Until recently, industrial facilities in the Middle East relied on captive power plants to generate the energy required to run the operation, and utilized equipment manufactured in regions with differing grid frequencies from that which was available locally.

A brick making facility in the Middle East, commissioned seven years ago in a semi-remote industrial location, was powered by seven 1.6 MVA diesel generator sets which ran the whole industrial complex. Now, nearly a decade later, the cost of diesel has risen and the generators are due for replacement at significant cost.

Meantime the local infrastructure has advanced rapidly and electrification has reached the edge of the industrial complex. The logical solution is to connect to the local utility and scrap the diesel generators.

The Problem
The plant uses machinery designed and purchased in Europe, hence the whole site is 400 V 50 Hz. The country in which the plant is situated has adopted 480V 60Hz grid as the network standard. Simply connecting 60Hz to the site would have all the conveyors running 20 percent faster - a great way to increase productivity perhaps, but unfortunately the motors and transformers would saturate and burn out.

One Possible Solution
Changing all the motors and gearboxes on site was a possible solution. However the capital cost was not the major issue. More significant was the logistics involved in removing hundreds of motor gearbox sets and replacing them with new, appropriate 60 Hz rated units. The downtime for the plant was predicted to exceed six weeks.
The ABB Solution
The decision was made to install ABB’s PCS100 Static Frequency Converter (SFC) between the new utility connection and the plant. This was not only the most expedient solution but also the most cost effective. PCS100 SFCs could be installed and precommissioned while the diesel generators continued to operate. All that was required was a one week shut down to effect the complete change over from on-site generated power to a utility supplied solution of 60 Hz converted to the correct 400 V 50 Hz level required by the plant. The PCS100 SFCs are specified as 2 MVA blocks which all synchronize together just like conventional alternators. This gives a certain level of redundancy and flexibility.

The Benefits
The plant had planned only to replace the generators as they reached the end of their useful lives. However when crude oil hit $140 per barrel, attention focused more closely on the economics of the current electrical supply and cost benefits of switching to the grid. It soon became apparent that even at a much lower fuel cost there was still a significant plant benefit of switching from site-produced electrical services to outsourcing the power from the utility.

To find out more about ABB’s power protection solutions:
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