THE 77th IIW ANNUAL ASSEMBLY

The IIW 2024 Venue: Rodos Palace, one of the most emblematic hospitality Structures in Dodecanisos Complex of Islands.

The Canadian Delegate Report

International Institute of Welding Commission VIII Health, Safety and Environment

David Hisey

This is a summary of the actions of IIW Commission VIII during the July 2024 conference in the Rhodes, Greece meeting. Should additional information be required the specific document which is published on the IIW web site.

INTERNATIONAL INSTITUTE OF WELDING

COMMISSION VIII HEALTH AND SAFETY

ANNUAL ASSEMBLY MEETING 08 - 09 July 2024

Rodos Palace, Rhodes, Greece

Summary

Most of the papers identified here are available in their complete form by contacting the CCIIW. The IIW website is up and functioning and most if not all papers and reports discussed here are available from this report author or the IIW website. Dave Werba of USA is chair. As the author of this report was unable to attend, this report is assembled from posted documents and input from those able to attend. Douglas Luciani, CEO of The CWB Group represented Canada and presented the Canadian National Report.

I apologize for any incompleteness in this report, as I was not present and gleaned the information from the downloads and from others in attendance.

MONDAY, JULY 08, 2024, 9:00 – 13:00

1. Opening/administrative items,

1.1. Opening and welcome by the Chair - Werba

Our Chair Dave Werba warmly greeted everyone who was in attendance.

1.2. Attendees & Roll Call of Delegates

Introductions were conducted and roll call of delegates was taken.

1.3. Approval of the Agenda (VIII-2372-24)

The agenda was approved as submitted.

1.4. Approval of the minutes of the intermediate meeting (VIII-2371-2024)

The minutes of the intermediate meeting were approved as published.

2. Technical Items – Presentations / Discussions

2.1. VIII-2380-2024 "Determination of Electromagnetic Field Exposure in Arc Welding by Introducing Improved Numerical Anatomic Body Simulation", Dr. Stephan Egerland CEng, SenMWeldI Presented by: Harald Langeder

Abstract
Electric and magnetic field (EMF) phenomena arise where applying manual arc welding equipment. Consequently, using such systems may cause adverse effects to welding personnel. Models available quantitatively to assess EMF impacts in welding consistently show underestimation of exposure; mainly due to simplified boundary conditions implemented to facilitate modelling application. For arc welding this paper introduces
a novel approach, namely, the implementation of Induction Factors to improve EMF exposure assessment quality. Moreover, it is shown in how far especially advanced MIG / MAG and TIG welding variants, for example involving additional hardware that may produce EMF effects, are represented deploying the standards existing. Results are presented and discussed both found in practical process application and numerical simulation.
Employing the developed calculation approach is capable of compensating for inaccuracies yet identified with models still recommended by regulatory- or professional bodies. Users are provided with comprehensive information to help practically evaluate EMF exposure.

2.2. VIII-2374-2024 "CO concentration measurement in CO2 welding", Satoshi Yamane

No paper was supplied

2.3. VIII-2376-2024 "Determination of the welding fume emission rate according to DIN EN ISO 15011 - Determination of system stability", Kevin Hoefer; M. Kusch; J. Hensel: Presented by Kevin Hoefer

Extended-Abstract
The exposure and emission capacity of welding processes can be assessed according to various national and international standards. The international standard ISO 15011-1:2015 [1] is widely accepted for determining the emission of welding fumes and their chemical composition. The procedure outlined in this standard for measuring emission rates and collecting welding fumes for analysis has remained unchanged for years and was initially described by Hewitt in 1978 [3]. However, recent research has identified several weaknesses in this method:
The standard ISO 15011-1:2015 recommends using only quartz or glass fiber filters to determine emission rates and assumes the separation rates of these filters are negligible. However, Hoefer [4] demonstrates that the choice of filter can affect the determined emission rates by up to 30 %. Additionally, unlike AWS F1.2 [5], the standard does not specify the conditioning status of the filters, which can also lead to inaccurate results.
Furthermore, as described in Westin et al. [6], there is no standardized procedure for referencing the fume chambers used or the on-site determination procedure. Preliminary investigations with two standard-compliant test scenarios revealed significant result differences of up to 68% when using a corrosion-resistant filler material [7, 8].
The recommended use of cellulose filters to analyze the composition of welding fumes is considered problematic, particularly for determining Cr(VI) contents [6].
Another weak point is the lack of specification regarding the sampling of particles for welding fume analysis. Both the time elapsed from welding to analysis [9] and the sample storage conditions significantly influence the results [10, 11]. Initiatives to revise the standard have been repeatedly rejected by international standardization committees due to an insufficient database. The ring study by Westin et al. [6] provides an initial database, but it primarily focused on high-alloy cored wires and the associated emission of hexavalent chromium.

The aim of this Round-Robin test study is to address the following open questions:
Are results from weld fume analysis obtained in different laboratories comparable to each other?

- What is the quantitative influence of different test scenarios (test chamber design, test procedure) on the resulting total welding fume emissions, including their chemical composition? Parameters: Filler material, test rig geometry, filter type, test parameters
-
- What is the influence of the sampling strategy on the resulting chemical composition? Parameters: Filler material, particle separation, storage conditions, time to analysis
-
-

The following figure 1 illustrates the basic workflow of the study. The filler materials used serve as fixed input variables for the welding tests. The study plans to include filler materials from different quantitative categories (e.g., solid wire, cored wire) and qualitative emission classes (e.g., low and high chromium content).
Emission tests on-site will be conducted in accordance with local, standard-compliant procedures. Additionally, standardized tests will be performed using specified filter materials and welding parameters. The primary output parameters include the determined emission rates, test parameters, and the chemical composition of the welding fumes.

