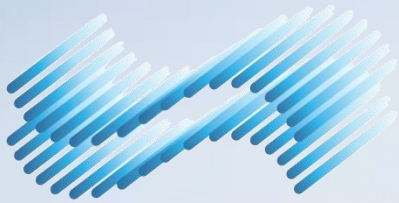

EMFWeld

Electromagnetic fields in welding

EMFWeld – Electromagnetic fields in welding
Preparing for the EU Directive 2013/35/EU

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EMFWeld

EMFWELD - Analysis of workers exposure to electromagnetic fields **(EMF)** from **weld**ing and NDT processes, guidelines for risk assessment and development of risk assessment web based application

Introduction

EMFWELD is a European Union funded research project which will develop an interactive web based software application to calculate and assess workers exposure to electromagnetic fields (EMF) in metal fabrication, particularly welding and non-destructive testing (NDT).

- EC Framework 7
- Research for SME Associations
- Start date: 1 October 2012
- Duratio: 2 years
- Total Value: 932,000 €

EMFWELD Partners

Background

Electromagnetic fields (EMF) are a form of electromagnetic radiation and are defined as non-ionising radiation having both Magnetic and Electric field components varying with time at frequencies up to 300GHz.

The European Commission Directive aims at promoting the safety and health of individuals working in environments likely to be subjected to electromagnetic fields.

Background

With the new European Commission Directive employers will have to:

- Determine the levels of exposure and assess risk to employees
- Provide mitigation measures to avoid or reduce risks where the exposure limits is exceeded
- Provide worker information and trainning regarding EMF exposure and the risk associated

