

College of Engineering

Tube environmentally friendly

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Abstract

The problem of environmental pollution occupy a large segment of researchers and scientists because of their danger to life and even the globe, including. There is the problem of global warming, which worsens and affects talking about scientists as predictors of the occurrence of a disaster in the land shrinking and sinking of the land as well as environmental pollution and health problems. From here, we look for solutions to avoid or reduce those risks. We have put innovation in this method the developer and scalable to a water tank is pulled from the water automatically in the path of the exhaust from the plant or machine. Water spray that absorbs thermal energy heat energy initially felt even then the degree of evaporation latent heat energy to convert water to steam spray is done with a fixed temperature. In the end, were calculated energy stripped from the exhaust before emitted to the air in relation to the amount of water required sprinkled of exhaust for a period of 6 hours during the day and found that 4.3 liters of water works to disarm 11124 kJ of heat energy of the exhaust before emitted into the air outside. These sides of the water droplets are working on purification of exhaust pollutants sticking out and clean the environment.



- **Why do we need to find ways to defeat the output of car exhaust?**
- Most of people know the effects of car exhaust, at least as basics, that it has big effects on health and Environment.

- **What is exhaust gas?**

- In general, an exhaust gas is a gas emitted through a combustion process. The exhaust gas is actually a combination of many different gases: N₂, CO₂, H₂O and O₂. Though some are harmless, there are few that are harmful and are considered major pollutants.
- One of the most dangerous of these is CO, carbon monoxide. This gas has the potential to kill people and animals if concentrations are high enough.
- So, carbon monoxide poisoning can kill, and of course the number one source of carbon monoxide is from exhaust fumes. When listing the dangers of exhaust fumes, death from carbon monoxide poisoning falls at the top of the list. However, death from carbon monoxide poisoning is just one of many dangers to be concerned with. Some of the dangers of exhaust fumes are immediate while others happen over a longer period of time and consequently, are not as readily apparent.
- Unfortunately, as if carbon monoxide were not bad enough, there are a great number of the other pathogens that contribute to the dangers of exhaust fumes. Some of those toxins include sulfur dioxide, nitrogen dioxide, benzene, polycyclic hydrocarbons and formaldehyde. Each of those substances is a pathogen which can have severe consequences both immediately and over the long haul. Medical science has established that many of these substances have harmful effects on bone marrow, the spleen and even our lymph nodes. As a matter of fact, the circulatory system is especially vulnerable to the toxins in exhaust fumes. Studies have shown

that many of these toxins have resulted in problems in the bloodstream such as anemia.

Taking into consideration that carbon monoxide literally suffocates us it is no wonder that it deprives our bloodstream of oxygen necessary for so many vital functions within the body. Some of these toxins, especially carbon monoxide, literally produce damage on a cellular level which can lead to a number of cancers. Some of the other dangers of exhaust fumes include an exacerbation of heart disease due to hypertension and a degeneration of the cells which line blood vessels. Many of these pollutants found in exhaust fumes of course cause respiratory problems as well including, but not limited to, asthma. There is also evidence to suggest that pollutants in exhaust fumes also cause irreparable damage to the central nervous system.

- **The dangers of car exhaust on the environment and health :**

- ❖ **The Harmful Effects of Vehicle Exhaust on health :**



Scientific experts now believe the nation faces an epidemic of illnesses that are exacerbated by air pollution. These illnesses include cardiovascular disease, asthma, chronic obstructive pulmonary disease, lung cancer, and diabetes.

- **Children at Special Risk :**

The American Academy of Pediatrics has concluded that levels of ozone and particulate matter are high enough in many parts of the U.S. to threaten children's health. **Eleven million** U.S. children live in areas that exceed one or more federal air quality standards; **9 million** children live in areas where ozone standards are exceeded; **3.5 million** children live in areas where the particulate standards are exceeded, and **2.8 million** children live in counties where the carbon monoxide standard is exceeded.

