



Source Capture Fume Extraction for Beginners

Welcome!



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Source Capture Fume Extraction for Beginners

Moderator and Panelist



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Health Systems



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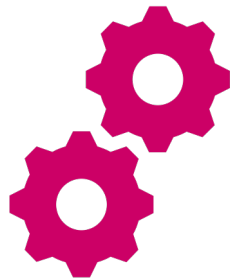
Agenda



1. Introduction of Topic



2. Diving Deeper into Welding Fume



3. Engineered Fume Extraction Systems



4. Getting You Started

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What is Welding Fume?



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Introduction of Topic

What is welding fume?

- It's a mixture of very fine metal particles and gases.
 - The composition of the mixture varies widely
 - Metal particles are extremely small, micron size
 - It can "float" in the air for a long time



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Introduction of Topic

Why do we care?

- **Welding Fumes Cause Cancer. It's that simple!**
 - Classified as a Group 1 Carcinogen by World Health Organization
- Welding fume is proven through research to be toxic to humans in short- or long-term exposure

Short Term Effects	Long Term Effects
Skins & Eye Irritation	Pulmonary Chronic Disease
Asthma	Nervous System Damage
Fume Fever	Kidney Damage
Poisoning	Cancer

- Unattractive for Employees and Unproductive for Companies (\$\$\$)

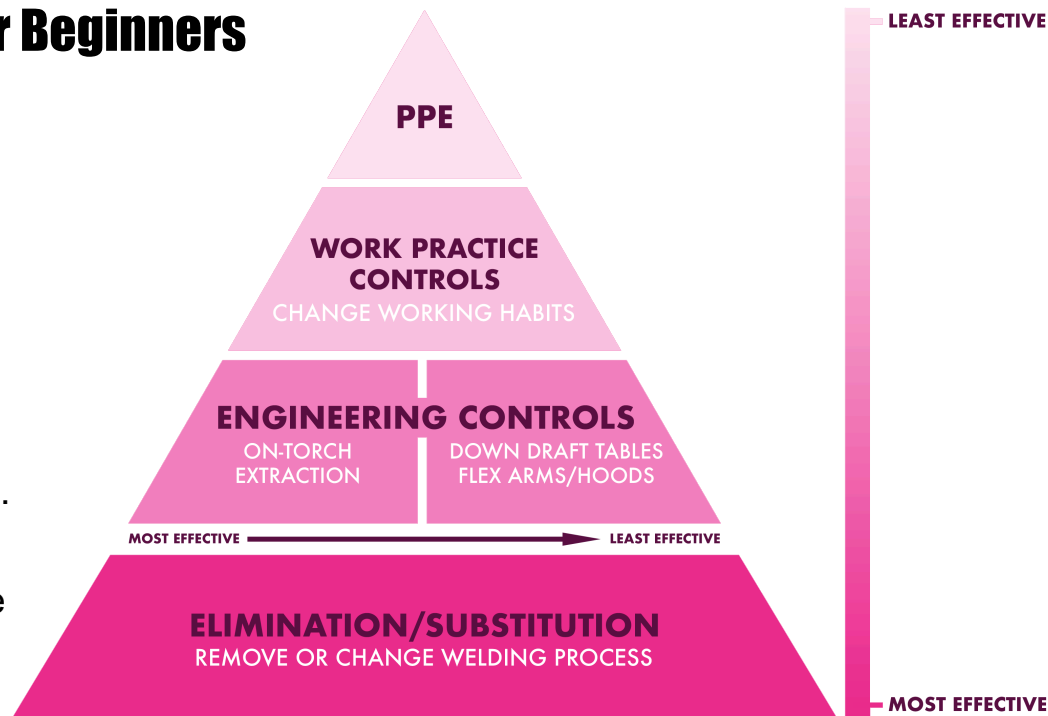


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Introduction of Topic

How to mitigate welding fume?

