fastmicro
cleanliness control

How to quantify **parts & assembly particle cleanliness**

Surface particle contamination measurement equipment

Fastmicro introduction

Growth track record

25 end-clients globally

55+ service & aftersales contracts

2019 founded

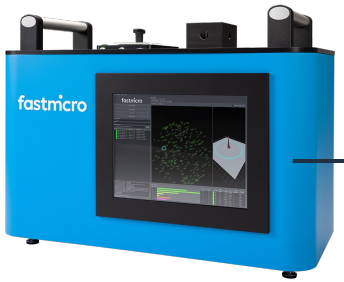
11 countries **on 3** continents

25 team members

60+ scanners built

INNOVATED WITH TNO

Solutions



Sample Scanner

Wafer Particle Defect Inspection System

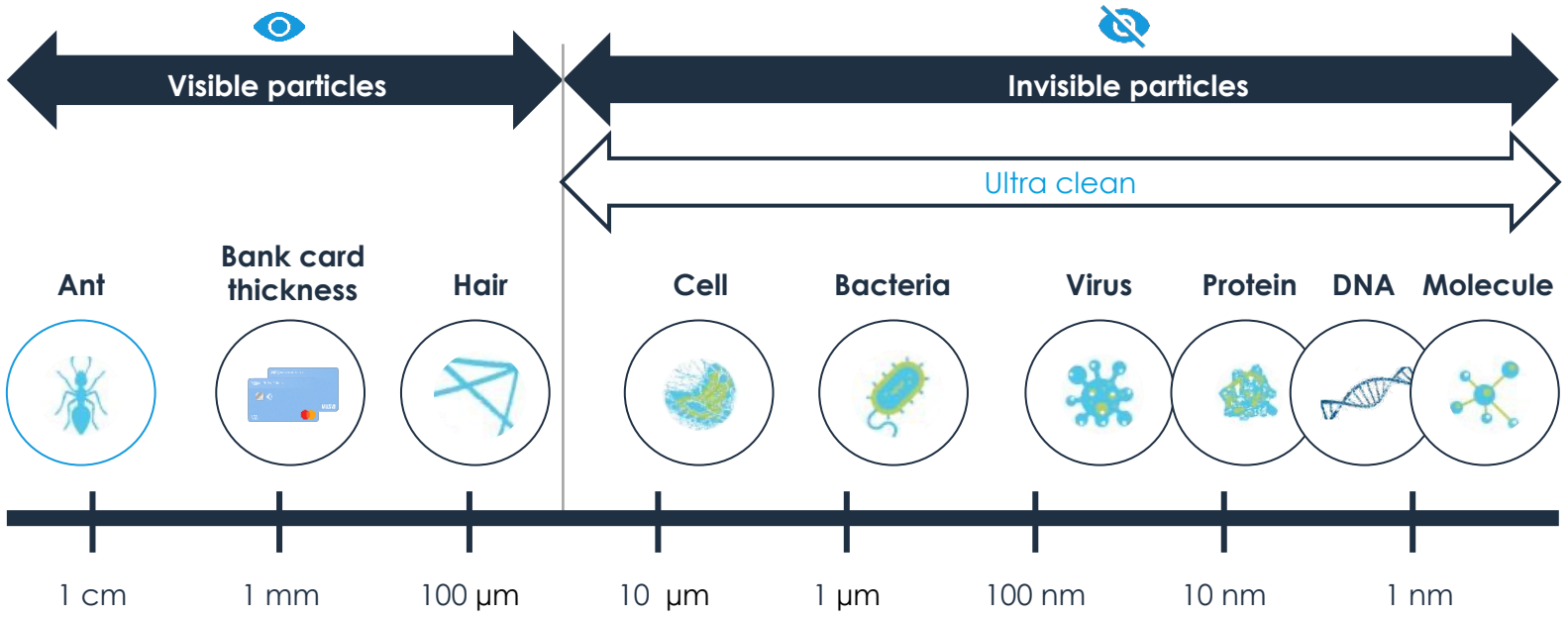
Particle Fallout Scanner

Pim de Korte
Technical Sales Manager
Fastmicro

Mechanical engineering background with over 12 years of commercial experience in high-tech industries

