Solder Pot Analysis And Sampling

During soldering the liquid solder in the solder pot will be contaminated continuously by impurity elements from the melting pot and the parts to be soldered. These may impair the solder quality.
In the course of time an equilibrium will be formed depending

- on the quantity of solder drag out
- quantity of replenished fresh solder
- components to be soldered (e.g. exposed copper surface of PCB's)

In case of a change of materials to be soldered (e.g. board metallization changed from Cu to NiAu) the equilibrium will readjust itself and other impurities will be present in different concentrations.

Regular monitoring of the composition and impurities of the solder is a basic prerequisite to achieve a high degree of process stability, since deviations can be detected and soldering defects prevented. **This is much more important in case of lead-free soldering than it is with conventional SnPb solders since e.g. copper is dissolved at a much faster rate by lead-free solders. Furthermore the level of lead contamination must be controlled below 0.1 % in case of RoHS-compliant production.**

A homogeneous **representative** sample of 150 – 200 g is required for solder pot analysis. Taking a proper sample is not a trivial task. The main constituent of commercially available lead-free solders is tin with additions of copper and/or silver. The solubility of these metals in tin is rather limited and highly dependant on the temperature. Taking a sample from the melting pot shortly after start-up of the machine will therefore not yield a representative analytical result with reliable information on the solder quality. **In no case should the solder sample be taken Monday morning before production start, and having remained unmoved over the weekend**.

Therefore a representative sample should be taken at operating temperature and after thorough mixing/stirring of the solder. To achieve this objective the solder bath has to be completely heated up, mostly 2-3 hours after start-up and after thorough mixing of the whole content of the solder bath.

In case of wave soldering equipment the wave has to be switched on – **running for at least 1 hour** – and the sample should be taken directly from the wave. **The optimum time for taking the sample is when production shift is half over.**

If you intend to send us solder samples for analysis, please take care that some basic rules are observed when taking the samples. Unfortunately, we often receive samples in shapes and forms that cannot be directly analysed but require costly and time consuming re-melting (see left picture below).

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Wrong:

Right:

Ideally the sample should have the shape of a disk with approx. 50 mm diameter and 20 mm thickness. This can be achieved by casting the solder into a special mould. After letting the solder solidify and cool down it can be easily removed from the mould.

The correct form is important since the number of analysis keeps increasing on a daily basis due to the conversion to lead-free solder and the general uncertainty still connected to this new technology.
Moulds are available from TAMURA ELSOLD.