

Eco-Friendly Cremation System

¹Snehal S.Pujari, ²Sadicha J.Ujalambe³Diksha H. Birru⁴Onkar S. Vibhute.

¹professor, Civil Engineering Department, N.B.Navale Sinhgad College Of Engineering, Solapur.

^{2, 3, 4}Students, Civil Engineering, N.B. Navale Sinhgad College of Engineering, Solapur.

Abstract—“Death is an everlasting truth after the life and cremation is an integral part of modern Indian culture. Cremation is the process which can never be changed or reversed. Cremation is the gateway to new life or reincarnation according to Hindu mythology. In India, there are countless beliefs about cremation and it varies according to the grouping. The methods of disposal of body varies according to the castes and the traditions they carry through their ancestors. The methods of cremation are some people bury the body of their loved ones while some burn the body, also some people immerse the body in the water. In fact, all Indians except Indian Muslims and Christians are known to burn the lifeless bodies of their dear ones after death. The Indian Muslims and the Christians bury the dead like they do everywhere on earth. But, as a matter of fact, all Hindus do not burn the dead bodies; some actually dispose of the dead in various other ways including burying and floating. But during whole process of cremation large amount of wood is used which results in degradation of forest and increase in air pollution. Cremation of body even results in water pollution due to the disposal of the ash in the river. The uniqueness of death and its spaces in the Indian scenario needs to be studied both, critically as well as naturally so as to envisage the role these spaces of cremation can play in the contemporary Indian city. This is an attempt to step on study the same

Keywords:*Cremation, India, Hindu, dispose, bury, bodies*

I. INTRODUCTION

With nearly a billion followers worldwide, Hinduism is the third largest religion in the world. It teaches that God is within each being and object, and the purpose of life is to become aware of this divine essence. The Hindu faith originated in India, but today there are many denominations worldwide, each with slightly different customs and beliefs. These beliefs about the soul and the body form the basis for why Hindu funeral rites generally include cremation. Hindus believe that the soul is not strictly bound to one body, but will actually reside in any number of bodies – which may or may not be human – before reaching the final destination of freedom, or mukti.

The only Hindus typically not cremated are babies, children, and saints, who are believed to be pure and unattached to their bodies; therefore they may be buried instead of cremated. Traditionally in India, Hindus are cremated along the Ganga River as part of a

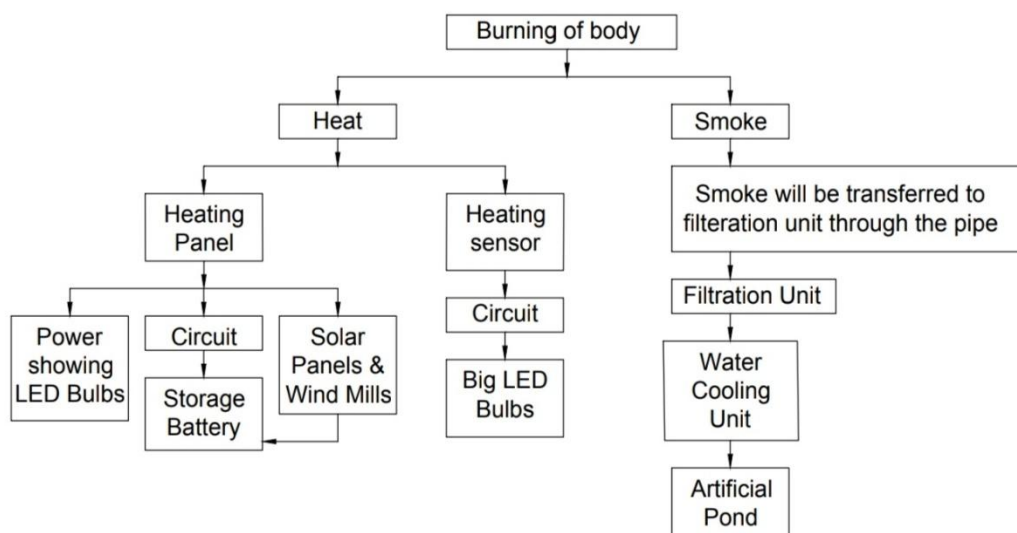
month-long series of funeral rites intended to purify and prepare the soul to move out of the body and assist it in moving toward mukti.