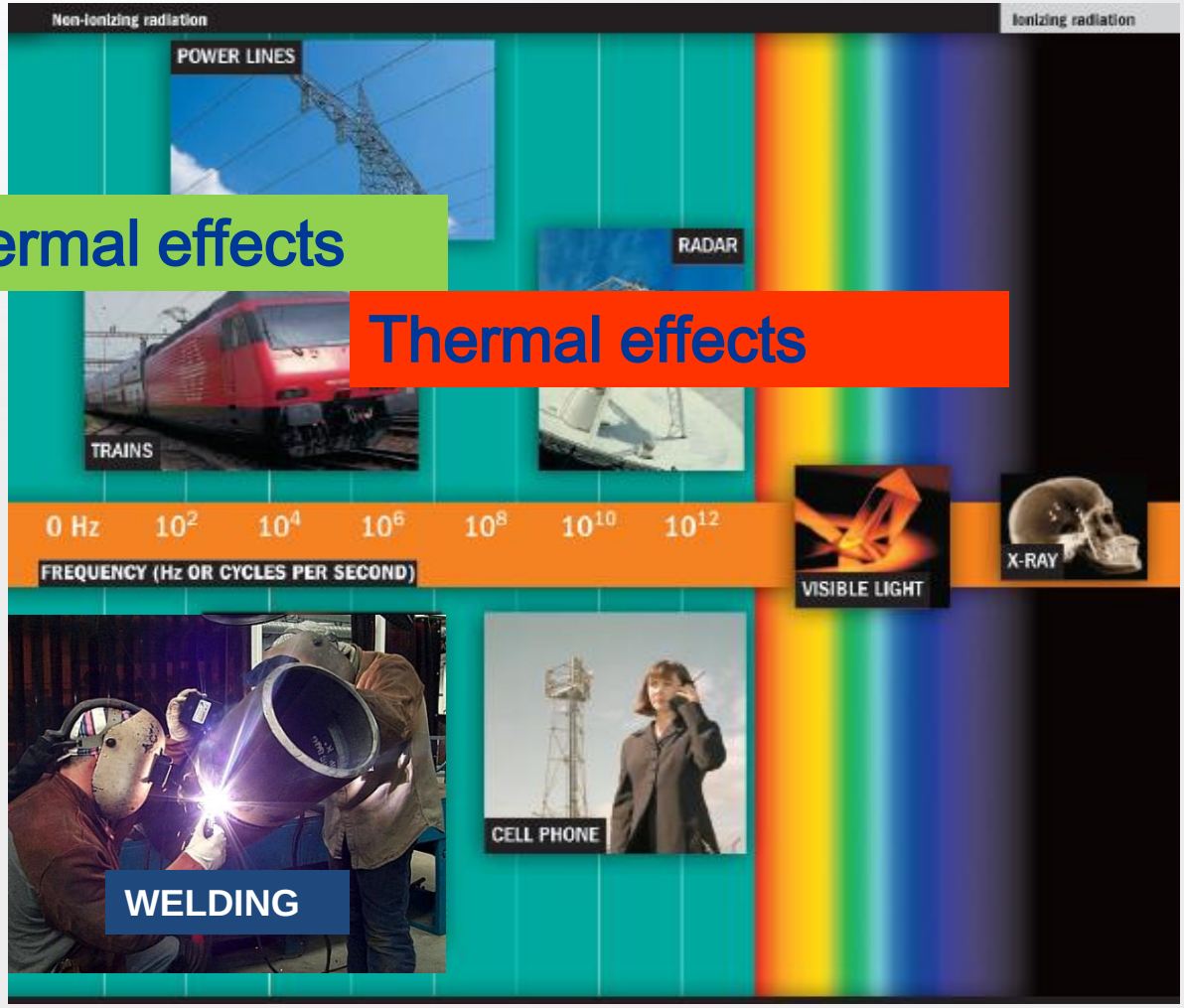
Objectives of EMFWELD

- Improve knowledge of EMF in welding and inspection
- Provide tools for the correct assessment of worker's exposure to EMF
- Reduce the cost of compliance with the EMF Directive for SMEs

EMF Health Effects

Non -Thermal effects

Thermal effects



Why Limit Exposure?

Non –Thermal effects 1Hz to 10MHz

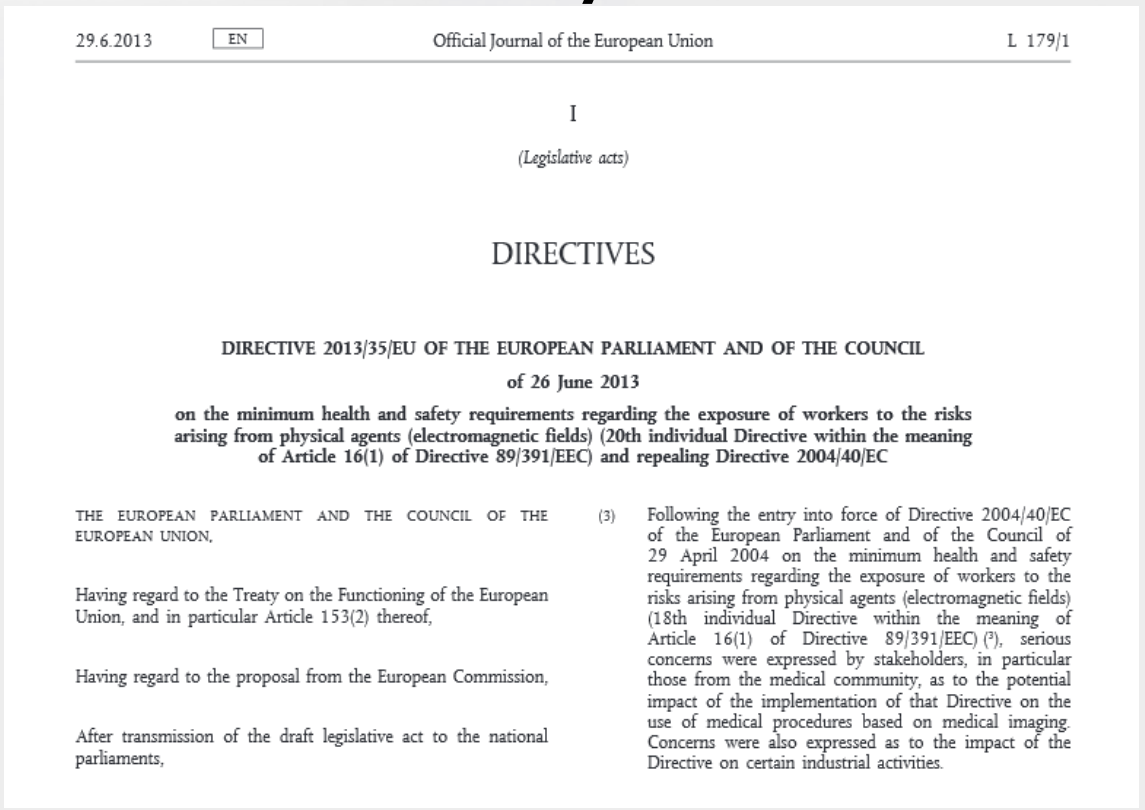
- Stimulation of Muscle, nerves and sensory organs
- Sensory Effects 1 to 400Hz
  - Vertigo
  - Retinal phosphenes
  - Metallic taste
- Interference with AIMDs (Active implanted medical devices)

