

The Canadian Delegate Report

International Institute of Welding Commission
VIII Health and Safety

David Hisey

This is a summary of the actions of IIW Commission VIII during the June 2017 conference in Shanghai, The People's Republic of China. 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 26 – 28 June 2017

Shanghai, Peoples Republic of China

Summary

MD PhD Wolfgang Zschiesche from Germany chairs this commission. Professor Zschiesche was recovering from a surgery and was unable to attend in person. John Petkovsek the committee vice-chair filled in for Professor Zschiesche. Dr. Zschiesche attended part of the meetings via Skype. The focus of this committee is in the areas of health, safety and environment as it has to do with welding. The IIW Commission VIII meetings have two main purposes: to gather together experts from around the world to discuss welding related health, safety and environment issues, and to allow the flow of information between the member welding societies in the parent countries. The meetings with Commission VIII were done in the form of papers and presentations given by experts in the field of welding HS&E. I will provide short descriptions of the papers/presentations given. This year there was a meeting held in Beijing a few days prior to this series of meetings, the meetings in Beijing were held by the Chinese delegation and several our IIW Commission VIII delegates were invited guests to the Beijing conference; the contents of that meeting are available as a separate document. Some of the papers identified here are available in their complete form by contacting the CCIW.

Monday, June 26, 2017: 08:30 – 12:30

Session I: General Matters / Administrative matters

- The vice chair John Petkovsek welcomed everyone, various individuals were recognized.
- The latest agenda was reviewed and approved for the meeting, there had been several last-minute changes. The Monday meeting continues in the morning, however subsequent meetings were moved to the afternoon as originally scheduled.
- Self-introductions completed the introductory session.
- The list of members not attending was reviewed and regrets were noted.
- Approval of the minutes of the meeting in Hannover, Germany, February 01 - 02, 2017 (Doc VIII-22239-16): Steve Hedrick, Wolfgang Zschiesche

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National Reports:

USA

Membership and balance of the AWS and the need to increase participation particularly adding more young professionals

Transparent Curtains: California testing results, standards we create around curtains, acceptable usage

NFPA 51B: Hot Work Operations and the change from a 30 minute to a 60 minute fire watch and the impact on end users

IARC Discussion on the possible decision to consider welding fume carcinogenic

France

Welding fume reduction concentrating on the workshop. They have begun a 4-year program to reduce the amount of welding fume that welders and other shop workers are exposed to.

Canada

Female Welder Reproductive Health Study

Current numbers: 448 female welders, 439 female electricians from across Canada. At the time of writing 350 pregnancies, which 185 are welders. The cohort will end in December 2017 and preparation of final reports in 2018.

CSA C232(CSC26) Electric Welding Equipment

The Canadian Harmonized Committee on Electric Welding Products met for the 2nd time on February 8th at the Canadian Standards Association Toronto offices. Canada has been consistently represented at the international TC 26 meetings since becoming a participatory member and our national committee continues to strengthen. Canada is currently looking at adopting additional IEC standards from the 60974 – series to eventually become fully reliant on these group of standards for welder manufacture and import.

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CSA Standard W117.2 Safety in Welding Cutting and Allied Processes

Our national TC have been working on a review for some time now, however, the issues tend to grow. One of our jurisdictions interpreted our section on welding on containers to be applicable to refinery pipelines, so a task force has been struck to both re-word the section for better clarity and yet get the jurisdiction on board so they do not feel alienated. We are also working to improve our requirements for welder clothing and are discussing the possible adoption of ISO 11611 Protective clothing for use in welding and allied processes.

Welder Educators Conference/Acorn Welder Training

The 8th Annual Welding Educators' Conference was held June, in Winnipeg, Manitoba. It is now an established program with broad support from both the welding industry and the welder training colleges across Canada.

Mind Over Metal Camps

The CWA Foundation is continuing to engage students at the Elementary, High school and Post-Secondary levels with opportunities that exist in the welding industry. Elementary school students are exposed to opportunities prior to course selection for high school, this is typically the first opportunity students have for hands-on welding instruction. Secondary students who wish to pursue an apprenticeship or post-secondary education in welding are invited to apply through the student awards program. They also fund secondary school welding programs in Canada upon request with personal protective equipment and course material through their national Initiatives. The CWA Foundation is providing support through student awards for Secondary School students to attend post-secondary studies in welding. The Foundation encourages students to continue their studies and re-apply each year of their post-secondary welding education. The goal is to ensure that students are given the necessary support to complete programs and move towards apprenticeship or employment in the welding trade.

