

# 1st EU/US LEAD FREE SOLDER INTERFACE MEETING

London, 27<sup>th</sup> March 2002



## ISQ EXPERIENCE WITH LEAD FREE SOLDER(ING)

Eduardo Dias Lopes (edlopes@isq.pt)



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**INSTITUTO DE SOLDADURA E QUALIDADE**  
([WWW.isq.pt](http://WWW.isq.pt))



**ISQ – EXPERIENCE WITH LEAD FREE SOLDER**

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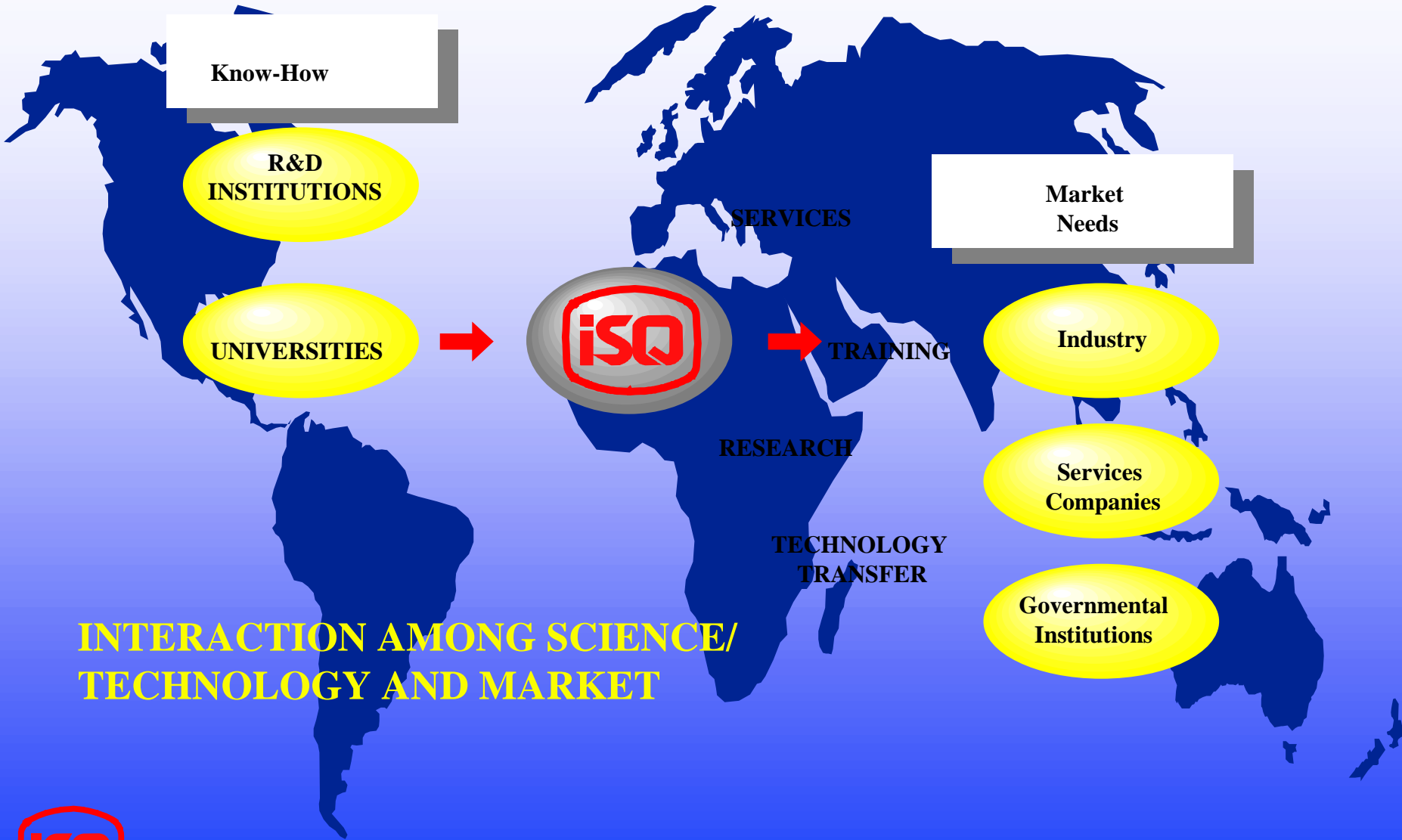
## ISQ HISTORY

- ❖ **FOUNDED IN 1965 AS WELDING INSTITUTE - Instituto de Soldadura**
- ❖ **ISQ - Instituto de Soldadura e Qualidade since 1982**
- ❖ **ISQ IS A PRIVATE, SERVICE-ORIENTED AND NON-PROFIT MAKING ASSOCIATION WITH DIVERSIFIED ACTIVITIES**