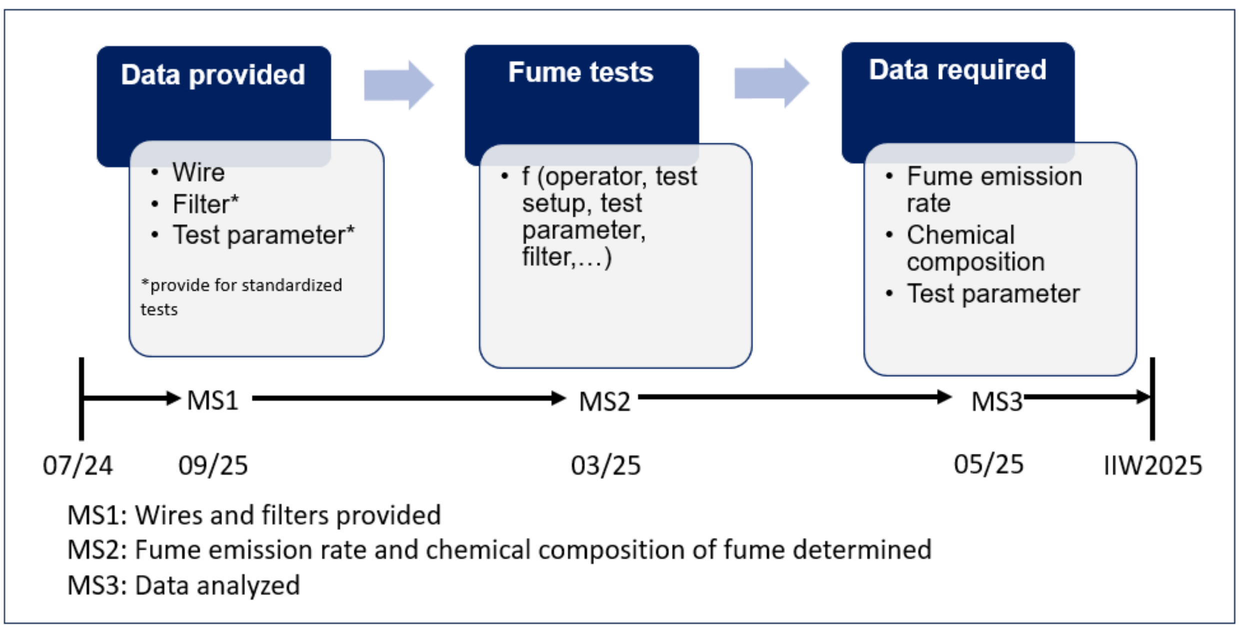


Figure 1. Workflow and timeline of the planned round-robin test

The study results offer a quantitative description of the following previously unclear points:

- o Influence of filter type
- o Influence of test bench geometry
- o Influence of test strategy and parameters
- o Influence of filler material

- o Influence of analysis strategy: particle separation
- o Influence of analysis strategy: particle storage
- o Influence of analysis strategy: analysis time

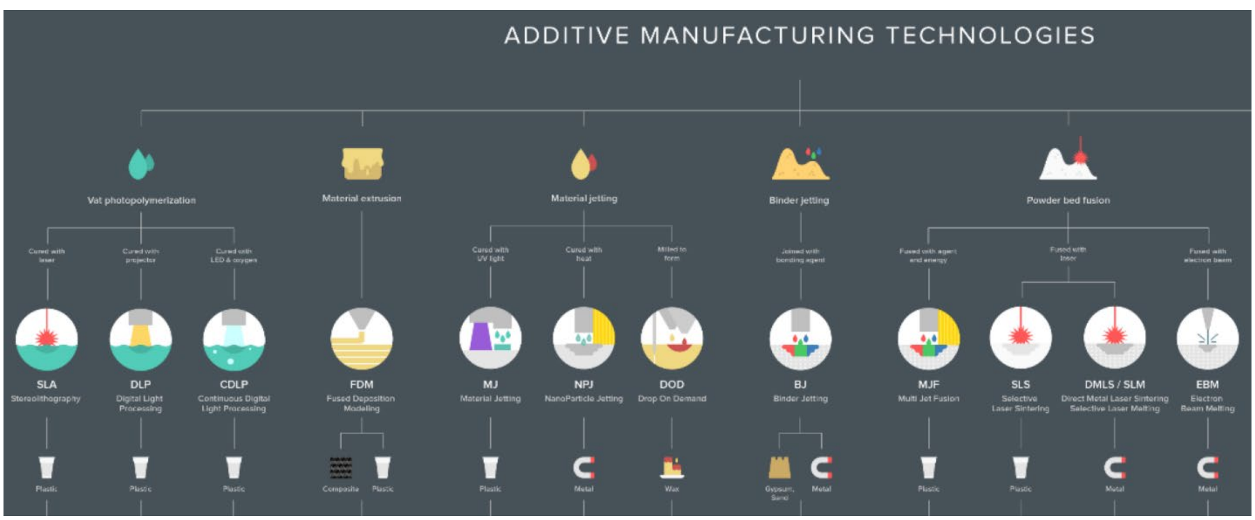
In summary, the intended findings establish quantitative factors for assessing the measurement uncertainty of determined welding fume emission rates or chemical composition when tested according to the normative specifications of the international standard DIN EN ISO 15011-1:2015. These findings will inform international recommendations aimed at adapting the standard accordingly.

