

Design Analysis of Automatic Sanitising Machine

Madan Singh Jadon, Rajesh Kumar, Rahul Kumar,
Sagarmal Gadri, Pankaj Kumar (Assistant Prof.)

*Department Of Mechanical Engineering,
Arya Institute Of Engineering And Technology,
RIICO Industrial Area, Kukas, Jaipur-302028, Rajasthan, India*

Submitted: 05-09-2021

Revised: 12-09-2021

Accepted: 15-09-2021

ABSTRACT: Due to spread of COVID-19 disease in last year which become the pandemic, cause harm to so many lives. The main problem due to disease was facing by the frontline workers, thus for the safety of all the humans beings Automatic sanitizer Machine was purposed which will sanitize the body in an effective manner by sanitizing the sanitizer on the human body with detecting the body temperature in contactless way with the help of sensors. We can use this machine anywhere at need i.e. in school/college premise, hospitals, playgrounds, gyms, malls, theatres etc. to sanitize the human body and to reduce the risk of spread of disease.

Keywords: Covid-19, Sanitisation chamber, Automatic Sanitising Machine, Portable.

Designing of Automatic Sanitizer Machine

A chamber consist of automatic system to sanitize human body is designed to reduce the spread of COVID-19.

It is a cuboidal chamber having dimension of 4feet x 3.5feet x 7feet, consist of Proximity sensor, temperature detector, screen, servo motor, barrier system, high pressure pump, pipe-nozzle system, tank and the outer body.

The outer body of machine is made up of aluminium frame and sheets for the conformance of stability and cost effective. There are total three gate like frame is used to support the structure and covered with aluminium sheets. Frame are of cross section 3inch x 3 inch hollow from inside having thickness of 2mm & sheets are 0.912mm thick.

At the top of front there is proximity sensor, at the right side of front frame there is a chamber of 20cm x 12cm in which temperature sensor is fitted, where the human being have to put there palm to measure the body temperature. Also at the top there is a screen to show the measured temperature of the body. There is also buzzer system, if the temperature exceeds from the normal temperature then the buzzers will get on which are fitted on the both side of machine.

On the middle frame from front side there is a servo motor fitted which rotate 90degree and back to zero through which a bar of aluminium which act as a barrier is join. The motor will work if buzzers are not working, i.e. if buzzers will beeping then motor doesn't on but if buzzer not on the motor will on and allow the person to go inside for further process.

At the centre of middle and last frame there is PVC piping in which sanitizer will flow having the density of 789Kg/m³. This piping will be connected to the nozzles for sanitizer output and with high pressure pump for input of sanitizer.

There are total 5 nozzles fitted at different positions and different angles for maximum sanitization of body within 10-15 seconds without wastage of sanitizer. Figure 1 shows the positioning of nozzles in the machine.

With the reference of a journal paper for the effective sanitization of the body there will be pressure of 470KPa and the discharge of 4.4lts/hr.

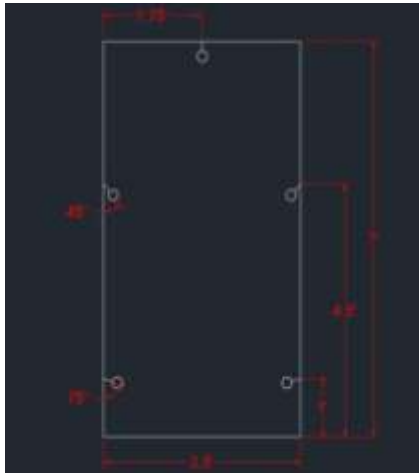


Fig 1. Position of Nozzles

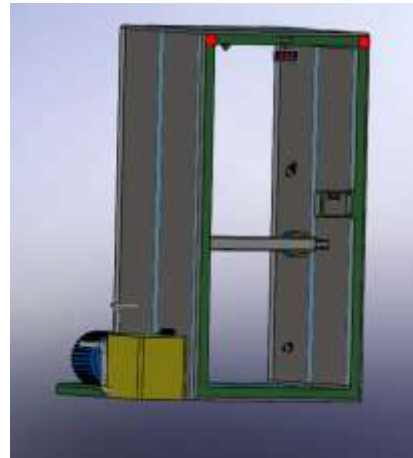


Fig 2. Design of ASM

According to calculations we will require a pump motor set of 1Hp to circulate the sanitizer of density 789Kg/m^3 in a close loop of pipe. Material of pipe will be PVC of density 1380 Kg/m^3 , total length of pipe in close loop is 21 feet and the outer diameter of the pipe and wall thickness are 20mm and 3mm respectively which will wear the pressure of 470 KPa.

Weight of the Automatic sanitizer machine will be 64kg including the weight of frame

as 32 Kg. There are total 3 frames of dimension 3.5 feet X 7 feet joining with side aluminium bars to make a cuboidal shape. Frame bars are hollow from inside with the thickness of 2mm and having outer cross-section of 3 inches X 3 inches. The frame will cover from both sides and from top and bottom with aluminium sheet of thickness 0.912mm.

The estimated design of the whole Automatic Sanitizer Machine (ASM) is shown in figure 2 and 3 figure shows the machine parts name.

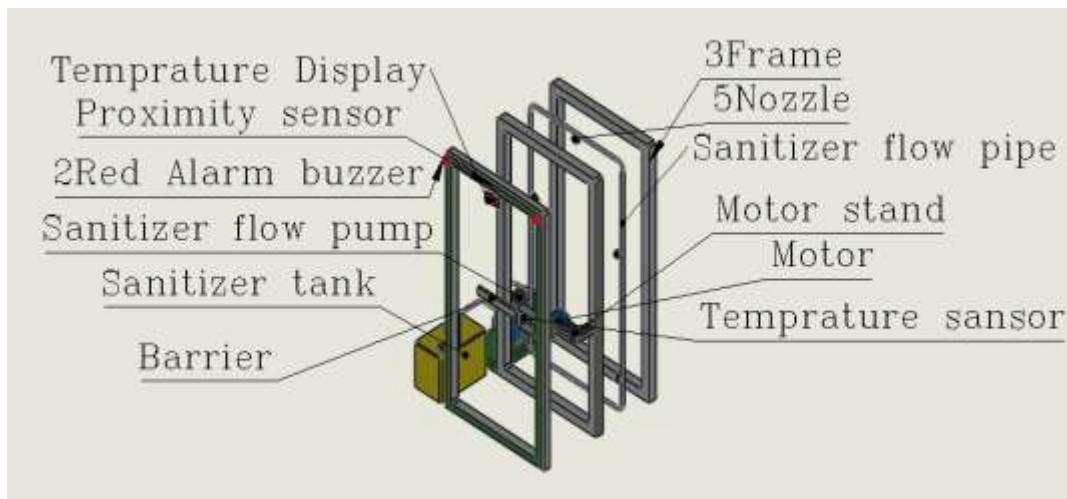


Fig 3. Machine parts name