ComEd
“Development of competences of educational staff by integrating operational tasks into measures of vocational training and further education”

Exploration task
“Vapour Phase Soldering for microelectronic circuits soldering”

(Stand: 09/2010)

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Education and Culture DG
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Contents

1. Subject of exploration and work order

Vapour phase soldering (also called condensation soldering) is one of soldering technologies for microelectronic circuit soldering. In recent years the soldering technologies had to modify for lead free solder pastes. The condition, used materials, thermal profile etc. had to adapt for new pastes to comply with requirements on quality and reliability.

Please make the poster presentation concerning the basic principles of VPS and depict your collected information about VPS possibilities and limitations in a PowerPoint presentation.

- What are basic principles of soldering?
- What kind of soldering do you know?
- Please describe VPS technology.
- Compare known technology of soldering and VPS. Where are advantages and disadvantages of VPS?
- Give summarisation of advantages and disadvantages of VPS.

2. Background information

- Definition and theory of soldering.
- Information about different soldering technologies.

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3. Utilities for the exploration

- Module about soldering in e-learning teaching system.
- Books.
- Accessible articles on internet.

4. Results of the exploration

A poster presentation concerning the basic principles of VPS and PowerPoint presentation concerning the topic of exploration task was worked-out.

5. Identified problems, needs for improvement

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6. Attachments

A poster and PowerPoint presentation.

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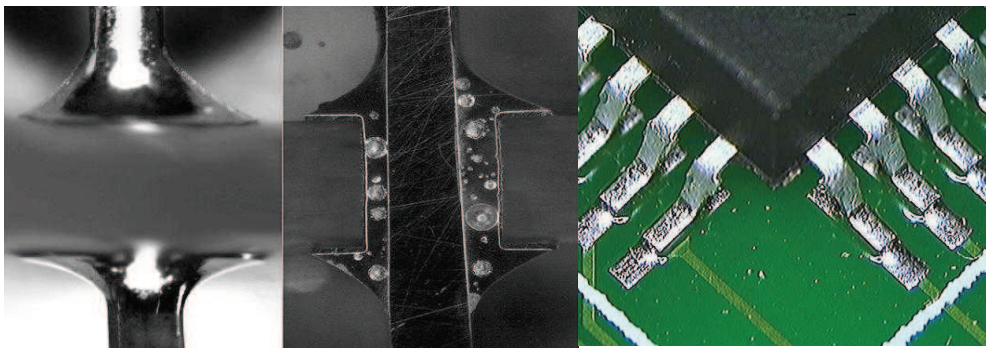
Vapour phase soldering for microelectronic circuits soldering

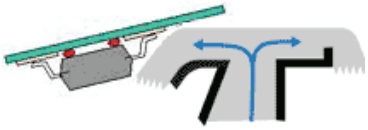
Soldering

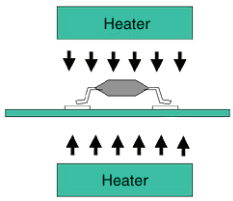
- forming of metallurgical bond of two metals with use of elevated temperature and without melting of bonded metal surface,
- solderability is capability of metal surface to be fast and steady wetted by solder.