They also have several programs to engage and encourage women to consider a career in the trades; this is growing in popularity at educational institutions across Canada. They also offer Mother/Daughter Welding Camps. They seek opportunities to involve at-risk youth through in welding camp programs that will help to build confidence, and teach new marketable skills. Welding camp programs also specifically target Canada's Indigenous groups. This program is proving to be a success through increased enrollment in our high school and welding training college programs.

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United Kingdom

The UK has very recently begun a program called BOHS (website based) “Do you breathe freely” The UK is counting 150 deaths per year related to welder health breathing issues. They are also claiming 40 -50 pneumonia case fatalities.

Japan

Ministry of HS&E the PAPR is strongly recommended for use in all welding work. This is being promoted by the ministry officials at every opportunity. They have created a brochure which is now being distributed.

Heat noise and vibration program being promoted to look at welding work place issues.

Sweden

Sweden is going fully to web based HSE documents. The material is not only for regulatory but also for teachers. They have begun a program on the Temporary Workplace, devising rules and regulations for work specifically in maintenance environments. In a review of welder in accident incident illness statistics, welding fume related issues are of lower priority, the greatest issue they have found is ergonomics. Over 50% of their accidents are from hand held tools. A near fatal incident occurred when 4 welders contracted pneumonia with same symptoms on the same job. IIW C VIII requested that they do some follow up to understand the illness trigger.

Netherlands

2 projects: Welding fume considering controlled reduction in exposures and to what extent the controls work.

Standard 3140 is the Netherlands annual inspection and calibration of welding equipment and they are doing a comparison with IEC standards 60974-14 (Validation of Arc Welding Equipment) And possibly the other IEC standards which might be appropriate.

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**The Results and Experience of the CVIII pre-assembly Conference
“Beijing Forum on Green Material Processing and Circular Economy”**

Speakers on this event: Geoff Melton, UK; Nicolas Floros, France; David Hisey, Canada; Dr. Mark Ou - China

Purpose of Conference:

There were many presentations made at the Beijing International Forum on Green Material and Processing Technology for Circular Economy (IFMP Beijing 2017), which were aimed at a reduction in energy, reduction or elimination of harmful substances, and in the re-use or re-manufacture of materials, including low energy re-production of scrap using friction stir methodology. The forum was sponsored by the Beijing Natural Science Foundation and hosted by the Beijing University of Technology (BJUT), which is also International Institute of Welding (IIW) C-VIII Pre-Assembly Seminar jointly organized by IIW Committee VIII-Health, Safety and Environment. The forum contained four themes, i.e. New green welding materials, Health and safety in welding and allied processes, Advanced welding technology, and Advanced remanufacturing technology. A detailed report on this conference is contained as a separate document.

Best Practice Paper: List of International and National Standards on Health and Safety in Welding - Update Doc VIII-2079r3/r3: *Mathias Lundin*

Mathias led the discussion on the work that he has done for many years on behalf of this committee to maintain an active list of the standards of all countries represented. This document is available on line. There was discussion on whether it would be valuable for Mathias to add a matrix with the list of all countries which have adopted an IEC or ISO standard; currently we only list the original standards and do not include the deviations which countries sometimes create when an international standard is adopted.

Coffee Break

Best Practice Paper on Carbon Monoxide: Concentrations of CO in Welders Breathing Zone and in workshops performing CO₂ Arc Welding Doc VIII-2245-17: *Norihiko Kohyama*

Gas metal arc welding using CO₂ shielding (CO₂ arc welding) is popularly performed in Japan, and the

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welders encounter the risk of carbon monoxide (CO) exposure. The welders' exposure level may differ in each welding site and welding attitude. It is important to recognize the welder's actual exposure for prevention of CO poisoning.

Methods: The concentrations of CO were monitored using controlled potential electrolysis sensors and passive dosimeter-tubes at manufactures of shipbuilding, construction steel frame and bridge where are performing CO₂ arc welding using 100% CO₂. The instantaneous concentrations of CO in the welders' breathing zones and fixed-points in the workshops (background) were recorded in the sensors and displayed by conventional recording methods and by 15 minutes moving averages. In addition, the effect of lowering CO exposure was examined by wearing a Powered Air Purifying Respirator (PAPR), and a CO alarm unit was checked for the proper use.

Results: The instantaneous concentrations of CO at 6 fixed-points in a workshop were ranging from 0.5 to 4 ppm during welding and about 0.2 ppm during not welding, but those in the welder's breathing zone were ranging from 100 to over 1000 ppm during welding. The 15 minutes moving averages ranged from 30 to 140 ppm. In a confined space, the instantaneous concentrations of CO at 6 fixed-points in the workshop were in about 10-120 ppm, which were much higher than those of an ordinary workshop (0.5 - 4 ppm). The CO concentrations by 15 minutes moving averages in the welder's breathing zone in the confined space were like those of the ordinary workshop, which suggests that the CO concentrations in welder's breathing zone are not so affected by the magnitude of welding space but sensitive to the welding attitude of welder. A similar flow of CO to welding fume was observed and the use of a PAPR was effective to decrease the CO exposure when the inlet of the PAPR was set on the welder's back.