- **Elderly at Special Risk :**

Cardiovascular disease, hypertension, diabetes and cancer are all illnesses disproportionately borne by the elderly. **Nearly one-half million** Connecticut residents are over **65 years of age**.

- **Asthma :**

Chemicals in vehicle exhaust are harmful to asthmatics. Exhaust can adversely affect lung function and may promote allergic reactions and airway constriction. All vehicles, especially diesel engines, emit very fine particles that deeply penetrate lungs and inflame the circulatory system, damaging cells and causing respiratory problems. Even short-term exposure to vehicle exhaust may harm asthmatics. Asthmatic children are particularly sensitive to air pollution. New England states have some of the highest asthma rates in the country. About **9**

percent of Connecticut's youth have the disease. Inhalation of vehicle emissions, even for short periods, may be harmful to asthmatics. One study found that children are **40 percent** more likely to have an attack on high outdoor pollution days.

- **Chronic Obstructive Pulmonary Disease :**

Vehicle emissions are particularly harmful to people afflicted with chronic obstructive pulmonary disease (**COPD**), such as chronic bronchitis. Significant and replicated associations have been found between increased ozone levels and a range of adverse effects on the lungs, and several studies have shown increased risk of hospital admission from **COPD** associated with high ozone levels. There is also a relationship between the levels of **PM10** and morbidity in patients with **COPD**. These associations were noted in Philadelphia, where the major source of these particles is motor vehicles. Fine particle matter is especially harmful to people with **COPD** and has been found to increase their hospital admission rates. High levels of **PM10** are also associated with increased morbidity among those with the illness.

- **Cardiovascular Disease :**

Mortality and hospital admissions for myocardial infarction, congestive cardiac failure and cardiac arrhythmia increase with a rise in the concentrations of particulate and gaseous pollutants. As concentrations of airborne particles increase, those with cardiovascular disease may experience increasing severity of symptoms, rates of hospitalization, and mortality. The risk of having a heart attack is greater for people exposed to pollution from heavy traffic, as well as for those living near air-polluted roadways.

- **Cancer :**

Vehicles emit numerous carcinogenic chemicals. Diesel contains benzene, formaldehyde, and **1,3-butadiene**—all three are well recognized carcinogens. EPA estimates that vehicle emissions account for as many as **half** of all cancers attributed to outdoor air pollution.

- **Diabetes :**

Increasing levels of air pollution are associated with rising mortality rates among diabetics. Because of the overlap between diabetes and cardiovascular disease, the nature of this association is not yet clear.

- **Besides these diseases, there are many other diseases can be caused by car exhaust, the point is car exhausts are very dangerous to health, we must reduce it.**

❖ **The Harmful Effects of Vehicle Exhaust on environment :**



- **What are the effects of exhaust fumes on the environment?**

Automotive exhaust (transportation fuel emissions) is a significant contributor to environmental problems.

The emissions from automobile exhaust contain:

- Unburned hydrocarbon: Contributes to photochemical smog and health issues
 - Nitrogen oxides: Contributes to photochemical smog and acid rain
 - Aromatic hydrocarbons: Contributes to photochemical smog and health issues
 - Carbon dioxide: Contributes to global climate change
 - Carbon monoxide: A human health issue in confined spaces
 - Particulate: Contributes to soiling
 - Odor: automobile exhaust components have an odor which impacts general air quality.
- Combustion from fossil fuel engines such as those which burn gasoline and diesel fuel is causing irreparable damage to the environment. Carbon monoxide isn't the only carbon byproduct given off in exhaust fumes. Carbon dioxide is also a problem and we know that it is the number one cause of the breakdown in the ozone layer which is leading to global warming. However, global warming is a catchall phrase that encompasses a great number of problems both to the earth on which we live and to the creatures that dwell on it. Without going into a treatise on global warming it should be sufficient to say that the surface of the earth is heating gradually so that the polar ice caps are melting and growing seasons are being disrupted.

