Chapter 7

Conclusion and Recommendation

7.1 Conclusion

HGA manufacturing is a simple assembly process made up of 3 component parts: slider, suspension and FOS (flex on suspension). However, these HGA's go through a very sophisticated test process, which due to their highly complex circuitry is very sensitive to the environment. This circuitry, which is in the slider, is ultimately generated in the wafer fabrication site. Therefore the primary focus of the engineering groups is to improve HGA test performance. The measuring device of this improvement is test yield. As shown in figure 7.1 below, HGA scrap cost is dominated by test yield fallout, which is 95% of HGA scrap per unit. This enables management and the engineering groups to focus their time on the test yield improvement.

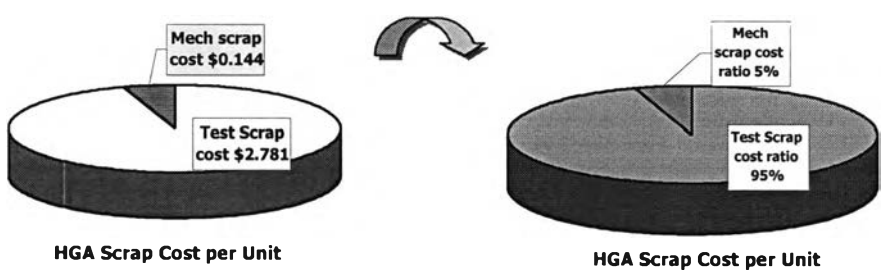

Figure 7.1 Yield and scrap per HGA unit

HGA operations have developed various activities to improve test yield. One of its activities is formulating and organization the information needed to help make decisions, to include response systems to detect and isolate problem areas. The different types of informational formats or systems were examined to see which best suited the different organizations involved; process engineering, test engineering and Quality assurance. This information system was then employed and used

as a reporting tool for data analysis and as a real time triggering tool. It has replaced the conventional method of manual data crunching which is time consuming and difficult to learn. It is an information management tool that offers a systematic approach to analysis for users rather than just looking at raw data.

After its implementation, this information system has proven to be very beneficial to the engineering management groups utilizing it.

1) Submerged in the data is the information essential for operational improvement and innovation. Hence, the 2 models clearly prove they help improve flexibility within organization. This flexibility is needed for dynamic change of HGA manufacturing. As a result, work focus can be re-organized as described below;

   Figure 7.2 compares the differences in the conventional systems and new information systems that support HGA operations.

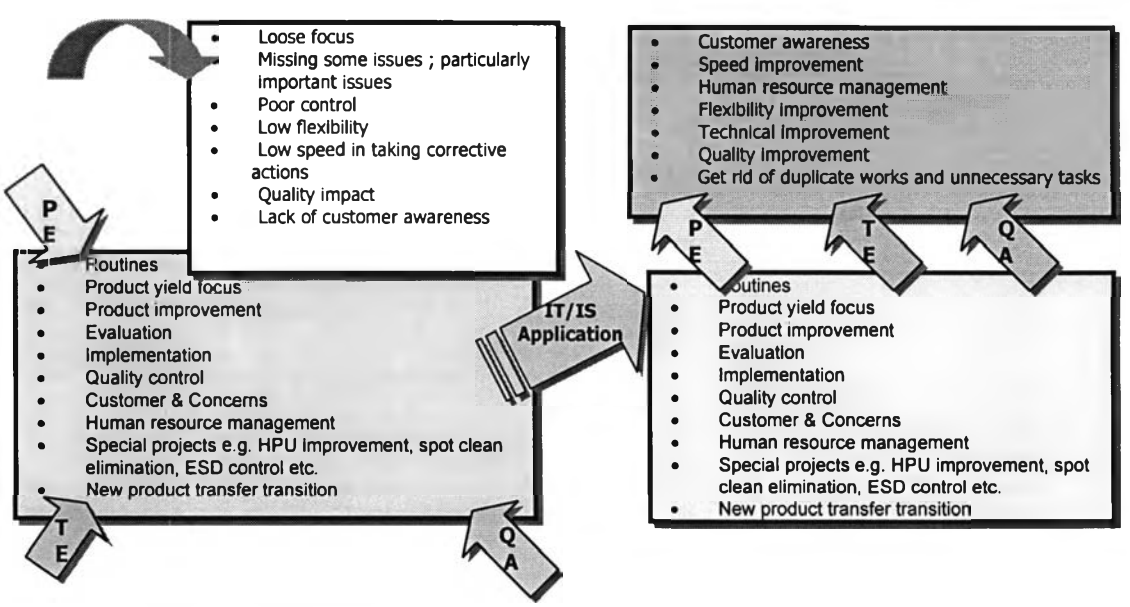

Figure 7.2 Comparison of conventional and re-formulated information system in HGA operation area

2) More standard reports have been established and used in communications and analysis upstream or down stream, from HGA to drive or HGA to wafer. This includes communications and presentation to management. This system requires fewer people, resulting in a saving of approximately $2,500 per month. Therefore, this analytical model provides instant information, improve report visualization and readability while reducing manual data crunching time.

