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Energy Savings with a Scalable Source Capture Ventilation



**BY
Steve Barnkow
PlymoVent Corp**

Why source extraction?

- Significant Energy Savings are realized when capturing the process pollutant at the source vs. using general ventilation methods
- When using general ventilation a high increase in air changes is required at a very high cost
- Protect the operators breathing zone and prevent the contaminant from being spread throughout the building and affecting other people
- 60% savings on Heating and Electric Bills can be achieved when using the source capture method
- 90% savings can be achieved when using source capture combined with “Demand Controlled Ventilation”

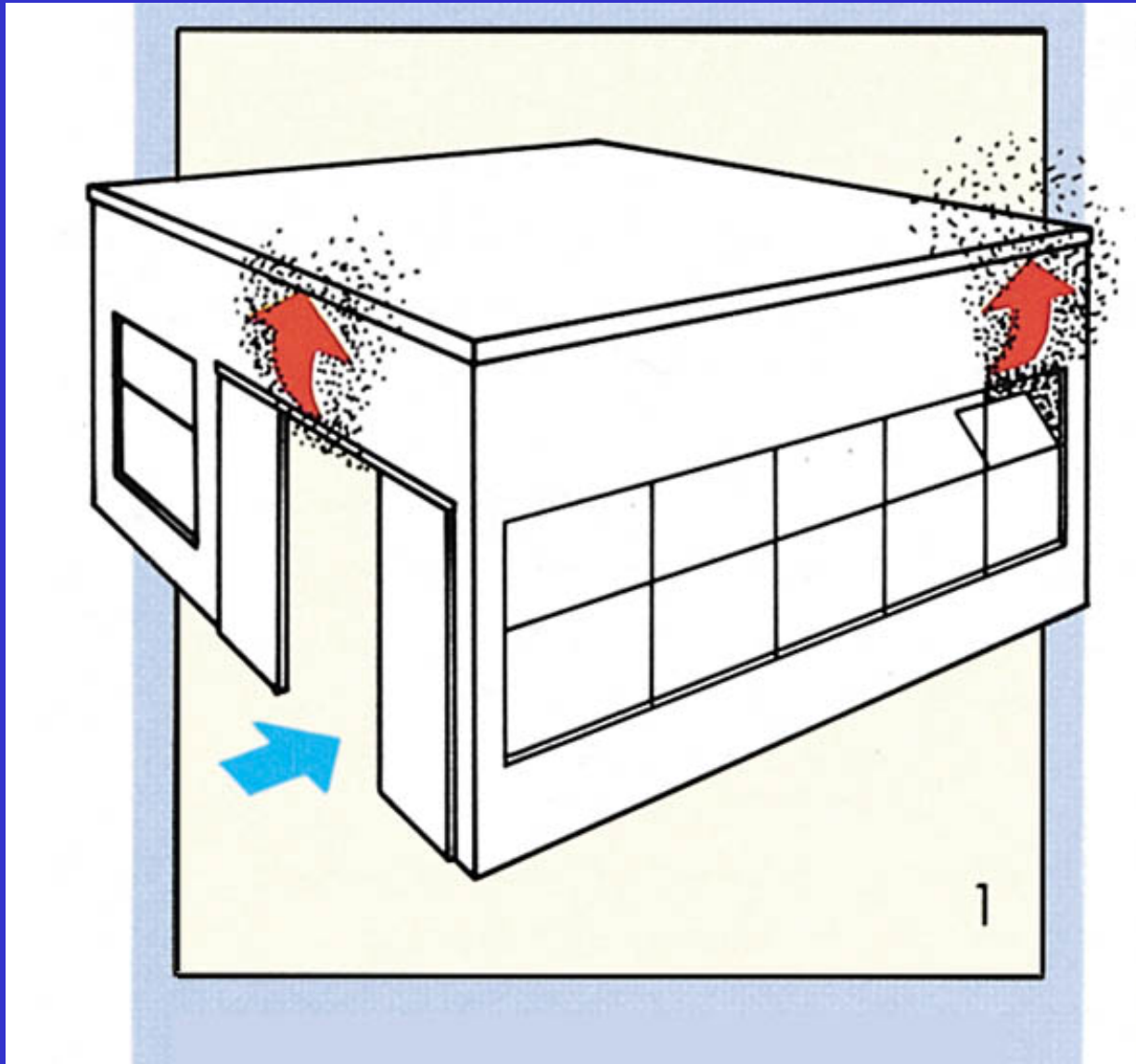
Run the process only at the capacity required at any given moment

