# IMPROVED control of moisture sensitive devices

**"Moisture sensitive device control has become a prerequisite in the EMS industry - particularly when building high reliability products," say Andy Wycherley and Steve Kinloch of Celestica.**

The successful management of evolving OEM/EMS relationships requires EMS players' continued dedication to the fundamental qualities that originally attracted OEMs to the outsourcing model - traits such as flexibility, responsiveness, quality, cost efficiency, velocity and customer service.

An important part of driving value and efficiency is a commitment to furnishing customers with innovative technologies that are required today and anticipated for the future. Striving to deliver process improvements and operational savings that reduce product cost while ultimately improving margins for customers, is an integral part of the partnership.

One of the key assembly line issues for EMS providers is improving first pass yields. This is important, as up to 80 per cent of the final product cost is the individual parts. Most large EMS providers use similar equipment to run a standard SMT process, and it is more often during the material handling procedures that problems can occur.

Two main types of component defects exist which can escape inspection and test processes, and result in early life field failures. The first type is electrostatic discharge (ESD) on the semiconductor. In general, this is well understood in the manufacturing industry and proper systems are now in place. The second type of damage is related to so-called moisture sensitive devices (MSDs), which includes most ICs made with plastic or organic materials.

The control of MSDs before surface-mount reflow is a critical assembly issue, with a direct, positive impact on final product reliability, customer satisfaction and manufacturing cost. Whilst the issue is well observed, monitoring systems are manual and are generally not geared to cope with the rapid increase in the quantity of MSDs, driven by shorter development cycles, ever smaller device sizes, new materials, larger chips, and higher levels of moisture/reflow sensitivity now required.

Steve Kinloch showing 'tagged' device

As a result, efficient MSD control has become important for EMS companies, particularly those working with high-reliability products. Furthermore, markets such as medical, automotive, aerospace and defence, require high mix/low volume assembly lines. In such environments, the total exposure time of MSDs increases significantly due to the cumulative effect of multiple machine feeder set-ups and product changeover.

ICs that are sensitive to moisture from atmospheric humidity are packaged in dry bags ahead of assembly. Once the bags are opened each device must be assembled and reflowed within a specified timeframe. Many of these MSDs are now assembled on both sides of the PCB, which can result in a further reduction of the allowable floor life prior to placement and increases the complexity associated with tracking components already assembled between the first and second reflow pass.

Defects appear when components have accumulated a critical level of moisture prior to solder reflow. The root cause of this type of failure mechanism is the rapid heating of the moisture absorbed within the plastic encapsulant or organic substrate. During typical solder reflow operations when surface mount devices are mounted onto a PCB, the entire PCB and device population