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Review onDesign and development of clean welding booth.

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Abstract: *In various welding processes hazardous fumes and gases are generated and these fumes are circulates around the workplace. It affects on the health of worker. Occupational data from England and wales for 1970 to 1972 report there were 66 deaths among welders compared to 42 expected deaths. Hence in conventional system filters are separately provided from the welding booth through ducting. Due to that it requires more space, ducting and running cost .In modern industry space occupation is one of the most important consideration .So we are going to modify and design this system by removing ducting, in compact size and improving efficiency. Hence by eliminating ducting power required to run blower will be reduce.*

Keywords: *Welding fumes, welding booth, fume filters*

I. Introduction:

In almost all engineering industries processes such as welding, soldering, plasma or laser cutting indispensable. These processes invariably emit menacing and hazardous fumes and smokes of different kinds such films are of fine submicron particulates.In spite of measures such as exhaust blowers blowers and paper filters the level of such fumes and smoke often exceeds the stipulated safe limited in working zone.In the light of the currently growing pollution levels and industry concern for employee health the cleaning of weld shop air is indeed a major concern.

Literature review:

1. ACGIH , Industrial Ventilation – A manual of recommended practice 23th edition , chapter 3: Hood design Local exhaust systems are designed to capture and removeProcess emissions prior to their escape into the workplace environment. The primary function of the hood is to create an air flow field which will effectively capture the contaminant and transport it into the hood.

2. Butterworth Heinemann, Air conditioning system design -2017 chapter 12: Air Filters: An electrostatic filter has two main sections. The first section is the ionizing section; it consists of a series of fine wires charged to a voltage of up to 13 kV, placed alternately with earthed rods. This sets up a corona discharge, and as the airborne particles pass through the ionizing field, they receive a positive electrostatic charge. The second part is the collector section; this consists of a series of parallel, vertical metal plates with a potential difference of 6–7 kV between adjacent plates. The ionized dust particles are attracted towards these plates to which they adhere. The plates are sometimes coated with oil to help dust retention. The filters are cleaned automatically by washing with high-pressure water.

3. Registar general decennial supplements England and Wales 1970-1972: occupational mortality. Her Majesty's Stationery Office London 1978: Occupational data from England and Wales for 1970 to 1972 report there were 66 deaths among welders compared with 42 expected deaths.

4.SCIENTIA IRANICA 'optimisation of one stage electrostatic precipitator for welding fume filtration by S.M.Remaoun , A. Tilmatine, F. Miloua , K. Medles In addition to huge installations of electrostatic precipitators (ESP), as those employed for dust filtration in blast furnaces and cement factories, there are also small devices as the ones used for fume filtration in welding shops. The aim of this paper is to optimize the geometric characteristics and the electric operating conditions of a precipitator intended for the filtration of welding fumes.

II. Welding Fumes

Welding fumes are a complex mixture of metallic oxides, silicates and fluorides. Fumes are formed when a metal is heated above its boiling point and its vapours condense into very fine, particles (solid particulates). Welding fumes generally contain particles from the electrode and the material being welded.

Fume Type	**Source**	**Health Effect**
Aluminum	Aluminum component of some alloys, e.g., Inconels, copper, zinc, steel, magnesium, brass and filler materials.	Respiratory irritant.
Beryllium	Hardening agent found in copper, magnesium, aluminum alloys and electrical contacts.	"Metal Fume Fever." A carcinogen. Other chronic effects include damage to the respiratory tract.
Cadmium Oxides	Stainless steel containing cadmium or plated materials, zinc alloy.	Irritation of respiratory system, sore and dry throat, chest pain and breathing difficulty. Chronic effects include kidney damage and emphysema. Suspected carcinogen.
Chromium	Most stainless-steel and high-alloy materials, welding rods. Also used as plating material.	Increased risk of lung cancer. Some individuals may develop skin irritation. Some forms are carcinogens (hexavalent chromium).
Copper	Alloys such as Monel, brass, bronze. Also some welding rods.	Acute effects include irritation of the eyes, nose and throat, nausea and "Metal Fume Fever."
Fluorides	Common electrode coating and flux material for both low- and high-alloy steels.	Acute effect is irritation of the eyes, nose and throat. Long-term exposures may result in bone and joint problems. Chronic effects also include excess fluid in the lungs.
Iron Oxides	The major contaminant in all iron or steel welding processes.	Siderosis – a benign form of lung disease caused by particles deposited in the lungs. Acute symptoms include irritation of the nose and lungs. Tends to clear up when exposure stops.
Lead	Solder, brass and bronze alloys, primer/coating on steels.	Chronic effects to nervous system, kidneys, digestive system and mental capacity. Can cause lead poisoning.
Manganese	Most welding processes, especially high-tensile steels.	"Metal Fume Fever." Chronic effects may include central nervous system problems.
Molybdenum	Steel alloys, iron, stainless steel, nickel alloys.	Acute effects are eye, nose and throat irritation, and shortness of breath.
Nickel	Stainless steel, Inconel, Monel, Hastelloy and other high-alloy materials, welding rods and plated steel.	Acute effect is irritation of the eyes, nose and throat. Increased cancer risk has been noted in occupations other than welding. Also associated with dermatitis and lung problems.

III. Existing system

1. Welding booth is used for avoid spreading of gases and fumes generated during processes and it consist of number of elements:
    a) Work table
    b) Ducting
    c) Filter
    d) Blower
2. On work table actual welding operation is occurs.
3. Ducting carries fumes from workplace to filter.
4. Blower creates negative pressure in ducting to suck the gases and fumes from work table.
5. Filter removes smoke, dust and fumes from air & makes healthy air for operator.

IV. Conclusion:

From this paper we get idea about improvement of welding booth with fume filter. This can be obtain by eliminating ducting in existing system. So space required for modified system should be less than that of existing system. Duct losses are also eliminated and hence efficiency increases. Hence Running cost also reduces.

Cartridge filter replaced by electrostatic precipitator we can remove more fine particles (less than 10µ) and provide more healthy environment for workers.

Further we can improve efficiency of removing particles by using two stage electrostatic presipitator. We can make system more feasible.

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