

Introduction of Hydrogen Fuel Cell Generator in Textile Industries

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Abstract - As environmental change turns out to be progressively apparent, mainstream researchers deals with an issue. The fixed applications the business is one of the best energy shoppers. Taking advantage of the worldwide capability of environmentally friendly power is presently being inspected for the purpose of creating energy using innovations that are both effective and low-dirtying. In this environment, new energy generating technologies are required to create minimal carbon emissions as well as to identify, develop, and implement strategies for using renewable energy sources' potential. One of the alternate alternatives for future clean energy systems is hydrogen fuel cell technology. This article examines the features of hydrogen energy, which suggest that it might be used to power stationary applications as a clean energy source. The review's goal was to present an overview of the sustainability aspects and potential of utilizing hydrogen as an alternative energy source for stationary applications, as well as to identify ways to increase hydrogen's share of energy in stationary applications. A SWOT examination was utilized as a review strategy, and a few suggestions for working on the utilization of hydrogen energy as a fixed energy elective were proposed. The current study's SWOT analysis shows that the hydrogen economy's implementation is heavily reliant on the following primary factors: legal framework, energy decision makers, information and interest from end users, possible investors, and the presence of experts in the sector.

Key Words: alternative energy, energy efficiency, fuel cell, hydrogen energy, stationary application.

1. INTRODUCTION

Due to both the scientific and political efforts needed in their creation, as well as the price rises of energy acquired via traditional techniques, unconventional energy sources have achieved and will continue to earn a growing role in energy systems across the world. Primary energy sources, also known as renewable energy sources, are those found in the

natural environment that are available in almost endless amounts or that are regenerated at a quicker pace than they are consumed. The Sun's beams, the Earth's inside warmth, and the gravitational communications of the Sun and the Moon with the oceans are wellsprings of authoritatively recognized sustainable. Renewable energy sources now provide a small portion of the world's energy needs due to improved processes and methods for producing or capturing these types of alternative energy. Lower infrastructure costs and improved conversion efficiency have made renewable energy sources a small part of the world's energy needs. Renewable energy production is expected to have a 30–50 percent share of the overall energy market by 2050, according to the most optimistic projections, however this is contingent on lowering production costs and developing huge energy storage capabilities. Furthermore, none of these sources of energy can produce sufficient quantities of fuel for use in a variety of stationary, mobile, and industrial applications.

In this context, we are actively exploring for energy-generation options that use technologies that are high-efficiency, reliable, and low-polluting. Fuel cells are one such technology, which is now regarded the cleanest way to get sustainable energy. Hydrogen-based energy creation has turned into a chance as energy units improve]. Hydrogen is introduced as an energy transporter inside a protected and feasible energy framework later on hydrogen-based economy. Mankind is going to enter another time set apart by advancement innovation and elective powers. New furthermore, fundamentally various approaches to making and using energy will be seen. Energy might be created from sources that emit almost no pollution. Hydrogen may be thought of as a synthetic fuel that will transport secondary energy in a post-fossil-fuel economy.

1.1 Aim and Objective:

Aim:

The aim of the project is to produce the necessary heat and electricity needed in the textile industries using hydrogen fuel cell generators.

Objective:

- To produce cleaner form of energy
- To save power by lessening power for heat creation
- Hydrogen for a sustainable future

2. Literature Review

While there is a large body of literature on stationary power production, just a handful will be discussed here. A study of large stationary applications is conducted by Baker and Adamson [2]. Brdar and colleagues [3] discuss a number of industrial and service enterprises, value propositions and ambitions, among other things. It is given with a global analysis. Drivers, market opportunities, and industrial partners are all discussed. Nishikawa [4] is a regional power. Garibaldi [5] gives a demonstration of a recent large-scale protest in Japan. Tulloch [6] lays forth a business model for the development of hydrogen parks and projects in Italy. In the United Kingdom, there is a Hebridean Hydrogen Park. The illustrations gained from each of these were analyzed. The study's starter organizes Additional references are not accessible. Mahadevan et al. [7] led ID and investigation of close term direct hydrogen proton trade layer power device markets under DOE Contract DE-FC36-03G013110. Moreover, Kurtz et al. [8] are examining current DOE activities.

3. Scope of the Project

Fuel cells can be used in a variety of applications such as transportation, industrial / commercial / residential buildings, and long-term storage of grid energy in reversible systems. Energy units offer clear benefits over the burning based advances at present utilized in many power plants and vehicles. Power devices are more proficient than gas powered motors and can straightforwardly change over compound energy in fuel into electrical energy with a productivity of up to 60%. Contrasted with gas powered motors, energy units radiate almost no toxins. Hydrogen fuel cells emit only water and not

carbon dioxide, helping to solve serious climate problems. There are no smog or air pollutants on the ground that cause health concerns.

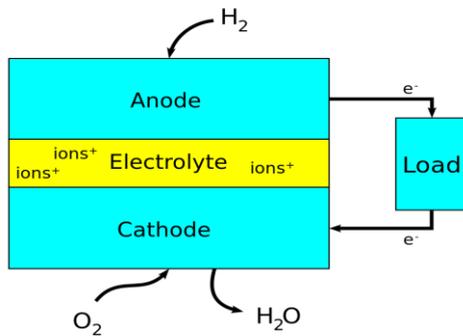
4. Need For Textile Industries

The global energy crisis and high fuel costs have led to additional efforts to save as much energy as possible. The material area is one of the least energy proficient and most energy-concentrated enterprises. Spinning consumes 34% of energy, weaving consumes 23%, chemical treatment consumes 38%, and others consume 5%. Power consumption is dominant in spinning and weaving, but chemical processing relies heavily on thermal energy. Thermal energy is known to be used primarily for two activities in textile factories: water heating and water drying.

