

## WTIA Guidance Note – an Expert Technology Tool

### ENVIRONMENT HAZARDS, IMPACT AND CONTROL IN FABRICATION OF WELDED PRODUCTS

FABRICATION ACTIVITY	ENVIRONMENTAL HAZARDS (NOTE 1)	ENVIRONMENTAL IMPACT	RECOMMENDED CONTROL (NOTE 2)
<b>Management</b>			
Overall Energy, Use (electricity, fuels, transport)	<ul style="list-style-type: none"> <li>Emission of Greenhouse Gas (direct or indirect)</li> </ul>	<ul style="list-style-type: none"> <li>Atmosphere and pollution –heating reduce O<sub>3</sub> layer</li> </ul>	<ul style="list-style-type: none"> <li>Reduce Energy consumption/output</li> </ul>
Overall Waste/Scrap	<ul style="list-style-type: none"> <li>As above + production of waste</li> </ul>	<ul style="list-style-type: none"> <li>As above + ground pollution</li> </ul>	<ul style="list-style-type: none"> <li>Reduce energy consumption/output</li> </ul>
<b>Material handling and preparation</b>			
Handling of various products	<ul style="list-style-type: none"> <li>Spilling of oils, laboratory reagents, solvents, scrap, etc.</li> </ul>	<ul style="list-style-type: none"> <li>Ground pollution with various organic and inorganic products</li> </ul>	<ul style="list-style-type: none"> <li>Reduce spills and improve containment</li> </ul>
Heat treatments	<ul style="list-style-type: none"> <li>Emission of combustion products</li> <li>Release of cooling liquids</li> </ul>	<ul style="list-style-type: none"> <li>Atmospheric pollution with gas, volatiles and particulate substances</li> <li>Ground pollution with liquids and particulate substances</li> </ul>	<ul style="list-style-type: none"> <li>Improve thermal efficiency of heat treatment</li> <li>Capture hazardous particles</li> <li>Release liquids to treatment system and then to removal</li> </ul>
Sand/ Grit blasting	<ul style="list-style-type: none"> <li>Discharging of sands</li> <li>Emission of fine particulates</li> <li>Emission of noise</li> </ul>	<ul style="list-style-type: none"> <li>Ground pollution</li> <li>Atmospheric pollution</li> <li>Acoustic pollution</li> </ul>	<ul style="list-style-type: none"> <li>Reduce contamination and control disposal</li> <li>Dust collection and disposal</li> <li>Reduce by shielding, insulation etc</li> </ul>
Thermal/Plasma Cutting	<ul style="list-style-type: none"> <li>Emission of cutting fumes</li> <li>Emission of radiant energy (light, heat)</li> </ul>	<ul style="list-style-type: none"> <li>Atmospheric pollution with metallic oxides</li> <li>Radiation pollution</li> </ul>	<ul style="list-style-type: none"> <li>Filter pollutants</li> <li>Reduce by shielding</li> </ul>

Underwater Cutting	<ul style="list-style-type: none"> <li>• Production of cutting slag</li> <li>• Emission of radiant energy (light, heat)</li> <li>• Release of cutting fluids</li> </ul>	<ul style="list-style-type: none"> <li>• Ground pollution</li> <li>• Surrounding pollution</li> <li>• Ground pollution</li> </ul>	<ul style="list-style-type: none"> <li>• Reduce contamination and control disposal</li> <li>• Reduce contamination and control disposal</li> <li>• Drain to treatment system &amp; then to removal</li> </ul>
Edge preparation	<ul style="list-style-type: none"> <li>• Spilling of cooling waters and machining oils</li> <li>• Emission of noise</li> <li>• Production of exhausted oils and metallic residual products (shavings, chips, scraps, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>• Ground pollution with oils</li> <li>• Acoustic pollution</li> <li>• Ground pollution with oils and metals</li> </ul>	<ul style="list-style-type: none"> <li>• Drain to treatment system and then to removal</li> <li>• Reduce by shielding and insulation</li> <li>• Drain to safe catchment and removal</li> </ul>
Calendering/ Pressing	<ul style="list-style-type: none"> <li>• Emission of noise</li> </ul>	<ul style="list-style-type: none"> <li>• Acoustic pollution</li> </ul>	<ul style="list-style-type: none"> <li>• Reduce by shielding</li> </ul>

