Monitoring Humidity in Immersion Scanner Reticle Environments to Reduce Reticle Haze Effects

ReticleSense® AMSR

Allyn Jackson, CyberOptics at SPIE PhotoMask 2015
Reticle Haze in 193nm Immersion Scanner Environments

• Immersion technology scanners are adversely affected by a phenomenon called “Haze” when proper measures are NOT taken to measure and control it.

• There are three areas that need to be controlled to reduce Haze effects on Reticles:
  – Mask residue / Acid
    • Controlled by cleaning procedures, etc.
  – 193nm light
    • Can’t be controlled because needed
  – Water/Humidity –
    • Controlled by monitoring H2O and eliminating H2O sources in the total reticle environment (not just inside the 193n scanners)
Reticle Haze Formation Accelerated When H2O Present

Optics placed in 10,000 ppm humidity environment (simulation)
Result: Haze Formation on Reticle accelerated

Optics placed in 1000ppm humidity environment (simulation)
Result: Less haze formation

For Illustration Purposes
Problems & Limitations of Current Reticle Environment RH Measurement Methods

1. **In-situ RH sensors are not needed everywhere**
2. **Hand-held RH sensors are inconvenient**
3. **Hand-held RH sensors compromise the reticle environment**
   a. If Scanner panels are opened, it might take hours to requalify the tool before going back on line
   b. Opening chambers, stockers, RSPs, etc. where Reticles travel contaminates the environment being tested
4. **Many reticle areas are inaccessible by hand-held RH sensors or in-situ RH sensors are impractical**
AMSР Wireless Real-time RH Reticle Sensor

- Measures H2O in the reticle environment
  - Helps identify sources of H2O to increase Reticle lifetime
- Measures X, Y & Z vibration
  - Identifies sources of reticle mishandling
- Measures X, Y & Z Inclination
  - Identifies incorrect reticle inclination
- All-in-one Reticle Form-Factor
AMSР Is an Actual Reticle That Can Travel Throughout the Entire Reticle Environment

1. Micro Environment

Wirelessly measures RH, vibration and inclination everywhere the reticle goes

2. Reticle Library

3. Reticle SMIF pods, carries. Etc…

4. Reticle Stockers
ReticleSense AMSR Humidity Functions (only HT1 Valid on Reticle Version)

Humidity Measurement

Associate RH with Specific Events and Locations
ReticleSense AMSR Vibration and Leveling Functions

Vibration Measurement

Leveling Measurement
Important Measurements to Increase Yields and Reduce Downtime

• AMSR can measure humidity in all locations of the reticle environment.
  • In emersion scanner environments monitoring humidity is critical in reducing Reticle Haze
• AMSR is an all-in-one device that also measures vibration and leveling
• Controlling inclination, humidity and vibration are all important factors in increasing yield and reducing downtime
• Equipment qualifications can be done faster with ReticleSense wireless real-time measurement reticles
Allyn Jackson
Sales Manager US & Europe / Semi Division
Toll Free: 1(800) 366-9131
Direct: +1 (763) 542.5827
Email: ajackson@cyberoptics.com
Website www.CyberOptics.com
Send questions to: cssupport@cyberoptics.com

Ferris Chen
Asia Regional Sales Director
CyberOptics Corporation
Email: FChen@CyberOptics.com
Mobile(TW): +886.912.543323
Mobile(US): +1.763.222.4494