

TRAINING COURSE FOR SOLDERING TECHNOLOGY

in a modular structure

The aim of the course: To provide a well-founded, well-applied, systematic knowledge about the processes take place during the creation of the solder joint, what kind of solder alloys and fluxes are used in electronics production. Describe in detail the materials and devices used in the discussed soldering technology, their properties, their selection criteria, the characteristic soldering parameters and their definition, as well as the most common soldering errors, their causes and ways to eliminate them. The course focuses on the relationship between soldering errors and the parameters of the known process, to understand the mechanism of occurrence of errors. It introduces the methods of repair and rework after the soldering process. By discussing the above, students will gain a wealth of background information that is additional to their daily work. The soldering practice provides an opportunity to directly perceive the behavior of the material and the process, the effects of changes, and to test and master the most typical rework methods.

Method of the course: An explanation (theory) illustrated with abundant visual material, based on a Power Point presentation. Classroom exercises on the correct setting of each soldering technology and the causes of soldering errors and their interrelationships. Practical manual soldering and rework instruction.

The lecturers have got more than 20 years experience in installation, service, process support of ERSA hand/rework/reflow/wave/selective soldering equipments and machines and the course is based on this knowledge, experience. During the training we discuss the Ersas machine related issues and concrete daily problems.

The course is modular and consists of 5 modules:

Module title	Duration*	Schedule**		Lecturer
1. Soldering basics	9 hours	-	09.00-17.15	-
2. Hand soldering – based on Ersa	3,5 hours	-	09.00-12.00	
3. Dip, wave and selective soldering – based on Ersa technology	12 hours	-	13.00-17.00 09.00-16.15	-
4. Reflow soldering - based on Ersa technology	16 hours	-	09.00-16.15 09.00-16.15	-
5. Soldering practice	8 hours	-	09.00-16.15	-

* 1 lesson = 45 minutes

** Depending on the interest of the audience, the finishing time can be slightly delayed..

The Module 1 is mandatory for all participants, while from Modules 2-5 at least one is mandatory. For those who choose Module 5, Module 2 is also mandatory. The Module 2, the hand soldering, since it is the basis for all rework, is recommended for those interested in Module 3 and/or 4.

Students will receive the material of the projected presentations printed in color in 6 slide / page format. The same can be obtained electronically in pdf format on request.

Who benefits? Employees, process engineers, quality assurance engineers, production managers, subordinates and managers, preferably with secondary or higher technical qualifications, who are involved in the design, implementation, supervision, management, control and quality assurance of soldering processes.

Thematics: (total number of hours: 48 hours – 6 days)

1. Module 1: Soldering basics (9 hours):

- 1.1. Physical and chemical processes leading to soldered joints
- 1.2. Lead free legislations
- 1.3. Types and properties of solders
- 1.4. Types, properties and classification of fluxes
- 1.5. Solderability
- 1.6. Handling and storage of components, PCBs
- 1.7. Types of PCBs
- 1.8. Inspection methods for soldered circuit assemblies and IPC standard for the acceptance of electronic assemblies
- 1.9. The repair and rework and IPC standard of rework

2. Module 2: Hand soldering (3 hours) – based on Ersat technology and equipments:

- 2.1. Materials of hand soldering (cored wires, fluxes)
- 2.2. Tools of hand soldering (soldering stations, irons, tips, wire feeders, fume extractors)
- 2.3. Correct way to create solder joints
- 2.4. Most frequent failures of hand soldered joints

3. Module 3: Dip, wave and selective soldering (12 hours) – based on Ersat technology and equipments:

- 3.1. Dip soldering and tinning:
 - 3.1.1. Materials of dip soldering, tinning
 - 3.1.2. Equipments of dip soldering
 - 3.1.3. The correct way and parameters of dip soldering
 - 3.1.4. Most frequent failures of dip soldering, tinning
- 3.2. Wave soldering:
 - 3.2.1. The principle, basics of wave soldering
 - 3.2.2. Materials of wave soldering
 - 3.2.3. Gluing of SMD components at wave process
 - 3.2.4. The structure of the wave soldering machines, the task of the main units, their role in the process
 - 3.2.5. The technological parameters of wave technology and execution
 - 3.2.6. Design of printed circuit boards for wave soldering
 - 3.2.7. Most frequent failures, their causes and ways to eliminate