### Welding & Allied Processes

Welding	<ul style="list-style-type: none"> <li>• Emission of welding fumes and gases</li> <li>• Emission of radiant energy (light, heat)</li> <li>• Production of slag and residuals of welding material</li> </ul>	<ul style="list-style-type: none"> <li>• Atmospheric pollution with metals, vapours, gases and particulate substances</li> <li>• Radiation pollution</li> <li>• Ground pollution with metals and their compounds</li> </ul>	<ul style="list-style-type: none"> <li>• Filter and absorb pollutants and dispose of substrate</li> <li>• Filter pollutants</li> <li>• Filter pollutants and control disposal</li> </ul>
Soldering	<ul style="list-style-type: none"> <li>• Emission of hydrogen bromide, lead oxide, hydrogen chloride, formaldehyde, hydrazine, inorganic tin compounds, washing liquids</li> </ul>	<ul style="list-style-type: none"> <li>• Atmospheric pollution with metals, vapours, gases and particulate substance</li> <li>• Ground pollution</li> </ul>	<ul style="list-style-type: none"> <li>• Filter and absorb pollutants and dispose of substrate</li> <li>• Reduce contamination and control disposal</li> </ul>
Brazing	<ul style="list-style-type: none"> <li>• Emission of boron oxide, boron trifluoride, cadmium oxide, fluorides, copper oxide, phosphorus pentoxide, silver oxide, zinc oxide</li> </ul>	<ul style="list-style-type: none"> <li>• Atmospheric pollution with metals, vapours, gases and particulate substances</li> </ul>	<ul style="list-style-type: none"> <li>• Filter and absorb pollutants and dispose of substrate</li> <li>• Reduce contamination and control disposal</li> </ul>
Flame Spraying	<ul style="list-style-type: none"> <li>• Emission of metallic oxides, based on the composition of the powder used</li> <li>• Emission of NOx</li> </ul>	<ul style="list-style-type: none"> <li>• Atmospheric pollution with metals, vapours, gases and particulate substances</li> </ul>	<ul style="list-style-type: none"> <li>• Filter and absorb pollutants and dispose of substrate</li> </ul>

Arc Spraying	<ul style="list-style-type: none"> <li>Emission of metallic oxides, based on the composition of the powder used</li> </ul>	<ul style="list-style-type: none"> <li>Atmospheric pollution with metals, vapours, gases and particulate substances</li> </ul>	<ul style="list-style-type: none"> <li>Filter and absorb pollutants and dispose of substrate</li> </ul>
Plasma Spraying	<ul style="list-style-type: none"> <li>Emission of metallic oxides, based on the composition of the powder used</li> </ul>	<ul style="list-style-type: none"> <li>Atmospheric pollution with metals, vapours, gases and particulate substances</li> </ul>	<ul style="list-style-type: none"> <li>Filter and absorb pollutants and dispose of substrate</li> </ul>
Plasma Spraying of chromium-nickel powders	<ul style="list-style-type: none"> <li>As above, plus emission of nickel oxide and ozone</li> </ul>	<ul style="list-style-type: none"> <li>Atmospheric pollution with metals, vapours, gases and particulate substances</li> </ul>	<ul style="list-style-type: none"> <li>Filter and absorb pollutants and dispose of substrate</li> </ul>
<b>Testing</b>			
Chemical and physical tests	<ul style="list-style-type: none"> <li>Emission of gases and vapours</li> <li>Production of analysis residual</li> </ul>	<ul style="list-style-type: none"> <li>Atmospheric pollution</li> <li>Ground pollution</li> </ul>	<ul style="list-style-type: none"> <li>Filter and absorb pollutants and dispose of substrate</li> <li>Improve containment and eliminate spills</li> </ul>
Radiographic test	<ul style="list-style-type: none"> <li>Emission of radiant energy</li> <li>Release of film developing, fixing and washing liquids</li> </ul>	<ul style="list-style-type: none"> <li>x and <math>\gamma</math> radiation pollution</li> <li>Ground pollution with liquids containing acids, salts, etc.</li> </ul>	<ul style="list-style-type: none"> <li>Reduce by shielding and distance</li> <li>Improve containment and eliminate spills</li> </ul>
Magnetic particle test	<ul style="list-style-type: none"> <li>Production of liquids and powders</li> </ul>	<ul style="list-style-type: none"> <li>Ground pollution with organic liquids and metallic particulate substances</li> </ul>	<ul style="list-style-type: none"> <li>Improve containment and eliminate spills</li> </ul>
Penetrant test	<ul style="list-style-type: none"> <li>Release out of liquids and particulate (pigments, talc, etc) substances</li> </ul>	<ul style="list-style-type: none"> <li>Ground pollution with organic and non organic liquids and particulate substances</li> </ul>	<ul style="list-style-type: none"> <li>Improve containment and eliminate spills</li> </ul>
Hydrostatic test	<ul style="list-style-type: none"> <li>Release out of liquids</li> </ul>	<ul style="list-style-type: none"> <li>Ground pollution with oils, oxides etc.</li> </ul>	<ul style="list-style-type: none"> <li>Improve containment and eliminate spills</li> </ul>