Cremation has remained common, possibly because cemeteries are a waste of space. New electric crematoriums are becoming more popular. They are more efficient and cleaner, and save precious fuel and forests. The cycles of birth and death are perceived a continuations of the disintegrating force of Creation while transmigration of the soul from one life to another is viewed a perpetuation of the separation of the individual from the unifying force of existence. The aim of the individual is to "get off the wheel," to escape the cycle and merge finally with the Oneness that was there before Creation began. Into the original One.

All the year round, around 50 to 60 million trees are burned during cremations in India. While burning the wood, there is also emission of million tonnes of carbon dioxide gas which is not good for the environment. The two main drawbacks of the traditional method of cremation are air pollution and deforestation. Also, cremation in open grounds generate large amounts of ashes, which are later thrown into rivers and water bodies, especially the Ganga River, thereby polluting the water. These are all environmental threats caused by cremation.

Cremations have been taking place in the Ganga for thousands of years. Perhaps a 100,000 cremated bodies are thrown in the Ganges every year. In Varanasi, funeral parties wait for their turns on the steps of the Ghats (cremation grounds). Bundles carried through the streets are often corpses. On the roads leading to Varanasi you will often see shrouded corpses placed on the roofs of vehicles like surfboards or kayaks. There is even a caste that specializes in sifting through the ashes and mud at the bottom of Ganga for rings and jewellery. Experts estimate that more than 3000 million litres of untreated sewage from these towns along the Ganges are pumped into the river every day. By the time it reaches Varanasi, whose untreated sewage (or most of it) is also pumped into the waters, it becomes a sewer and the sixth most polluted river in the world.

II. METHODOLOGY / EXPERIMENTAL SETUP



Firstly the body is placed in the unit on the body tray. The body is ignited and the smoke starts coming. The smoke is transferred to the pipe through the hood. Through pipe it

is transferred to the filtration unit. Heat sensor placed near the body senses the heat and bulbs connected to the heat sensor glows. The bulbs connected to heat sensor glows till the cremation is carried out. Smoke which is transferred to the filtration gets mixed with the water and from there the warm water is then sent to the filtration chamber to cool down. Once the water gets cooled it is pumped to the artificial pond. Solar panels and wind mills are provided so that they can naturally generate energy. Bulbs provided can be used for the cremation which is carried out during night time. Solar panels and wind mills are not only provided to generate energy but also to charge the batteries. Batteries are provided to store the energy and can be used when needed. No source of energy is taken from outside. Due to combustion, the complete burning of body is completed in 2 to 3hrs. In Eco-Friendly cremation system 90 to 100kgs of wood is used for burning a body, which is environmentally less harmful. The idea of using less number of woods and large number of cow dungs can be beneficial to the society. Using more number of cow dung not only reduces the air pollution but also gives job to the needy people. People who can't afford cost of cremation throw half burnt bodies in the river which will not only pollute the water but also will affect the beauty of holy places. Eco-friendly cremation system will be affordable for the poor people. As bodies will be completely burned, there will be reduction in water pollution.

III. DESIGN / EXPERIMENTATION



IV. DESIGN CALCULATION

Analysis of a project means the calculation evaluation and manipulation of old data of project to get new and improved results. The data collected for analysis of this project includes the data of pollution occurred due to cremation, data of efficiency of combustion of wood, data of amount of wood required for cremation. The main three gases emits due to

cremation that are CO₂, CO and CH₄. Following are the data collected from different standard resources:

1kg of wood produces 1.805 kg of CO₂.

1kg of wood produces 0.2 kg of CO.

1kg of wood produces 0.0187 kg of CH₄.

y = amount of pollutant produced in kg

x = amount of wood used in kg.

A= amount of pollutant released by combustion of 1 kg of wood.

