

Volume manufacturing of PEMFC stacks for transportation and in-line quality assurance – project VOLUMETRIQ

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VOLUMETRIQ, funded under the topic "Cell and stack components, stack and system manufacturing technologies and quality assurance" of the 2014 annual working plan, has the ambitious objectives of simultaneously achieving the scale-up of a novel reinforced membrane, based on an electrospun polymer nanofibre reinforcement, first developed in MAESTRO, with at-scale downstream manufacture of catalyst-coated membranes, alongside the volume production of bipolar plates and the manufacture of automotive stacks reaching 2020 cost and power targets. It thus has every potential to provide a European automotive stack platform integrating European cell and stack components. In the first 12 months (of the 42 month duration), reference membrane electrode assemblies have demonstrated a beginning of life current density of 2.0 A/cm² at 0.6 V in single cell testing, while first improved MEAs incorporating project reinforced membranes have given 1.29 W/cm², which represents an encouraging improvement in power density over the reference, and shows real promise of reaching the final target of 1.5 W/cm² at 0.6 V. At materials development level, good progress has been made in low equivalent weight ionomer development both for the membrane and the catalyst layer, and the design of the membrane reinforcement has been fixed. At the manufacturing level, advances have been made in the upscale of the novel membrane reinforcement and a continuous membrane casting line has been used to produce VOLUMETRIQ membranes at scale. Bipolar plate design optimisation for the high power stack demand has begun, and tooling is being prepared for volume manufacture of the plates and for the fully automated line for production of the ElringKlinger liquid-cooled automotive NM5 stack, having a final stack power density of >3.5 kW/L. Fuel cell stack requirements, and corresponding test protocols for use in generating membrane, MEA and stack performance data have been agreed and validated. This poster will describe the current status of VOLUMETRIQ cell and stack components and of the VOLUMETRIQ stack.

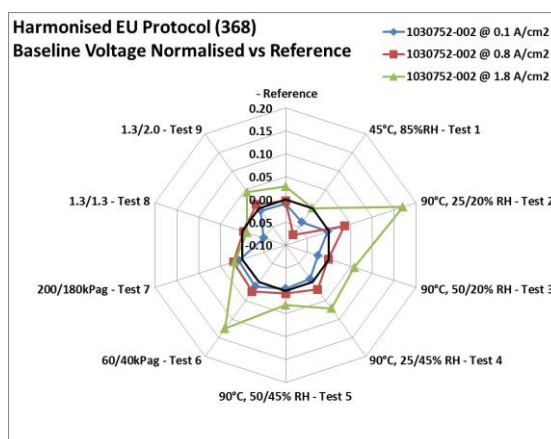


Figure 1: MEA using a membrane with electrospun reinforcement demonstrates higher performance than the project reference MEA using a membrane with conventional reinforcement

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