



Enhancing wet bench performance for Si wet etching under exhaust limitations via Levitronix® BFS

Stefan Zürcher (Head of Process Technology)

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AP&S at a glance

Integration of Levitronix® BFS

- Baseline situation
- Feasibility study
- Validation
- Equipment qualification

Review by AP&S SimLAB

Conclusion

AP&S at a glance



A leading expert in wet process technology



20+ years of experience



cleaning | etching | plating | drying



>850 installed base



Batch | Singlewafer equipment
Production support equipment



~230 employees



Fully focussed on semiconductor industry



Cleaning

Standard RCA

Pre-/Post Diffusion

Pre-/Post EPI

Post-CMP

Bevel Clean

Polymer Removal

Carrier/Boxes

... and many more!



Etching

Oxide

Nitride

(Poly-) Si

III-V

Stress relief

TSV / TGV

various metals

... and many more!



Drying

CMOS

MEMS

Photonics

planar surfaces

... and many more!



Advanced Packaging

eless-UBM

eless-Cu (seed)

TGV etch/clean

... and many more!



DemoLAB

Process R&D

Proof-of-concept

Process validation

Pre-Qualification

Sample production

... and many more!



SimLAB

Tool R&D

Tool optimization

Process optimization

Simulation service

... and many more!

Markets:

Semiconductor

Photonics

MEMS

...and more

Batch Immersion (up to 300mm)



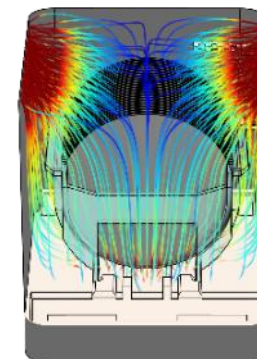
Singlewafer (up to 300mm)