- Unfortunately, this is just the beginning of a snowball effect that filters down through virtually every life form on the planet. Animal habitats are being destroyed at a record speed, which causes creatures to seek new sources of food and shelter. As a result, it is projected that some species could very well become extinct within our lifetime. Also, due to a change in the length of growing seasons many crops will become scarcer and of course, food will become much more expensive when available. The melting polar caps will cause an increase in sea level which will most certainly submerge many islands and coastal areas forcing both animals and humans farther inland.

- The only certainty is that the future should look very different from the past. When we consider air pollution in cities from burning fossil fuels as the main source of energy for electricity production, transportation, home heating and industrial production, then the entire infrastructure of industrial countries must change. Climate change from burning fossil fuels is occurring with destructive forces that will continue to increase and interfere with expectations of a "normal" life and economy.

- Driving a car is the most air polluting act an average citizen commits. Air pollution is not a good idea for a variety of reasons, large and small. The right ideas for remediation of environmental degradations involve unselfish and compassionate behavior, a scarce commodity. The right ideas involve long-term planning, conservation and a deep commitment to preserving the natural world. Without a healthy natural environment, there will be few or no healthy humans.

- **To understand air pollution you can consider a simple schematic that divides a big problem into components.**

 - Local effects -e.g. poisoning humans breathing bad air.
 - Regional effects - fallout from airborne pathogens - infections, particles, chemicals.
 - Global effects - changing interactions between the atmosphere, oceans and the sun, weather effects, effects on plants and the ocean biosphere.
- Air pollutants are substances that adversely affect the environment by interfering with climate, the physiology of plants, animal species, entire ecosystems, as well as with human property in the form of agricultural crops or man-made structures. We list climate at the top of the list to reflect the fact that global climate change has been recognized as one of the most important environmental challenges to be faced by humanity in the **21st century**. In this context certain climate forcing agents—the most important one being carbon dioxide—which otherwise cause no harm to living organisms, should be added to the list of “classic” pollutants, along with such compounds as oxides of nitrogen or sulfur. On the other hand, climate research has linked certain compounds long recognized as air pollutants (for instance black carbon) to the warming of climate, thus providing one more reason for their control.

- Atmospheric reactions can transform primary pollutants into different chemical species. These reactions can produce both harmless compounds and secondary air pollutants that may be more harmful than their precursors.

- Governments and international organizations have been taking actions to protect the quality of air, as well as—in more recent years—to control emissions of climate forcing agents. Ambient air quality standards and guidelines, issued by environmental protection authorities, are instrumental in achieving the air quality objective. An example of such legislation is set by the US National Ambient Air Quality Standards (**NAAQS**) adopted by the Environmental Protection Agency (**EPA**). The **NAAQS** apply to both human health (primary standard) and public welfare (secondary standard). Primary standards protect sensitive members of the human population from adverse health effects of criteria air pollutants. Secondary standards protect the public welfare from any known or anticipated adverse effects associated with the presence of a pollutant in the ambient air. Welfare effects include effects on soils, water, crops, vegetation, manmade materials, animals, wildlife, weather, visibility, climate, damage to and deterioration of property, hazards to transportation, as well as effects on economic values and personal comfort and well-being .

- Under the US Clean Air Act of **1990**, the **NAAQS** standards set maximum ambient concentration limits for six criteria pollutants including:
 - Ozone, (**O3**)
 - Carbon monoxide, (**CO**)
 - Nitrogen dioxide, (**NO2**)

- Lead, (**Pb**)
 - Particulate matter below 10 μm , (**PM10**)
 - Oxides of sulfur, (**SO_x**)
- In the end of the day we can't stop using gas or stop the combustion
at least not now , but we must minimize its effects and that we can do .