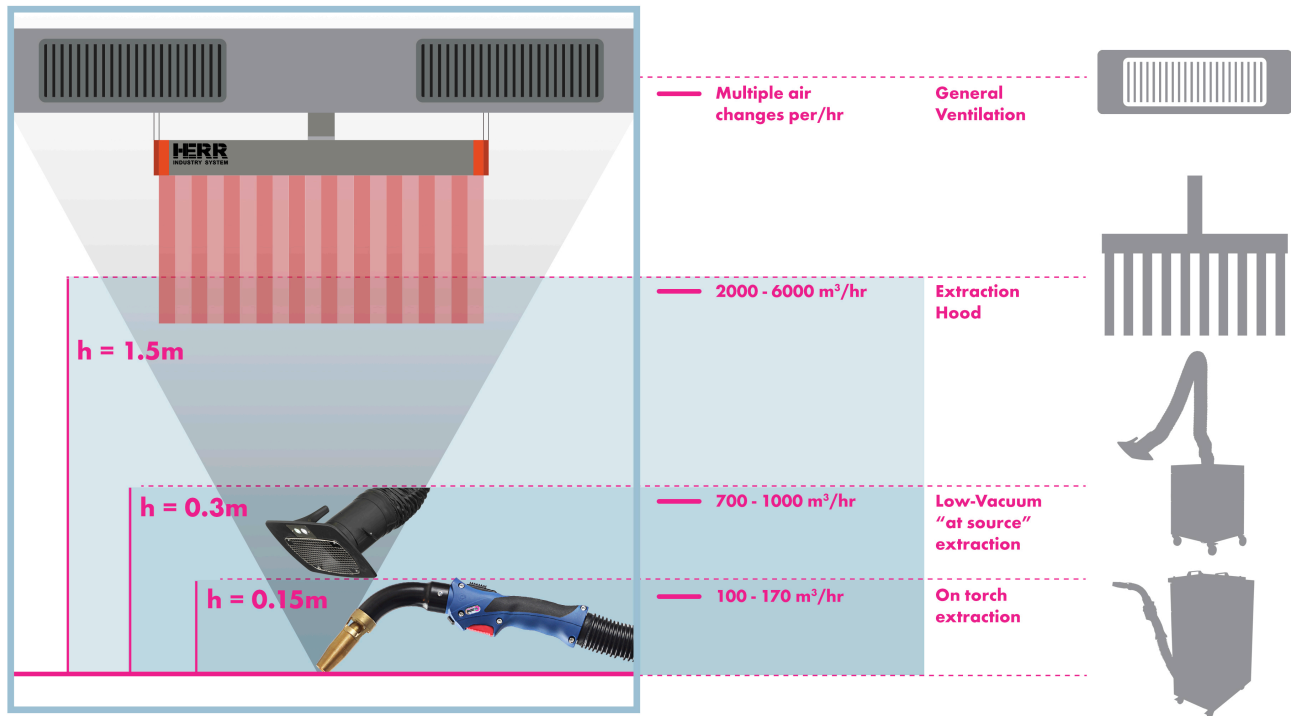
- Many ways to address the problem
- Systematic approach
- Most effective: Eliminate or change process.
 - Engineering Controls:
 - Most effective is source capture
 - Local exhaust ventilation
 - Local air filtration
 - General ventilation
 - Work Practice Control
 - Personal Protection



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Introduction of Topic

How to mitigate welding fume?



Cost	Efficiency
\$\$\$\$\$	★
\$\$\$	★★★
\$\$	★★★★
\$	★★★★★

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Welding Fume

How are they dangerous to your workers?