EMF Directive

On June 29 2013, the new EMF directive **"Directive 2013/35/EU of the European Parliament and of the Council of 26 June 2013 on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (electromagnetic fields) (20th individual Directive within the meaning of Article 16(1) of Directive 89/391/EEC) and repealing Directive 2004/40/EC** was published by the Official Journal of the European Union

EMF Directive

The Directive is now official EU law.
Member States shall bring into force the laws, regulations and administrative provisions necessary to comply with this Directive
by 1 July 2016



29.6.2013 EN Official Journal of the European Union L 179/1

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(Legislative acts)

DIRECTIVES

DIRECTIVE 2013/35/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

of 26 June 2013

on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (electromagnetic fields) (20th individual Directive within the meaning of Article 16(1) of Directive 89/391/EEC) and repealing Directive 2004/40/EC

THE EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty on the Functioning of the European Union, and in particular Article 153(2) thereof,

Having regard to the proposal from the European Commission,

After transmission of the draft legislative act to the national parliaments,

(3) Following the entry into force of Directive 2004/40/EC of the European Parliament and of the Council of 29 April 2004 on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (electromagnetic fields) (18th individual Directive within the meaning of Article 16(1) of Directive 89/391/EEC) [3], serious concerns were expressed by stakeholders, in particular those from the medical community, as to the potential impact of the implementation of that Directive on the use of medical procedures based on medical imaging. Concerns were also expressed as to the impact of the Directive on certain industrial activities.

EMF in Welding

Some welding and non-destrucive testing processes use relatively high currents that generate significan magnetic fields around cables, work pieces and electrodes.

Arc Welding

Resistance Welding

Project Workpackages

WP number	WP Title	Work Package leader
WP 1	Review of regulatory requirements and system specification	EWF
WP 2	Process monitoring and measurement	TWI
WP 3	Modelling and simulation	CHALMERS
WP 4	Development of a software toolkit	DTU
WP 5	Testing and Validation	TWI
WP 6	Demonstration	INACEINOX
WP 7	Dissemination, Exploitation and Training	CEEMET
WP8	Project Management	EWF