- **The idea of innovation**

- ❖ humidifying and purified exhaust Device :

- The work developed a special device publishes the water on the body spray stream of gas emitted to the full by the gas emitted and then absorbed around dust grains and micro particles and after that weigh weighing deposited and enjoying this method with high efficiency for the removal of contaminants (80-95% of the carbon dioxide for example). Systems that will prove highly efficient in controlling air pollution, and can be added to most industrial processes for cleaning chimneys or the path of vehicle exhaust (Exhaust).
- The idea is to put Gorge (Nozzle or Orifice meter) in the path of the exhaust, followed by thin tube extending from inside a tank of water, which in turn converts flow energy (pressure), which moves the exhaust into kinetic energy (speed) and thus reduce the pressure at the back of the gorge and at the mouth of the tube causing the withdrawal of water from the tank deployment spray the exhaust path where it acts on the adhesion of dust grains and micro particles and after that weigh weighing deposited.
- The other thing is that spray water, which spreads mixed with exhaust absorbs a large amount of thermal energy carried by the exhaust to turn it

into steam, and so it is thermal energy potential of any non-perceptible any lead to the conversion of water into steam without changing its temperature while the exhaust has lost power thermal felt any temperature dropped. Therefore machine should be placed somewhere in the path of the exhaust (on top of the exhaust path), which has a temperature sufficient to steam water withdrawn from the water tank .

- As for the amount of water withdrawn, it changes according to the speed of the exhaust flow and the relationship between them is a direct correlation can be controlled via a valve called (By bass) and shows that by manometer reading through which the incident illustrated the differential pressure of the exhaust as a result of the gorge is located.

Some Calculation

The heating load of the exhaust (Q) = mass flow rate $\times C_p \times T$

If T= 120 °C, $C_p = 1.005 \text{ kJ/kg} \cdot ^\circ\text{C}$ and mass flow rate = 0.015 kg/s

Assume:

Velocity of gases = 3 m/s,

Area = $\pi/4 \times d^2$ (d \approx 4cm)

Density= 1.2 kg/m^3

\therefore Mass flow rate = 0.0045 kg/s

Q= $0.0045 \times 1.005 \times (110+273) = 1.7 \text{ kW}$

The pressure of exhaust gases approximately equal to arranged about 1.5 bars, so we can get the latent heat of water at that pressure:

Saturation temperature (T_{sat}) = 110 °C

L.H = 2226.5 kJ/ kg

So, we can remove 0.445 kW of heat from exhaust gases by 0.0002 kg /s of water injection by latent heat only. ($Q_L = 0.445 \text{ kW}$)

But the sensible heat = mass flow rate of water $\times C_{pw} \times \Delta T_w$

$$Q_s = 0.0002 \times 4.2 \times (110 - 27) = 0.0697 \text{ kW}$$

$$\therefore \text{Total heat remove } (Q_t) = Q_L + Q_s$$

$$= 0.445 + 0.0697 = 0.515 \text{ kW}$$

Total heat remove per day = $0.515 \times 3600 \times 6 = 11124 \text{ kJ/day}$ (if the engine works about 6 hrs/day)

$$\therefore \text{The amount of water injection per day} = 0.0002 \times 3600 \times 6 = 4.3 \text{ kg/day.}$$

