

# Impact of emissions from soldering processes on occupational workers' health



The LEADOUT Project is not just about LEAD and assembly problems, remember that the main objective of WEEE and RoHS is the environment. Is there a benefit or not from all these effort? This month we again take a look at the LEADOUT project.

Different industries have for several years been subject to increasing legislative requirements towards the development of 'Cleaning Technologies'. This is the situation of electric and electronic industries and the imperative implementation of lead-free soldering processes. This change has been caused by the European Directive 2002/95/EC RoHS. According to it, the use of lead, mercury, hexavalent chromium, cadmium and others will be banned from July 2006.

Although the main objective of the LEADOUT project is to provide technical support to the European electric and electronic SMEs during the removal and change of lead from the tin/lead solder used to join electronic

components to the PCB, the principal reasons of this project should be taken into account:

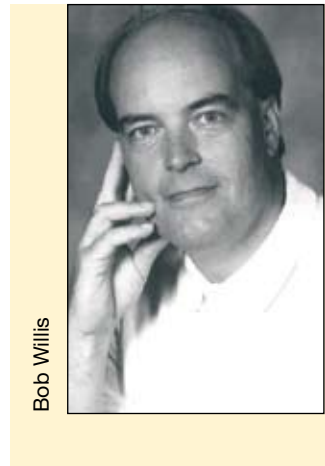
- The importance of the potential environmental impact (the lead waste from the manufacturing process and the disposal of lead containing electronic equipments at the end-of-life could contaminate the landfills and subsequently, the Environment) and,
- The relevance of the social issues (it is mandatory the maintenance and preservation of the involved soldering process worker's health)

Removal of this source of contamination will have, therefore, a considerable positive impact in terms of quality of the working conditions and, also, in the environment as a whole. Effectively, the threat to human health by lead accumulation in the body due to the occupational exposure is becoming a greater concern. The continuous inhalation of gases containing lead over limits causes chronic

intoxication affecting mainly the central neuronal and peripheral neuronal systems. Also anaemia and renal and cardiovascular problems can be produced.

Although the use of lead in the electronic industry seems to be minimal, the contamination potential for lead exposure during soldering processes through the inhalation of lead vapours is the reason to perform generated emissions measurements. The aim is, therefore, to determine the emissions of hazardous substances susceptible of being inhaled by the workers at the assembling companies that use tin-lead alloys and, after this, to make a comparison to the emissions from the industries that use lead-free solders.

With this aim and within the framework of the LEADOUT project, several measurements of the chemical agent emissions generated during the soldering process have been performed. Also, a further analysis and evaluation of its potential hazardous characteristics for the workers' health have been made. As has been mentioned, measurements at different companies participating in the LEADOUT project have been carried out.



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These enterprises used, until now, tin-lead based pastes and solders. Once lead free processes (mainly wave and *Continued on page 7.*



Figure 1. Close-up of the air monitoring/sampling device used by production staff.



Figure 2. Operator working on a wave soldering system during the monitoring process.

Table 1.

Package type	Process	Type of Flux	Isopropyl Alcohol (mg/m³)		Formaldehyde (mg/m³)		Methanol (mg/m³)		Pb (mg/m³N)	
			Measured value	Limit values (TWA)	Measured value	Limit values (TLV-C)	Measured value	Limit values (TWA)	Measured value	Limit values (TWA)
Assembler 1	Wave	Organic Flux	2.3	983	<0.3	0.12	< 3.0	266	<0.01	0.1
Assembler 2	Wave	Organic Flux	< 1.0	983	<0.3	0.12	< 3.0	266	<0.01	0.1
Assembler 1	Reflow	Organic Flux	< 1.0	983	< 0.3	0.12	--	266	<0.002	0.1
Assembler 2	Reflow	Organic Flux	< 1.0	983	< 0.3	0.12	--	266	0.003	0.1