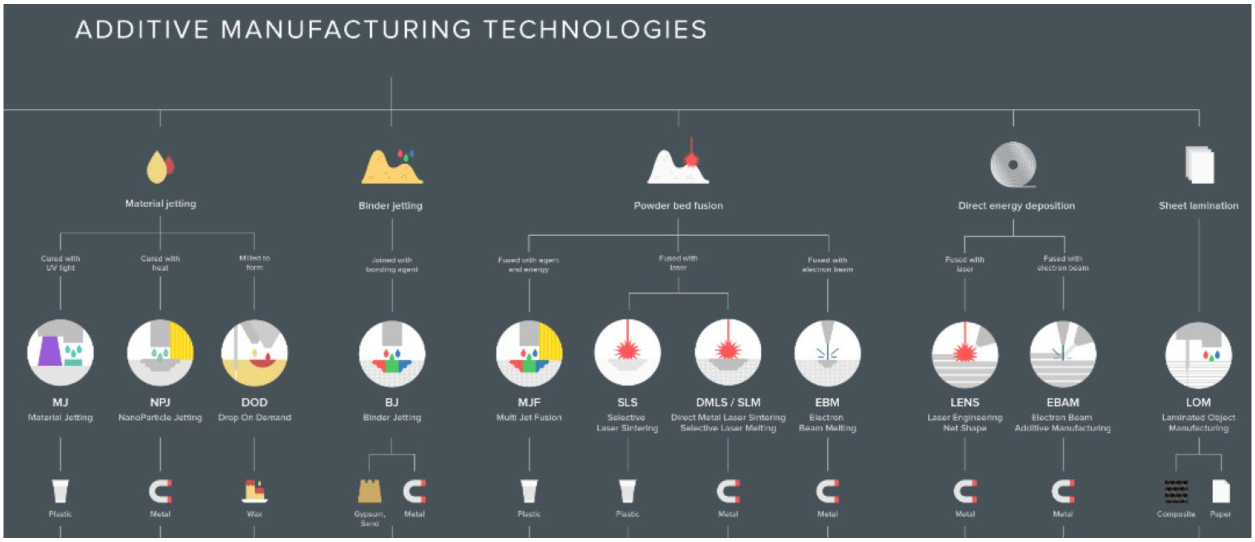
2.4. VIII-2382-2024 “Safety in metal additive technologies -Operational Framework for Metal-PBF process”,

Stefano Pinca

ISO/ASTM 52900:2021: «Additive manufacturing —General principles —Fundamentals and vocabulary»

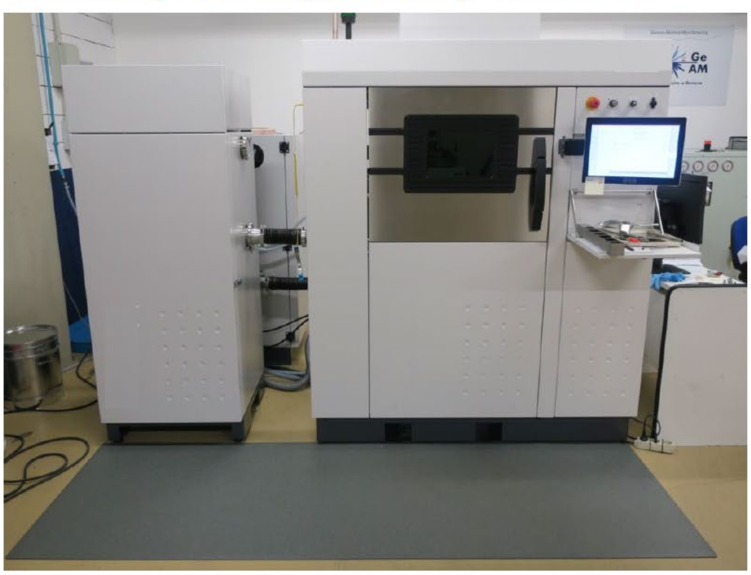
•Def. 3.1.2 –AM: “process of joining materials to make parts from 3D model data, usually layer upon layer, as opposed to subtractive manufacturing and formative manufacturing methodologies”

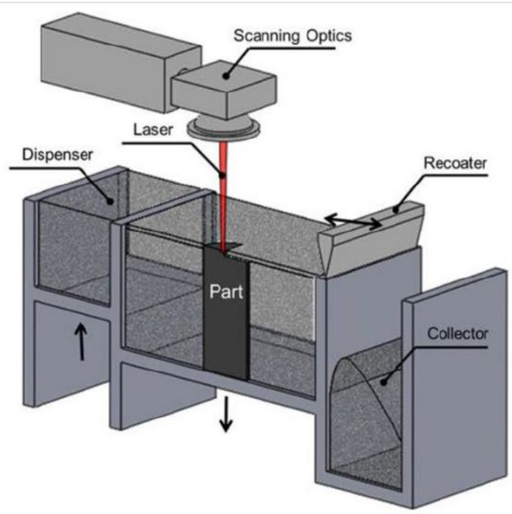




(I made 2 photos – left and right - of the above slide, so it hopefully is readable)

Def.3.2.5: "Powder bed fusion: additive manufacturing process in which thermal energy selectively fuses regions of a powder bed."





ISO/ASTM 52900:2021

INTERNATIONAL INSTITUTE OF WELDING

COMMISSION VIII HEALTH AND SAFETY

ANNUAL ASSEMBLY MEETING 08 - 09 July 2024

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AITA is a cultural association aiming to gather all the stakeholders in the frame of the additive technologies (producers of machines, end-users, enabling technologies suppliers, service centers, universities, research centers, etc.) www.aita3d.it

<https://www.inail.it/cs/internet/docs/alg-pubbl-la-sicurezza-nelle-tecnologie-additive-metalli.pdf>

Operational Safety Framework for M-PBF – Topics: Scope:

This work arises from the need to have a first reference document for the identification and characterization of the specific hazards in place for equipment that adopts additive technologies (M-PBF processes).

This document is addressed to employers, users and those who work in the field of machinery safety and deal with the application of additive technologies in working contexts.

The document, addressed to the metalworking and mechanical engineering industry, was created taking into account both the legislation in force (in particular Legislative Decree 81/2008 and Legislative Decree 17/2010, transposition decree of the Machineries Directive) and generic technical safety standards (type-B safety standards).

