To Design Smart Incinerator with Catalytic Converter Attatchment, Fabricate and Test for Exhaust Gas Emission for Maintaining Hygenic Living.

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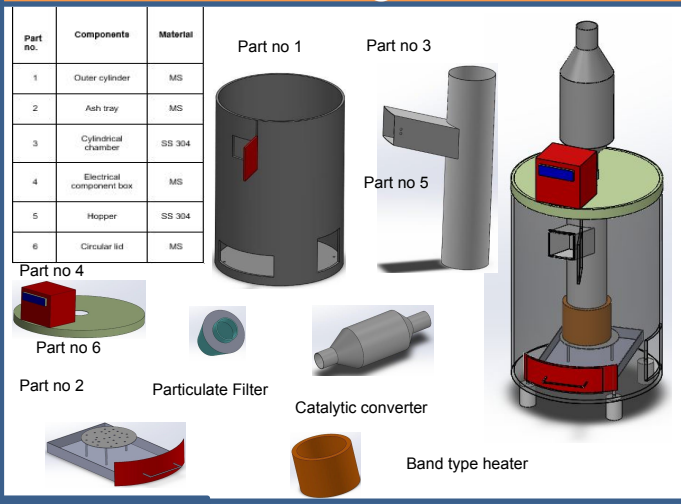
Abstract

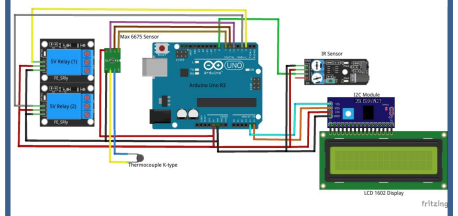
The incinerator is designed and an entirely new machine has been fabricated and tested. This incinerator is relatively low cost, with a capacity of 5 napkins per cycle and with a power consumption of 0.55 KWh per cycle. The Manufacturing cost of the incinerator is Rs.5000/-. The incinerator uses a band type heater with a 500 Watt power rating placed around an SS304 cylindrical shell and a 12 V DC powered fan. The incinerator comes with the incredible features of heater-auto On/Off , air circulation with fan for better combustion process and a counter mechanism using IR sensor with an Arduino controller attachment all these features can be sharply controlled. A small LCD display is used to provide the temperature and counter of pads. It also has an exhaust layout that contains a particulate filter that can filter up to 1-micron size particle and a MM diesel walker catalytic converter to tackle the Central Pollution Control Board (CPCB) norms for incinerators that are implemented and a provision has been made by using naphthalene balls for eliminating the bad odour released during burning. The total power consumption of the machine will be 550 Watt and the time for a burning cycle is 25 minutes for 5 pads, and the cost of burning 5 pads per cycle is Rs.2. The machine can carry out a total of 10 cycles per day. The cumulative weight of the machine is 8 kg.

Design

Part no.	Components	Material
1	Outer cylinder	MS
2	Ash tray	MS
3	Cylindrical chamber	SS 304
4	Electrical component box	MS
5	Hopper	SS 304
6	Circular lid	MS



Electronic/Smart Machine



Interfacing of Different sensors and their functions:-
-IR sensor for getting the count of pads.
-Max 6675 sensor for temperature.
-Two 5V Relays for controlling the Band type heater and 12V fan.
-Lcd 1602 I2C display for displaying information.
-Arduino Uno R3 is used as a microcontroller.

Test Results and Conclusions

	No of pads	Energy Consumed (in W)	Time required (min)	Expense for burning per pad (Rs)
Dry test	5	481.5	17.33	0.16
Wet test	5	550	25	0.41

	HC(PPM)	CO2 (%)	O2 (%)	CO (%)	NO (PPM)
Dry test	9	0.04	19.44286	0.020286	0.571429
Wet test	14.7778	0.555833	20.02222	0.043778	0.3333
Avg. Values	11.889	0.2979	19.7325	0.032032	0.45236
Permissible Values	24	0.75	22	0.1	195

Result:-
1.heat loss is prevented by thermal insulation.
2.an air filter for dust particles and catalytic converter for pollution control.
3.It is a smart device which senses the input and controls the Machine.
4.Heater and fan has auto ON-OFF on reaching the system requirement .
5.Decides the optimum time for heating in accordance with number of napkins
6.provision to eliminate bad odour released during burning.
7.maintenance and cleaning can be done easily by using removable mesh.
8.when pad count of 5 is reached, machine starts automatically.
9.better combustion process, by providing air circulation through fan.
10.Display unit is used to provide the temperature and pads count.
11. Maximum temperature reached during testing was 350 degree Celsius.

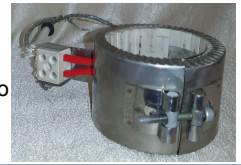
Architecture/design detail

Diesel oxidation Catalytic Converter:-
-catalysis of NO_2,CO and hydrocarbons takes place.
-MM diesel catalytic converter manufactured by Walker.
-Pt:Pd:Rh=1:0:0.15gm/cu.ft

K-type Thermocouple:-
-Temperature measurement upto 800° C.
-Specially used for high temperature applications.

Ceramic fiber insulation:-
-High temperature stability.
-Low thermal conductivity.
-Light weight insulation.
-Corrosion resistance.

Particulate Filter:-
-Filter particulate upto 1um.



Ceramic Band type heater:-
-500W power rating.
-lower operation cost.
-Maximum temperature 450+ degrees.
-Less heat escapes to the

New Manufactured_Mini Incinerator

Smart Mini Incinerator Machine Specifications:
-550 W
-Capacity = 5pads/cycle
-25 minutes/cycle.
-73 cms (height) × 27 cms (dia)
-8 kg weight.

Circular lid with Electronic components box

Burning chamber and attachments

Ash tray

Inside components assembly of incinerator

Smart Mini Incinerator

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