Case Study

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Treatment of Indoor Air at an Auto Repair Shop: A Case Study

Site History

The CAP™ Clean Air Plant was tested for its effectiveness at cleaning and controlling indoor air quality at auto repair shops. The air quality in auto service stations has the potential to be very poor due to high ambient concentrations of hydrocarbons, particulate matter, ozone, NO_X and carbon monoxide (CO).

Destruction of Gasoline Vapors

One CAP-90 unit was tested for the indoor air at the auto shop. The unit biologically oxidizes any hydrocarbons that pass through it and thus often oxidizes a much greater hydrocarbon load than is indicated by the analytes of interest. Any particulate matter, like brake dust, tire dust, and cigarette smoke is also drawn into the CAP and oxidized.

For this demonstration, the CAP-90 was operated continuously at 65 cfm. To test the percent of conversion, a 3-foot tube was placed at the CAP inlet to allow proper mixing to take place. A similar tube was placed at the outlet of the CAP. An open container of gasoline, placed at the inlet of the CAP, was probed for concentration (ppm), then measured at the outlet. The results of this test are indicated in the Table below. The CAP degraded gasoline vapors by an average of 70% in less than 1 second.

Recommendation

Conventional methods of air exchange, like venting and exhausting, are ineffective because they fail to destroy hydrocarbons, and other gases and fumes. Venting garages to the atmosphere doesn't work in cases of heavy fumes or spills. Exhausting odors can also cause a public nuisance in neighborhoods. Additionally, loss of heated/cooled air through exhausting can be very expensive. The CAP™ Clean Air Plant presents a total solution to the air quality problems experienced by auto repair shops.

Table 1. Single pass (less than 1 second residence time per pass) destruction of gasoline vapors.

Time(min From start)	HC (ppm) In	HC (ppm) Out	% removal HC
0	2727	887	67
1	2867	921	68
2	2963	858	71
3	2895	796	73
4	2667	884	67
5	2679	827	69
6	2628	722	73
8	2517	784	69
12	2693	710	74

NOTE: The CAP works by continuously recirculating shop air. At the rate above, the CAP90 would clean a single bay in a shop to 99.99% within 4 hours.

CAP™ CLEAN AIR PLANT

Benefits:

- Destroy VOCs, emissions, fumes, and vapors;
- Treat fugitive emissions;
- Remove particulates and solids;
- Eliminate odors;
- Save on energy usage & costs;
- Create a healthier environment.

Selected Applications:

Cleanrooms: xylene, tetrahydrofuran, dimethylacetamide
Silk Screening: methylene chloride
Printer: petroleum naphtha, glycol methyl ether, VOCs
Ink Manufacturer: ammonia
Beauty Salon: liquid monomers, ethyl methacrylate, ethyl acetate, butyl acetate
Flavor & Fragrance Manufacturer: odors, scents, and emissions
Manufacturer: vinyl chloride
Auto Mechanic: car & diesel exhaust and emissions, hydrocarbons, benzene, CO
Remediation: gasoline & heating oil fumes
Baker; Building Manager: mold control
Wood Treatment Facility: naphthalene, phenanthrene, fluoranthene, pyrene
Pesticide Manufacturer: toluene, organic-metallic compounds, pesticide residue
Superfund Site: TCE, toluene, acetone, MEK, MIBK
School: petroleum vapors
Scented Candle Manufacturer: assembly line odors
Homeowner: control of mold, odors, pet dander, pollen, allergen/asthma triggers