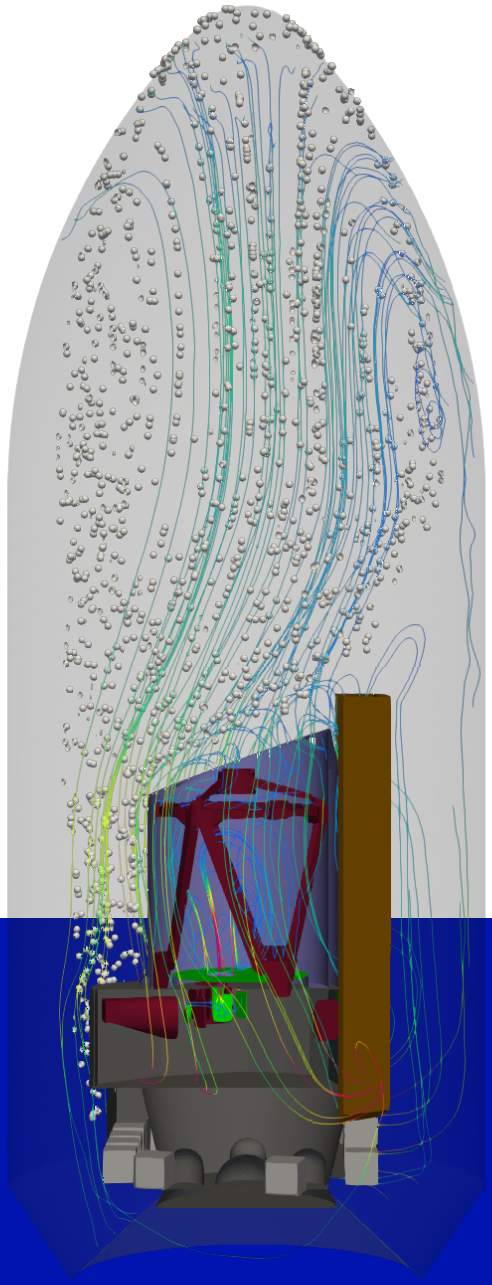
DUSTFLOW



Simulate and Verify Contamination

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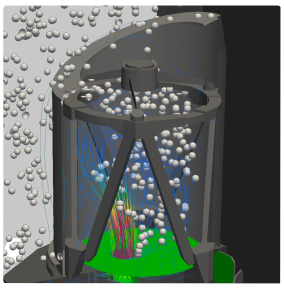
How DUSTFLOW can support you?

1. Predict particulate contamination

Predict particulate contamination under different scenarios by simulating the flow field and particle transport. CFD data can be generated directly in DUSTFLOW or imported from external solvers. **The contamination simulation is decoupled from the CFD** analysis, making the process much faster and easier.



2. Simulate prelaunch and launch phase

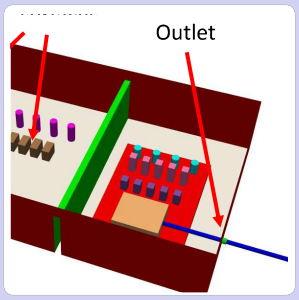
DUSTFLOW is designed to model the pre-launch and launch phases under the fairing. **It accounts for** depressurisation, shocks, vibrations, and other factors affecting particle detachment and transport to sensitive surfaces. The simulation results provide information on the **time evolution of particle concentration.**

3. Optimise cleanroom operations

DUSTFLOW can be **applied to any situation where particulate contamination transport is important**, including cleanroom environments. The simulation results provide insights into how to **achieve the required cleanliness level** with fewer resources or assess contamination risks under different scenarios.

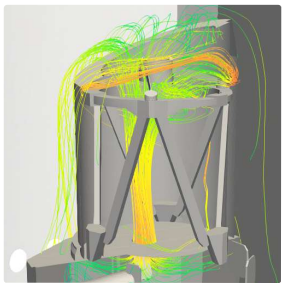
4. Venting, purging and rarefied flow

Purging with multiphase flows can be simulated to assess humidity levels or the concentration of specific gases. **Venting** analysis provides insight into pressure evolution over time in closed cavities. DUSTFLOW also includes the **DMSC solver** for rarefied gas simulations.

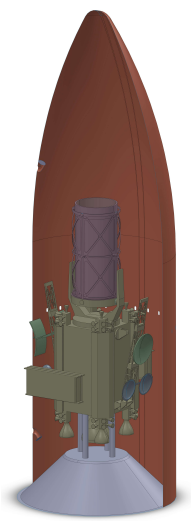


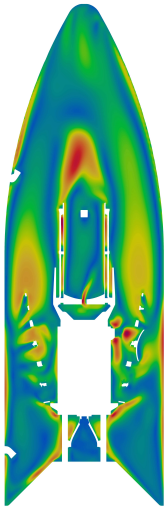
5. Supporting your team were you need

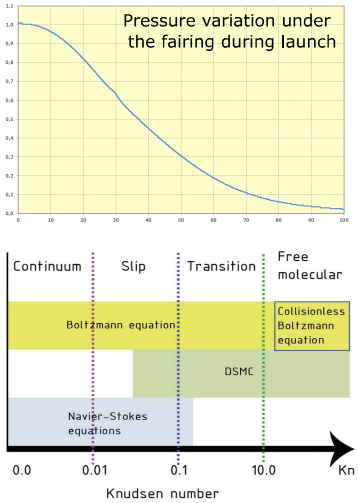
Simulations often require CFD expertise, which is typically beyond the scope of contamination teams. DUSTFLOW allows these two phases to be decoupled — CFD can be prepared independently (by us or another group), while your team focuses on the particle transport analysis.

