Contamination Control and Monitoring at the Supplier Level in the HDD Industry

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Abstract

- Contamination control in HDD assembly operations, the associated sub assembly operations and media manufacturing has been ongoing for some time.

- The associated cleanroom is monitored as a matter of course, while greater levels of monitoring is in situ of the operations and provides important operating parameter data for yield enhancement.
Abstract

With the increased demands for cost reduction in drive production the traditional component cleaning at HDD facilities has been pushed off to suppliers. These suppliers are expected to provide clean components as well as monitoring data to support their cleaning operations.
Supplier Level Contamination Control

★ Should be designed with the end user’s requirements in mind (or is should be specified up front).

★ Levels of Contamination
  ★ Can not be tested into the product.
  ★ The extent of the parts cleaning process must be defined.
  ★ Post cleaning handling of parts procedures must be defined.
  ★ Quality testing is necessary.
  ★ Process “clean monitoring” provides a superior level of control.
Suppliers Facility

★ The clean environment needs to be suitable for the operations that need to be carried out
   ★ On par with the operations, if a pre-clean operation, cleanliness levels should match this.

★ Final cleanliness of the parts should mirror the environment the parts or components are to be used
   ★ End User Class 10, packaging level should be Class 10
Example Facility

- **Parts Cleaning**
- **Part Drying Operations (CDA)**
- **Assembly and Packaging**
In Situ Monitor of Cleaning System

★ Parts Cleaning.

★ In Situ Monitoring of Final Tank Cleanliness.

★ Process Monitoring is Indicative of Process Control.

★ Not a Complete Indication of Parts Cleanliness
Cleaning Process Optimization: Rinse Tank

Peaks Represent Parts Entering Tank

Valleys Represent Tank Clean-up

Tank Water Idle

Higher Throughput

Specification Limit
Cleaning Process Optimization

- Cleaning Tool
- Idle
- Clean Up
- Threshold
- Lower Throughput
Parts Cleanliness Testing

★ Lab System as a Test of Parts Cleanliness and Water Extracted from Tanks.

★ Allows for Level testing of Parts.

★ (Post Ultrasonic Extraction).
# Parts Testing Data

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**Run Results**

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Run Complete OK
Particle Testing of Compressed Gas

★ Particle Count of Compressed Gases Used for the Drying of Components.

★ Predictive of Compressor Failure, Drying System Failure or Filtration Failure.

★ Failure of this system would be a major source of contamination.
Contamination Monitoring as a System

★ Not a Piece of Software
★ Holistic Approach
★ Comprehensive Contaminating Control
  ★ Personnel Gowning, Training, SOPs
  ★ Cleanroom Monitoring (Particle, Pressure Differential)
  ★ Process
  ★ Parts testing
  ★ CDA Monitoring
Conclusion

★ Contamination monitoring in final HDD manufacturing is common place.

★ Contamination control at the supplier level is a growing concern in HDD manufacturing.

★ Parts cleanliness monitoring and testing is useful for process control and has been demonstrated in HDD operations.

★ Suppliers are under more pressure to supply clean parts that will be delivered direct to manufacturing operations.