at least one fuel outlet pipe portion and cutting through the at least one fuel outlet pipe portion to separate the at least one fuel outlet pipe portion into a first fuel outlet pipe portion connected to the fuel cell strip and a second fuel outlet pipe portion connected to the fuel cell bundle;

removing the fuel cell bundle, the second fuel feed pipe portion, and the second fuel outlet pipe portion from the fuel cell strip;

inserting a replacement fuel cell bundle including a replacement second fuel feed pipe portion and a replacement second fuel outlet pipe portion; and

connecting the replacement fuel cell bundle to the fuel cell strip by:

connecting the replacement second fuel feed pipe portion to the first fuel feed pipe portion with a first sealing member; and

connecting the replacement second fuel outlet pipe portion to the first fuel outlet pipe portion with a second sealing member.

[0012] A benefit of the method is that defects detected during manufacture and inspection of the strip within a particular bundle can be replaced with relative ease enabling the fuel cell strip to be rectified. A further benefit of the method is that replacement of a defective section within a structural gas tight ceramic fuel cell assembly such as a fuel cell strip may minimise the cost impact of a manufacturing defect or any defect detected during operation.

[0013] Optionally, the method further includes locating a feed pipe cutting guide on the at least one fuel feed pipe portion and locating a outlet pipe cutting guide on the at least one fuel outlet pipe portion, and positioning the cutting blade on the feed pipe cutting guide on the at least one fuel feed pipe portion and on the outlet pipe cutting guide on the at least one fuel outlet pipe portion.

[0014] According to a second aspect, there is provided a solid oxide fuel cell stack comprising at least one fuel cell strip, the at least one strip comprising:

a fuel feed pipe comprising a plurality of fuel feed pipe portions;

a fuel outlet pipe comprising a plurality of fuel outlet pipe portions; and

a plurality of bundles, each bundle comprising a plurality of tube sub-assemblies, the tube sub-assemblies comprising fuel cell tubes separated longitudinally by end fittings connecting adjacent tube sub-assemblies, the end fittings providing a passage for fuel;

wherein one of a respective lowermost or uppermost tube sub-assembly of each bundle comprises a manifold end fitting connecting the bundle to the fuel feed pipe portion

and the other of the respective lowermost or uppermost tube sub-assembly of each bundle comprises a manifold end fitting connecting the bundle to the fuel outlet pipe portion; and

wherein at least one of the plurality of fuel feed pipe portions and at least one of the plurality of fuel outlet pipe portions comprise a cutting guide configured to indicate a location for safe cutting of the at least one of the plurality of fuel feed pipe portions and at least one of the plurality of fuel outlet pipe portions.

[0015] The cutting guide indicates the position at which a cutting blade may be positioned on the fuel feed pipe portion in order to safely cut through the fuel feed pipe portion without damaging other parts of the fuel cell strip. The cutting guide may be a line or mark, or it may be a groove in the pipe portion. The ability to safely remove a bundle from a strip vastly may reduce the manufacturing and running costs of a fuel cell. Over the lifetime of a fuel cell, certain fuel cell bundles may experience adverse degradation or may even experience complete failure. Consequently, surrounding bundles compensate for the reduction in efficiency of the degraded bundle and the overall strip life span is reduced. Current methods only allow removal of an entire strip. However, this is wasteful since a large proportion of the strip may be in good working order.

[0016] Optionally, the cutting guide is a notch configured to constrain a cutting blade positioned in the notch, to reduce movement of the cutting blade relative to the fuel feed pipe portion and/or the fuel outlet pipe portion.

[0017] Optionally, the cutting guide is a line formed on a surface of the at least one of the fuel feed pipe portion and at least one of the fuel outlet pipe portion.

[0018] Optionally, the fuel feed pipe portions and the fuel outlet pipe portions may be made from an impervious material such as a magnesia magnesium aluminate (MMA) ceramic material. The benefit of using MMA is that the pipe portions may be manufactured using techniques such as injection moulding or press moulding which provide very accurate structures and therefore provide very accurate tolerance of the cutting guide.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] Embodiments of the invention are further described hereinafter with reference to the accompanying drawings, in which:

Figure 1 shows a portion of a solid oxide fuel cell strip;

Figure 2 shows a portion of a fuel pipe;

Figure 3 shows a portion of a fuel pipe;