NOVEL ELECTROLYSER MANUFACTURING SUPPORT: Supercritical

ADVANCED MANUFACTURING FOR ELECTROLYSER MANUFACTURE
The MTC has accelerated the development of Supercritical’s novel hydrogen electrolyser, from initial prototype to developing a commercial supply chain.

The experience of the team at the MTC and their systematic process for identifying suitable approaches for manufacturing based on Supercritical’s product design enabled us to rapidly converge on a functional prototype. With a key requirement of ours being that the process had to be scalable, and scalable quickly, the MTC leveraged their expertise and wider network to ensure that we could take our work to a commercial environment in the UK supply chain as soon as possible.

Luke Tan, Chief Product Officer & Co-Founder, Supercritical

THE CHALLENGE
The Supercritical electrolyser utilises high temperature, high pressure water to continually produce hydrogen using up to 30% less energy than conventional systems. To achieve its full potential, the electrolyser requires a complex structure with a high surface area, that is not currently manufactured using conventional methods at scale.

Through the AHEAD (Affordable Hydrogen from Electrolysis Accelerating Decarbonisation) and WhiskHy UKRI and DESNZ funded projects, the MTC has developed a pilot manufacturing process and supported Supercritical in identifying and building a commercially viable method of manufacturing Supercritical electrolyser cells in the UK supply chain.

MTC’S SOLUTION
- MTC investigated a range of conventional and novel manufacturing methods capable of producing components within Supercritical’s specification and selected the most appropriate processes for further study.
- MTC further developed and analysed these technologies and secondary processes producing multiple prototypes and test pieces, working with commercial suppliers to identify supply capability and modelling cell manufacturing costs.
- MTC identified a series of inspection methods to support quality assurance and analysed end-of-life components to characterise the effect of the adverse processing conditions on cell condition.
This project has demonstrated the agility and adaptability of the MTC to deliver innovative solutions for novel net zero products, which help to resolve the energy challenge we are all facing. The MTC team has flexibly trialled an array of manufacturing technologies to identify the most optimal solution, and carried this through to support Supercritical in identifying an appropriate supply chain they can work with longer term.

Tom Cockerill, Chief Engineer, MTC

THE OUTCOME

- A technology downselection, informed with physical trials, directing current ongoing and future state development.
- A range of analytical reports on primary and secondary (post processing) manufacturing processes informing and directing current and future state designs.
- Quality inspection downselection, identifying methods capable of measuring multiple challenging quality criteria.
- A variety of prototype cells using different manufacturing/processing methods.
- Commercial supply capabilities identified, evaluated and validated, with costs modelled.

BENEFITS TO THE CLIENT

- Development of current state manufacturing process for components that were previously unable to be produced.
- Production of prototype cells and test pieces allowing Supercritical to validate simulated design changes in real components.
- Production prototypes integrated into equipment testing to develop and validate the Supercritical design.
- Development of a nascent commercial supply chain and quality assurance process for cell manufacture.
- Continued partnership between Supercritical and the MTC to support further development.

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