

Presentation Title: Why Photo mask Cleaning ? (LED production)

Sub. Title: Keywords :

- * Photolithography process use 4 or 5 Masks
- * Contact Aligner adhere Resist & particles to Masks
- * Pattern defects cause reduction of Yield rate
- * That is WHY? Mask cleaning is a key
- * Mask cleaning productivity and cost saving method

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General:

The year of 2011 majority of LED production expansion in the world have been planned in China, and been built. Total numbers of LED chip companies goes up to 60, almost 2 times. As startup of the production lines have been progressed, next stage of engineers focus will be production yield rate. So the year of 2012, it is time to watch Mask cleaning quality.

Photolithography process:

Most LED production lines become 24/7 operations, and thus, UV exposure process by Aligner needs many clean photo masks in timely manner. Photo mask cleaning process also needs to improve in both its Quality and efficiency. Contact Aligner adhere Resist & particles to Masks which cause Pattern defects resulting reduction of Yield rate

When a hand brush cleans the mask. You may have quality of cleaning issue time to time. As well as Mask cleaning productivity becomes more serious issue.

Mask Cleaning process:

Current situation and problem:

- 1) Most of Mask cleaners are of particle removal and final cleaning by surfactant detergent model, so resist contaminations are some times remains unclean --- Quality issue
- 2) Most mask cleaners are of manual operation type, which requires Manpower--- Cost issue
- 3) Most mask cleaner facilitated with organic solvent chemical model so, safety measure is costly, Such as non-explosive structure is required. --- Cost issue
- 4) Urgent need to improve cleaning efficiency, in order to meet production increase. --- Productivity issue

Identification of issues and proposed solution:

- 1) Resist removal need Chemical treatment; therefore, we propose Alkaline Chemical dip-in process as a standard specification and not to use Organic solvent. (Solution 3))
- 2) To lower the cost than Manual operation model, a fully automated model is proposed, With 20 mask/cassette called Cassette-to-Cassette Model Mask cleaner.
- 3) Avoid using Organic solvent chemical, as mentioned in 1)
- 4) To meet production increase, optimize each cleaning process, such as choosing suitable Cleaning chemical, its temperature and dip-in time, etc to shorten the process time.

*rinse chemical by DI water, next is to *wash by surfactant chemical spray with brush scrubbing, then to *rinse by DI water. And as the final step, *DRY the mask.

In order to optimize those process, evaluation of cleaning conditions such as liquid temperature(°C), and its dilution (%) as well as dip-in time (second) are very key factors.

This applies all process of cleaning. Purpose of this optimization is not only finding out a most suitable RECIPE but, shorten the process time, lower the Liquid temperature as well as saving DIwater

Productivity and cost saving of Mask Cleaning

End

Typical Mask cleaning process is consist of
*Resist removal in Dip-in pot, and then to