When clean is in the eye of the beholder

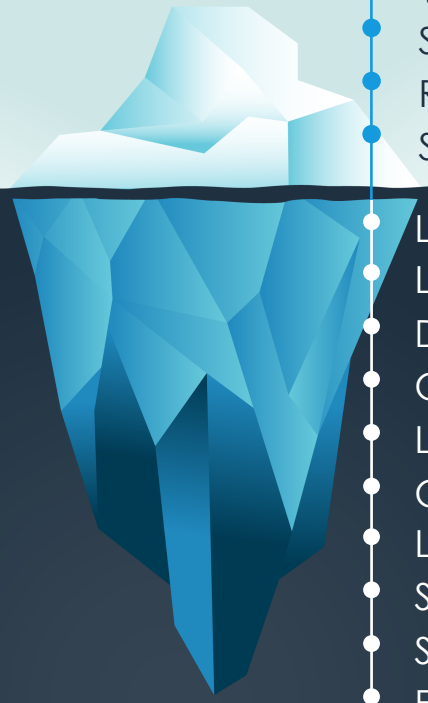
- Human judgment is inconsistent and cannot be standardized
- Visual perception misses small but critical particles
- Results depend heavily on who, where, and how the check is performed
- Without hard data, there is no standard for comparison or improvement
- Problems are often discovered only after downstream failures, resulting in costs of non-quality



The price of non-quality

Visible costs

- Tangible
- Easy to measure
- Directly related to failure



- Warranty claims
- Scrap of products
- Rework of products
- Shipping costs

Hidden costs

- Intangible
- Difficult to measure
- Indirectly related to failure

- Lost customer trust & satisfaction
- Lost opportunities
- Damage of brand reputation
- Cost of root cause analyses
- Lower employee morale from reworks
- Costly engineering changes
- Loss of personal resources
- Strained supplier relationships (blame game)
- Sorting of defective goods
- Extra packaging & logistics costs

Quantified particle contamination control

to ensure clean processes & products

Surface Particle Counting process control

CLEAN AIR IN CLEANROOMS **ISO14644-1**

closed loop on overcleaning air

CLEAN PROCESS **ISO14644-17** PDRL

closed loop on clean process

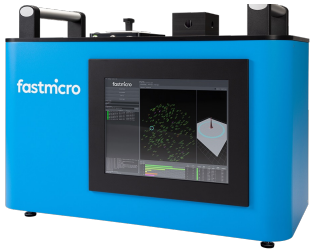
CLEAN PRODUCTS **ISO14644-9** SCP

speed up through-put by pre-scan

ANALYSIS

Particle traps
2- to 12-inch wafers and sampler

Continuous monitoring



Surface sampling & qualification

Direct inspection on standardized products

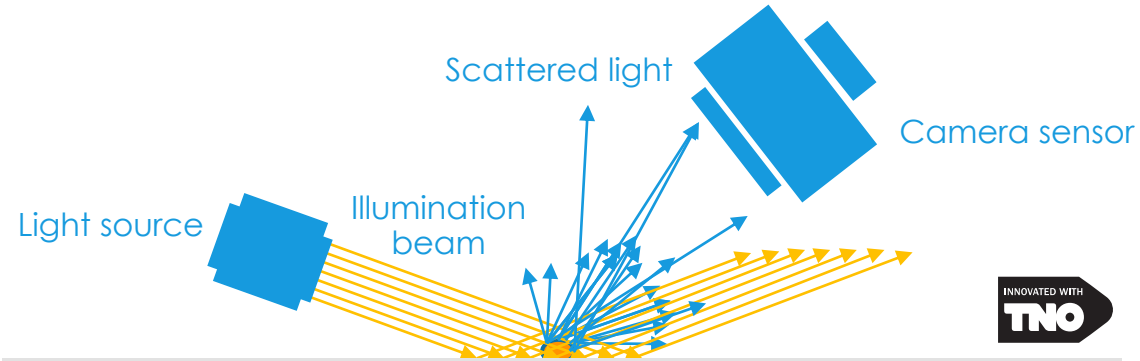
Particle
Deposition Rate monitoring

Surface Cleanliness
by counting particle concentration

Fast particle detection at sub-micron level

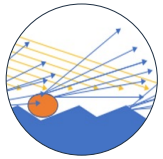
Using patented light scattering technology

Equipment

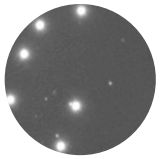


Design principles

Dark environment

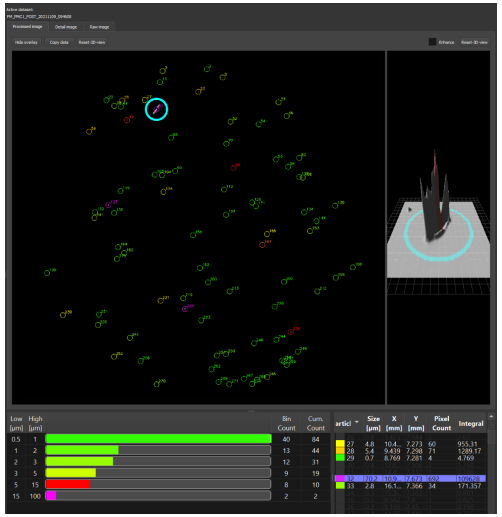


Smooth surfaces

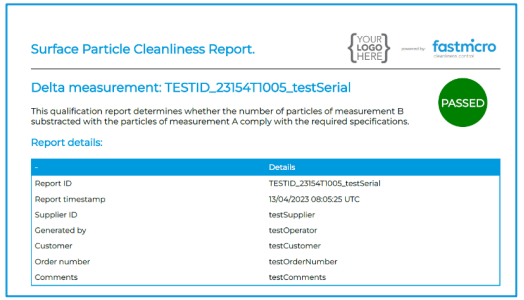


Size calibration on PSL shape & optical properties (according to the NIST standard)

