

Development and Applications of HHO Water Based Flame Torch

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Abstract— Saving fossil fuels and using alternate sources of energy which aid in reducing pollution in manufacturing industries has been a prime motto for present researchers. This led in achieving the generation of HHO (Oxy-hydrogen) water based technology which can be used in various operations such as polishing, welding etc. This paper presents the development and applications of HHO based flame torch having a flame length of one inch which is used to melt, heat, cut ores or metals and also to join materials such as iron and ceramics.

Index Terms— Applications, Flame torch, HHO water based technology, Manufacturing.

I. INTRODUCTION

With the advent of increase in demand of fossil fuels in manufacturing industries, the need for an alternate source of energy to meet the requirements has gained prominence. The use of hydrogen cells based on water technology would not only limit the consumption of fossil fuels but also control pollution. This led to the development of HHO water based flame torches which can be used in various manufacturing applications. Noor Alam et al conventionally produced HHO (hydroxyl gas) by electrolysis of alkaline water by using grade 316-L steel as electrode and also established that the gas produced is flammable and eco-friendly [1]. Mohamed M. et al. generated a HHO system and investigated the engine performance and emissions [2]. Sumansaurabh et al built a torch for flame welding from a hydrogen fuel cell which is produced by electrolysis of water hence environment friendly and would weld different materials [3]. Subashinini De Silva et al designed a HHO generator which would improve the efficiency and performance of the system. The designed system generated more hydroxy gas from a less input of energy [4]. Tested the performance of SINJAI spark ignition engine by dry cell (HHO gas generator) to check the optimized cell working when PMW (pulse width modulation) technique is used in HHO gas generation [5]. Dragoslav Dobras et al used brown gas produced from electrolysis process for welding. This gas obtained could effectively produced flame and carried out welding process. Combination of two hydrogen atoms with single oxygen was obtained which resulted in HHO gas [6]. Yull Brown invented the use of hydrogen and oxygen gases mixed in certain ratios to produce a mixture of gas which is used in welding and brazing [7].

II. DESIGN OF THE HHO GENERATOR AND TORCH

A. HHO Generation

The HHO generator is prepared using a gallon water which should be filtered or distilled and is run through a process of electrolysis with only 1.5 volts DC and an amp of current. The principle is to produce a HHO with less amount of electrical energy and more heat. When water is introduced with electrical current/voltage [DC] it has a tendency to become excited and divides into its primary elements of hydrogen and oxygen. The produced hydrogen and oxygen are now in a gaseous state from the liquid water and mixed in a ratio of 2:1 which generates HHO gas. A HHO generator based on the gas collected is built which is configured to permit a useful output with minimal power.

B. HHO generator and torch

The hydrogen gas is produced by electrolysis method where the water splits into hydrogen and oxygen when power supply of 220V is supplied to the PWM (Pulse Width Modulation) circuit. Then water splits and ionized in the form of gas which is further carried out through the bubbler to the welding torch where it gets flamed and used for welding purposes. The components of HHO gas flame torch are reactor, tank, bubbler and flame torch and the flow chart for HHO generator and torch is seen in Fig. 1.

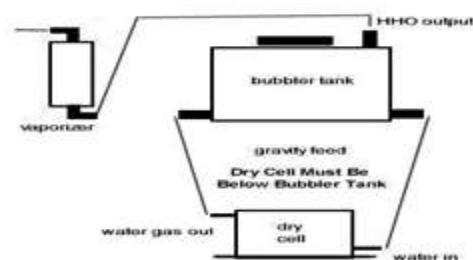


Fig. 1 HHO Generator and Torch System

C. Components of HHO Generator System

In the reactor there are 110 stainless steel plates which are of 16 gages. These steel plates can easily retain the temperature of 1000⁰ C supply of current to the reactor is 220V so there will 2.2 voltage drop per plate which is best for the electrolysis process. The capacity of tank is one liter and it is made up of polyvinyl chloride, there are five brass nozzles attached to the tank, two nozzles from each side and one at the upper side of the tank as seen in Fig. 2(a). One flash port is also attached at the upper side

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of tank for the protection from back fire of hydrogen gas, as it releases the pressure.

