



Source Capture Fume Extraction for Beginners Welcome!



Source Capture Fume Extraction for Beginners

Moderator and Panelist



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Source Capture Fume Extraction for Beginners

Agenda



1. Introduction of Topic



2. Diving Deeper into Welding Fume



3. Engineered Fume Extraction Systems



4. Getting You Started

Source Capture Fume Extraction for Beginners

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 (\$\$\$)

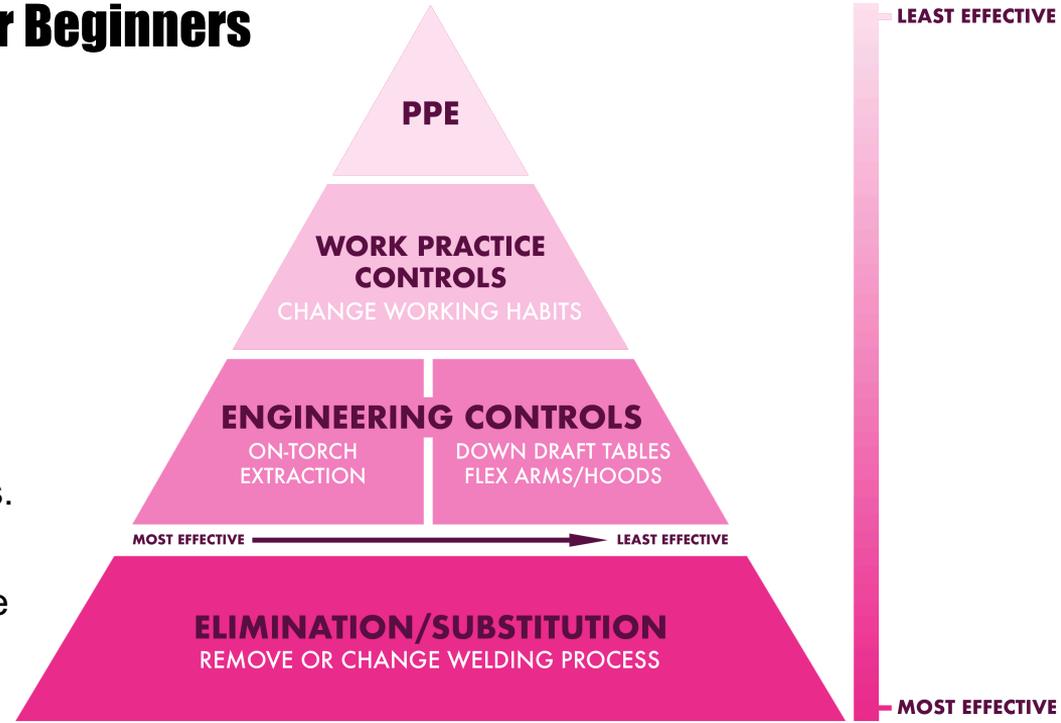


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Introduction of Topic

How to mitigate welding fume?

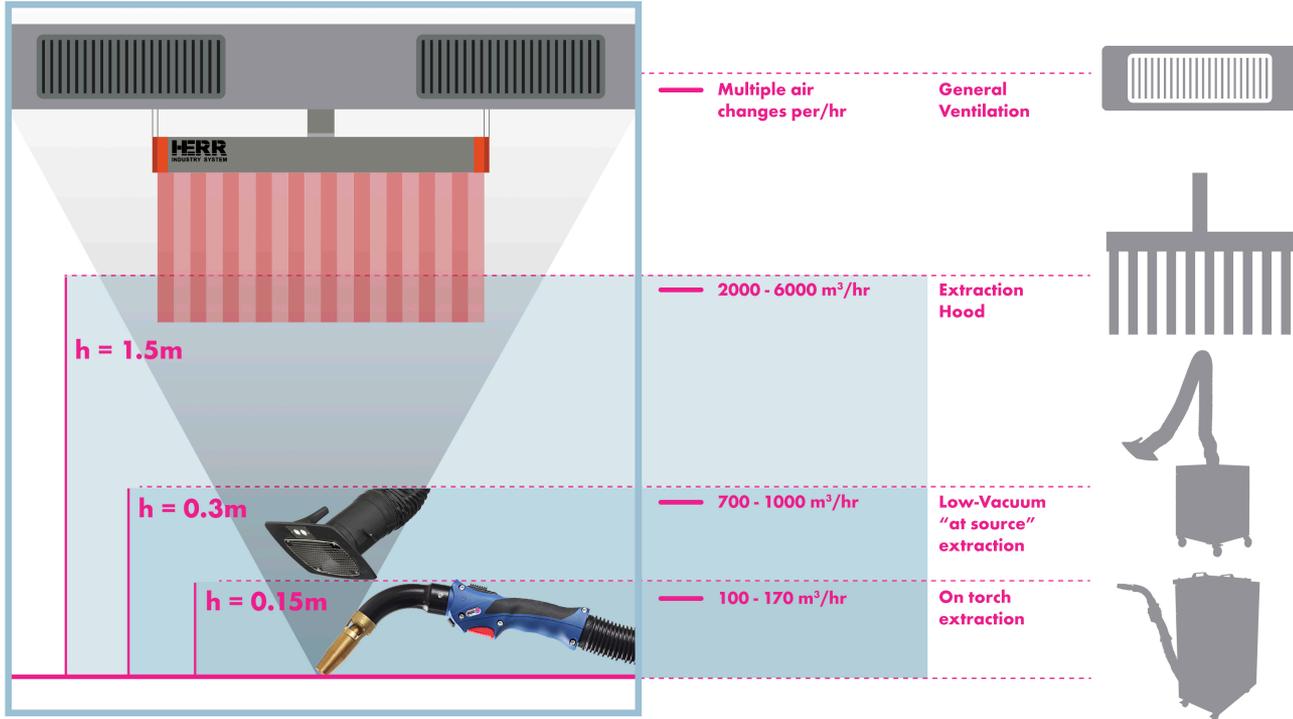
- Many ways to address the problem
- Systematic approach
- Most effective: Eliminate or change process.
 - Engineering Controls:
 - Most effective is source capture
 - Local exhaust ventilation
 - Local air filtration
 - General ventilation
 - Work Practice Control
 - Personal Protection