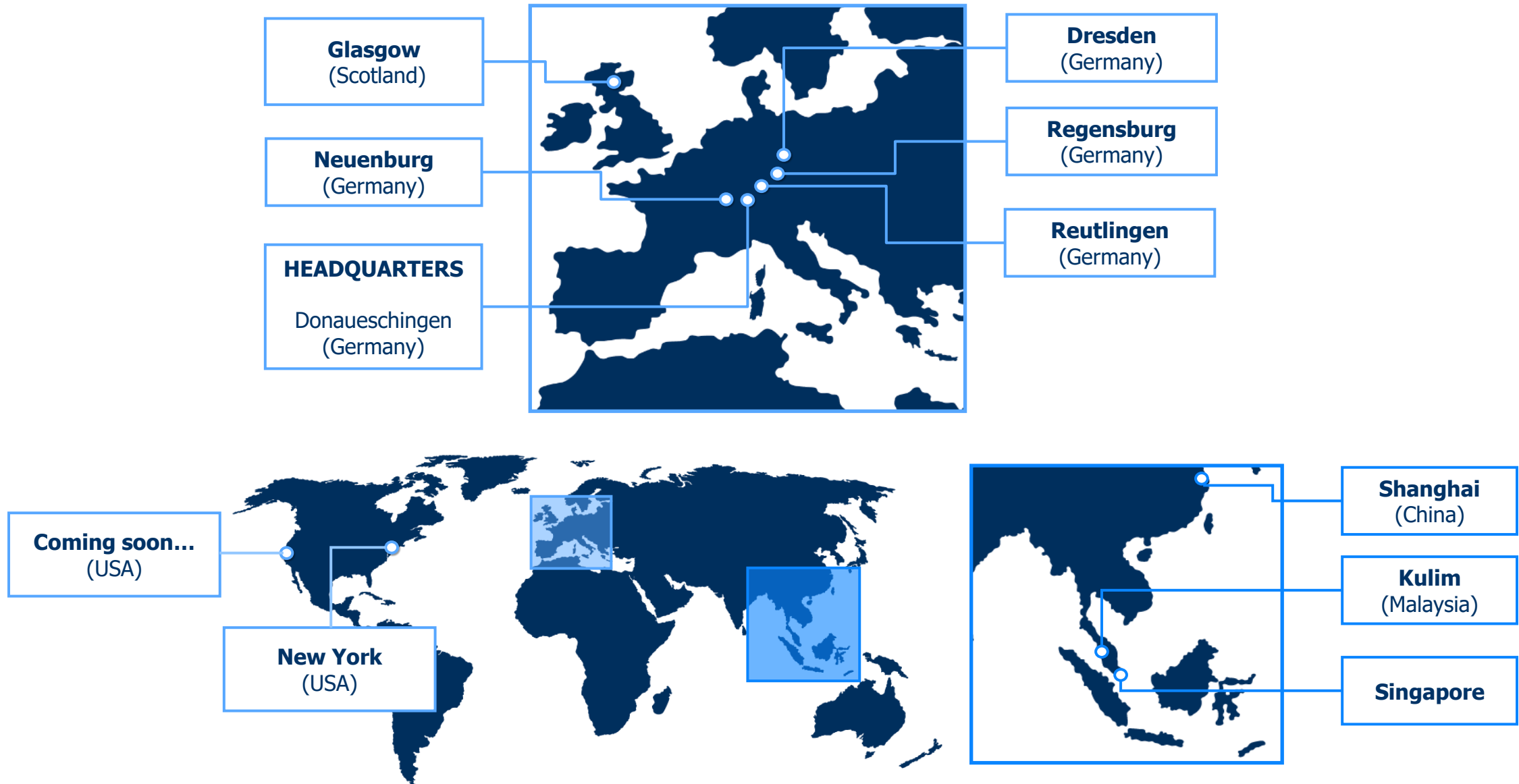
Carrier/Boxes

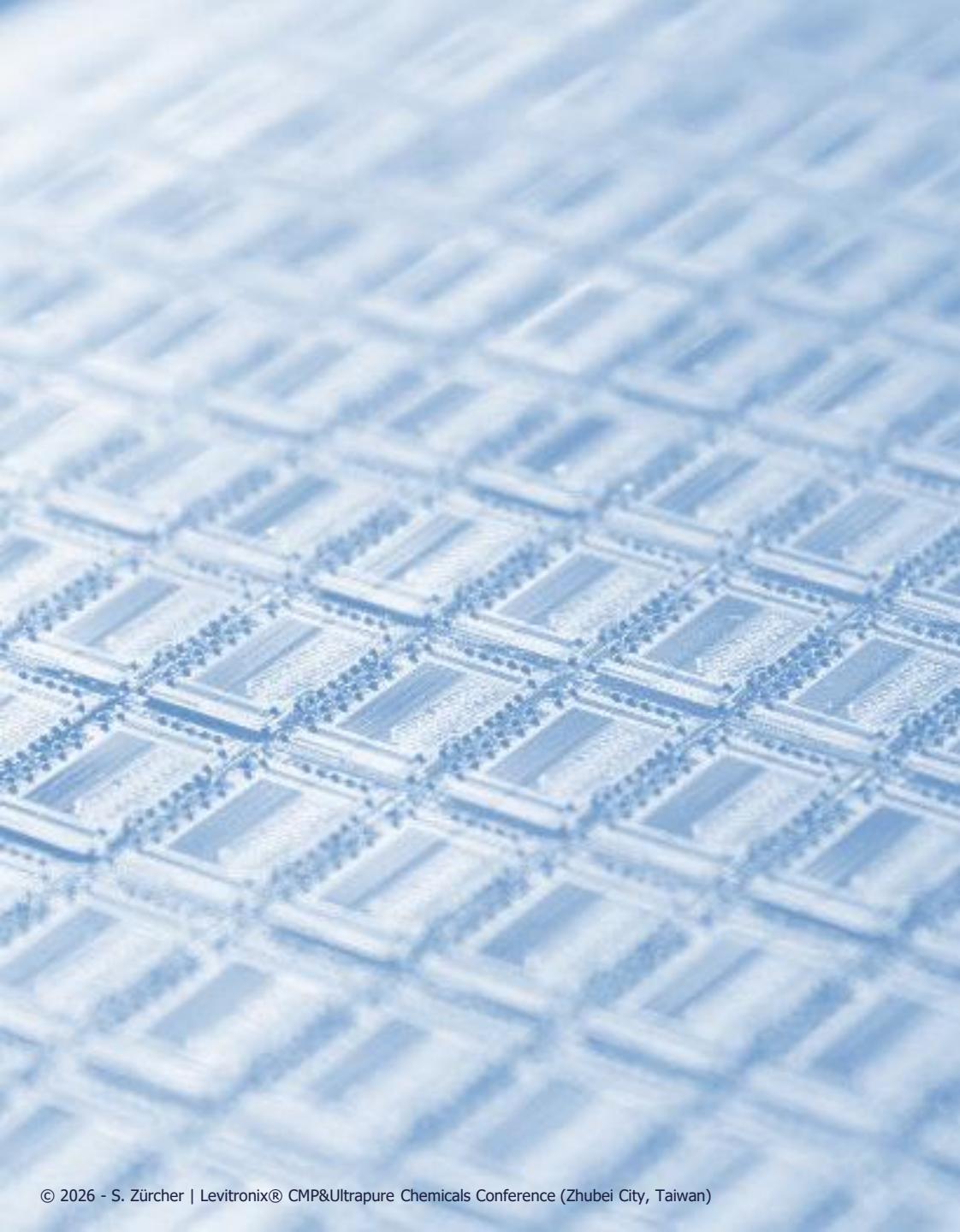


Production support



Locations & Service network



A close-up, high-magnification photograph of a microchip, showing a grid of