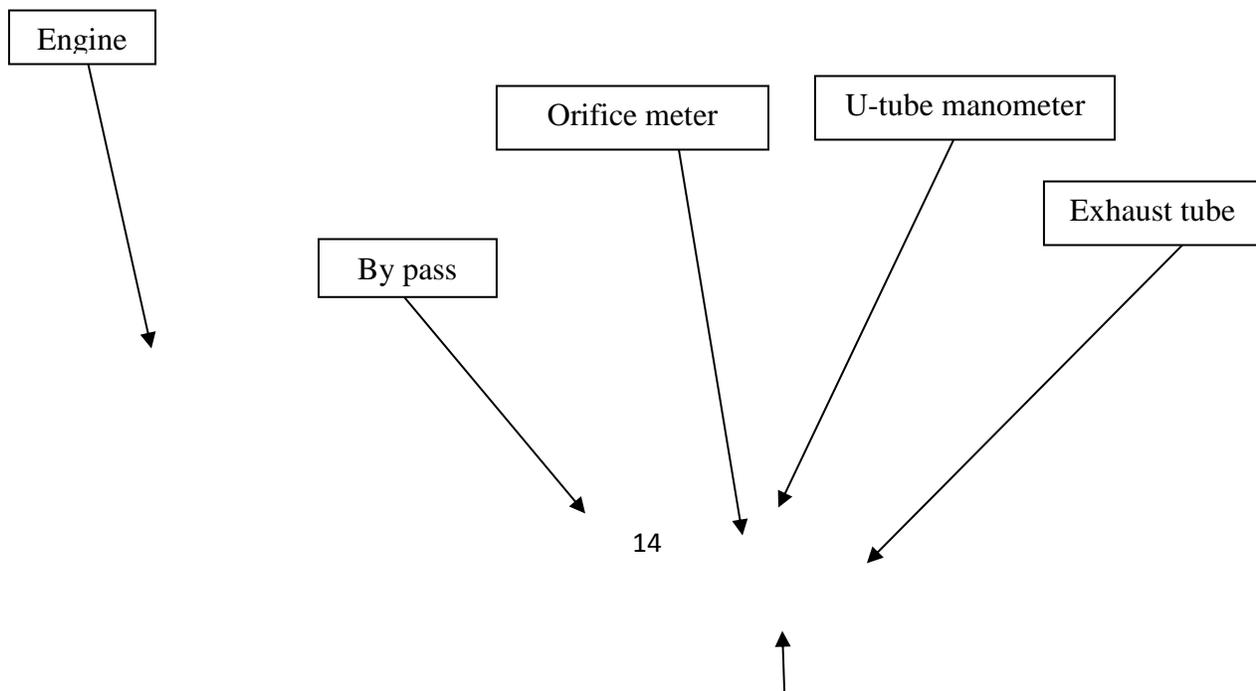
$$\text{Volume} = \text{mass/density}$$

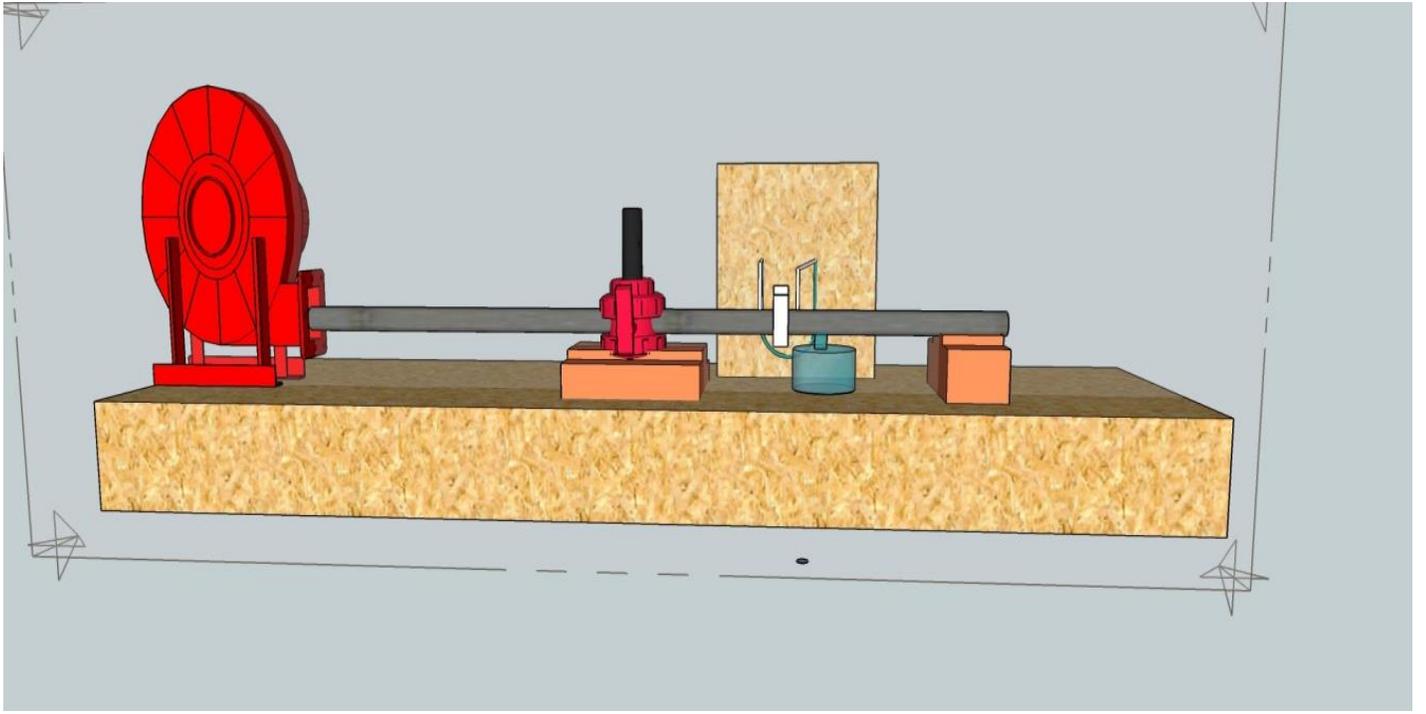
$$= 5.76/1000 = 0.00576 \text{ m}^3/\text{day} \text{ or } 4.3 \text{ L/day}$$