Software



Advanced analysis



ISO standards-based reporting

Service

1

SLA Preventive Maintenance & Calibration
To secure (synchronised) performance

2

SLA On-Site Repair
To secure fast response time (5 days)

Benefits Fastmicro technology at microscale

Fast

Imaging in seconds

Quantitative

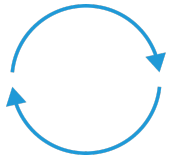
Measurement and qualification reports

Easy to operate

Operator independent

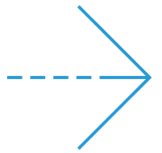
Accurate

High-resolution measurement (quantity, position, size)



Consistent

Objective measurements, time after time



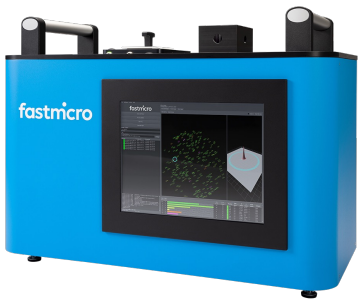
High throughput

Processing in less than a minute

Product offering

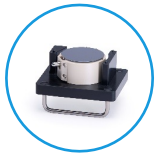
Covering the entire semiconductor value & supply chain

Sample Scanner
for clean products



Fastmicro SP Sampler

PMC 2.0 in a box



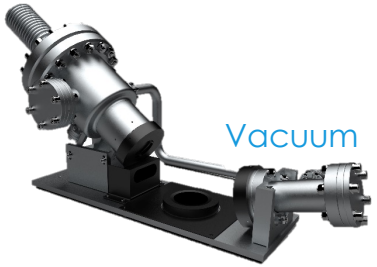
2-inch Witness Wafer

Applications

- Clean product qualification
- Clean assembly qualification
- Cleaning process qualification
- Cleanroom cleanliness monitoring
- Workspace cleanliness monitoring

Particle Fallout Scanner
for clean processes

Ambient



Vacuum

2-inch Witness Wafer

Applications

- Continuous cleanroom cleanliness monitoring
- Continuous workspace cleanliness monitoring
- Continuous in-situ cleanliness monitoring