small, rectangular, metallic-looking structures on a blue substrate.

Why enhance wet bench performance by a Levitronix® bearingless fan system?

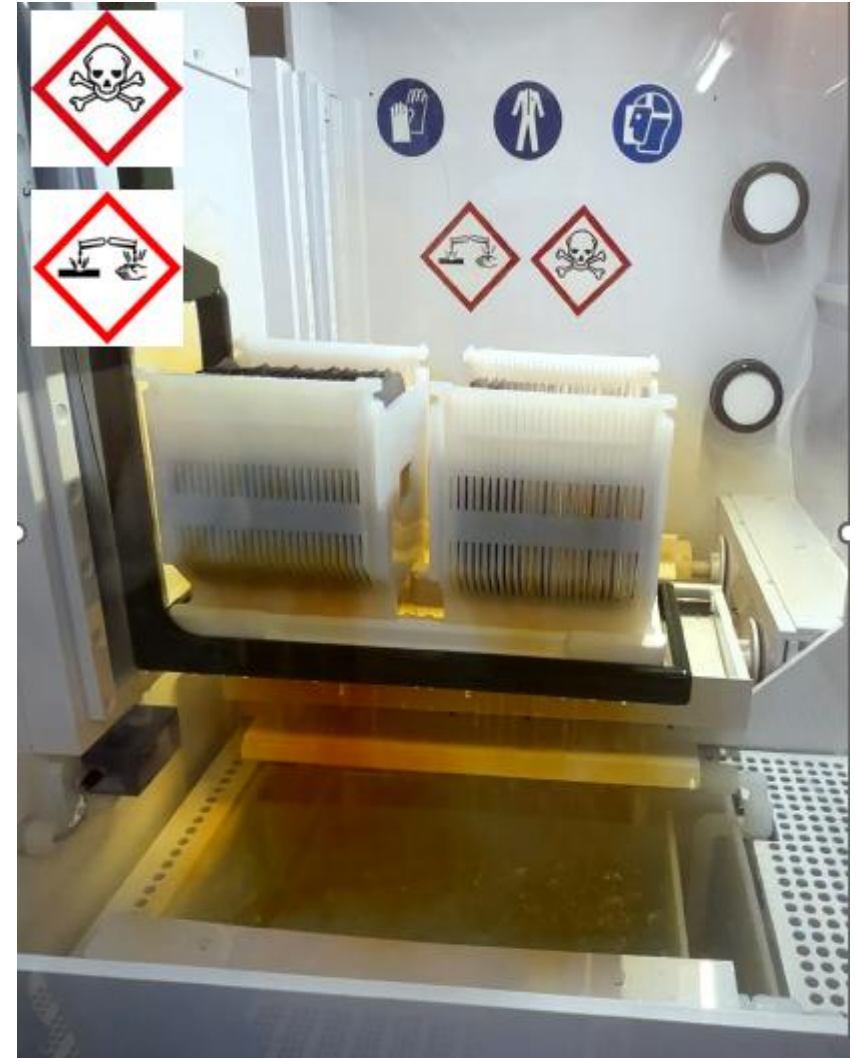
Installation of a new wet bench for Si wet etching / chemical polishing