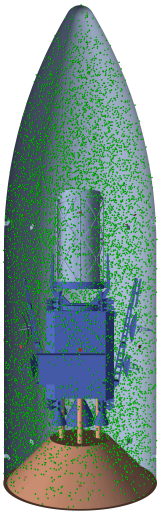


How DUSTFLOW works?





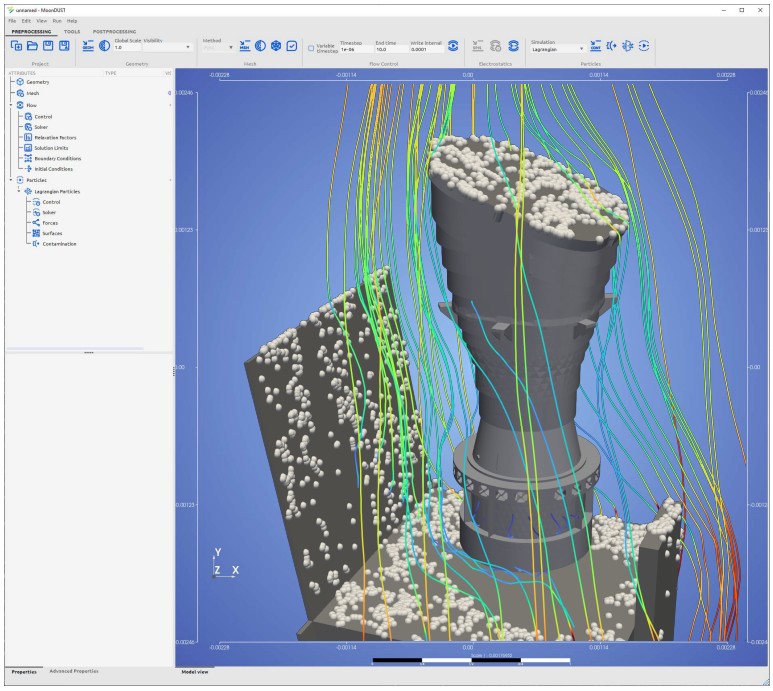


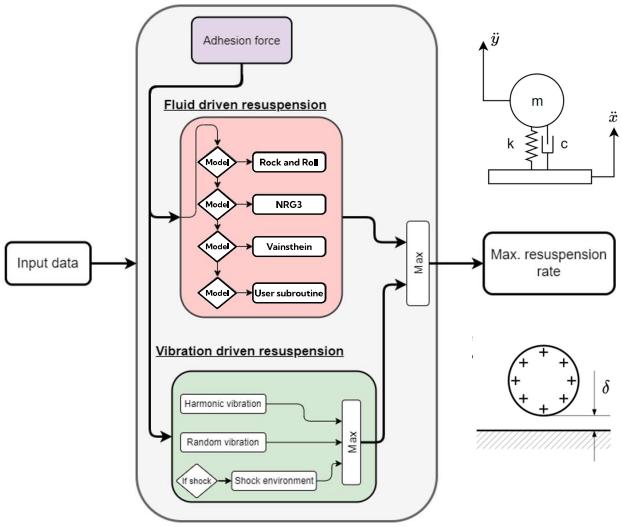


Geometry + BC → Flow simulation → Prelaunch: Ventilation & Purging; Launch: Navier-Stokes FVM; Launch: DSMC → Particle transport simulation

Make informed decisions supported by physics-based modelling

- **Validated** deposition and resuspension models
- Account for **vibration** based release and **electrostatics**
- **Optimised** contamination control
- **Decoupled** flow and particle simulation
- Stand alone **software** or combined with **consultancy**





CIM LAB BY CIM-MES

Who we are?

We are a research and engineering partner, combining design expertise with advanced simulation methods (FEM, CFD, and multiphysics). **CIM-lab**, a division of CIM-mes, develops innovative modelling techniques and engineering software for space applications. In cooperation with **ESA**, we have created several software tools — **DUSTFLOW**, **MoonDUST**, and **TEDMAP 3D** — supporting contamination and thermal analyses in space projects.

How we work?

1. Free consultancy session
2. Offer, schedule and scope
3. Execution and intermediate checks
4. Joint optimisation and revisions
5. Report, documentation and follow up

CIM-mes provides valuable support and the necessary calculations in a very short time, which repeatedly accelerates our work and design decisions. We value working with them – it is substantive, fast and predictable at every stage.

Filip Ljubas
Lead Engineer in **Kelvion**

Among the others, we were trusted by

WÄRTSILÄ · esa · AVIO · BLUE ORIGIN · WEIZMANN INSTITUTE OF SCIENCE · Kelvion

Ready for the next step? Contact us, and we will help define the scope of work and align with your project requirements.

CIM LAB BY CIM-MES

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You whish to discuss your project?

Schedule a free technical consultation with our engineer.

Scan the QR code to book a slot.