Manufacturer's obligations: Risk assessment; Placing on the market; EU declaration of conformity; CE marking Instructions

Employer's obligations: Risk assessment; Risk management; Personal protective equipment (PPE); Information, education and training

Workers' obligations: (This was left blank)

Specific hazards: - Movable elements; Falling objects; Radiations and fields; Ionizing radiations; non-ionizing radiation; Optical radiation (laser); Hot surfaces and materials; Fire and explosion; Static electricity; Dust and gas; Metallic powders; Inert gases

Operational Safety Framework for M-PBF – Topics: Metal Powder

The metallic powders for AM Processes have average particle sizes typically between 15 µm and 45 µm and, if airborne, could be inhaled by operators during the loading phase into the machine, during the removal of the finished pieces and during the maintenance and cleaning of the machine itself.

Labelling and Safety Data Sheet -Classification of the substance :
Skin Sens. 1; H317, May cause an allergic skin reaction.
Carc. 1B; H350, May cause cancer.
Repr. 1B; H360F, May damage fertility.
STOT RE 1; H372, Causes damage to organs through prolonged or repeated exposure.

Aquatic Chronic 3; H412, Harmful to aquatic life with long lasting effects
Flam. Sol. 1; H228, Flammable solid

Type A Powder: - May form combustible dust concentrations in air
Steels (Carbon, Low alloy, SS)
Nickel Alloys

Type B Powder - Flammable solid (easily flammable)
Aluminum Alloys
Titanium Alloys
Note: Ti Powder may have an exothermic reaction with N2

Metal condensate: during the process secondary substances may be produced and deposited on the side walls and accessories of the building chamber and collected in the recirculating gas filter.

Metal Condensates are defined easily flammable even if the bulk powder is not.

Powder Handling

1. Storage: Metal powders must be stored in a room and in containers whose temperature, humidity, ventilation, closure and labeling conditions are in accordance with the requirements defined in the powder supplier's safety data sheet.

2. Powder Loading: The powder loading operations are conducted through a manual system which allows the confined transfer by gravity, without dispersion.

3. Powder Removal: Powder removal has two purposes: the recovery of un-melted powders to proceed to sieving for recycling and the cleaning of the build chamber and optics, especially to eliminate metal condensates

The operations are conducted with different systems, which must be ATEX compliant: Conveying Module; Glove Box Module; Vacuum cleaner

4. Powder Sieving: This phase is carried out with specific machines for the elimination of impurities or elements with grain sizes unsuitable for the reuse of powders in subsequent processing. For sieving, an appropriate risk analysis must be carried out, in order to identify the hazards associated with the handling of powders and the related risks, in a similar way to what happens with powder bed fusion machines.

Personal Protection Equipment/Devices

According to Manufacturer's Instruction for use, for example:

Condition 1: Product handling, operations on the machine and accessories (excluding maintenance of recirculation system filters)

PPE Requirements: Powder-free nitrile protective gloves (EN 374); Eye protector with side shield (EN 166); Anti Static & Flame-Retardant Clothing; Protective gloves against thermal risks (EN 407); Safety Shoes with ESD (Electrostatic Discharge) (EN 61340-4-3); Respiratory Protection (Filtering P3)

Condition 2: Maintenance of recirculation system filters Replacement of the Particle Bin; Replacement of the cartridge filter and fines filter

PPE Requirements: Full Face Mask (Filtering P3); Anti Static & Flame-Retardant Hood; Anti Static & Flame-Retardant Clothing; Protective gloves against thermal risks (EN 407); Safety Shoes with ESD (Electrostatic Discharge) (EN 61340-4-3)

Current Standardization references

(update 17/06/2024)

Doc.	Title	Rev. Status	Abstract
ISO 27548	Additive manufacturing of plastics — Environment, health and safety — Test method for determination of particle and chemical emission rates from desktop 3D printer material extrusion	60.00 International Standard under publication	This document specifies test methods to determine particle emissions (including ultrafine particles) and specified VOCs (including aldehydes) from Material Extrusion(ME) processes often used in non-industrial environments such as school, homes and office spaces in an Emission Test Chamber (ETC) under specified test conditions. However, these tests may not accurately predict real-world results. This document describes a conditioning method using an ETC with controlled temperature, humidity, air exchange rate, air velocity, and procedures for monitoring, storage, analysis, calculation, and reporting of emission rates. This document is intended to cover a Fused Filament Fabrication (FFF) type desktop 3D printer using thermoplastic materials. The primary purpose of this document is to quantify particle and chemical emission rates emitted from a specific ME type desktop 3D printer which is operated using thermoplastic feedstocks. However, not all possible emissions are covered by this method. Many feedstocks could release hazardous emissions that are not measured by the chemical detectors prescribed in this document. It is the responsibility of the user to understand the material being printed and the potential chemical emissions. An example is PVC feedstocks that could potentially emit chlorinated compounds, which would not be measured by this document
ISO/ASTM 52931:2023	Additive manufacturing of metals — Environment, health and safety — General principles for use of metallic materials	60.60 International Standard published	This document provides guidance and requirements for risk assessment and implementation of prevention and protection measures relating to additive manufacturing with metallic powders. The risks covered by this document concern all sub-processes composing the manufacturing process, including the management of waste. This document does not specify requirements for the design of machinery and equipment used for additive manufacturing.
ISO/ASTM 52933:2024	Additive manufacturing — Environment, health and safety — Consideration for the reduction of hazardous substances emitted during the operation of the non-industrial ME type 3D printer in workplaces, and corresponding test method	60.60 International Standard published	This document specifies a test method for measuring hazardous substances emitted during the operation of material extrusion type AM machines commonly used in the non-industrial places and includes non-normative suggestions for ways to reduce them. This document specifies some of the main hazardous substances emitted from this type of machine during operation for currently commonly used materials, it describes the additional information and the associated test method for measuring hazardous substances, and includes considerations for reducing the hazardous substances and basic countermeasures. This document specifies how to measure concentrations of hazardous substances generated in the non-industrial places (school, public place and so on) in which this type of machines are installed, and to maintain an acceptable work environment by managing field facilities, machines, filaments, and additive manufactured products for the reduction of hazardous substances. However, this document does not cover all gas-phase chemical emissions. Only a range of Volatile Organic Compounds (VOCs) from n-hexane to n-hexadecane, including aldehydes are included. Considerations for reducing chemical emissions and for improving the work environment are given in Annexes A and B.
ISO/ASTM DIS 52938-1	Additive manufacturing of metals — Environment, health and safety — Part 1: Safety requirements for PBF-LB machines	40.99 Full report circulated: DIS approved for registration as FDI	Under development

