

Yield enhancement at dicer equipment by implementation of APC Methods - Brian Lee

Dr. Michael Brüggemann

WeiFong.Lee@infineon.com - Michael.brueggemann@infineon.com

Infineon Technologies Wuxi

No.8 Xing Chuang San Lu Wuxi-Singapore Industrial Park

Phone: +86 510 8866 8569 Fax: ++86- 510 85282432

Abstract

APC is since several years implemented at Infineon Backend sites. The wish to ensure the automotive and security related quality expectations of our customers has lead to a strong push forward for the APC implementation at all backend and chip card segments in the last 1.5 years. Backend dicer equipment as a pilot started early 2010. DISCO model DFD 6350 heads the IFX wide rollout to dicing equipment. The team slogan was "Turn data into knowledge - knowledge into solution". For monitoring feedback data from our pilot machine inside APC Trend, the IFX in house solution for APC-FDC was used. Shortly after review of the first data the team saw further potential and decided to link up additional 3 more machines to APC Trend for detail clarification of some findings that we detected at this pilot machine. A case study was being formed for each of the detected abnormalities.

Root Cause Analysis – Zero Defects [ZD]

APC Trend was used as an additional tool during 8D investigation for root cause analysis at both front side & backside chipping which was detected at FCOS assembly. It was started to use for problem lots, soon to be proliferated across all products (Picture1).

Abnormal Behavior of Spindle Motor during blade change - ZD

This abnormality was observed few times within the equipment, but no tool alarm was being indicated by the equipment! Repeated simulation confirmed that this phenomenon occurred when the blade replacement was done in full production mode. Now every blade replacing is monitored in the APC log file to ensure the effectiveness of the action (Picture2).

Abnormal Blade Exposure setting – Zero Defects [ZD]

The chance to monitor now this enormously detailed data gave the opportunity to see abnormalities which

could never be encountered before. The equipment does not deliver a tool alarm to monitor these abnormalities. New limits were defined and the automatic information of the end user is a central part of this comfortable setup, minimizing analysis time (Picture3).

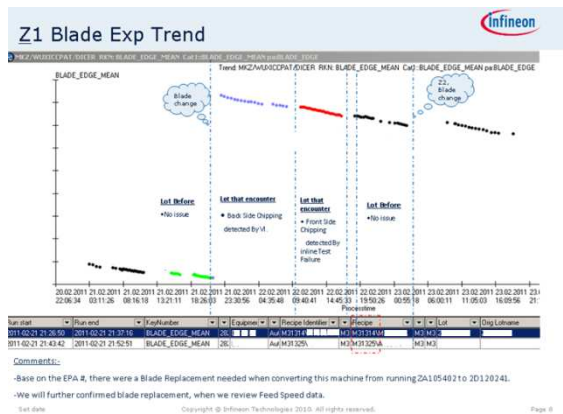
Critical Alarm Analysis & Optimization

Irregular spikes current could be identified which only occurred on the DFD6340 machine during Cut Start. This abnormality doesn't cause any product defects. It might be caused by the starting torque needed for this type of spindle motor, in order to generate the necessary spindle RPM speed directly before cutting start of the wafer. On other same model equipment this behavior is unknown. Besides gaining new information on our product performance, we also start using the alarm analysis features of the system. Based on the collected alarm, we identified the most frequent alarm → Kerfs Check Failure. The first acquisition and interpretation of the bulk of data made it possible to use the information on the same level as process data violation from the FDC system, what led to the first implemented predictive maintenance application (Picture4).

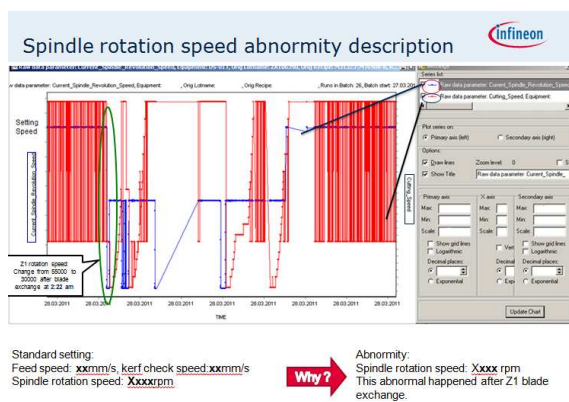
Conclusions and outlook

In summary, APC was the right choice for starting this project in the Chip Card segment. It could be shown that the APC controlled dicers performed considerably better compared to non APC controlled (Picture5, 6).

