

EUR24_25 - Large Electrolysis Systems - Challenges with the advent of Green Hydrogen

Author(s): Andreas Luig (ThyssenKrupp nucera), Alexander Pawlak (ThyssenKrupp Uhde)

Abstract:

Electrolysis processes are a key factor in the chemical industry, initially for producing caustic soda (NaCl) with chlorine as a byproduct. With the new upcoming production of hydrogen by electrolysis, this technology becomes more attention.

Currently the predominant rectifier technology in the high current area is based on thyristor controlled 3 phase bridges which is a mature technology for decades but creates challenges regarding harmonics and power factor control, especially under constantly changing operating conditions like fluctuating availability of green energy.

New technologies based on IGBT semiconductors in active frontend or chopper designs line up to take over. These technologies provide solutions for the challenges of the pure restriction on use of green energy only, the type of these green grids and the power quality issues that come with the operation of large rectifier systems.

The paper will describe some aspects as they were faced and tackled during the execution of three larger projects in the range of 200 to 2600MW electrolysis load.

Additional challenges with downstream production of Ammonia and or Methanol due to replacement of steam turbines by large electrical drive systems are addressed.