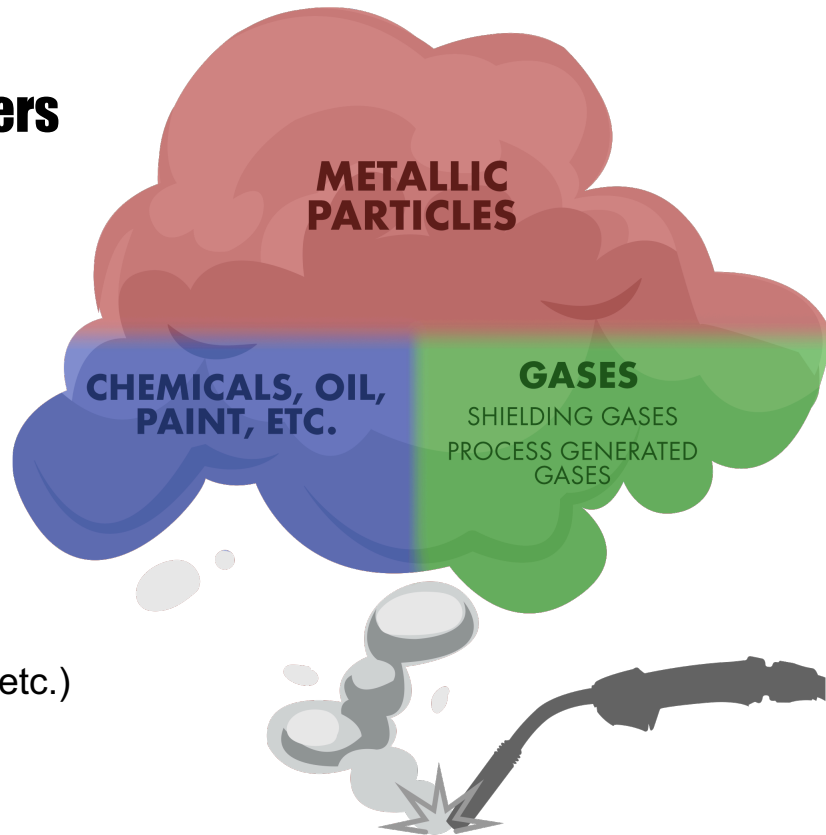


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Welding Fume

Deeper into welding fume

- Mixture of airborne gas and fine particles
 - Varies on welding process and metals
 - Chromium, Nickel, Zinc, Manganese, etc.
- Gases divide into 2 groups:
 - Shielding (Argon, CO₂, etc.)
 - Process-generated (NO_x, Fluorides, Hydrogen, etc.)
- Other vaporized substances from welding process:
 - Flux chemicals
 - Oil
 - Coatings
 - Paint



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Welding Fume

Deeper into welding fume

- General exposure limits in mg/m^3
 - PEL, TLV, TWA, ...
- Specific limits for Chrome Hexavalent and Manganese
 - Cr (IV) TWA $5 \mu\text{g}/\text{m}^3$ [$2.5 \mu\text{g}/\text{m}^3$ Action Level]
 - Mn TWA $0.2 \text{ mg}/\text{m}^3$
- Refer to your local Health and Safety regulations
- OSHA : www.osha.gov
- ACGIH : www.acgih.org

CAS No.	Regulatory Limits		
	OSHA PEL		Cal/OSHA PEL
	ppm	$\mu\text{g}/\text{m}^3$ mg/m^3	8-hour TWA (ST) STEL (C) Ceiling
	Recommended Limits		
	NIOSH REL		ACGIH® 2019 TLV®
	>10-hour TWA (C) Ceiling		8-hour TWA (ST) STEL

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Engineered Systems



**LOCAL EXHAUST
VENTILATION**



**HIGH VACUUM
MIG TORCH**



**HIGH VACUUM
ROBOTIC TORCH**



**FLEX ARM
EXTRACTION**



**SINGLE, MULTIPLE,
CENTRAL SYSTEMS**

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Engineered Systems

Local Exhaust Ventilation (LEV)

- LEV's goal is to try to get as close as possible to the source to avoid dissipation and have the highest impact / efficiency on fume mitigation
 - High vacuum Funnel and on-tool extraction
 - Flex arms
 - Hoods, downdraft tables
- 100 m³/hr for high vacuum smoke extraction Mig torch,
- 1000 m³/hr for flex arms and
- 1000's of m³/hr for hoods and downdraft tables.