SOURCE CAPTURE IS COMMONLY USED FOR THE FOLLOWING PROCESSES

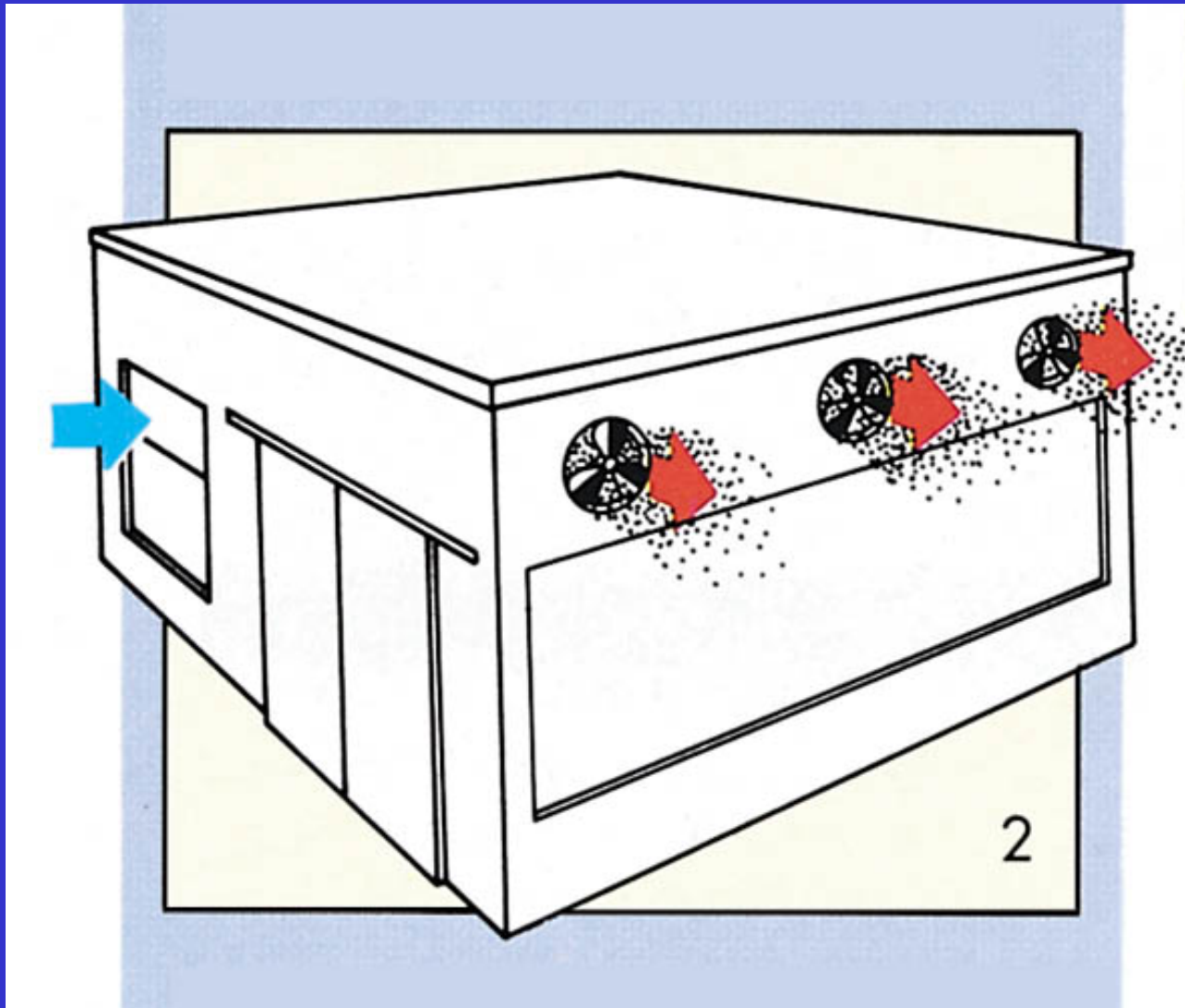
- Welding Applications
- Grinding Applications
- Machining Applications
- Vehicle Exhaust Applications

