italy, a studio electrician provided a single-phase 415:240/120-volt isolation transformer to reduce the studio's higher utilization voltage down to 120-volts. The 120/240-volt 'center-tap' isolation transformer is shown in the photograph.



The local 50Hz frequency was not a problem, since her equipment had a dual frequency rating. Initially, this setup seemed to provide a satisfactory solution; the equipment functioned normally. However, within a short period of time, her equipment's switch-mode power supplies began to fail. Thelma's crew noticed that their power supplies were running 'very hot'. This problem essentially stopped all

production, since Scorsese requires that each day's filming be digitized overnight, before starting the next day's work.

Solution

PQI received the call and we were on our way to Rome the same day. Fifteen hours later we arrived at the Capa Roma studio. A few simple measurements revealed a serious voltage distortion problem at the loads. THD_v levels exceeded 12%, more than twice the limits recommended by IEEE Std 519-1992. Calculations confirmed that at these distortion levels, the switch-mode power supplies' DC current would increase to 129%. The I²R 'penalty losses', resulting from this increase, would cause the power supplies to fail. Investigating further, we discovered that all of this sensitive electronic equipment was being supplied from one side of the center-tapped secondary winding. Since harmonic voltage and the resulting voltage distortion are caused by harmonic source impedance ($E_h = I_h \times Z_h$), reconnecting half the load to the other side of the center-tapped winding would effectively reduce source impedance by 50%.

Impact

Upon reconnection, THD_v levels were reduced to 6% and the power supplies cooled down immediately, as expected. Even though 6% THD_v is not ideal, it was low enough to eliminate power supply failures.

Determining the cause of switch-mode power supply failures and the reconnection of the transformer took less than one hour, including 30 minutes to get the power turned 'OFF' then back 'ON'. The digitizing and editing equipment suffered no further failures.



Thelma Schoonmaker at the Capa Roma Studio



Thelma Schoonmaker receiving an Academy Award

Thelma has received numerous accolades and awards including thirteen Academy nominations and three 'Oscars'. We believe we had a small part in keeping the cameras rolling for this production.