Measuring the EMF in welding

Arc Welding

Spot Welding

Stud Welding

Magnetic Particle inspection

Induction Heater

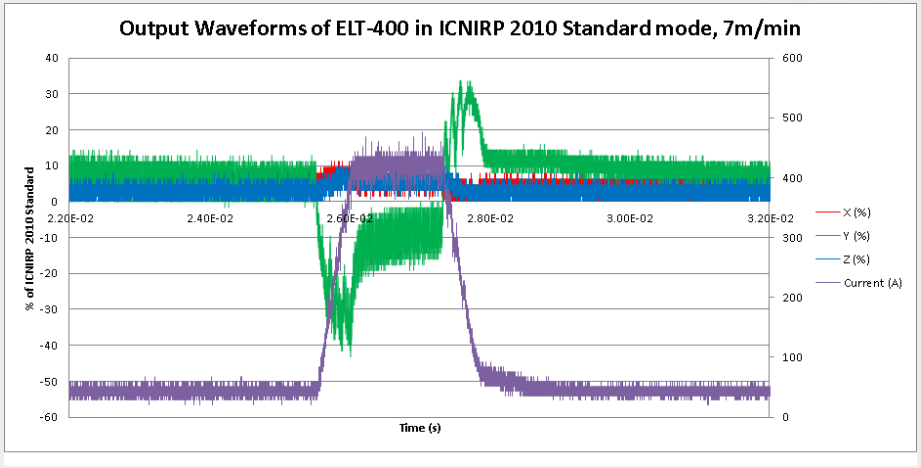
Measuring the EMF in welding

EMF Measuring of pulsed TIG welding

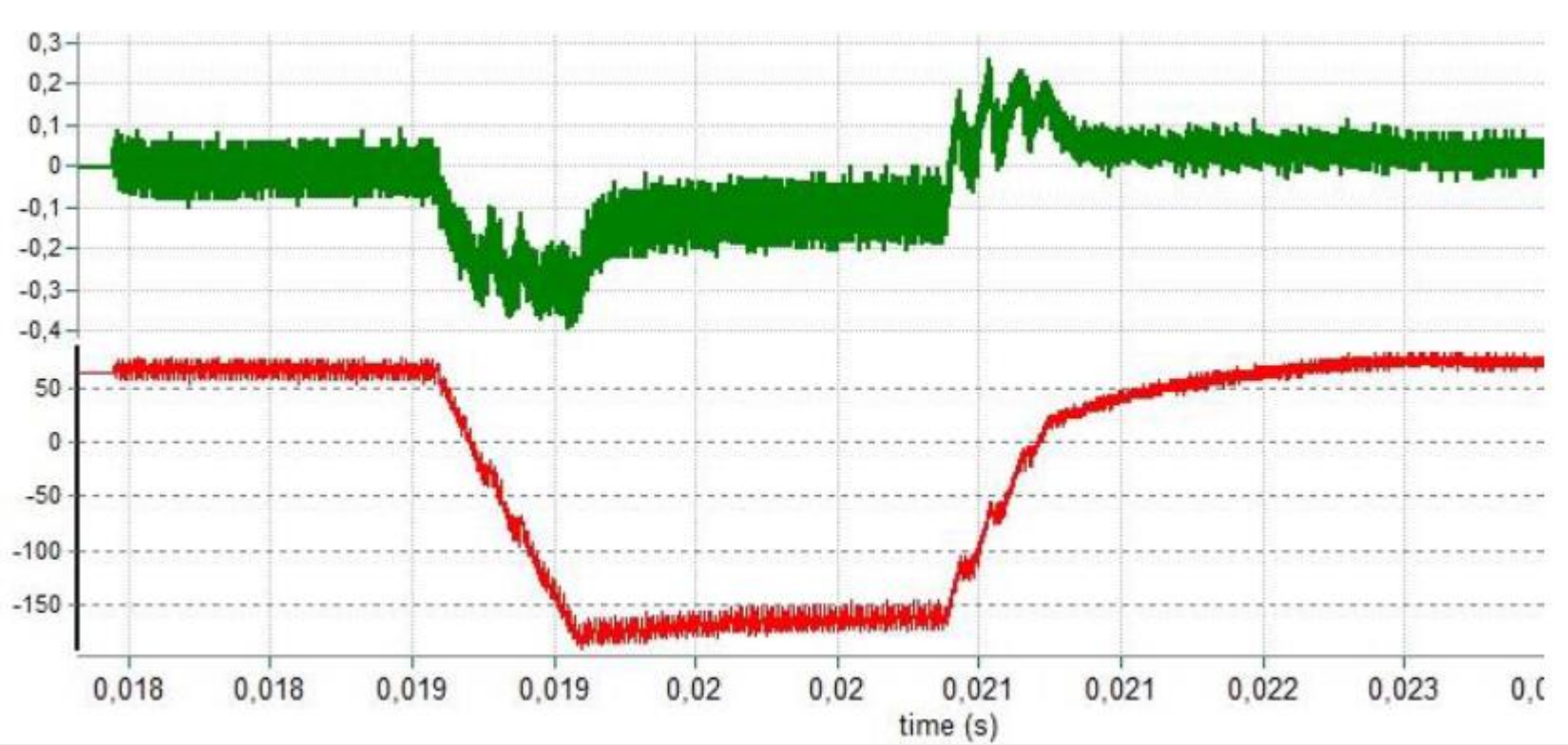
EMF Measuring of resistance welding

Measurement Setup for standardised results

- Measurements taken with ELT-400 at 20cm from a cable (or in the case of resistance, from the electrodes).
- Waveforms collected from probe analogue outputs.