2.5. VIII-2379-2024 "Investigating the Effect of Varying Powder Size on Particulate Matter Emission and Mechanical Properties of In-Situ Micro powder Alloyed WAAM Depositions", Adarsh Prakash, Rubal Dhiman, Anirudha Ambekar, Thaseem Thajudeen, Sachin Dnyandeo Kore: Presented by Adarsh Prakash

Abstract
Wire Arc Additive Manufacturing (WAAM) fabricates 3D products by laying molten filler wire in layers, resulting in final products with properties similar to the parent filler wire. However, In-situ micro powder alloying during WAAM can modify the deposited material without changing the parent filler material to enhance the mechanical properties. This research investigates the effects of adding titanium (Ti) and copper (Cu) micro powders, varying in size ranges (< 25 µm, 25-45 µm, and 45-95 µm), within the layers of carbon steel in multilayered vertical walls during WAAM. The analysis of the variations in the mechanical and metallurgical properties of WAAM deposited samples, arising from the differing size ranges of CuTi powder addition, was also conducted. This study also delves into the dynamics of fine and ultrafine particle (UFP) emissions resulting from WAAM depositions, both with and without the incorporation of Cu & Ti powders (CuTi powders). Real-time data acquisition employed a combination of low-cost particulate matter sensors (LCS) and scanning mobility particle sizer (SMPS) to monitor particulate matter (PM) and UFP. The incorporation of CuTi powders in various sizes has been observed to improve the mechanical properties, with the most significant enhancement noted in samples containing CuTi powder with sizes ranging from 25-45 µm. This improvement is likely attributable to the superior adhesion and uniform distribution of these particles across the surface compared to samples containing CuTi powders of finer size ranges. Variations in PM and UFP levels across different sizes of CuTi powders reveal that smaller-sized CuTi particles (less than 25 µm or 25-45 µm) demonstrate superior combustion compared to larger particles (45-95 µm). Consequently, larger particles contribute to higher PM and UFP emissions. This study underscores the importance of micro powder size in emission characteristics and mechanical properties enhancement, suggesting the potential for identifying an optimized size range.

2.6. VIII-2375-2024 Welding Fume Pollution and Treatment of Inner Tank of LNG Storage Tank",
Zhenwen Zhu

No presentation provided

3. Video - Welding in the World & Closing - David Werba

INTERNATIONAL INSTITUTE OF WELDING

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TUESDAY, JULY 09, 2024, 9:00 – 13:00

4. VIII-2372-2024 Welcome Day 2 - David Werba

5. IIW Secretariat - Elisabetta Sciaccaluga

6. Technical Items – Presentations / Discussions

6.1. VIII-2378-2024 "Welding Air Borne Contamination - A review", George Assimacopoulos

Abstract
It is well known that the welding process is at the heart of the global industry. Ships, trains, aeroplanes, metallic bridges, pipelines, offshore structures, refineries, pressure vessels, to name just a few, all require welding during their construction, manufacture, repair and maintenance work. As a result, many thousands of people around the world are heavily involved in this work, exposing their health and wellbeing to potential dangers every day.

These dangers, or risks (and their combination) include the following:
- Radiation
- Noise
- Vibration
- Heat Charge
- Electrical Hazards
- Hazards from Electromagnetic Fields
- Risks of Explosion and Fire
- Risk of entrapment in Confined Spaces.
- Falls
- Ergonomic Issues
- Dangers from Fume Inhalation

This last one is considered as very critical and therefore it constitutes the focus of our present review as far as the welder's protection is concerned. XY-XYZT-2024 - WELDING AIR BORNE CONTAMINATION –A REVIEW

So, the question here is what do the welding personnel, and its management, need to be aware of and how can we act to mitigate such a risk in the field?

6.2 VIII-2373-2024 "DEVELOPMENT OF LOW Cr (VI) EMISSION SMAW STAINLESS STEEL ELECTRODE USING NANO-SILICA COATED CORE WIRES", Rahul M

No presentation provided

7. Work Items

7.1. VIII-2383-2024 Presentation of AWS Safety & Health Fact Sheet on Handheld Laser Welding Safety & Discussion on Endorsement of Currently available documents or possible draft IIW C-VIII Best Practice Guide on Handheld Laser Welding Safety - David Werba

INTRODUCTION

A Handheld Laser Welder is a high-power Class 4 laser instrument defined by OSHA 21 CFR, Subchapter J, part II, 1040.10(d).
High-power lasers (with a minimum continuous wave of 500 mW and minimum pulsed wave of 10 J/cm2 or the diffuse reflection limit) are hazardous to view under any condition either directly or diffusely scattered.
These products typically emit visible or near-infrared (invisible) light, and the total power output can be several kilowatts.
Each company operating Class 3B or 4 lasers must have a qualified Laser Safety Officer (LSO).
A Laser Controlled Area (LCA) is required for each point of use (See "How to Reduce Exposure" section for LCA specific requirements).
Operators and all persons in the LCA must wear specified Personal Protective Equipment (PPE).
A documented Laser Safety Program is required.

NATURE OF THE HAZARDS

Class 4 high-power lasers present the most serious of all laser hazards.
Precautions must be taken to prevent accidental exposure to both direct and reflected beams.
Diffuse and specular beam reflections can inflict severe eye and skin damage.
Class 4 laser beams are also a potential electrical and fire hazard.

Eye Hazards

Exposure to laser light can inflict severe retina and/or cornea injuries leading to permanent eye damage.
Some laser light, including the welding, cutting, or cleaning beam (1070 nm), is invisible.
Laser safety eyewear is designed to protect against direct, reflected, scattered laser beams and radiation.
Follow the equipment manufacturer's recommendations for the Optical Density (OD) of protective eyewear.
Always inspect eyewear for damage or improper fit before use.
Direct beams are the most hazardous.