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London, 27<sup>th</sup> March 2002



**INTERACTION AMONG SCIENCE/  
TECHNOLOGY AND MARKET**



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# 1st EU/US LEAD FREE SOLDER INTERFACE MEETING

London, 27<sup>th</sup> March 2002



**ISQ's FIELDS OF EXPERTISE**

**R & D ACTIVITIES**

**TECHNOLOGY TRANSFER**

**TRAINING**

**CONSULTANCY SERVICES**



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London, 27<sup>th</sup> March 2002

## ISQ's FIELDS OF EXPERTISE

Construction Safety Inspection

Energy Studies

Environmental Impact Studies, Analysis and Management

Maintenance Inspection

Mechanical & Materials Testing

Metrology

Non Destructive Testing

Occupational Safety and Health Management



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# 1st EU/US LEAD FREE SOLDER INTERFACE MEETING

London, 27<sup>th</sup> March 2002

## ISQ's FIELDS OF EXPERTISE

**Product Safety (Electrical Testing, etc.)**

**Production and Joining Technologies**

**Project Review - Projects Supervision**

**Quality Management**

**Research & Development**

**Risk Analysis - Risk Based Inspection**

**Structural Integrity Assessment**

**Technical Inspections**

**Training**

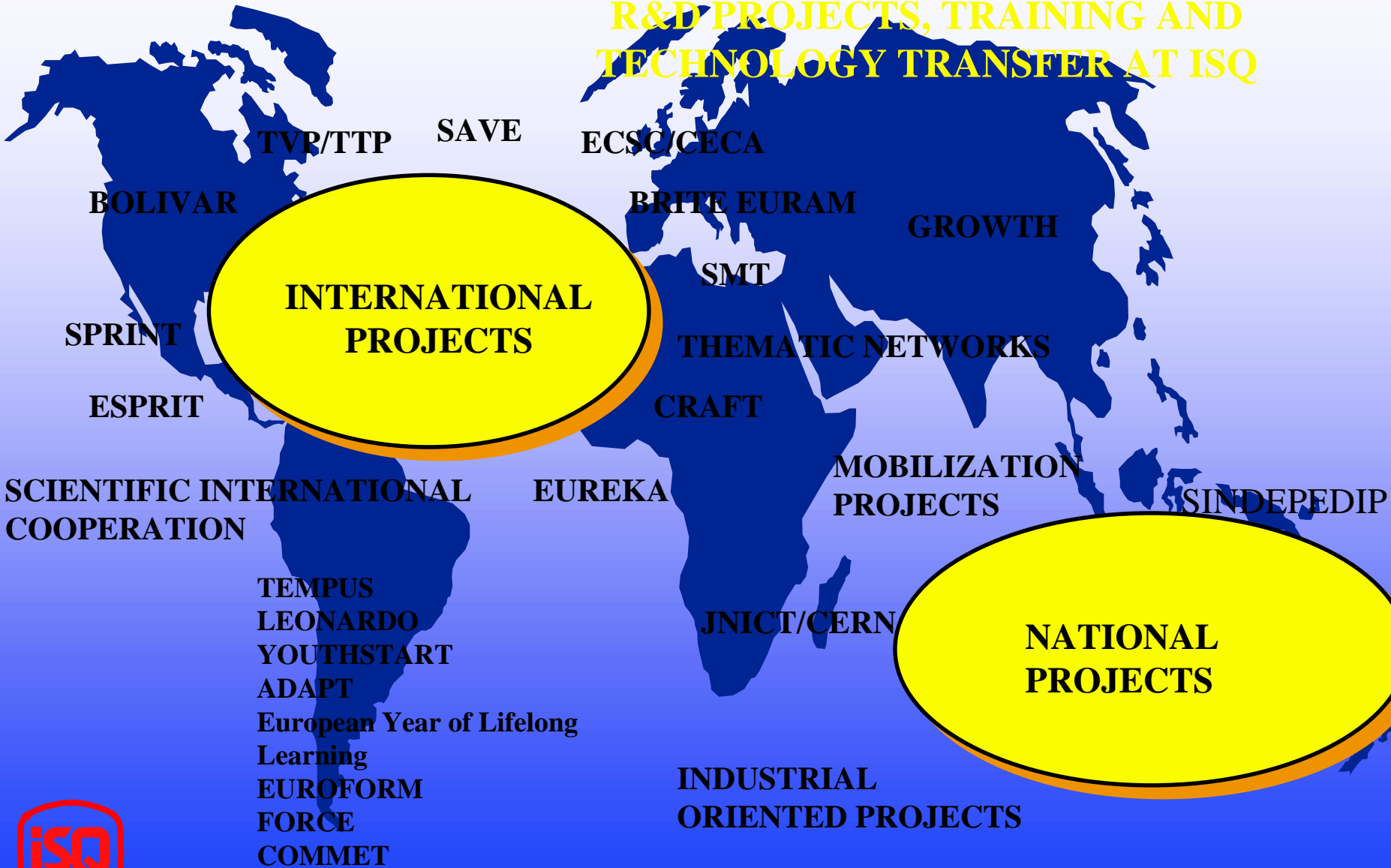


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## R&D PROJECTS, TRAINING AND TECHNOLOGY TRANSFER AT ISQ



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London, 27<sup>th</sup> March 2002

## PRODUCTION AND JOINING TECHNOLOGIES

Joining Process Consultancy

Analysis of Inspection Plans

Welding Procedures Qualification

Welders Qualification

Evaluation of Welding Specifications

Welding Consumables Qualification

Supervision and Verification of Inspection Plans

Welding Inspections



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## PRODUCTION AND JOINING TECHNOLOGIES

Assistance to the Fabrication of Welding Test Specimens

Electrical Arc Welding

*LASER WELDING*

Electron-Beam Welding

*BRAZING AND SOLDERING*

Resistance Welding

Bonding of Non Metallic Materials

Oxigas Welding



London, 27<sup>th</sup> March 2002

## LEAD FREE SOLDER (ING) CAPABILITIES AT ISQ

- **Chemical and Physical Characterization**
- **Modelling of Soldering**
- **Soldering Tests (wave, laser assisted)**
- **Analysis of Soldering Solutions (eg. materials tests, X Ray, SEM, TEM, EDX, EDS, AES, XPS)**
- **Product Safety (Electrical Equipment and Component Testing, eg. humidity, temperature, radiation)**



London, 27<sup>th</sup> March 2002

## LEAD FREE SOLDER (LFS) CAPABILITIES AT ISQ

- **Electromagnetic compatibility**
- **Cleaning Technologies (cryogenic surface cleaning)**
- **NDT (e.g. X Ray microfocus, ...)**