<b>Final treatments</b>			
Pickling	<ul style="list-style-type: none"> <li>Emission of acid and basic liquids and vapours</li> </ul>	<ul style="list-style-type: none"> <li>Ground and air pollution</li> </ul>	<ul style="list-style-type: none"> <li>Improve containment and eliminate spills</li> </ul>
Heat treatments	<ul style="list-style-type: none"> <li>Emission of combustion products</li> </ul>	<ul style="list-style-type: none"> <li>Atmospheric pollution with gas, combustion products and particulate substances</li> </ul>	<ul style="list-style-type: none"> <li>Improve thermal efficiency of heat treatment</li> <li>Capture hazardous particles</li> </ul>
Sand/ Grit blasting	<ul style="list-style-type: none"> <li>Discharging of sands</li> <li>Emission of noise</li> </ul>	<ul style="list-style-type: none"> <li>Ground pollution</li> <li>Acoustic pollution</li> </ul>	<ul style="list-style-type: none"> <li>Reduce contamination and control disposal</li> <li>Reduce by shielding, insulation etc</li> </ul>
Painting	<ul style="list-style-type: none"> <li>Release of solvents with or without pigments</li> </ul>	<ul style="list-style-type: none"> <li>Ground and air pollution</li> </ul>	<ul style="list-style-type: none"> <li>Improve containment and eliminate spills</li> </ul>
Machining	<ul style="list-style-type: none"> <li>Spilling of cooling waters and machining oils</li> <li>Emission of noise</li> </ul>	<ul style="list-style-type: none"> <li>Ground pollution</li> <li>Acoustic pollution</li> </ul>	<ul style="list-style-type: none"> <li>Reduce contamination and control disposal</li> <li>Reduce by shielding, insulation etc</li> </ul>

*Note: Other possible impacts, when significant, could be taken into consideration (i.e. reduction of electric energy sources, pollution caused by accidents, fires, failures of containers etc).*

*Note 1: Also has OHS Impact*

*Note 2: Controls will vary depending on impact level and location. Special protection is needed for staff.*

## **USE OF THIS GUIDANCE NOTE EXPERT TECHNOLOGY TOOL**

The Note summarises as a table the environmental hazards encountered in the fabrication of welded products, their potential impact and recommended control measures.

The aim of the Note is to promote environmental awareness and to assist in the identification of environmental hazards as required for the preparation of occupational health and safety and environmental management systems.

These pages could be made available to workshop staff as a laminated wall chart or handout.

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2. WTIA Technical Panel 9

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