Methods of process ventilation

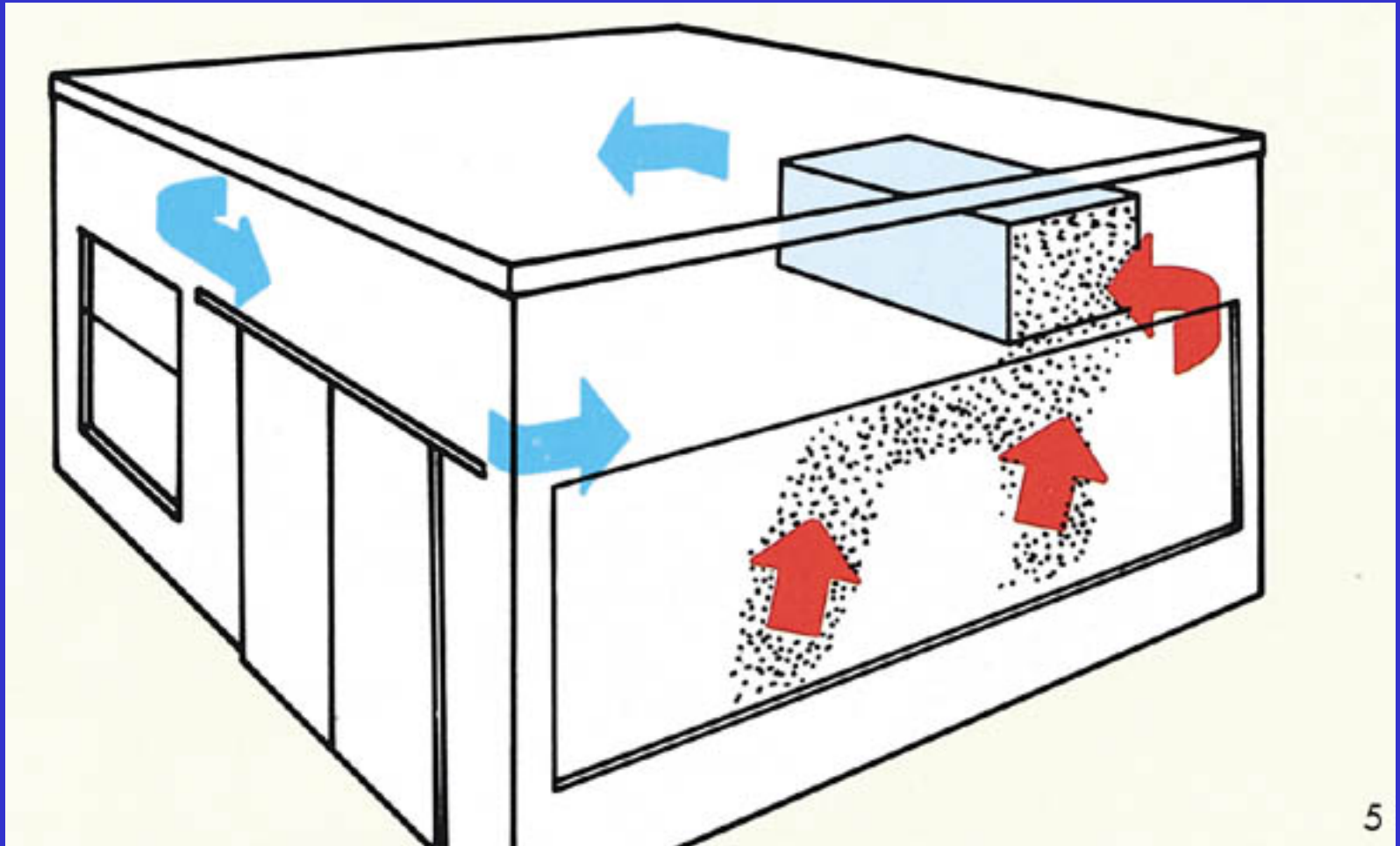
Natural ventilation