Depending on the power level of the laser beam, laser safety eyewear is designed only to protect accidental (i.e., very brief) direct and reflected beams.
Never look directly into a laser aperture, even if wearing full eye protection.
Never point the torch at another person.

Skin Hazards
Exposure to infrared (IR) and ultraviolet (UV) light radiation as well as heat and sparks can cause injury to the skin.
All persons in the LCA must wear all appropriate PPE, including laser welding helmet, laser safety eyewear, heat resistant gloves, and flame-resistant clothing.
Sleeves and collars shall be buttoned at all times.
Exposure to UV light can cause sunburn and increase a welder's risk of skin cancer and accelerated signs of skin aging.

Reflection Hazards
Highly reflective metals such as aluminum and copper can cause some portion of the beam energy to be reflected from the target weld site.
Specular reflections can present eye and skin hazards to the operator as a portion of the beam can be reflected from multiple surfaces.

HOW TO REDUCE EXPOSURE
Read and follow all labels and the equipment Owner's Manual carefully before installing, operating, or servicing handheld laser welding equipment.
Follow all standards, individual facility or building regulations, and national, state, and local codes.
Have only qualified persons install, operate, maintain, and repair handheld laser welding equipment.
Provide an LCA for each point of use, including demonstrations.
An LCA is a light-tight enclosure with laser-blocking panels, an access door with interlock switch, and Laser On warning sign.
Any barriers or windows used in the LCA should be made of a laser-safe material that can withstand direct and diffusely scattered beams.
Post laser warning signs outside the LCA when the laser is in use
Appropriate laser warning signs should be posted throughout the controlled area, especially any entrances to and from the area.
Restrict access to the LCA only to those individuals who are trained in laser safety while operating a laser.
See OSHA, Technical Manual (OTM), Section III: Chapter 6, Laser Hazards, www.osha.gov.
Each company must have a qualified LSO responsible for the safety of operators and observers who must be trained on all potential hazards.

INTERNATIONAL INSTITUTE OF WELDING

COMMISSION VIII HEALTH AND SAFETY

ANNUAL ASSEMBLY MEETING 08 - 09 July 2024

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INFORMATION SOURCES

ANSI Z49.1, Safety in Welding, Cutting, and Allied Processes, American Welding Society, <http://www.aws.org>.
ANSI Z87.1, Safe Practice for Occupational and Educational Eye and Face Protection, American National Standards Institute, <www.ansi.org>.
ANSI Z136.1, Safe Use of Lasers, American National Standards Institute, <www.ansi.org>.
CSA W117.2, Safety in Welding, Cutting, and Allied Processes, Canadian Standards Association, <www.csagroup.org>.
IEC 60825-1, Safety of laser products - Part 1: Equipment classification and requirements, International Electrotechnical Commission, <https://webstore.iec.ch/publication/3587>.
ISO 11553-1, Safety of machinery — Laser processing machines Part 1: Laser safety requirements, International Organization for Standardization, <www.iso.org/standard/67658>
NFPA 51B, Standard for Fire Prevention During Welding, Cutting, and Other Hot Work, National Fire Protection Association, <www.nfpa.org>.
OSHA 1910.177 Title 29, Subpart N, Part 1910 Subpart Q, and Part 1926, Subpart J, Occupational Safety and Health Standards for General Industry, Occupational Safety and Health Administration, Code of Federal Regulations (CFR), <www.osha.gov>.
OSHA 1040.10 Title 21 Code of Federal Regulations (CFR) Chapter I, Subchapter J, Laser Products, Occupational Safety and Health Standards for Food and Drugs, Occupational Safety and Health Administration, Code of Federal Regulations (CFR), <www.osha.gov>.
OSHA, Technical Manual (OTM), Section III: Chapter 6, Laser Hazards, Occupational Safety and Health Administration, <www.osha.gov>.
LIA, Questions that an OSHA Inspector May Ask You about Laser Safety Fact Sheet, Laser Institute of America, <www.lia.org https://assets.lia.org/s3fs-public/pdf/OSHAquestions_2018.pdf>.

77th IIW Annual Assembly and International Conference on Welding and Joining
7-12 July 2024
Rhodes, Greece

American Welding Society
Safety and Health
Fact Sheet No. 46
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April 2024

Handheld Laser Welding, Cutting, and Cleaning Safety

INTRODUCTION

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High-power lasers (with a minimum continuous wave of 500 mW and minimum pulsed wave of 10 J/cm² or the diffuse reflection limit) are hazardous to view under any condition either directly or diffusely scattered. These products typically emit visible or near-infrared (invisible) light, and the total power output can be several kilowatts.

Each company operating Class 3B or 4 lasers must have a qualified Laser Safety Officer (LSO).

A Laser Controlled Area (LCA) is required for each point of use (See "How To Reduce Exposure" section for LCA specific requirements).

Operators and all persons in the LCA must wear specified Personal Protective Equipment (PPE).

A documented Laser Safety Program is required.

NATURE OF THE HAZARDS

Class 4 high-power lasers present the most serious of all laser hazards. Precautions must be taken to prevent accidental exposure to both direct and reflected beams. Diffuse and specular beam reflections can inflict severe eye and skin damage. Class 4 laser beams are also a potential electrical and fire hazard.

Eye Hazards

Exposure to laser light can inflict severe retina and/or cornea injuries leading to permanent eye damage. Some laser light, including the welding, cutting, or cleaning beam (1070 nm), is invisible. Laser safety eyewear is designed to protect against direct, reflected, scattered laser beams and radiation. Follow the equipment manufacturer's recommendations for the Optical Density (OD) of protective eyewear. Always inspect eyewear for damage or improper fit before use. Direct beams are the most hazardous. Depending on the power level of the laser beam, laser safety eyewear is designed only to protect accidental (i.e., very brief) direct and reflected beams. Never look directly into a laser aperture, even if wearing full eye protection. Never point the torch at another person.

