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The Prediction and Evaluation of Contamination in the Large Clean Room for Manufacturing Electronic Components

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ABSTRACT

The world gross market of many kinds of electronics, such as TV and mobile phone has been increasing rapidly these days. It is mainly caused by the amazing developments of IT technology during past decade and the changes of individual life style for the better.

Thanks to the increases of electronics manufactured in quantity, much more electronic components such as MLCC (multi layer ceramic capacitor) and PCB (printed circuit board), which are our main products, have been needed as a consequence.

Though it was reported that total market of electronic components exceeds several hundreds of billion dollars, there are many manufactures struggling for survival in the competition of electronics components. Then the recognition of quality as a key technology has spread and the efforts for high-yield production lines have been kept in many companies.

In this paper, our efforts to eliminate the contamination of particles and the diffusion of some volatile organic compounds which is very harmful to workers at production line have been introduced.

Because both the transition of particle and the diffusion of volatile organic compounds depend on the convective flow in the clean room, firstly, we had predicted and evaluated the flow patterns in the clean room with flow simulation. It was found that these contaminants could be transferred from one process to another, which is usually designated as the cross-contamination we must avoid. Secondly, the information on the local environment where particles and volatile organic compounds exist was achieved by the some analytical equipments such as FT/IR (Fourier Transform Infra-Red Spectroscopy) and GC/MS (Gas chromatography and Mass Spectrometer).

The flow pattern predicted by numerical flow simulation is shown in figure 1. Some improvements have been performed to resolve the cross-contamination as an application of methodology presented in this study. Contrast to the experimental methods which includes measurements of particle number, flow velocity, concentration and so on, the numerical prediction has been considered to have some advantages.

Finally, the number of risky particles causing failures of our products has been reduced and then the cost for poor quality could be saved as a consequence.

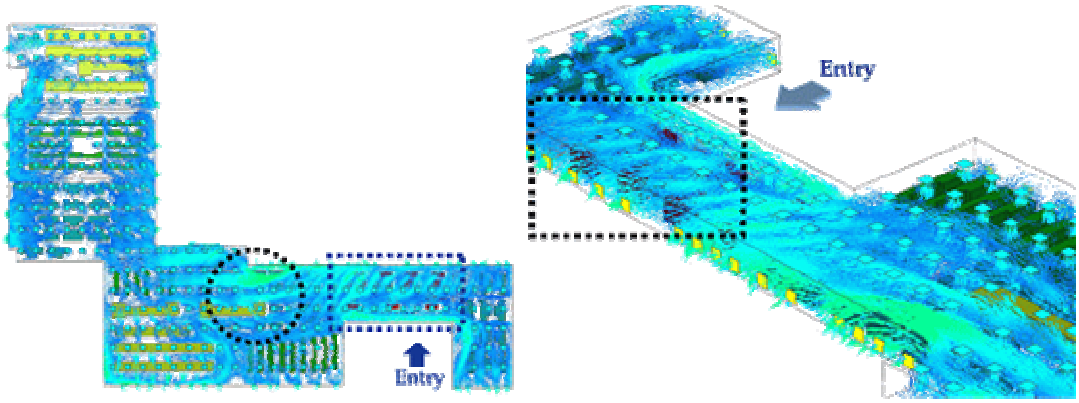

Figure. 1 The overview of flow pattern (Left : Top View, Right : Zoom near Entry)

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