- Etchant: mixture of HF/HNO₃/CH₃COOH @25°C
- removal of 2-5µm Si from each wafer surface following mechanical grinding

→ **formation of highly toxic and corrosive NO_x-containing vapours during wafer transfer**



Equipment released for production after successful tool and process qualification!



After ~8 weeks of full production:

Equipment operation SUSPENDED



following the installation of additional wet benches connected on same exhaust main line!

- significant deviations from specified exhaust flow rates & vacuum level
- high risk to personell safety and equipment integrity
- ➔ facility exhaust system already operating @100%



Wetbench

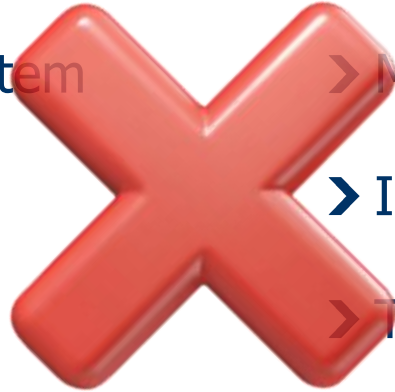
➤ Modification of internal exhaust system

Customer facility

➤ Modification of overall exhaust system

➤ Increase volume/pressure capacity

➤ Temporary shut-down of single wet benches



Selected and validated technical solution

➔ Temporary boost of extraction rate required

➔ Implementation at equipment level, as not possible by facility



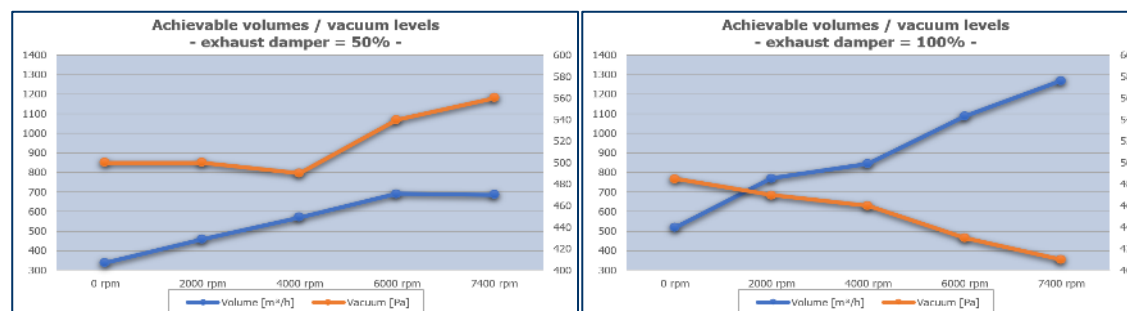
Installation of a Levitronix® BFS-i10

Validation @AP&S DemoLAB prior to integration in customer wet bench

➤ Successful mechanical/electrical integration



➤ Verification of achievable volumes and vacuum levels (equipment)



➤ Assessment of the impact on main exhaust system



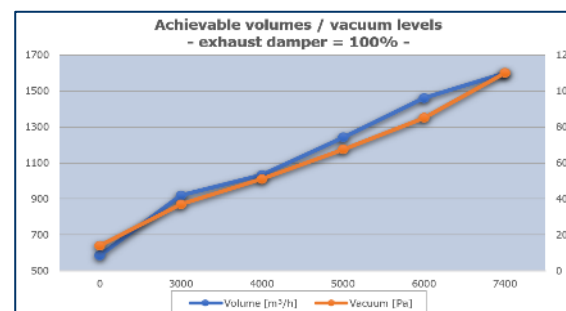
No adverse impact on the pressure-controlled facility exhaust fan observed