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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?

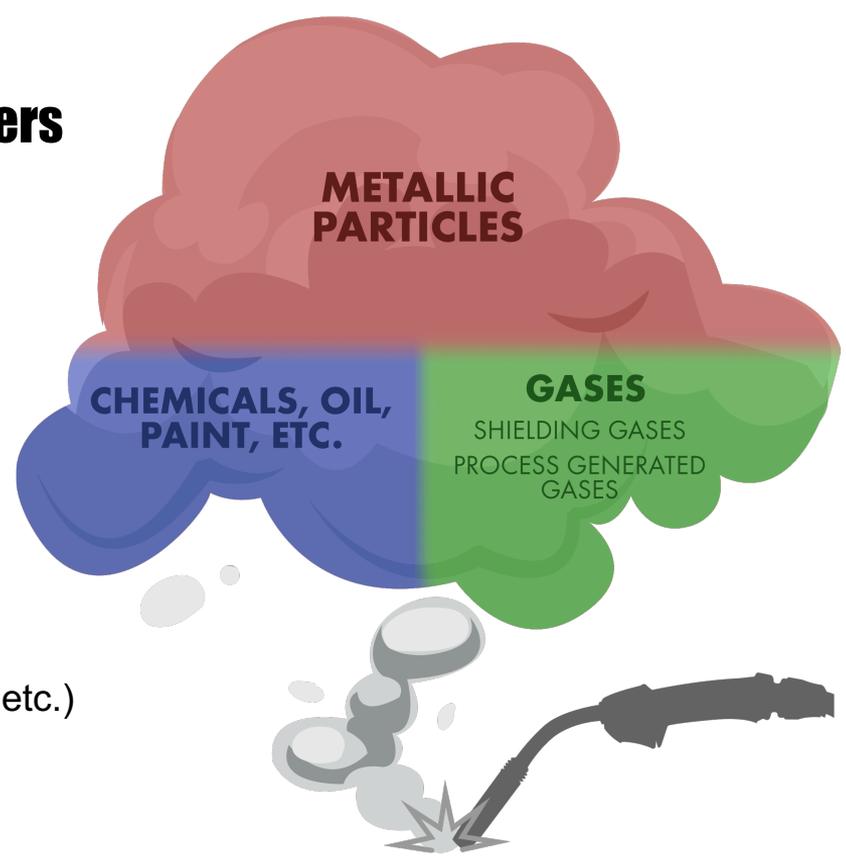


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Welding Fume

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.

