The Siemens Power Transmission and Distribution Group (PTD) received an order from Red Eléctrica de España in January 2004 to set up MSCDN systems in the substations Jijona and Hoya Morena near the Costa Blanca in Spain. The purpose of this new equipment is to stabilize system voltage and to keep voltage fluctuations caused by load variations, for example air-conditioning in summer season and change of network conditions within acceptable limits. The order includes the Project Management of engineering, installation, construction and the delivery of the protection and control system as well as high voltage equipment. The order is worth around € 4.68 million.

Hoya Morena (ref. to Fig.1) and Jijona (ref. to Fig.3) were successfully commissioned in December 2004 as scheduled. The punctual accomplishment of the substations was very important because of the expected higher energy demand based on the cold winter and was successfully achieved.

In the special case of Jijona and Hoya Morena a MSCDN was used. A MSC configuration with a high damped, loss minimized filter MSC is called Mechanically Switched Capacitive Damping Network (MSCDN).

In effect, it provides direct compensation of changes in the reactive power requirement of connected loads and keeps the transmission lines free from additional reactive power flow, thus reducing transmission losses.
Suitably designed MSC also improves system voltage stability also under fault conditions. Large voltage dips caused by system disturbances (short circuits followed by changed network conditions) and heavy load conditions can be reduced in this way. However, the effectiveness of voltage stabilization depends on the distance from the fault location.

Referring to the Single Line Diagram of a MSCDN in Fig.2, it incorporates only passive components such as capacitors reactors and resistances and can be connected directly to the high voltage busbar system or via a coupling transformer. To learn more about the MSC/MSCDN ➢ Click Here

The MSCDN system was basically chosen by Red Eléctrica de España to improve the voltage stability of the 220kV grid in the regions Alicante (Jijona Substation) and Murcia (Hoya Morena Substation) at heavy loads.

The design of the MSC’s was covered in order to afford a dedication in 220 kV network throughout Spain. Furthermore, the primary and secondary design was standardized for all MSCDN’s in Spain.

With our experiences in similar projects in the past (ref. to FACTS Reference list), for example Willington Project (UK), the good reputation of Siemens representatives in Spain and last, but not least the professional tender documentations from Siemens were honored from Red Eléctrica de España with the order. Red Eléctrica de España itself is the operator of the 400 kV network in Spain and received the order from the Spanish state to stabilize the total Spanish 220 kV network and to reduce power failures.

The first positive impression on the customer was consolidated because of the engaged, fair and professional Project Management of Siemens PTD. The excellent co-operation of the customer contributed to the success. Special challenges occurred during the project process. For example, both substations are near the seaside. The salty air-conditions are the reason for higher requirements (e.g. larger creepage distance on insulators, top hats and special RTV-coating for the reactors).

The soil investigation study which was performed after signing the contract showed that especially at the Jijona substation (ref. to Fig. 3) the soil pressure is insufficient. Therefore it was necessary to put pilates under the equipment foundations in order to avoid any soil movements.
Because of the special challenges a construction distortion of three months was the consequence. But Siemens managed to catch up and to commission the order as scheduled.

The customer’s satisfaction was reached caused by good Project Management, delivery reliability and good partnership between the Red Eléctrica de España, Siemens Spain and Siemens Germany.