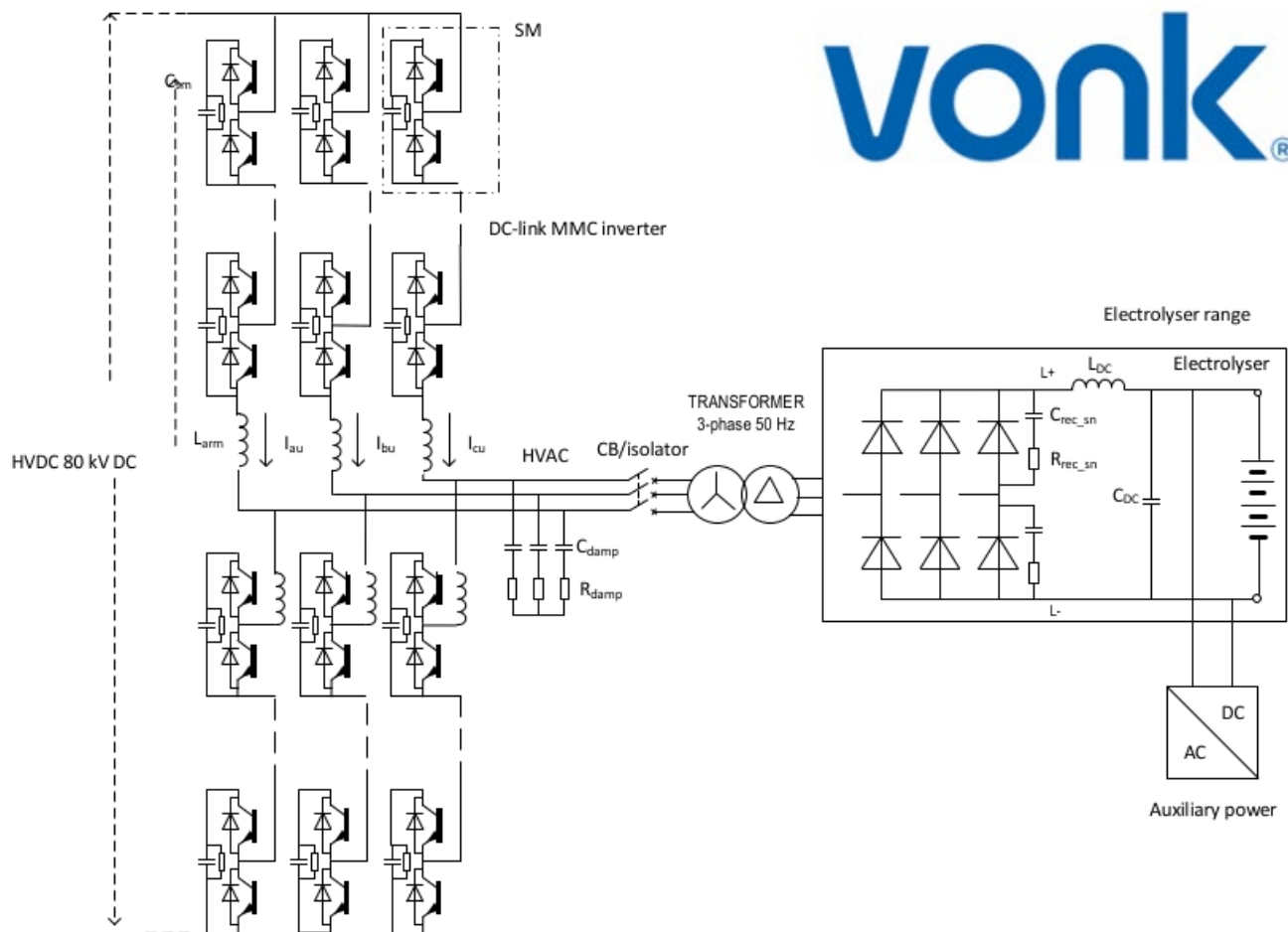


Design a HVDC MW-Level MMC Converter for Electrolysers

Master internship/thesis project

vonk®



Summary:

To study and design the upscaling of a MMC power converter for high-voltage DC-connection instead of medium-voltage DC-connection. The designed power converter will be used to power a low-voltage high-current electrolyser.

Problem definition:

Vonk is leading manufacturer and system integrator of the power converters. Vonk along with other industrial partners is investing in upscaling of the green hydrogen generation in which the available energy from solar or wind is converted to feed the electrolyser with the desired power quality.

A MW-level, state-of-the-art MMC based converter topology is proposed (and designed) by Vonk as an interface between a MVDC grid and LVDC electrolyser. The student shall design a MW-level converter topology to connect a HVDC grid (e.g., 80 kV) to the LVDC (e.g., 600 V) electrolyser. The focus will be on the design principles for HVDC and the design criteria for e.g., a HVDC MMC sub-module, voltage and current measurements and which semiconductor can be used in such a sub-module.

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Method:

- Literature study about HV converters, HV power switches, possible potential hazards
- Enhance existing MATLAB/Simulink simulation to Design/Specify every component from the proposed topology: e.g., MMC sub-module, transformers, filters, various measurements, and their interfacing with Vonk control platform, etc.
- Implement and verify some design principles of for instance a voltage measurement, current measurement or MMC sub-module in a high voltage laboratory.

Research objectives:

- Determine requirements for design of a HVDC converter for a MW-level electrolyser system.
- Specifications of main components of a HVDC converter.
- Proof of concept for voltage and current measurement at high voltage.

Courses and supervision:

No specific courses other than the power electronics compulsory courses are needed as a background.

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