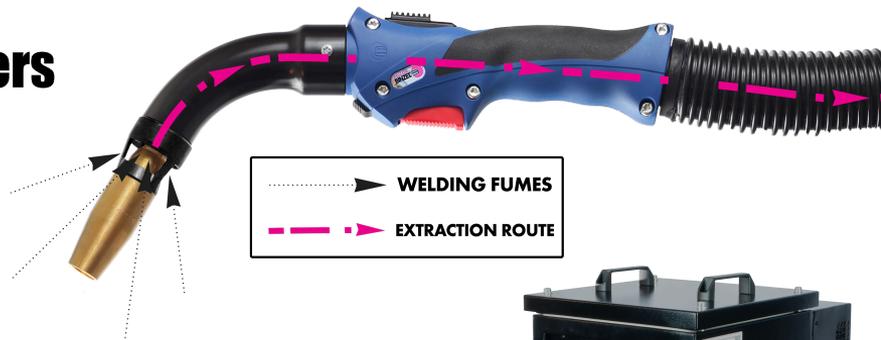


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Engineered Systems

High vacuum smoke extraction MIG torch

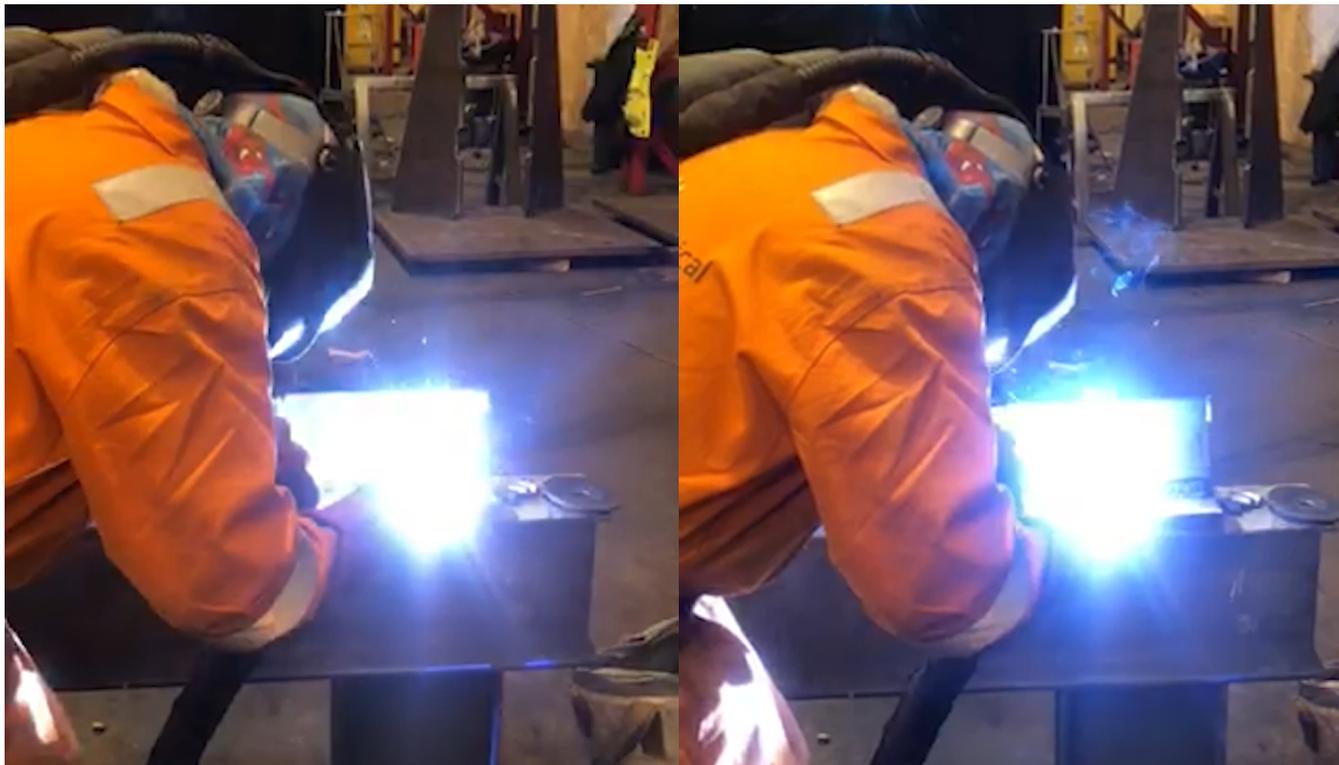
- Closest to the source
- Fume is captured through a special fume nozzle
- Best protection for welder
- Efficiency is high in most conditions
- Good for all MIG processes
- Requires a special high vacuum system