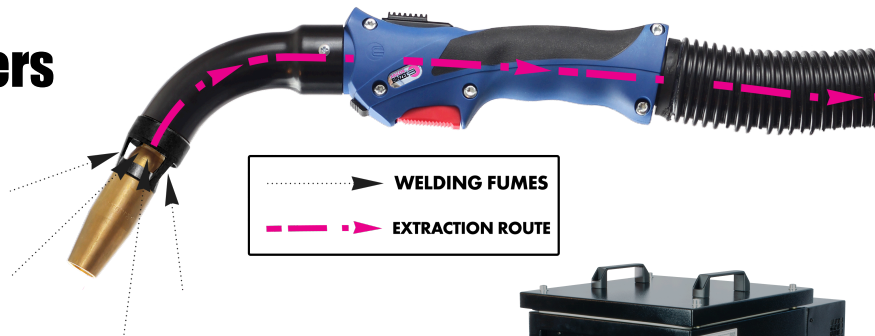


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Engineered Systems

High vacuum smoke extraction MIG torch

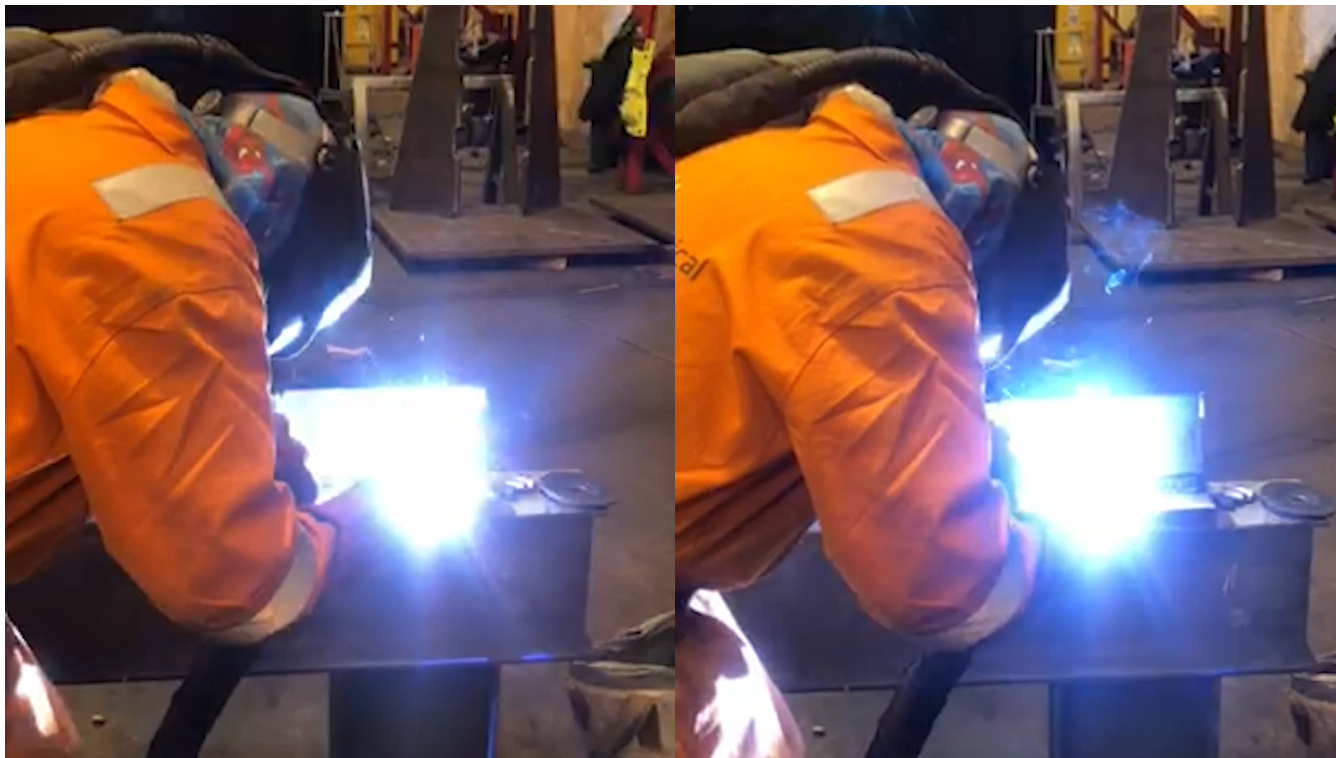
- Closest to the source
- Fume is captured through a special fume nozzle
- Best protection for welder
- Efficiency is high in most conditions
- Good for all MIG processes
- Requires a special high vacuum system



