



Hyper-fine solder powders leading the miniaturisation of printed circuit boards

The FineSol project is an effort industry-wide by the electronics sector to support innovation and efficiency

February 4th 2016 – To sustain its growth, retain its competitive edge, improve upon its already high standards of efficiency and reduce the impact from waste of electrical and electronic equipment (WEEE directive), the European electronics industry is looking to innovate in key areas. One such area is the drive for ultra-miniaturisation/ultra-functionality of equipment, namely by increasing the component density on the printed circuit board (PCB). The FineSol project is aiming at just that, by looking at the key show-stopper for miniaturisation of electronics in mass production – the size limits for reducing the solder joint sizes due to the solder paste particle size.

On a first stage, FineSol will deliver an integrated production line for hyper-fine lead free solder particles and to formulate solder pastes containing these particles that, by proper printing methods (e.g. screen and jet printing) will reach the targeted miniaturization of solder joints in mass production. The industry-wide impact of this can be easily perceived by considering the possibility of more than doubling the functions available in electronic devices per volume, such as cell phones, satellite navigation systems, health devices and the increasing need for Internet of Things.

The project puts together the most recent advancements in technological fields such as mechanical and chemical engineering as well as of automated control systems and nano science, in order to successfully achieve miniaturization of PCBs via the delivery of functional, low cost, hyper-fine solder powders of type 8-9 (particle size less or equal to 10 μm). The consortium partners are leading entities responsible for contract manufacturing of electronics components as well as for the production of relevant materials.

The trend in miniaturization in electronics and its potential impact was coined in 1965 by Gordon Moore, co-founder of Intel, who has predicted in his famous Moore's Law that the number of transistors on an integrated circuit for minimum component cost would double every two years. Indeed consumer electronics, as exemplified by the cell phone, have continuously decreased in size whilst offering more and more functions with future cell phones aiming to offer phone/video/TV/medical-diagnostics/computer power, not to forget the ongoing and recent trend on embedded electronics, only made possible by this miniaturization.





Figure 1- Cell phone size decrease

A leading-edge industry and its challenges

The total EU electronics industry employs ≈20.5 million people, with sales exceeding €1 trillion and encompassing a total of 396,000 SMEs. It is a major contributor to EU GDP and its size continues to grow fuelled by demand from consumers to many industries. Despite its many positive impacts, as previously highlighted, the industry also faces some sustainability challenges connected with the enormous quantity of raw materials that it needs, the huge quantity of waste from electrical and electronic equipment (WEEE) generated and the threat of competition from Asia. Moreover, the already-existing energy issue has become even more important after the transition from tin-lead solders to lead-free solders one decade ago, which require soldering temperatures 50°C higher relative to older tin-lead solders. This increase in processing temperature has meant not only higher energy consumption for manufacturing, but also increased risk of heat damage to electronics components on the PCB.

About the European Federation for Welding, Joining and Cutting

EFW is a pioneer in implementing a harmonized qualification and certification system for joining professionals. Through European projects EFW has been innovating in training methodologies, and involved in the development of new technologies and uses for joining. Through its member organisations, EFW has established a firm link to the local industry, providing knowledge and training as well as participating in research initiatives that address the most pressing questions and challenges in the field of joining technologies.

Consortium members: Center for Research and Technology Hellas, Atomizing System Limited, POLMECANIC Sp. z o. o., Artia NanoEngineering & Consulting IKE, Abis Sp. z.oo, Instituto de Soldadura e Qualidade, Prisma Electronics SA, Mat-tech BV, SP Denmark A/S, Center of Technology Research and Innovation Ltd, SP Technical Research Institute of Sweden AB, European Federation for Welding Joining and Cutting (EFW), Applied Materials Italia S.r.l., Microsemi Semiconductors, Ltd.