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Fact Sheet No. 46 – April 2024
Page 1/3

Skin Hazards

Exposure to infrared (IR) and ultraviolet (UV) light radiation as well as heat and sparks can cause injury to the skin. All persons in the LCA must wear all appropriate PPE, including laser welding helmet, laser safety eyewear, heat resistant gloves, and flame-resistant clothing. Sleeves and collars shall be buttoned at all times. Exposure to UV light can cause sunburn and increase a welder's risk of skin cancer and accelerated signs of skin aging.

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INFORMATION SOURCES

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ANSI Z136.1, *Safe Use of Lasers*, American National Standards Institute, <www.ansi.org>.

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Fact Sheet No. 46 – April 2024

Page 2/3

IEC 60825-1, *Safety of laser products - Part 1: Equipment classification and requirements*, International Electrotechnical Commission, <https://webstore.iec.ch/publication/3587>.

ISO 11553-1, *Safety of machinery — Laser processing machines Part 1: Laser safety requirements*, International Organization for Standardization, <www.iso.org/standard/67658>

NFPA 51B, *Standard for Fire Prevention During Welding, Cutting, and Other Hot Work*, National Fire Protection Association, <www.nfpa.org>.

OSHA 1910.177 Title 29, Subpart N, Part 1910 Subpart Q, and Part 1926, Subpart J, *Occupational Safety and Health Standards for General Industry*, Occupational Safety and Health Administration, Code of Federal Regulations (CFR), <www.osha.gov>.

OSHA 1040.10 Title 21 Code of Federal Regulations (CFR) Chapter I, Subchapter J, *Laser Products, Occupational Safety and Health Standards for Food and Drugs*, Occupational Safety and Health Administration, Code of Federal Regulations (CFR), <www.osha.gov>.

OSHA, Technical Manual (OTM), Section III: Chapter 6, *Laser Hazards*, Occupational Safety and Health Administration, <www.osha.gov>.

LIA, *Questions that an OSHA Inspector May Ask You about Laser Safety Fact Sheet*, Laser Institute of America, <www.lia.org https://assets.lia.org/s3fs-public/pdf/OSHAquestions_2018.pdf>.

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Fact Sheet No. 46 – April 2024

Page 3/3

Discussion: Endorsement of Currently available documents or possible draft IIW C-VIII Best Practice Guide on Handheld Laser Welding Safety

8. National Reports

8.1 Australia - Bruce Cannon: Bruce provide an oral report; Australia has implemented zero voltage at the electrode for changing electrodes, due to the fact that welders in certain areas of the country were feeling a tingling sensation even with the VRD install and operating. Effective, January 01, 2024, allowable welding fume as a whole has been reduced from 5mg/ m^3 to 1mg/m^3 . Effective January 01, 2026, allowable CrVI will be Zero.

8.2 Austria – Harald Langeder - no record was provided

8.3 Belgium - Steven Verpaele - no record was provided

8.4 Canada – Doug Luciani – The complete report is posted on the CSA COI website https://community.csagroup.org/docs/DOC-181013 or also on the web as DOI: 10.13140/RG.2.2.19615.98728

his report highlights the work Canada has done in furthering the cause of women in welding. The What-Me study conducted by Dr Cherry et al, and the University of Alberta on the female welder and her unborn child and the 10 papers written on the subject are covered, as is the new proposed annex to CSA W117.2 covering pregnant welders in the work place. In addition, the secondary educational institutes across Canada are highlighted and the effect this is having on enrolment, not only in all trades , but in women moving into the technical field of welding including engineering. Professor Yolanda Hedberg from the University of Western Ontario is highlighted and Kimberly Meszaros, P.Eng., M.Sc. WE, API 570, Principal Engineer, Welding @ Inotech Alberta, are highlighted as women who have achieved in support of welding in Canada and the world. Various other young women from across Canada who have achieved in their field from high school to careers in welding art were provided.
The report finishes with the issue of PPE for almost 40% of women is just not available. A slide provided by one of the individuals listed, who wears size 4 work boots was provided describing the difficulty she has in doing her work when it involves her being in the welding workplace. Since the report was presented Miller Electric has offered to collaborate with the individual in an attempt to outfit her with their new "lightweight" PAPR.
The report finishes, outlining recent headway on this issue by CSA Research working with the Canadian governments to get a commitment that progress will continue to push for proper PPE for women in the physical workplace.

8.19 USA - David Werba

IIW C-VIII National Report – USA

July 2024 - David Werba

AWS Safety and Health Committee (SHC)

- Last Meeting – June 11, 2024, EWI Columbus, OH/Hybrid
- Regulatory Action Update:
  1. European Chemical Agency (ECHA) that proposing to add "bulk welding fumes" as a regulated level - discussion on the concerns and pushing back on this proposed change.
  2. The Hazard Communication Standard (HCS) was updated - goes into effect July 19, 2024 - compliance effectivity - July 1, 2027.

AWS Safety and Health Committee (SHC)

2. The HCS (cont'd)
   - Updated standard will improve effectiveness by better informing employees about chemical hazards in the workplace.
   - The SHC is considering writing an AWS Welding Journal article on the implications of the updated Standard.
- Documents Status:
  - F2.3 and F4.2 -SHC conducting a general review of each document prior to the Fall meeting

AWS Subcommittee on Fumes and Gases (SH1)