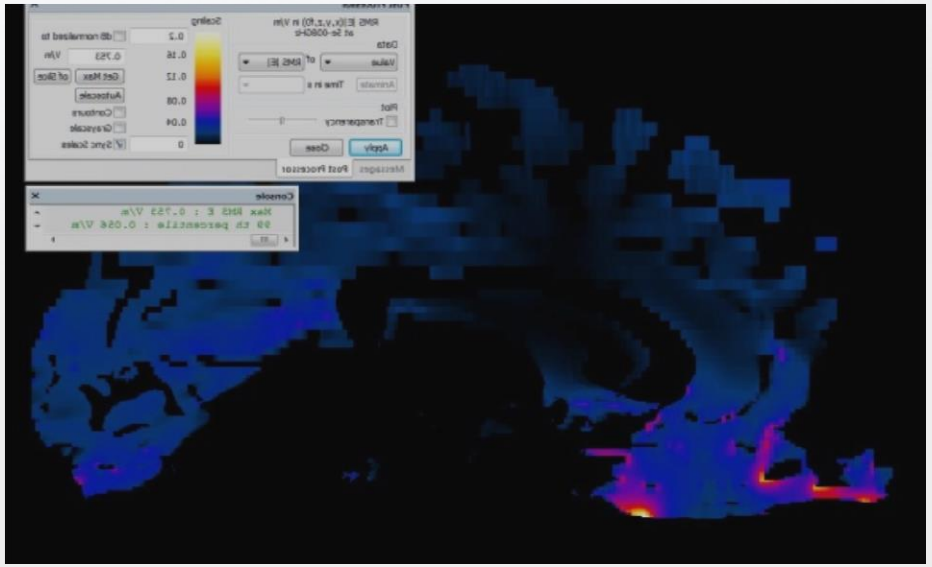
Measuring results

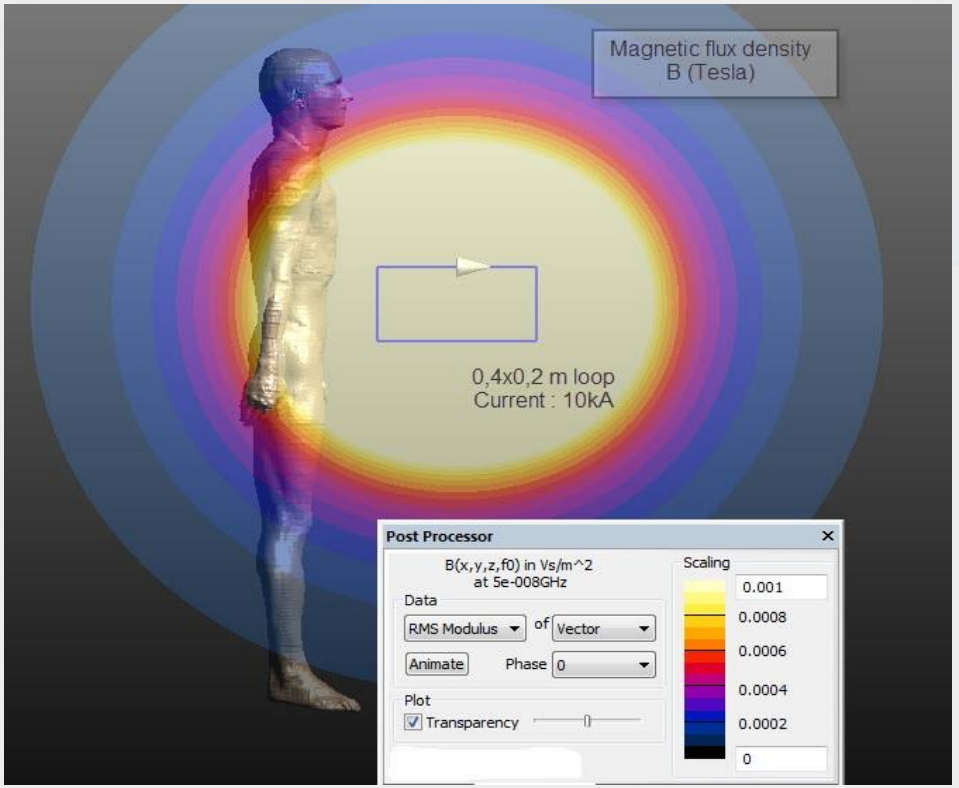


Measured magnetic field waveform (red)
Calculated weighted reference value (green)