Integration in customer wet bench

- Successful mechanical/electrical integration



- Verification of achievable volumes and vacuum levels (equipment)



- Assessment of the impact on main exhaust system

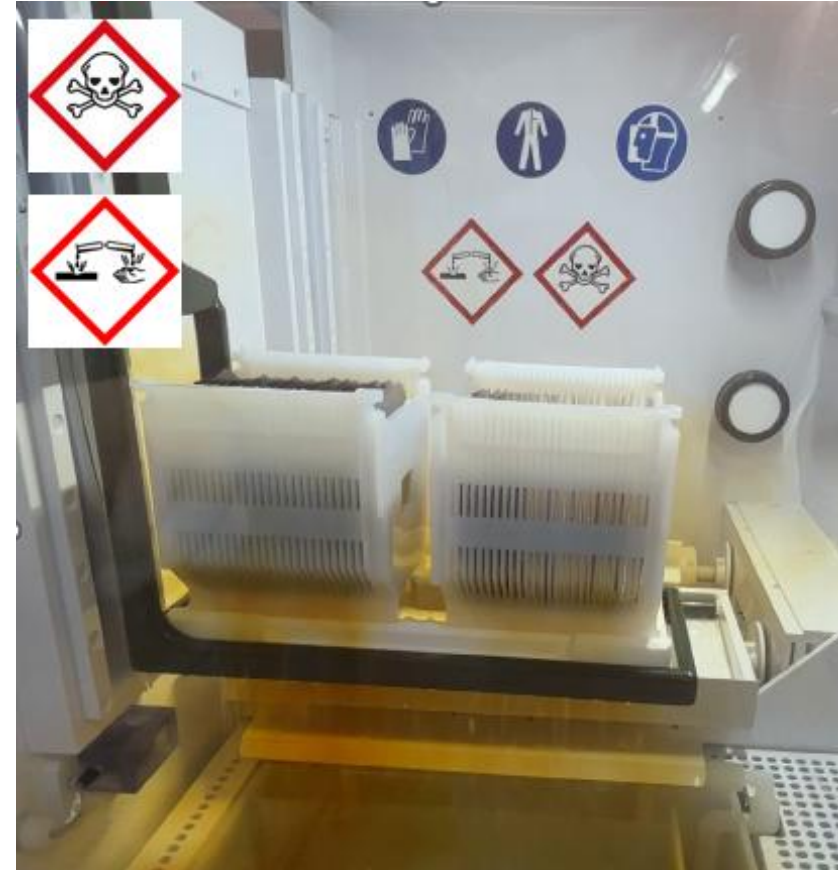


No adverse impact on the pressure-controlled facility exhaust fan observed

Baseline situation



vs. Setup with Levitronix® BFS-i10

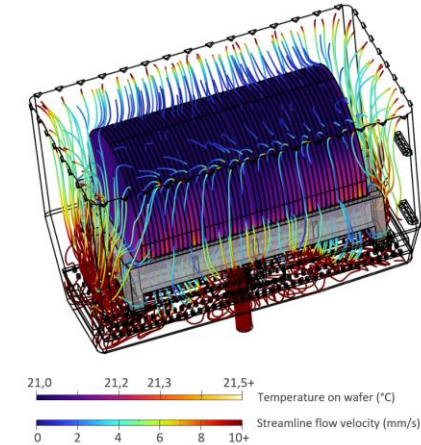


**Successful integration
for production release**

Project review by AP&S SimLAB

- AP&S SimLAB was established in 2025
 - Enhancing understanding of fluid flows and airflow behaviour
 - Simulation-driven process and equipment development
 - Prediction of process conditions and equipment performance
 - Process and equipment optimization