Methods of soldering

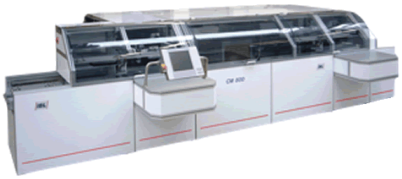
wave soldering

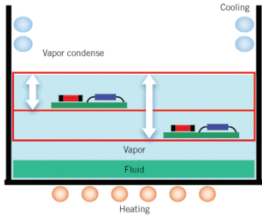




reflow soldering

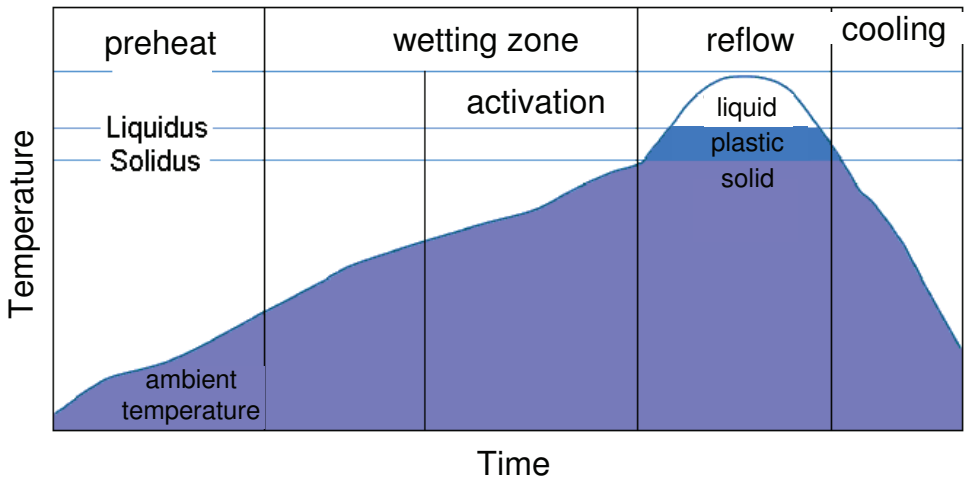
vapour phase soldering



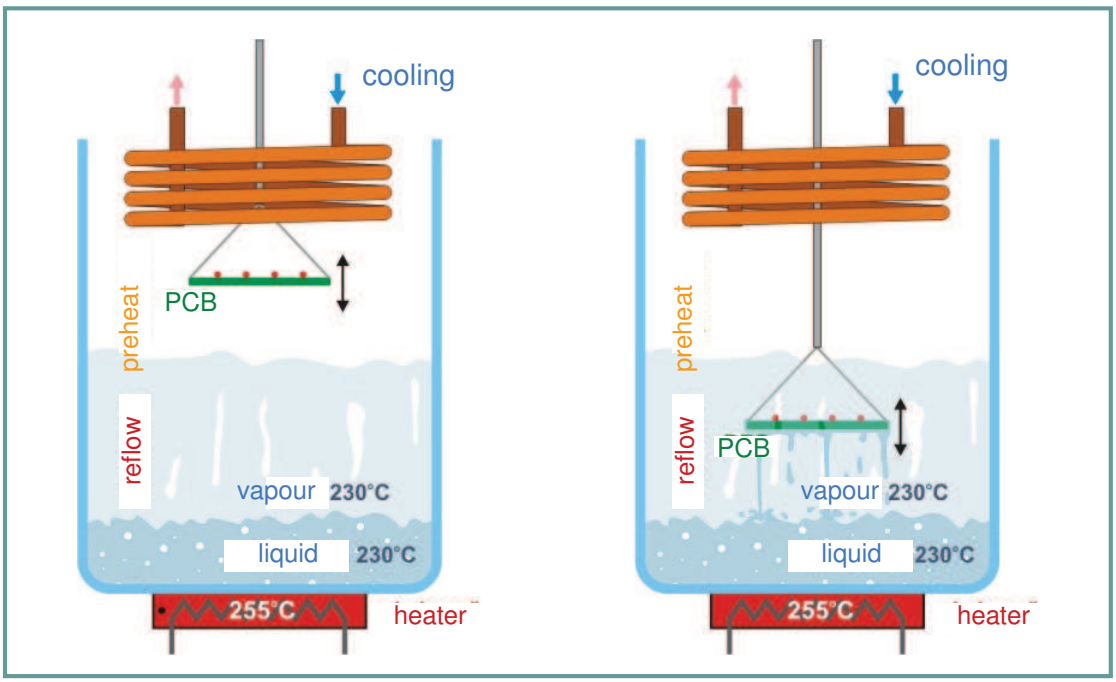


Temperature profile

- dependence of temperature vs. time.



Principle of vapour phase soldering



Advantages of vapour phase soldering

- heat transfer is independent on size, shape or geometry of heated surface,
- heat transfer is approximately 10 times faster than hot gas reflow and 8 times faster than IR reflow,
- no-risk of overheating,
- stability of temperature,
- inert atmosphere – oxidation prevention,
- minimal risk of low quality joint.

Comparison of soldering methods

	Infrared	Convection	Vapour phase
Heat transfer	Infrared radiation	Preheated nitrogen or air	Evaporated liquid
Advantage	undemanding	Homogenous temperature distribution	Effective temp. transfer, homogenous temperature distribution, inert atmosphere
Disadvantage	Non-homogenous heating	Low rate of heating and slow flow of gas	Expensive