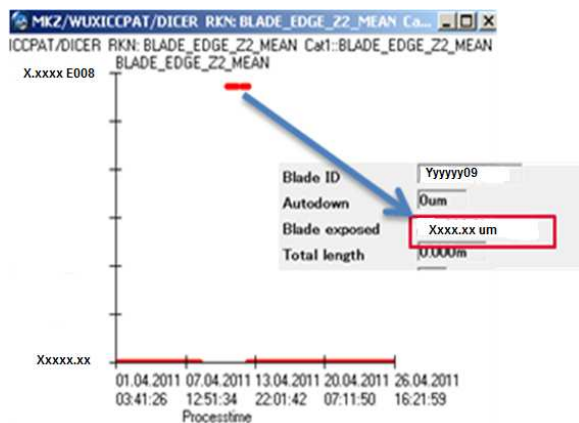
We believe that with continuing data collection for analysis, we will gain more control toward our assembled product leading towards ZERO DEFECT. APC will be systematically rolled out across all process. Our mission for this year is to have all equipment that already had APC system available by other sites to be implementing first, where it had been proven functional at other site.



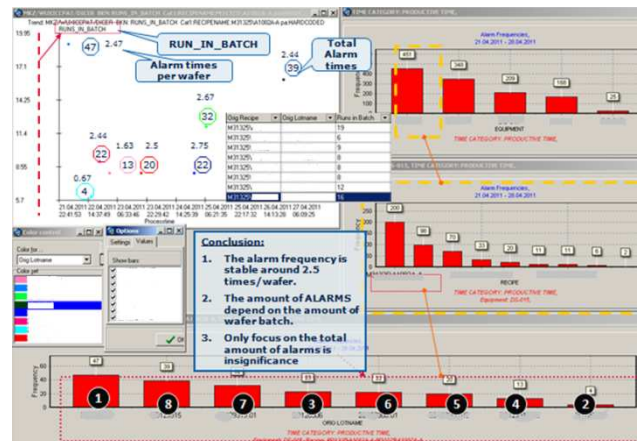
Picture1: shows blade expose trend of lot before & lot after the abnormality.



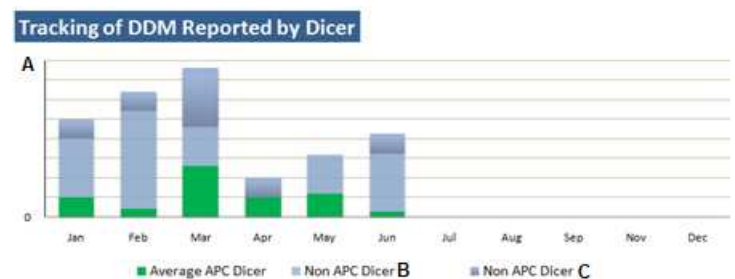
Picture2: Abnormal spindle RPM Speed.



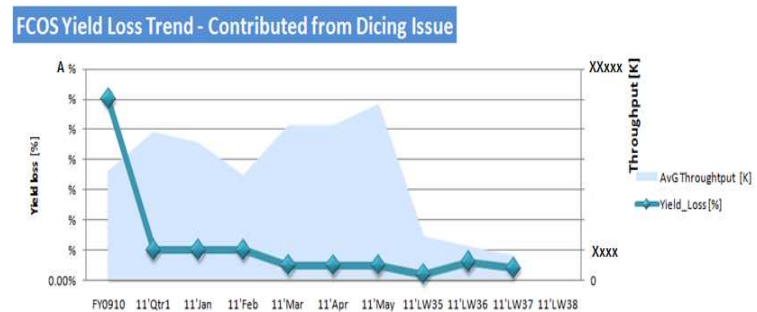
Picture3: Show the incorrect Blade Exposure key input by technician during new blade replacement.



Picture4: shows of weekly Pareto analysis of high Kerf Check failure alarm for each processed lot.



Picture5: DDM Reporting



Picture6: show tracking of Dicer related Yield Loss tracking for FCOS Product. We could see an immediate reduction of Yield loss and good sustenance achievement.