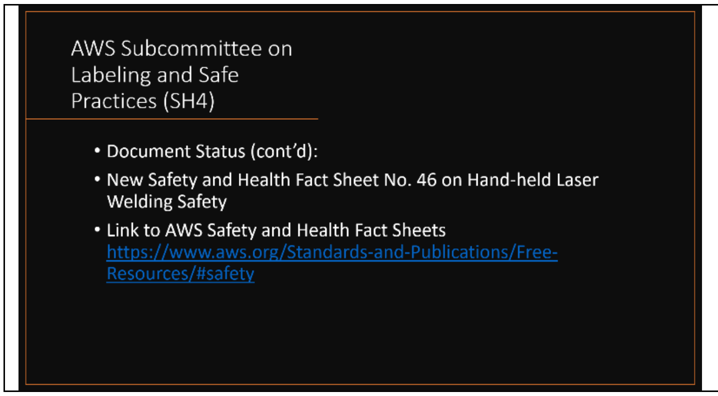
- Last meeting – June 12, 2024, EWI, Columbus, OH/Hybrid
- Regulatory Action Update:
  1. Heat Stress - Seems a general move that by 2027 - employers will be required to air condition their workplaces, or work at night to prevent employees from becoming overheated while on the job.
  2. Respirable crystalline silica regulations - no new updates / requirements related to welding, however, there are changes to construction and mining. Permissible Exposure Limit (PEL) - respirable crystalline silica - 50 μg/m³ full 8-hour shift exposure.

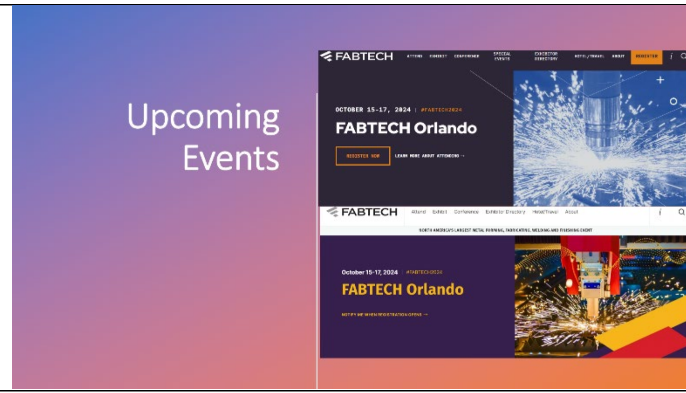
AWS Subcommittee on Fumes and Gases (SH1)

- Document Status:
  - F1.1 and F1.2 - Subcommittee conducting a general review of each document prior to the Fall meeting.
  - F1.6, Annex A - Task Group formed to possibly expand Annex A, Typical Emission Factors for Total Fume and Elemental Fume Content

AWS Subcommittee on Labeling and Safe Practices (SH4)

- Last meeting – April 16, 2024
- Document Status:
- F2.2 and F4.1- Subcommittee conducting a general review of each document prior to the Fall meeting.
- Approved for publication Safety and Health Fact Sheets No's: 1, 6, 7, 15, 18, 19, 20, and 22





Note: There was additional national reports provided but they were not documented presentations, so the reports were not available online.

9.0 Closing – David Werba

Annex A

Title	Document Number	Author(s)	Year
Contact lens use in industry	VIII-1588-91; IIW-1124-91	ZSCHIESCHE W.	1991
On the question of drinking of milk by welders as a health protection measure	VIII-1298-85; IIW-831-85		**1985**
Personal ultraviolet radiation exposure of workers in a welding environment	VIII-1817-97	TENKATE T.	1997
Statement on welding and cutting on containers	VIII-1823-97; IIW-1374-97		1997
Welding adds hazards to work in confined spaces	VIII-1856-98; IIW-1416-98		1998
Health hazards from exposure to electromagnetic fields in welding	VIII-1858-98; IIW-1415-98		1998
IIW Statement on Manganese: Chromium and manganese in welding - Exposure and the need of control measures	VIII-2029-06	GAVELIN F.	2007
Health and safety in fabrication and repair of welded components:	VIII-2078-08; IIW-1986-09	COSTA L.	2008

aspects, impacts and compliance to regulations.			
Title	**Document Number**	**Author(s)**	**Year**
Lung cancer and arc welding of steels	IIW-2223	IIW Commission VIII	2011
List of standards relevant to health, safety and environment	VIII-2079r3-11	COSTA L.; LUNDIN M.	2011
Welding Fumes Main Components and Structure*	VIII-2056r5-17	FLOROS, N.	2017
Hazardous Substances in Welding and Allied Processes	VIII-2188r10-17	SPIEGEL-CIOBANU, V.	2017

Best Practice Documents of Commission VIII Published as ISO Documents

IIW CVIII Title	IIW Document Number	ISO Title	ISO Document Number
Health and safety in welding-guidelines for risk assessment of welding fabrication Activities	VIII-2081r2-09	Health and safety in welding -- Guidelines for risk assessment of welding fabrication activities	ISO Technical Report 18786:2014
Health and safety in welding and allied processes – arc welding fume components	VIII-2057r3-07	Health and safety in welding-and allied processes -- Arc welding fume components	ISO Technical Report 13392:2014

Best Practice Documents of Commission VIII Published in *Welding in the World (WIW)*			
IIW CVIII Title	**IIW Document Number**	**Author(s)**	***WIW Citation***
Lung Cancer and Arc Welding of Steels	VIII-2090r6-11	IIW Commission VIII	Weld World 2011; 55: 12-20
Welding with non-consumable thoriated tungsten electrodes	VIII-2172-12	COSTA, L.	Weld World 2015; 59: 145-150
Exposure to nitrogen oxides (NO, NO2) in welding	VIII-2108r-10	SPIEGEL-CIOBANU, V.; ZSCHIESCHE, W.	Weld World 2014; 58: 499-510
Arc welding and airways disease	VIII-2136r3	COSGROVE, M.	Weld World 2015; 59: 1-7
Arc welding of steels and pulmonary fibrosis	VIII- 2171r-14	COSGROVE, M.; ZSCHIESCHE, W.	Weld World 2016; 60: 191-199
Welding electrical hazards: an update	VIII-2145-12	HISEY, D.	Weld World 2014; 58: 171-191
Fire prevention during hot work	VIII-2145r4-14	HEDRICK, S.; PETKOVSEK, J.; HISEY, D.	Weld World 2015; 59: 585-587