It is made up of stainless steel of 16 gages. It has two nozzles for output and input. It consists of flash port at the upper side of the bubbler and at the bottom there is a perforate plate for the dispersion of the hydrogen. The bubbler attached to reactor and tank is seen in Fig. 2(b).



Fig. 2(a) Tank



Fig. 2 (b) Bubbler

Flame torch is made up of poly vinyl chloride, it has pressure relief valve, as it pops off when there is back fire of hydrogen gas. It has usually two springs, one at the upper side and other at the bottom, a small glass ball is placed at the bottom spring. When hydrogen gas flashes back the glass ball pops off to the upper spring and the pressure of the hydrogen gas is released at the open part of flash port. Fig. 3 shows flame torch set up.



Fig. 3 Flame Torch Setup

problems that can cause costly equipment damage. Bubbler tank, setup box with cooling fans attached are shown in Fig. 4(b). All the devices for generating HHO gas like bubbler, dry cell, cooling fans, and transformer are fixed in a setup box. So that it easy to carry therefore it becomes a mobile welding device.



Fig. 4(a) Dry cell



Fig. 4(b) Setup box with cooling fans



Fig. 5 Assembled HHO water gas flame torch and its components

III. ASSEMBLING AND PERFORMANCE TEST ON DIFFERENT MATERIALS

A. Parts of Experimental Setup

The following are the components which are assembled to build a HHO water based flame torch as shown in figure 5. Transformer is an electrical device based on electromagnetic induction transfers energy between two or more circuits. Dry cell uses a paste electrolyte, with only enough moisture to allow current to flow. Fig. 4(a) represents dry cell. Cooling fans are ideal for use in hydrogen gas generating to prevent overheating

IV. APPLICATIONS OF HHO WATER GAS FLAME TORCH

Cutting- In this process intense heat is generated in the area when a torch which produces flame is applied on it. It burns metal into metal oxide which flows away from the cutting zone and the material is cut leaving behind the oxide slag which adheres to base material. Fig. 6(a) shows the cutting process by HHO water based gas flame torch.

Melting- Continuous torching on the metal area on both the top and bottom side to heat up both sides while adjusting the flame coming out of the torch would melt the metal when it reaches its melting point. Fig. 6(b) shows the application of torch for melting.



Brazing- The two brazed to be joints are brazed using a filler material which is melted by application of gas flame torch as shown in Fig. 7(a).

Polishing- The difficult to polish acrylic sheet can be efficiently polished using flame torch as seen in Fig. 7(b).

Welding- The tip of torch from where the flame flares is used to heat two pieces to be weld. It attains the temperature of molten state a filler material can be used to weld the pieces as shown in Fig. 8.

V. RESULTS



Fig. 6(a) Cutting of Iron using HHO Flame Torch



Fig. 6(b) Melting using HHO Flame Torch



Fig. 7 (a) Brazing using HHO Flame Torch



Fig. 7 (b) Polishing of acrylic sheet using flame torch



Fig. 8 Welding using of HHO flame torch

VI. CONCLUSION

The HHO is generated by water electrolysis technology on the supply of 220V, 11 ampere with a production rate of 12.6 lpm (liter per minute) where minimum amount of power is consumed. The utilization of this gaseous mixture is made by building a HHO water based flame torch by assembling components such as transformer, dry cell, tank, bubbler, setup box with cooling fans and a flame torch. This developed flame torch based on HHO gaseous mixture is used in cutting, welding, brazing, polishing, melting and to process refractory materials. This overall mechanism of using water based technology for manufacturing would aid in saving fossil fuel and reduce pollution.

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