

Fuel for automation

Cambridgeshire-based GB Innomech recently designed and built the world's first automated manufacturing system for alkaline fuel cells, one of the most promising new forms of energy generation currently being taken up for industrial power generation.

Tim Mead, commercial director at Innomech explains.

The fuel cell technology is clean, quiet and efficient but there are hundreds of components, or layers, in a commercial-scale fuel cell stack and the number of stacks needed to generate sufficient power make it almost impossible to manually assemble them at speed and at a competitive cost.

The new assembly equipment has been developed for AFC Energy as part of its EU-backed POWER-UP consortium to develop and install industrial clean energy generation plants that will use hydrogen as a fuel source. The first plant is being built at an Air Products industrial gas processing plant at Stade, northern Germany and will comprise two AFC Energy KORE systems, each containing 24 alkaline fuel cell cartridges generating up to 250 kW at full power. The first system is due to be installed towards the end of this year.

The fuel cell stack within a cartridge is made up of multiple layers of anodes, cathodes and spacer components, along with other essential components that are assembled in sequence to form specific channels to carry hydrogen, air or potassium hydroxide electrolyte during use.

Although none of the individual components are particularly heavy, there are hundreds of layers and the final completed stack needs to be moved by forklift on account of its weight and bulk. The challenge for Innomech was to scale up the manufacturing process and to

automate the assembly of stacks to a consistent quality, while also allowing the operator to safely manipulate the stacks and to complete manual process steps at the start and end of the production cycle.

The assembly system uses an ABB IRB 2600 industrial robot, with a 1.65m arm and a 20kg payload capacity surrounded by a racked enclosure with hoppers of fuel cell components. There are four bulk quantities of electrodes all with protective plastic spacers between each plate: one with cathode sheets face up, a second with them face down and the same for the two anode stacks. The stacks of layers are angled in the racking so that gravity helps with alignment and registration.

Innomech has designed the automated manufacturing system to assemble fuel cell stacks with an agreed number of layers and interconnected anodes and cathodes but the system can also



Image courtesy of GB Innomech

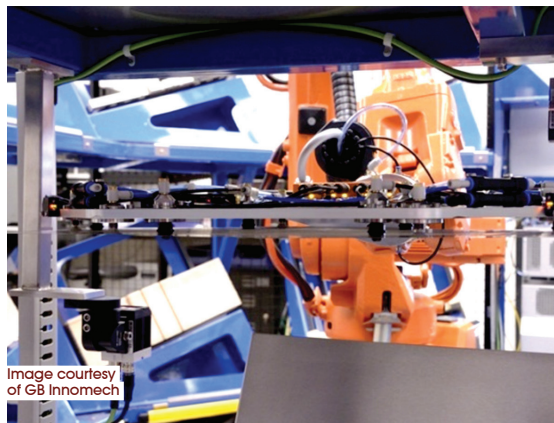


Image courtesy of GB Innomech

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be quickly and easily reconfigured by its operator, if required, to build stacks with larger or smaller capacities. The second phase of work, which is due to start later this year, is for the company's automation specialists to design and develop disassembly equipment that will allow fuel cell stacks to be taken apart layer by layer at the end of their working life. The electrode materials, plates and spacers can then be separated for recovery and re-use with the catalysts and other materials regenerated and recycled. **END**

FURTHER INFORMATION:

For more in-depth information on this automation project, visit bit.ly/1h2LTQz