Simulations of the magnetic fields from welding

Simulation to determine compliance with the Exposure Limit values





EMFWELD Overview

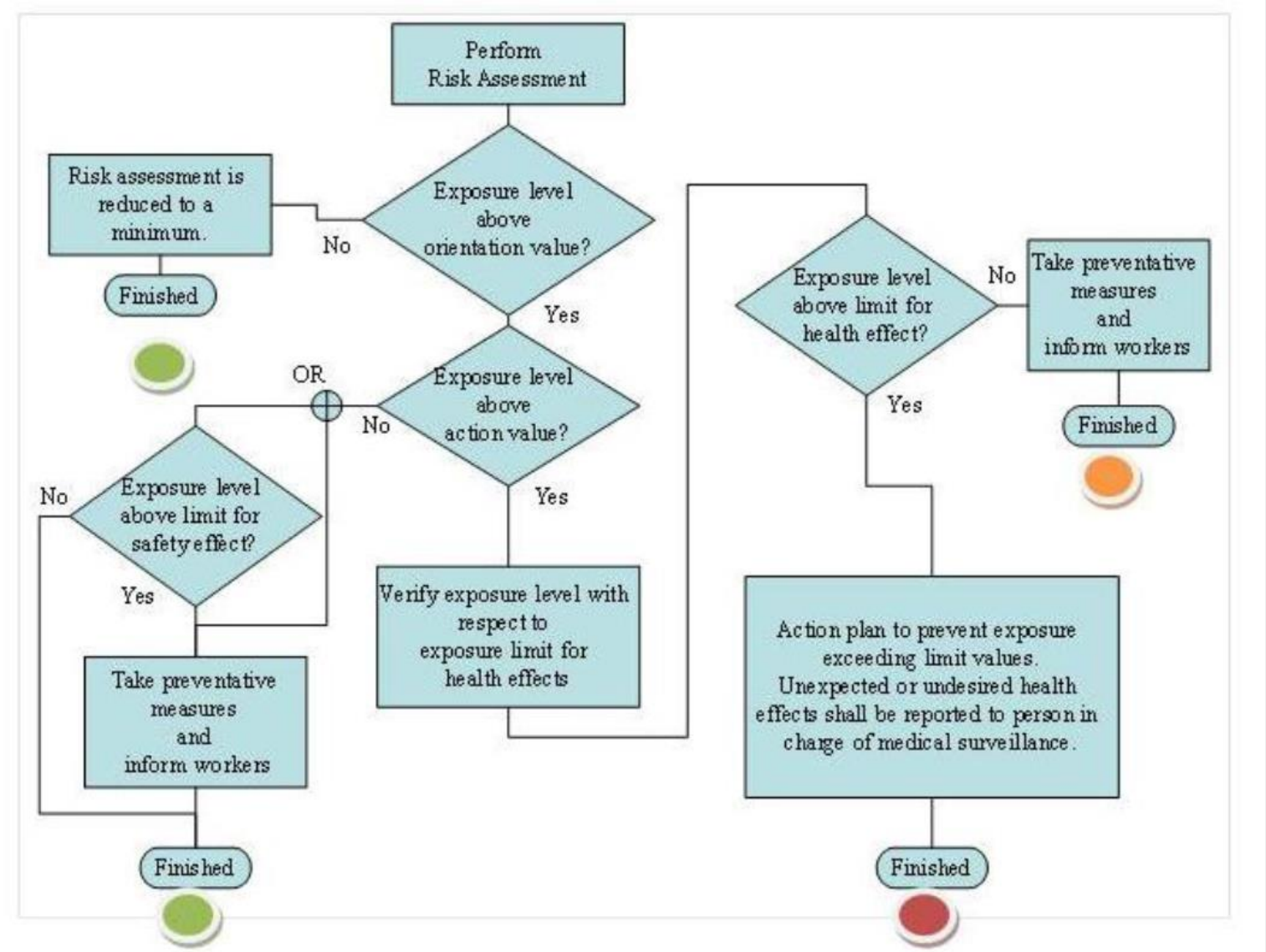
Measurement

Modelling

Software toolkit

	Green - No risk at all (i.e. exposure below the limit imposed by the directive).
	Amber - System will request additional information from user concerning equipment age, operational environmental parameters etc. Will then return either Green or Red
	Red - Level of exposure likely to be above the limit imposed by the directive. The end user will then be redirected to equipment manufacturers or other possible sources of information.

EMFWELD assessment software



Conclusions

- The main objective of the EMFWELD project, to improve the knowledge in terms of EMF in different welding and inspection processes is showing some progress with initial evaluations already carried out.
- The software that will combine this knowledge with the EC Directive requirements is being developed with the intent of supporting SMEs in the implementation of the Directive

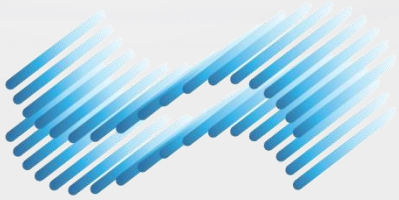
Further work

Next steps

- Finalise the measurement of the EMF for different welding and inspection processes
- Model and simulate the effect of those EMF on the user of the equipment
- Develop the software which will integrate the EMF measurement with the EC Directive
- Carry out trial/tests in industrial conditions

Aknowledgements

The EMFWELD project has received funding from the European Community's Seventh Framework Programme managed by REA-Research Executive Agency (FP7-SME-2012) under grant agreement no. 315382.



EMFWeld

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The End

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