Particle Defect Inspection System
for process control

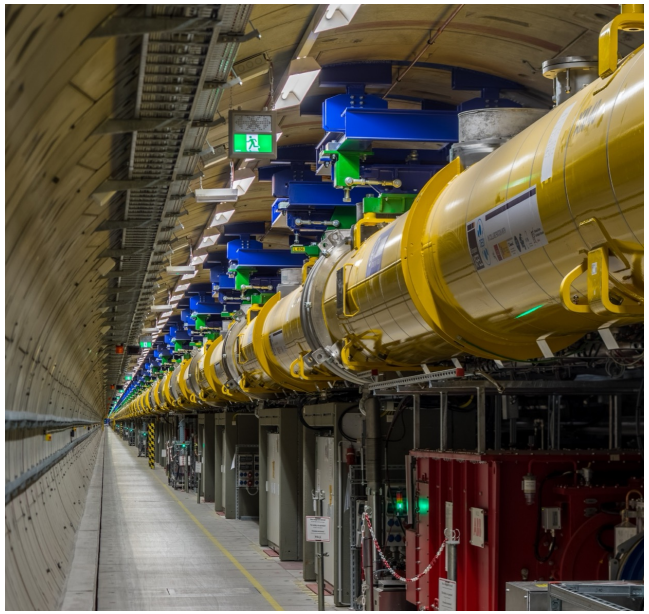
Manual

Automated

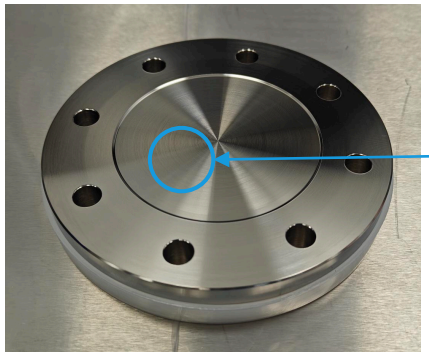
Applications

- Wafer inspection
- Pellicle inspection
- Reticle inspection

Use case: Cleanliness Validation High Vacuum Flanges



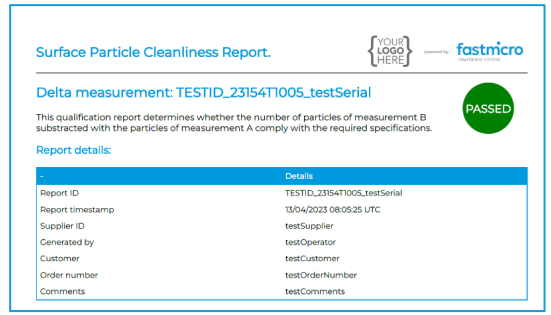
The accelerator section of the XFEL with its yellow superconducting accelerator. Copyright DESY / Dirk Nölle



Sampled area

Flanges to be validated on surface particle cleanliness

Instruction
Sampler tool



ISO standards-based reporting

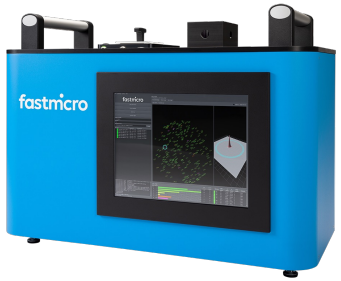
9

Fastmicro cleanliness control value

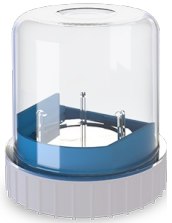
fastmicro cleanliness control =

Effective cleanliness control

Quantitative × Fast × Easy to operate × Accurate × Consistent



System costs / Lifetime + Secured performance + Consumable



Total cleanliness control cost

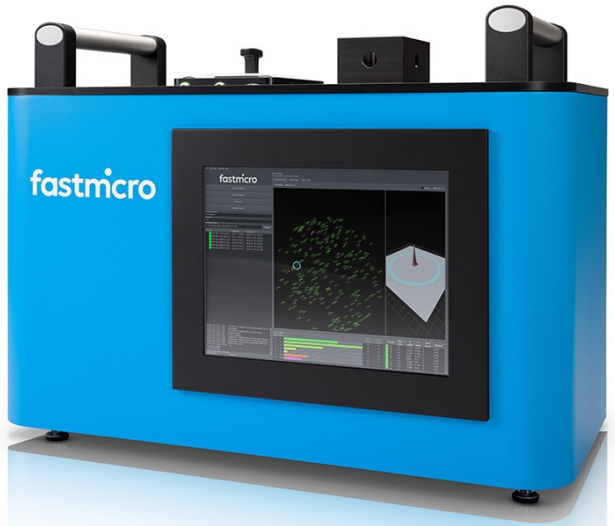
thank you for your attention

Sample Scanner

Even for rough, curved, difficult to reach surfaces

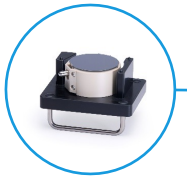
Key Specifications

- Measures particles from 0.5 micrometers
- Imaging in seconds, measurement results in less than one minute
- Field of View particle detection area:
  - Ø 14 mm PMC 2.0
  - Ø 20 mm Fastmicro Sampler and 2-inch wafer
- Calibration using NIST-certified PSL particles
- Samplers have more than 90% particle pickup efficiency
- Samplers leave no measurable residue
- Use with PMC 2.0 and the new Fastmicro SP Sampler for indirect measurements, and with 2-inch Wafer for fallout measurements



PMC 2.0 in a box
Interface (default) + recipe

Fastmicro SP Sampler
Interface + recipe



2-inch Wafer
Interface + recipe

Quantitative
Measurement and qualification reports

Easy to operate
Operator independent

Consistent
Objective measurements, time after time

Key benefits

fastmicro

Quality control
Assemblies cleanliness

Quality control
Part cleanliness

Quality control
Cleaning process

Cleanroom cleanliness monitoring

Workspace cleanliness monitoring

Applications

Particle Fallout Scanner

For continuous monitoring of particle deposition in equipment and cleanrooms

Key Specifications

- Continuous particle deposition measurement on witness wafer
- Measurement interval 10 seconds or at longer interval setting
- Particle detection from 0.5 µm
- 2-inch Field of View
- Standard KLARF and .csv export
- Compact size, (L×W×H) 300 × 100 × 200 mm
- Including Fastmicro eBox for local processing, Linux OS

Why particle deposition measurement?

Process validation at the critical application surface area is the only true indicator of effective contamination control

Quantitative
Measurement and qualification reports

Easy to operate
Operator independent

Consistent
Objective measurements, time after time

Fast
Measurement interval in 10 seconds

Key benefits

Continuous Cleanroom monitoring

Continuous Workspace monitoring

Continuous In-stu process monitoring

Batch measurement of 2-inch wafers

Applications