Conclusion: The concentrations of CO in welders' breathing zones are quite high compared to those of the workshop (background). The preventive measures to CO exposure are necessary for the welders. A PAPR being used for dust control has a limitation to trap CO, but it is generally effective to decrease the CO exposure if a welder sets the inlet to his back and takes care of the welding attitude. To make double sure, a CO alarm unit attached near the inlet fan is effective to let the welder know an elevated level of CO is being inhaled. For welding in a confined space, the use of an exhaust duct is necessary to decrease CO exposure.

Visit and Information from the Technical Manager representing the IIW Board: *Dr. Nadège Brun.*

There will be a new website installed and in use by the end of the year. SharePoint will be installed and in use by year end. IIW is attempting to continue to update and modernize the website.

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Welding Fume Main Compounds (State of Publication Process in Welding in the World
Doc VIII-2056-17: Nicolas Floros, with input from all.

This document has been submitted for publication in Welding in the World. Nicolas reviewed with the committee, the comments which were returned by the reviewers. John Petkovsek and Steve Hedrick will work with Nicolas to correct the reported language deficiencies.

Tuesday, 27th of June 2017 14:00 – 18:00

Commission VIII IIW Website

Status of documents; unrestricted access to Best Practice Papers: *Steve Hedrick*

Steve has made a list of Best Practices Documents. It was very close to being finalized in Hannover. Wolfgang Zschiesche reviewed it and made some minor changes. It is ready for implementation; however, Luca Costa is required to clear the permissions from IIW central office.

Electric shock in welders: Further investigations and research in Canada: *Dave Hisey*

In Canada, we have been interested in understanding the risk of electric shock in manual metal arc welding. From previous work we have done, much of electric shock from the welding machine current occurs at no load voltage when the welder is changing electrodes. Our concern is the voltage level we allow by code to be present under no load conditions. It is this voltage which causes serious electric shock and therefore electrode shock fatalities, it occurs when changing electrodes, or the welder is re-positioning with the electrode in place.

Wolfgang suggested we start by asking the question “What does your country do to prevent welder electrode shock in stick welding? So far Sweden has been the only country to respond. They did not find welder electrode deaths; however, they did find injuries and lost time illness that needed follow-up.

I have captured data on 2 welder electrode shock incidents which occurred in Canada, one died, one lived. This report explores these 2 scenarios.

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Coffee Break

Hazardous Substances in Welding and Allied Processes

Finalization of Wording for Publication as an IIW Booklet

Doc VIII-2188-17: *Luca Costa, Dave Werba, John Petkovsek, Dave Hisey*

Dave Werba had submitted comments on the re-written preface which Wolfgang had recently submitted. The issues left are to add the references which are listed at the end into the document which will be completed by Vilia Spiegel-Ciobanu. The document will be circulated for one additional review by Commission VIII members.

Terminology regarding Health and Safety in Welding Activities of Commission VI for ISO; cooperation with Commission VIII Current State of the ISO document: *Steve Hedrick*

Steve reviewed the status of this item. There are many documents which need to be updated. There may be some copyright issues which need to be understood.

Excess risk of bacterial pneumonia in welders: recommendations for vaccination: *Dr. Wolfgang Zschiesche via Skype*

The occurrence of pneumonia in welders is on the decrease, including in countries such as China which are still in the infancy of dealing with proper health and safety issues in welding. However, it is still an illness which occurs and in one case reported by Sweden in this meeting, occurred in 4 welders on one specific job, so it deserves to some attention, although how much is debated amongst health specialists. This report had a recommendation.

Recommendation: Vaccination against pneumococcus with the PPSV 23 vaccine with a minimum gap between repetition of 6 years for persons with occupational activities like welding and cutting of metals which result in an exposure to metal fumes including metal-oxidic welding fumes.

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Section “Environment” within Commission VIII Potential future activities

There were many presentations made at the Beijing International Forum on Green Material and Processing Technology for Circular Economy (IFMP Beijing 2017), which were aimed at a reduction in energy, reduction or elimination of harmful substances, and in the re-use or re-manufacture of materials, including low energy re-production of scrap using friction stir methodology. Dave Hisey will assemble a report from this conference and supply for posting on line. From the members present in Beijing, it was thought that most of these topics were much beyond the scope of this committee, yet there are many points which can be taken and promoted from within those presentations by this committee. How we are to do that as a committee is what needs to be discussed and decided on. This will be a topic for our next Commission VIII meeting.