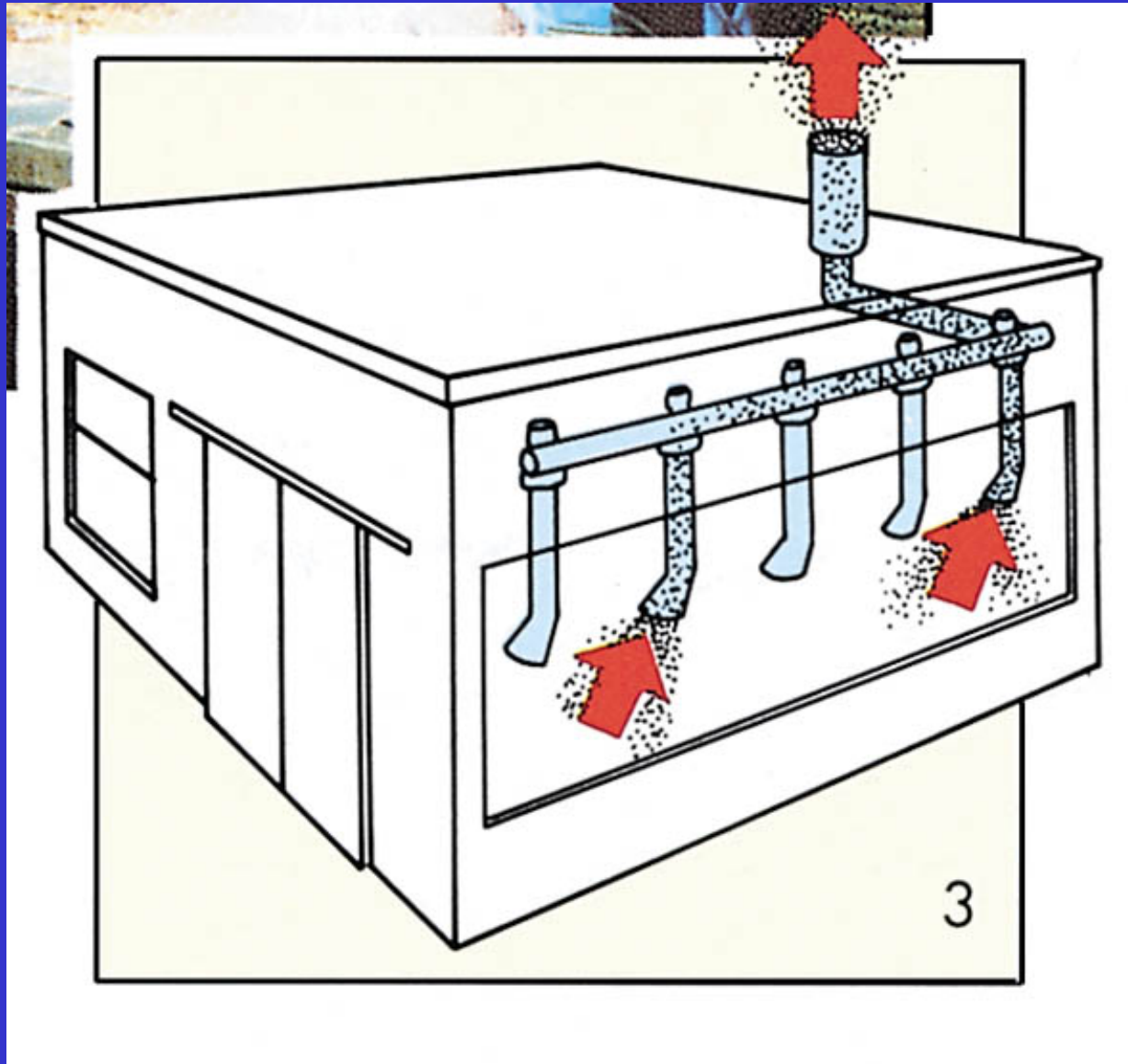
General ventilation with ceiling or wall mounted fans