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Engineered Systems

High vacuum smoke extraction MIG torch



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Engineered Systems

High vacuum smoke extraction Robot torch

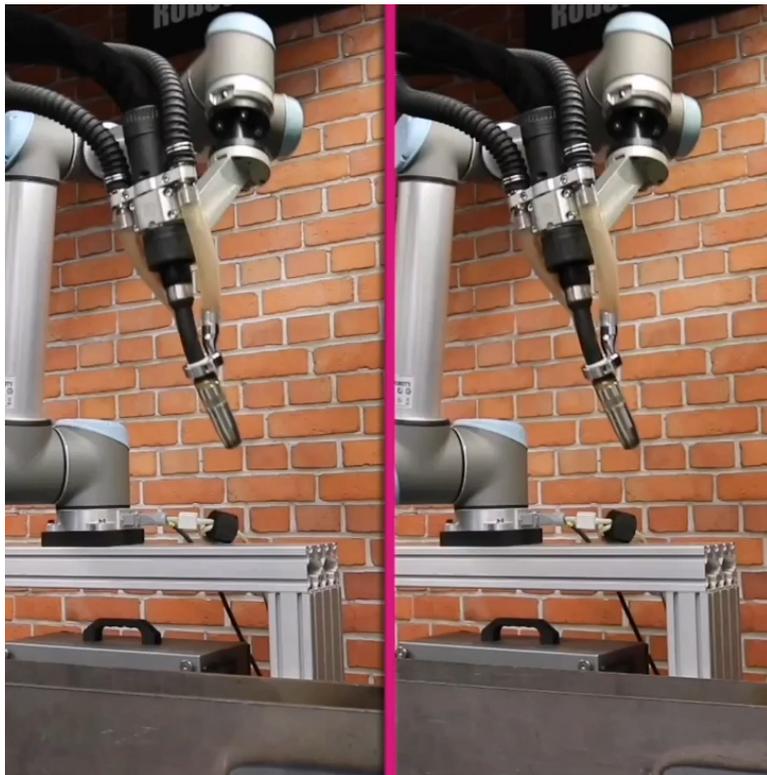
- Closest to the source
- Fume is captured through a special fume nozzle
- Efficiency is high in most conditions
- Good for all MIG processes
- Lower cost than a hood
- Requires a special high vacuum system



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Engineered Systems

High vacuum smoke extraction Robot torch

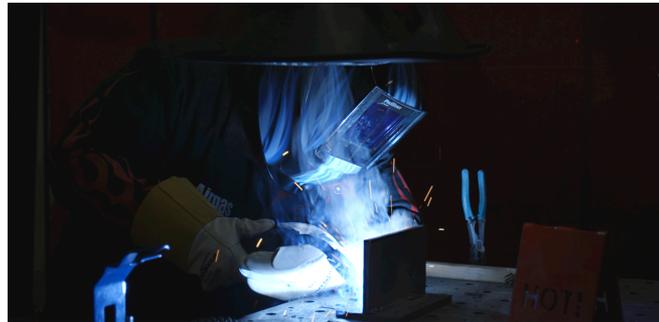


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Engineered Systems

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



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Getting Started

Welding Fume Risk Assessment

- 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

FUME ASSESSMENT
QUESTIONNAIRE

ABICOR
BINZEL

Answer each question as it pertains to your welding operation.

Number of Welding Stations:

1. Visible Fume
Where can you see fumes in your operation? (circle all that apply)

a. Welder's breathing zone
 I. In correct welder position
 II. Use of existing equipment

b. Non-welder's near dense fumes

c. High fume density areas

d. Ceiling level accumulation

Name: _____

2. Current Systems Evaluation
What systems are currently in place to manage fumes in your operation? (circle all that apply & elaborate)

a. LEV (Local Exhaust Ventilation)

 I. Location:

 II. Type:

 III. Effectiveness/Usage:

 IV. Maintenance:

 V. Filter, Type & Status:

b. General Ventilation System

 I. Location:

 II. Type:

 III. Effectiveness/Usage:

 IV. Maintenance:

 V. Filter, Type & Status:

c. PPE (Personal Protective Equipment)

 I. Location:

 II. Type:

 III. Effectiveness/Usage:

 IV. Maintenance:

 V. Filter, Type & Status:

Name: _____

3. Employee
How do your current managers assess fume exposure? (Answer the following)

a. Employee
 I. Health
 II. Work

b. Work
 I. Health
 II. Work

c. Health
 I. Work
 II. Health

4. Local Health
Check your local legislation for fume exposure limits (Answer the following)

a. Total Fumes
 I. Check
 II. What
 III. What

b. Manganese fumes
 I. Check
 II. What
 III. What

c. Chrome Hexavalent
 I. Check
 II. What
 III. What

d. Other
 I. Check
 II. What
 III. What

5. Next Steps
Contact a fume expert for further evaluation.

www.binzel-abicor.com

www.binzel-abicor.com

Contact Us

We'd Love to Hear From You

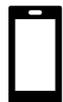


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Contact Us

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Source Capture Fume Extraction for Beginners Questions?