Russian World Skills: Carl Peters, Director of Training, Lincoln Electric

Carl is with the Youth Skills Training organization and this year they will be holding the World Skills program in Russia. The issue Carl has is that the level of safety used at each venue is that administered by the country or the locale where the program is being held. Carl provided a picture of the welding booth that is to be used in Russia. Carl was seeking C VIII input to ensure that proper eye protection, breathing protection (use of PAPR's), ventilation and hot work.

Wednesday, 28th of June 2017 Joint Meeting with C II 14:00 – 18:00

The Results of the IARC evaluation 2017 on the Carcinogenicity of Welding Fumes (IARC Group1) and UV radiation from welding (IARC Group 1) Consequences for the welding world: Wolfgang Zschiesche via Skype

A large variety of studies and presentations were provided. Welding fume are cancerogenic there was discussion on the relationship between smoking and welding, long term vs short term. Wolfgang spent 8 days at this symposium held at Lyon, France.

Exert from: TLO_May17_News_IARC DOI: S1470-2045(17)30255-3

In March 2017, 17 scientists from ten countries met at the International Agency for Research on Cancer (IARC; Lyon, France) to evaluate the carcinogenicity of welding, molybdenum trioxide, and indium tin

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oxide. These assessments will be published in volume 118 of the IARC Monographs.¹ Worldwide, an estimated 11 million workers have a job title of welder, and around 110 million additional workers probably incur welding related exposures. Welding can involve exposures to fumes, gases, radiation (ultraviolet [UV] radiation and electromagnetic fields) and co-exposures to asbestos and solvents. Welding involves several processes (e.g., oxyfuel [gas], arc, and resistance welding) and materials (e.g., mild and stainless steel). Exposure determinants include the process, material welded, ventilation, degree of enclosure, and use of personal protection.

Assessment of the amount of surface layers on wires: Gerhard Posch

All welding wire has a coating layer for the purposes of preventing corrosion (if this is copper free) and a lubricant to ensure the wire will run through the feed and tube mechanisms. This information is considered proprietary by all welding wire manufacturers. Gerhard was proposing a methodology to estimate the amount of lubricant or corrosion resistance material which is on the wire. It was suggested that they wash a prescribed amount of wire and measure the fume outcome and compare that fume outcome to the same specific amount of unwashed wire. While components may change in the process, the test will supply the amount of contaminant present. Nicolas Floras suggested that he could do the testing at the Aire Liquide lab in France.

Electromagnetic field exposure assessment of EMF from AC Tig and CD Stud Welding in accordance with the EMF Directive 2013/35/EU: Ruben Oten

The UK has applied and been granted an exclusion from application of the EU directive based on testing which was completed for AC tig welding and for stud welding. The reason the UK applied was that they could not meet the requirements for these processes. The presentation demonstrated that through the Finite Element Method modelling it was proved that although the limits were exceeded, the harm level was likely low.

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Factors that Influence Welding Fume and Gas Emissions in Gas Metal Arc Welding, Nicolas Floros, Air Liquide-Paris Saclay Research center, Nicolas made a presentation of the document he presented in Beijing

During welding, fumes and gas are generated, predominantly by the welding consumable and to a lesser extent by the base metal. The amount of fumes and gases greatly depends on the welding process. Even for a same welding process, fume and gases emissions are influenced by several factors. These emissions can be minimized by adjusting welding parameters and selecting appropriate shielding gas.

In this work, we have studied the influence of shielding gas composition and arc transfer mode in Gas Metal Arc Welding (GMAW).

Four 1.2mm solid wires have been selected: 2 aluminum wires (G2 Si70S-3, SAI 4043/S Al 5754), one low alloyed steel wire (G2 Si70S-3) and one stainless steel wire (G19 9 L Si/308LSi). Wires have been tested in a fume box where fume and gas emissions rates generated have been monitored. For each alloy, several suitable shielding gases have been selected and tested in different arc transfer modes. For each configuration, Fume Emission Rate (FER) as well as NO_x, CO, and O₃ emissions rates have been measured on a laboratory test bench.

Wrap up and closing of the meeting

Next Intermediate meeting: Poland, date and place to be determined later???

Discussion on what projects should be undertaken by Commission VIII

C VIII is suffering a decline in attendance, we need to go on a recruiting spree. Everyone should contact whomever they think might be able to attend in Bali.

David Hisey and Wolfgang Zschiesche will attempt to get a delegate from China.

Meeting was adjourned at 17:00 hrs.