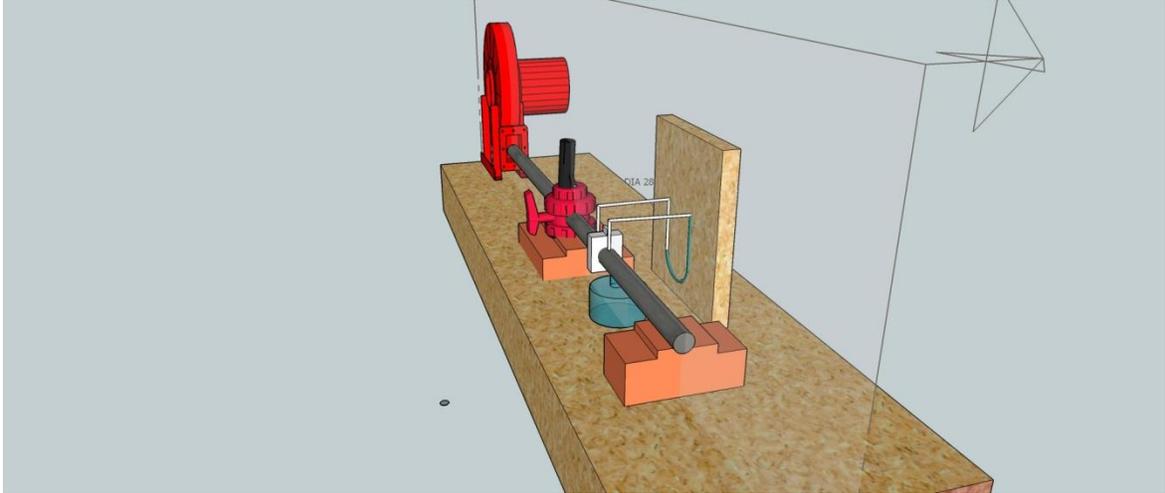
The goal of idea

We can remove $(0.515 \times 3600 \times 6) = 11124 \text{ kJ/day}$ of heat from exhaust gases which polluted the environmental by 4.3 L/day water injection.

The following graphics of the device as well as a photocopy him after the initial design







A photocopy of the device

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