$y = A * x$

V. RESULT

Fuel (Wood)	CO ₂ (in kg)	CO(in kg)	CH ₄ (in kg)	Total pollutants (in kg)
1 kg	1.805	0.2	0.0187	2.0237
400 kg (normal cremation)	722	80	7.28	809.48
120 kg (MGCS)	216.6	24	2.244	242.844
90kg (Improved MGCS)	162.45	18	1.683	182.377
100 Kg (ECS)	180.5	20	1.87	202.37

In the above table as we can see that 1 kg of wood emits 2.0237kg of total pollutants. 400kg of wood is required for normal/ traditional cremation for burning one body. Mokshada Green Cremation System (MGCS) an NGO which works for the betterment of the society uses 120kg of wood which emits 242.844kg of total pollutants which is compatibly lesser than the traditional cremation. Eco-friendly Cremation System (ECS) uses 100kg of wood for burning of one body by which only 202.37kg of pollutants are emitted. In holy places like Varanasi, Nepal, Haridwar 400 to 500 bodies are burnt daily so we can't even imagine the number of pollutants that are emitted daily.

VI. CONCLUSION

- Only 100 kg of wood is required as against 400 kg in the conventional method.
- As such, there is an equivalent reduction in GHG emissions also.
- Maintenance cost is less because our design of ECS, this helps in improving the sustainability of the system.
- Air and water pollution is minimal.

- All rituals like Tarpan, Mukhagni, Kapal kriya etc. can be performed in a traditional manner without affecting the religious faith of people.
- Saving of wood also reduces cremation cost substantially & makes ECS affordable to people below poverty line.
- To Generate Electricity by natural ways.
- No source of electricity is taken from outside source.
- ECS helps to maintain the beauty of holy places.
- ECS helps the holy rivers being polluted by cremation process.
- The ECS can provide jobs to the needy people.



Cremation of Covid Patients at Delhi



Covid-19 is taking lives of people day by day. The above pictures show that there is not even sufficient space for cremation. The people carrying cremation there, don't even care if the body is half burnt. Congested cremation can be harmful for the society. ECS will be helpful because it helps in complete and faster burning of body and there will be sufficient space for cremation.



Bodies of Covid-19 victims have been found dumped in the river Ganga.



- **Prayagraj: Bodies of the deceased buried under the sand during the second wave of COVID-19 pandemic, near the banks of Ganga River, in Prayagraj.**
- Many people are dumping the bodies of Covid patients on the banks of river Ganga, which is very harmful to the people living nearby. ECS helps in faster and complete burning of the body and these issues shown in the pictures can be avoided by using ECS.

ACKNOWLEDGEMENT

I would like to thank the Project guide, Head of Department and staff of Department, for providing all the material possible and encouraging throughout the course of project. It is great pleasure for us to acknowledgement the assistance and contributions for mam's prompt and timely help in the official clearances and valuable suggestions during the development of this project.

I would also like to express my profound gratitude to my faculty members and all my team members for their efforts and collaboration in doing this project work.

Last but not least, I express my heartiest gratitude to almighty god and our well wishes for their love and blessings to complete the project successfully.

REFERENCES

- [1] Anshul Garg (2007)“Mokshda Souvenir”: pg 17-20.
- [2] Maria Olsson, Jennica Kjallstrand (2005).”Low emission from wood burning in an eco-labelled residential boiler.” Journal of Science Direct 40:pg.1148-1158.
- [3] Cremation. <https://en.wikipedia.org/wiki/Cremation>.
- [4] Anne Marie Helmenstine “Combustion of fossil fuels”.
<http://chemistry.about.com/od/chemistryglossary/g/combustiondefinition.htm>
- [5] Anshul Garg “Project proposal for GEF funding”; pg3-8.
- [6] Hindu corpse wrapped in holy cloth & garlands by the bank of river Bagamati. Source <https://beardedvagabond.wordpress.com/2012/10/24/by-the-burning-ghats-of-the-bagamati/>.
- [7] Open-air cremation being carried out at ghat besides Pashupatinath temple. https://en.wikipedia.org/wiki/Pashupatinath_Temple
- [8] Antim Sanskara (Asthi Visarjan) in the holy water of river Ganga Source: <https://www.parmarth.org/sanskaras/ash-immersion/>.
- [9] Gagneux A., (2008). “Installation of the first 50 m2 Scheffler Solar Crematorium” April 2008.
- [10] Binford, L.R.1963An Analysis of Cremations from Three Michigan Sites Wisconsin Archaeology 44(2):98-110.
- [11] Buikstra, J.E., and L. Goldstein1973. The Perrins Lodge Crematory, Illinois State Museum Reports of Investigation 28,Illinois Valley Archaeological Program Research Papers, 8, Illinois State Museum, Spring-field, IL