- Project review objectives
 - Raise awareness of facility exhaust limitations in critical wet-processing applications
 - Evaluate risks related to safe equipment operation
 - Demonstrate the impact of individual components (e.g. FFU) on overall system performance



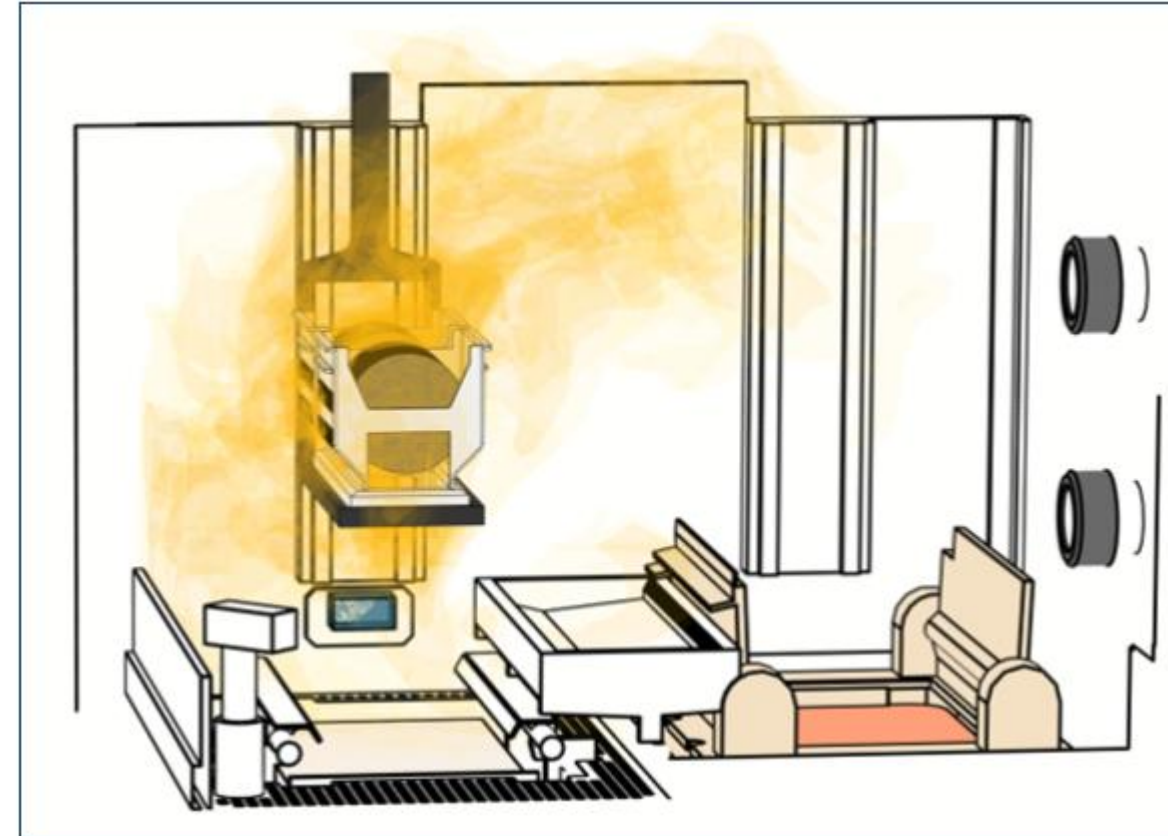
Project review

- installed FFU
- with Levitronix® BFS



Scenario

- installed FFU
- no Levitronix® BFS
- exhaust volume/pressure too low (facility)



Conclusion

- ✓ Successful qualification of a Levitronix® BFS-i10
- ✓ Existing facility exhaust limitations were successfully compensated
- ✓ Levitronix® BFS systems provide additional exhaust capacity and pressure capability
- ✓ Additional Levitronix® BFS configurations have subsequently been qualified

THANK YOU!

Questions?

AP&S International GmbH

Obere Wiesen 9 | 78166 Donaueschingen | Germany

stefan.zuercher@ap-s.de | www.ap-s.de



Stefan Zürcher

Head of Process Technology