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## SOME RELEVANT R&D PROJECTS RELATED TO SOLDERING, CLEAN SOLDERING

Modelling of Temperature Profiles during Laser  
Brazing and Soldering

Modelling of Cracking during Laser Brazing  
and Soldering

Clean Soldering with lead free and low VOC



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## OTHER RELEVANT R&D PROJECTS RELATED TO JOINING

**Conductive Adhesives as Solder Alternative**

**Adhesive Joining Technology in Electronics  
Manufacturing (Adhesives in Electronics)**



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**MODELLING OF TEMPERATURE PROFILES AND  
CRACKING DURING LASER BRAZING AND  
SOLDERING**

**Numerical models are adequate to predict Temperature  
Profiles during Laser Brazing and Soldering**

**Numerical models are also adequate to predict cracking**

**(in Mesquita, J.-"On the Transient Temperatures calculations during spot welding of  
Copper and Aluminium alloys by laser".**

**Proceedings 73rd Annual AWS Convention, Chicago, March 1992)**



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## CLEAN SOLDERING WITH LEAD FREE AND LOW VOC

**Feasibility study (within a consortium) to achieve lead  
lead free solder**

**(Tinbased with bismuth and indium)**

- **Reduction/elimination of VOC**
- **No post-joining cleaning process**



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## CONDUCTIVE ADHESIVES AS SOLDER ALTERNATIVE


- Use of conductive adhesives are applied at RT
- More adequate to accommodate stresses and strains
- No need for cleaning after the joining process



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## ADHESIVES IN ELECTRONICS (THEMATIC NETWORK)

- 
- A world map is shown in the background, with the continents of North America, South America, Europe, Africa, Asia, and Australia visible. The map is rendered in a light blue color against a darker blue background.
- Application on consumer electronics
  - Telecommunication
  - Aviation
  - Space
  - Defense
  - Computers
  - Medical System



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## ADHESIVES IN ELECTRONICS (THEMATIC NETWORK)

– Stimulating the exchange of information on the results of recent RTD products

More information [www.adhesives.de](http://www.adhesives.de)



London, 27<sup>th</sup> March 2002

## FINAL REMARKS

- ISQ has some expertise in this area coming from industrial contracts and EU and national research programmes
- Lead free soldering is a main issue due to environment constraints
- Companies are reluctant mainly to the high melting temperature of eutectic solders
- Some companies are also searching other alternatives for some specific applications