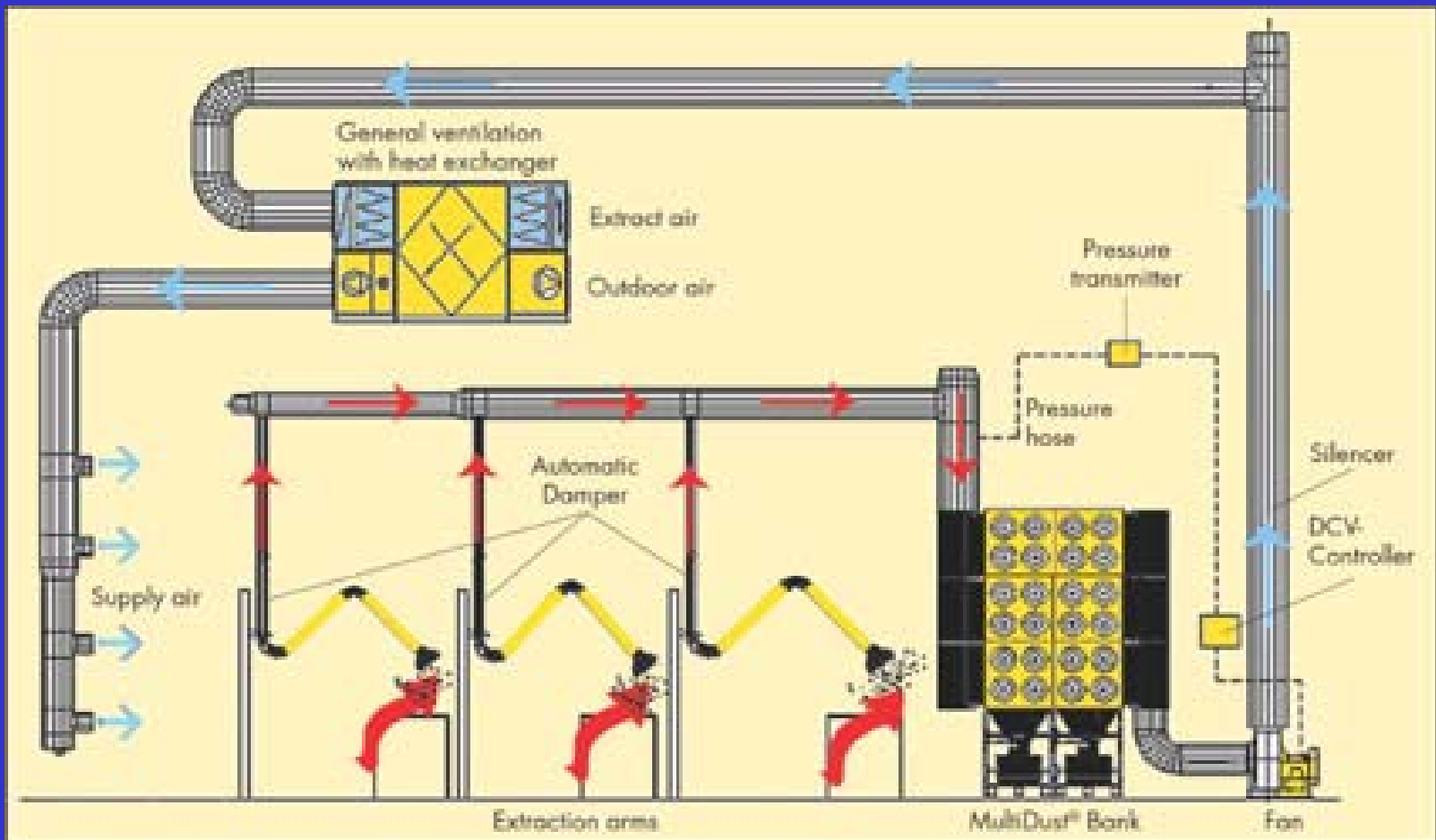
General ventilation with re-circulation



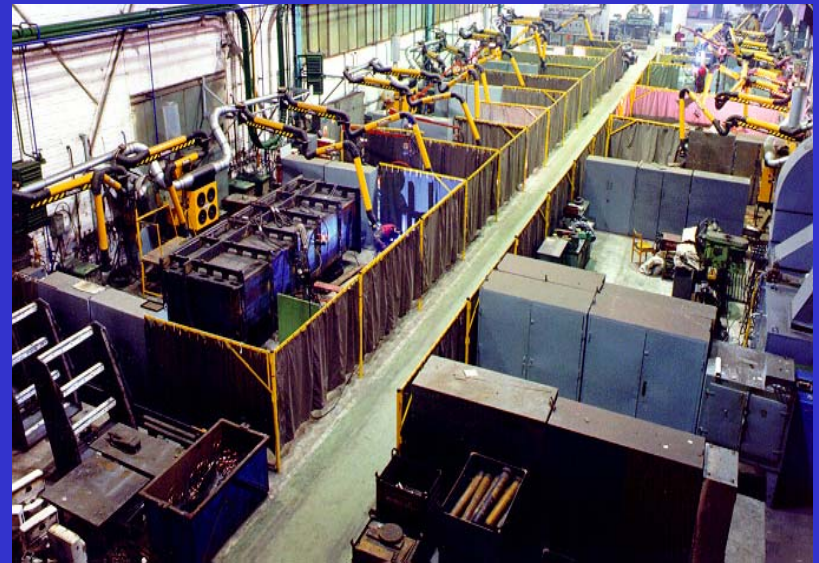
Source Capture Fume extractors



Source Capture with energy saving controls and a variable speed drive



Source Capture of welding smoke



Source Capture of Grinding Dust