3.3. Selective soldering 3.3.1. Methods of selective soldering

3.3.2. The structure of selective machines

3.3.3. The technological parameters of selective soldering and execution

3.3.4. Design of printed circuit boards for selective soldering

3.3.5. Most frequent failures, their causes and ways to eliminate

3.4. Inspection of soldered electronic assemblies 3.4.1. Methods, specifications

3.4.2. Equipments, machines, aspects

3.5. THT solder joints – repair, rework 3.5.1. Execution of repair, rework, soldering/desoldering

3.5.2. Intermediate preparation of soldering surfaces

3.5.3. Non hand soldering rework methods

3.5.4. Brush Module

4. Module 4: Reflow soldering (16 hours)

4.1. The steps of reflow soldering process, technology

4.2. Materials of reflow soldering, the solder paste

4.3. The processes before reflow soldering: paste printing, component placement

4.4. The reflow machines

4.5. Underfilling of hidden joints components, after reflow soldering

4.6. THT components soldering with reflow technology

4.7. The parameters, process setup, temperature profile of reflow technology, maintaining stability of production quality (with practice)

4.8. Most frequent failures of reflow soldering, their causes and ways to eliminate them (with practice)

4.9. Inspection of soldered circuit assemblies 4.9.1. Methods, specifications

4.9.2. Equipments, machines, aspects

4.10. Repair, rework of surface mounted solder joints 4.10.1. Materials specifically for rework purposes

4.10.2. Soldering and desoldering with soldering iron and tweezers

4.10.3. Intermediate preparation of soldering surfaces

4.10.4. Hot air and infra soldering equipments 4.10.4.1. Soldering and desoldering of chip components and smaller SMD components

4.10.4.2. Rework (soldering and desoldering) of special components with hidden solder joints (QFP, QFN, BGA, PoP, etc.)

4.10.4.3. Most frequent failures of rework, their causes and way to eliminate (with practice).

5. Module 5: Soldering practice (8 hours)

- 5.1. Hand soldering with soldering iron
- 5.2. Most typical rework soldering methods
 - 5.2.1. Soldering and desoldering of THT components
 - 5.2.2. Soldering and desoldering of chip components
 - 5.2.3. Soldering and desoldering of SOIC, SOT and QFP
 - 5.2.4. Preparation of PCBs after desoldering for resoldering

Verification and certification of the acquisition of the knowledge: Module 1-4: written test per module, Module 5: practical skills assessment, with written certification issued by Microsolder Kft.

Possible module combinations: Please indicate the chosen package when applying! Ask for a price offer.

A.	Full course (Module 1-5)	6days,48hours
B.	Basis + Hand + Reflow + Soldering practice (Module 1, 2, 4, 5)	4 ½ days, 36 hours
C.	Basis + Hand + Reflow (1, 2, 4)	3 ½ days, 28 hours
D.	Basis + Reflow (1, 4)	3days,25hours
E.	Basis + Hand + Wave/selective + Soldering practice (1, 2, 3, 5)	4days,32hours
F.	Basis + Hand +Wave/selective (1, 2, 3)	3days,24hour

G.	Basis +Wave/selective (1, 3)	2 ½ days, 21 hours
H.	Basis + Hand + Soldering practice (1, 2, 5)	2 ½ days, 20 hours
I.	Basis + Hand (1, 2)	1 ½ days, 12 hours
J.	Basis + Hand +Wave/Selective +Reflow (1, 2, 3, 4)	5days, 40hour
K.	Basis +Wave/Selective +Reflow (1, 3, 4)	4 ½ days, 37 hours

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