5. Fuel Cell

A power device is an electrochemical cell that utilizes a couple of redox cycles to change the substance energy of a fuel (regularly hydrogen) and an oxidizing specialist (usually oxygen) into power. Power modules vary from most batteries in that they require a steady supply of fuel and oxygen (ordinarily from air) to keep the substance response going, though compound energy in a battery is normally gotten from metals furthermore, their particles or oxides that are as of now present in the battery, except for stream batteries. Fuel cells can create power endlessly insofar as fuel also, oxygen are accessible.

There are various kinds of energy units, however they continuously have an anode, a cathode, and an electrolyte that licenses particles to go between the different sides of the energy component, most frequently emphatically charged hydrogen particles (protons). An impetus at the anode incites oxidation processes in the fuel, which produce particles (ordinarily decidedly charged hydrogen particles) and electrons. The electrolyte transports the particles from the anode to the cathode. Simultaneously, electrons go through an outer circuit from the anode to the cathode, giving direct current power.



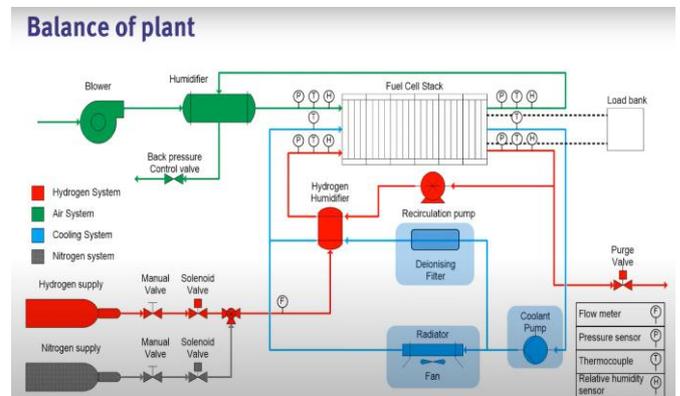
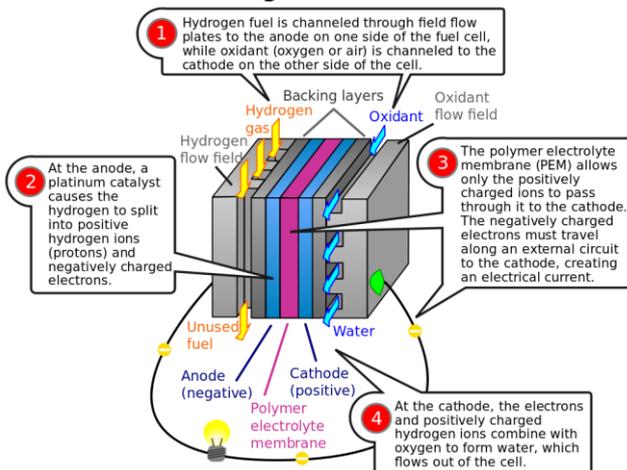
7. Working of Hydrogen Fuel Cell

A hydrogen generator generates electricity using cutting-edge power gadget technology. An energy unit is a device that combines hydrogen and oxygen to generate water fume, heat, and power. In POWER energy units, proton trade films are utilized (PEM). A platinum catalyst is utilized to separate hydrogen gas into protons and electrons. Protons, however not electrons, can go through the PEM. At an anode, free electrons are gathered and sent around the PEM. The section of electrons around the PEM makes the electric stream expected to drive a store

8.1 Working Of Hydrogen Fuel Cell Generator

The hydrogen gas passes from the hydrogen tank and reaches the humidifier and gets humidified, so that the efficiency is not lost on the proton exchange membrane. In the same way oxygen is also blown from the atmosphere using blower, which is also humidified and reaches the cathode of the hydrogen fuel cell stack. The electrolysis process takes place in the fuel cell stack and the by products such as water vapour and heat is released, which can be further used. The radiator ensures that the temperature is maintained in the fuel cell stack and finally nitrogen supply is used periodically for removing the leftover by products that are still present in the fuel cell stack.

Proton exchange membrane fuel cell



8. Hydrogen Fuel Cell Generator

Single Fuel cells connected in series and parallel form a fuel stack and with the assistance of other components like humidifier, blower and radiator fan form a hydrogen fuel cell generator which can be used as an alternate for diesel generator to produce electricity.

9. Conclusion

Textile industries require both heat and electricity for production and fabrication. For example spinning machine and stitching machine requires electricity whereas the blow drying machine and stress and strain removing machine requires heat. Instead of spending additional electricity in producing heat, the heat that is produced as by product in hydrogen fuel cell can be used for drying process in textile industries. Currently the prices of green hydrogen are slightly expensive. But it is expected to reduce in the upcoming years when the production of green hydrogen increases. As of now blue Hydrogen & Grey hydrogen can be used to power the generators. Thus usage of hydrogen fuel cell generator pave us a path for a sustainable future.

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