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Engineered Systems

High vacuum smoke extraction MIG torch

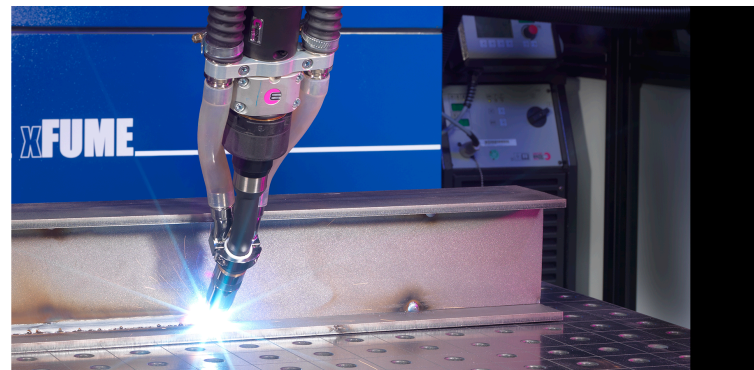


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Engineered Systems

High vacuum smoke extraction Robot torch

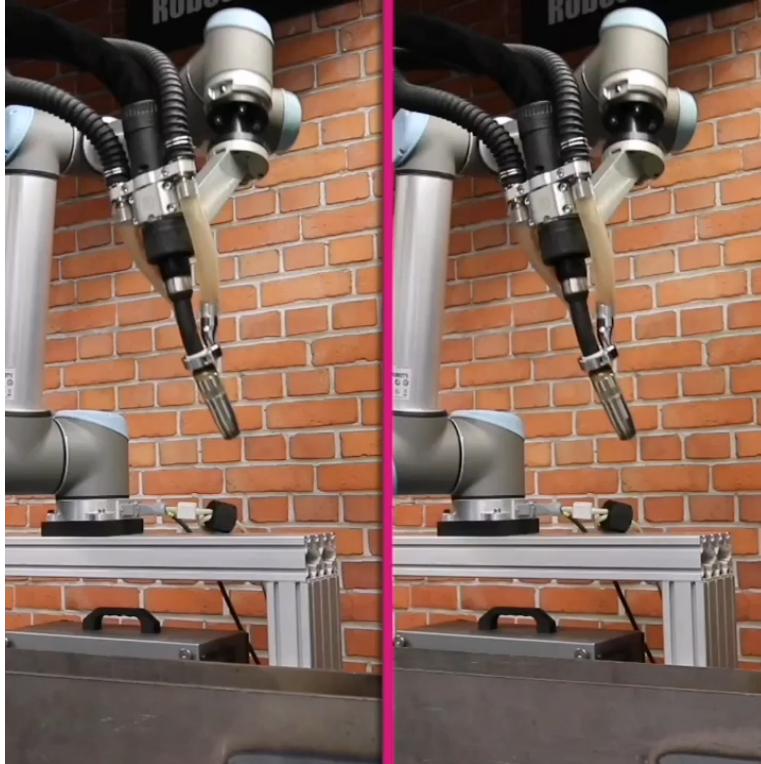
- Closest to the source
- Fume is captured through a special fume nozzle
- Efficiency is high in most conditions
- Good for all MIG processes
- Lower cost than a hood
- Requires a special high vacuum system



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Engineered Systems

High vacuum smoke extraction Robot torch



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Engineered Systems

Flex arm extraction

- Close to the source
- Fume is captured through a hood
- Good protection for welder in optimal conditions
- Efficiency is good in optimal conditions
- Good for all Arc welding process from stick to TIG
- Requires a special low vacuum system



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Engineered Systems

Flex arm extraction system



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Engineered Systems

Single vs Multiple vs Central

Single Portable Fume System

Low Upfront
Investment

Maintenance
Intensive

Multi-Station Fume System

Mid-level
Investment

Low
Installation
Cost

Centralized Fume Systems

High Upfront
Investment

Low
Maintenance
Cost



- Initial assessment and actions
- Your own observations
 - Fume Build-up
 - Filter life getting shorter on different equipment
 - Know your existing equipment and maintenance
 - Know your local legislation
- Feedback from welders and other plant workers
 - From employee's health concerns
 - Health and Safety officer
- Professional Help
 - Industrial Hygienist
 - Air testing Services
 - Equipment suppliers

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Contact Us

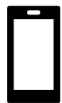
We'd Love to Hear From You



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Questions?