Source Capture of oil mist generated from CNC Lathes



Source Capturing of oil mist with 4" arms---Open machine tools

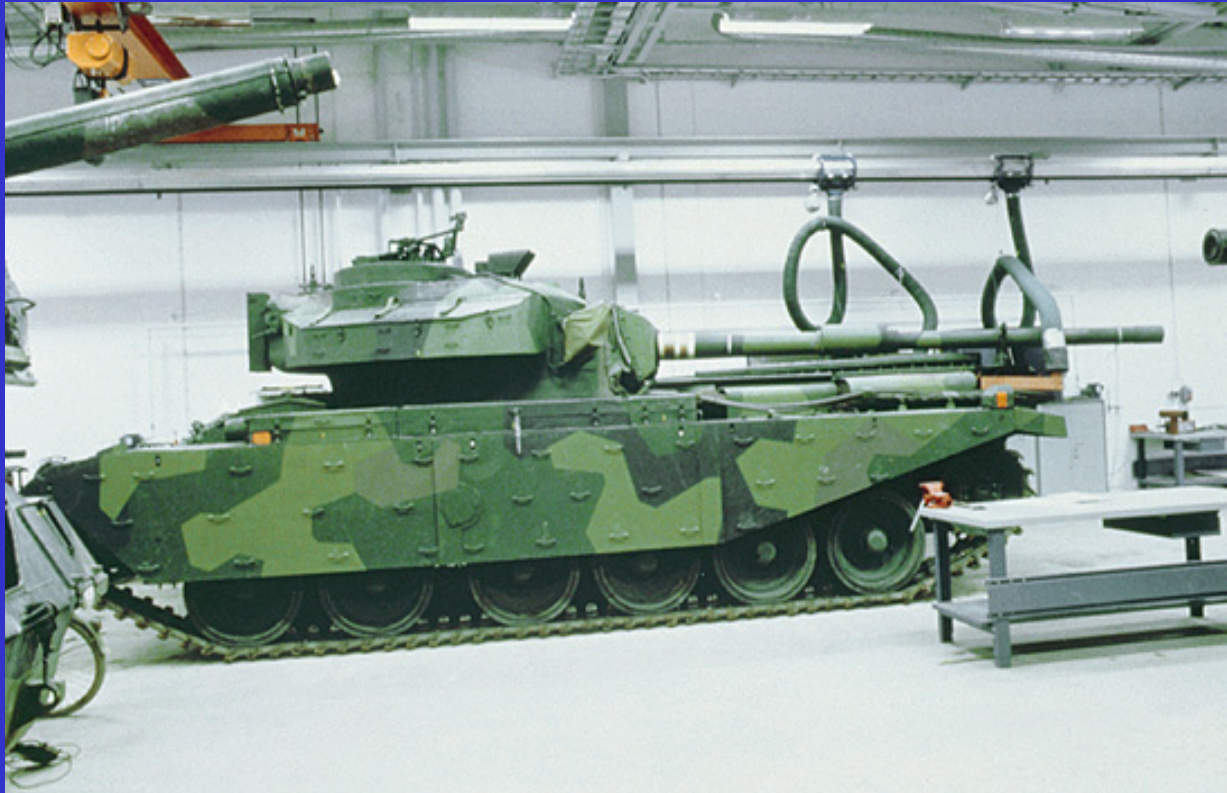


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Source Capture of Vehicle Exhaust fumes in a maintenance repair facility