3) Mainly the process engineering groups, who are responsible for the yield situation, use these models. The test engineering and quality groups also find these models beneficial. Since cost effectiveness is an activity focused on by management, improving 0.4% HGA test yield tends to save 161 k$ per month. The 45.2 k$ investment of implementing the system is small compared to the potential gain. It could be seen in figure 7.3 below, how this one cost savings has paid for the implementation of the whole system.

Item	Description	$ ('000)
1	Investment	
	♦ Hardware	21.2
	♦ Software and development	24.1
	Total Investment	45.3
2	Cost Saving	
	♦ Yield (0.4% yield @ 8858.2 k HGA volume build per month	70.87
	♦ Headcount reduction (13 DL)	2.39
	Total cost saving	73.26
3	Net benefit	27.96

Figure 7.3 Financial gain summary

4) The triggering system has proved itself as well. Many problems have been detected that normally would not by the

old manual system. Therefore, reaction time due to internal problem, especially tester issues, improved significantly from 11,600 DPPM to 2248 DPPM.

5) The system automatically generates reports saving countless engineering hours in the form of data preparation and presentation.

6) There is no resistance from any organization in the replacement of manual work with systematic models according to the reason's described below:
   - Management is driving to make IT/IS a strategic asset for business, communication, and living.
   - Employees do not mind the change because they realize this system will facilitate their work.
   - All employees are familiar with dynamic changes of work environments and computer utilization.

7.2 Discussion

As is all good systems there are some limitations. To overcome these limitations, they have to be well understood.

- The model provides valuable information but additional information is sometimes required to determine the internal/external root causes. The system will sometimes point the engineer in the right direction instead of pointing to a specific problem. Many variables cause this, such as:
  - Low correlation between wafer structure, slider and HGA parametrics.
  - Product sensitivity is very complex and sensitive to environments, e.g. noise, vibration, contamination, etc.

- There is no system currently to detect and stop defects in both the wafer and slider manufacturing sites. Wafer defects are usually allowed to flow to the HGA site.

Defects from these sites can be seen after the HGA is built which increases company cost in terms of test yield and scrap costs.

It is recommended to study the vertical integration of information among wafer, slider and HGA. This integrated data system which develops correlation between the three organizations is called Coherent data. The goal of this system would be to screen parts at the lowest level possible, improving scrap costs at HGA, therefore maximizing cost savings to the HGA Manufacturing site. The criteria should be reviewed and may be revised accordingly. Figure 7.4 shows the three phases of the performance test information system. The third phase is strongly recommended to improve HGA performance test thus allowing minimal defects from the wafer and slider level to flow to the HGA site.

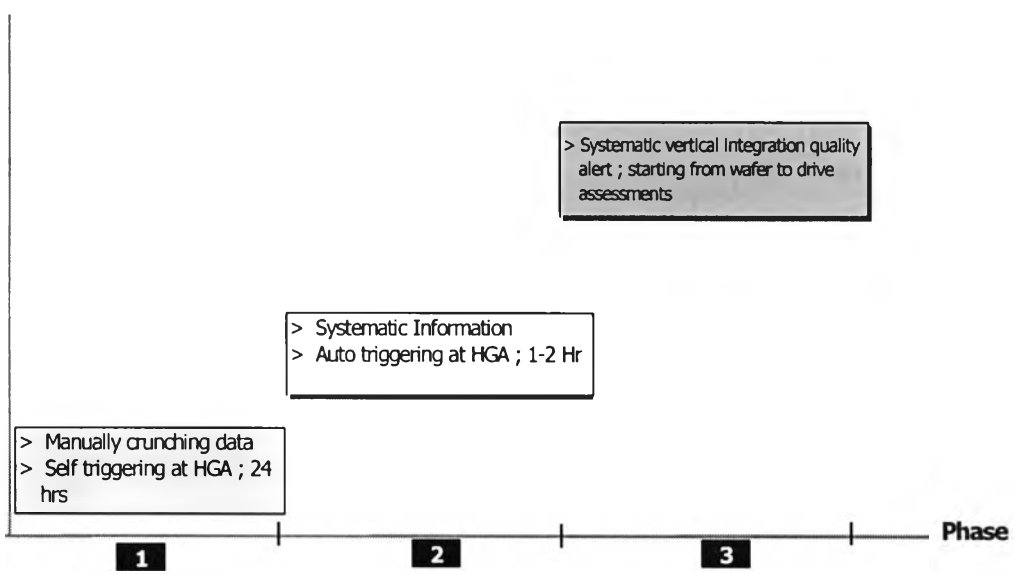

Figure 7.4 3 phases of information system application for HGA performance tests