Source Capture of Vehicle Exhaust fumes in an Army tank repair facility

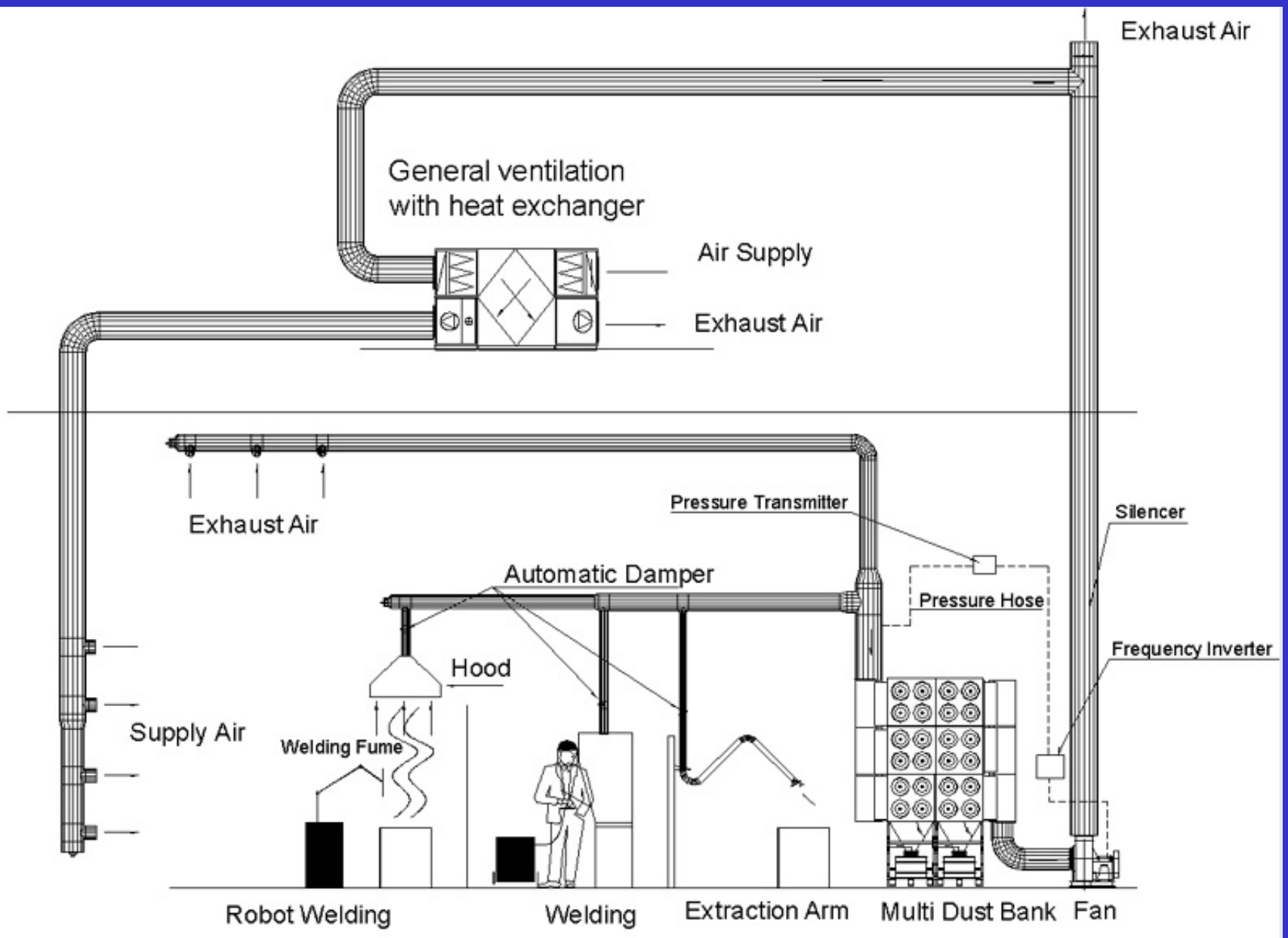


Source Capture of vehicle fumes at Dyno Testing Station



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PROCESS VENTILATION WITH HEAT RECOVERY



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TYPICAL CONTROL SENSOR TYPES

- Pressure differential sensor
- Infra-red light sensor
- Inductive electrical sensor
- Particulate sensor
- Relative humidity sensor
- CO sensor
- Hydrogen sensor
- Temp. sensor
- And many others

Energy Saving Analysis

Average temperature on location C	6 degrees C
Ambient air temperature	-15 C
Two shift operation hours	3520h
Year hours	8760h
Energy required to heat 1 m ³ air 1 degree C	0,348W
Min. required efficiency on heat exchanger	50%

	Pcs	Airflow per		Without controls and		With controls and		With controls and	
		point	Hours	Usage	Total	Usage	Total	Usage	Total
		m3/h	/year	%	airflow/h	%	airflow/h	%	airflow/h
Extraction arms manual welding	5	1 000	3520	100	5 000	30	1 500	30	1 500
Suction tables manual welding	24	1 800	3520	100	43 200	30	12 960	30	12 960
Suction hoods robot welding	8	1 800	3520	100	14 400	80	11 520	80	11 520
General ventilation	1	28 000	8760	100	28 000	100	28 000	100	28 000
Total airflow					90 600		53 980		53 980
Energy consumption per year process ventilation				kWh	1 063 000		445 885		156 153
Energy consumption per year general ventilation				kWh	1 195 000		1 195 000		421 431
Power consumption on fan motor				kWh	497 340		419 724		419 724
Total				kWh	2 755 340		2 060 609		997 308
Savings with control equipment				kWh			694 731		
Savings with control equipment and heat exchanger				kWh					1 758 032

HOW ARE SAVINGS ACHIEVED ?

- **Lower energy consumption** – energy consumption is reduced since the ventilation system only operates when required by the demand of the process.
- **Lower maintenance costs** - maintenance cost will be reduced since the system will not be required to operate at 100% capacity at all times.
- **Lower operating costs** – operating costs will be reduced by more efficient energy saving blower motors which in turn are energy managed by demand controllers.
- **Lower installation costs** – installation costs are reduced by reducing the overall size of the system and its related components such as electrical wiring, motor starters, size of ductwork, and the need for fire suppression.
- **Lower initial purchase costs** – since few manufacturing processes operate at 100% demand, a savings will be achieved by reducing the overall air volume of the system and its filtering systems.

QUESTIONS FROM THE AUDIENCE

THANK YOU FOR YOUR PARTICIPATION.

- If you have any questions or comments, please email them to sbarnkow@plymoventusa.com
- Or Call 732-371-7583