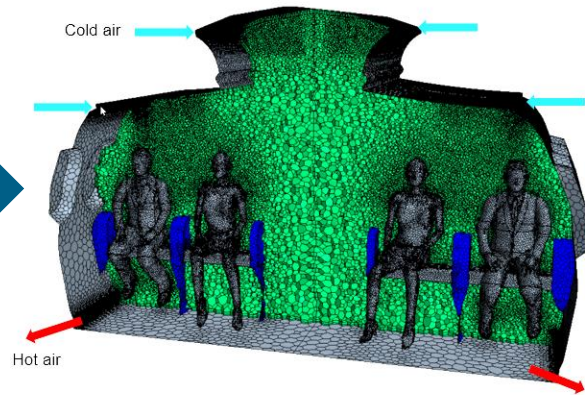
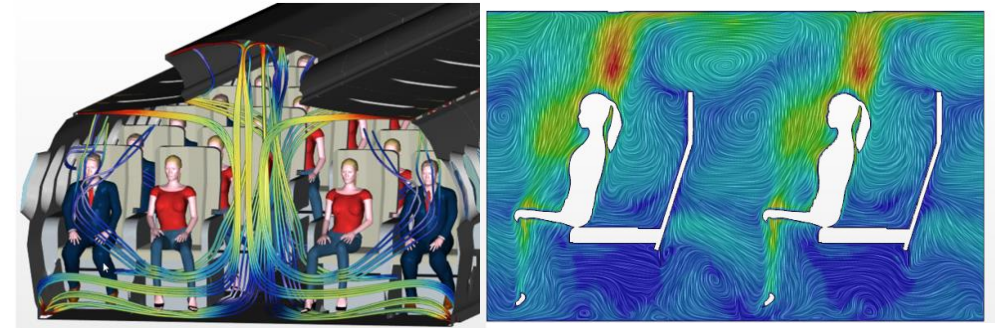


Simulating complex airflow in a ventilated environment

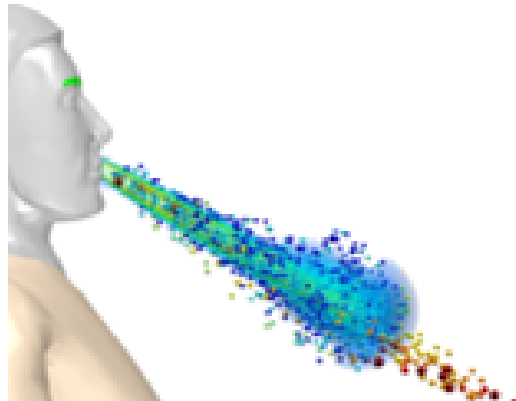
1. Build Grid



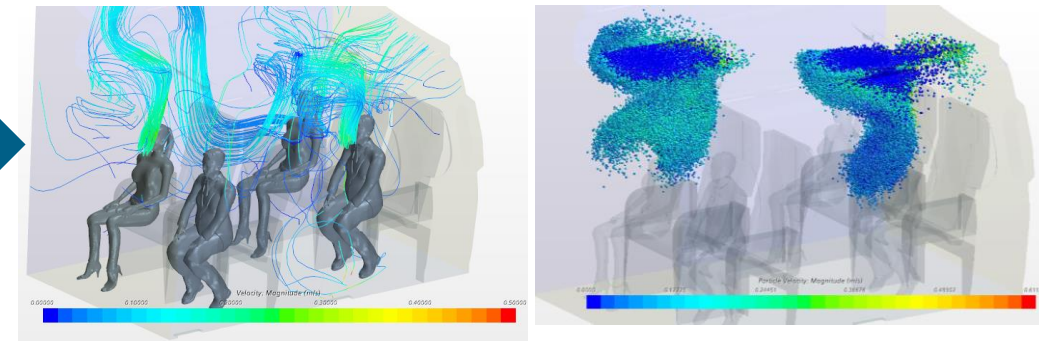
2. Model Airflow



3. Inject Particles

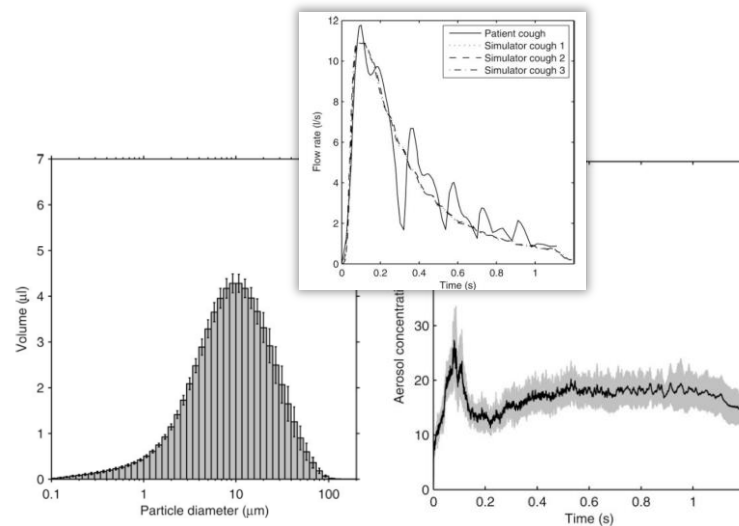
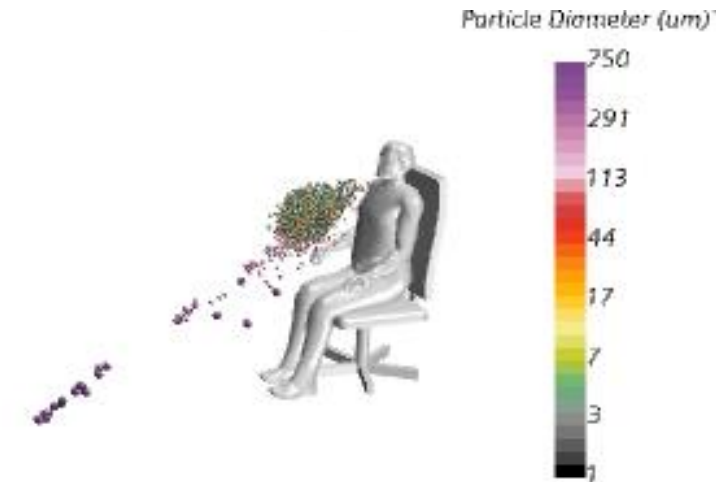
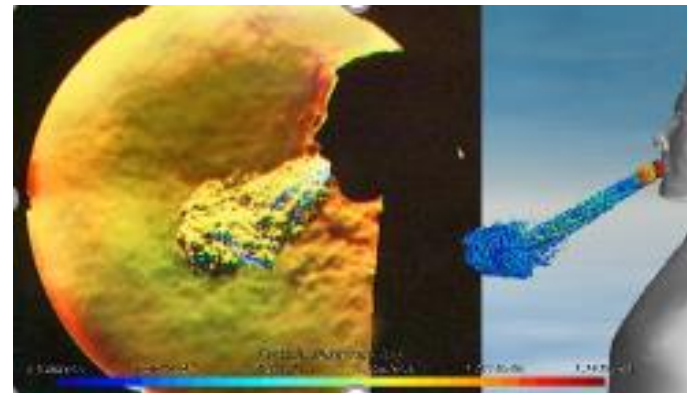


4. Track Particles

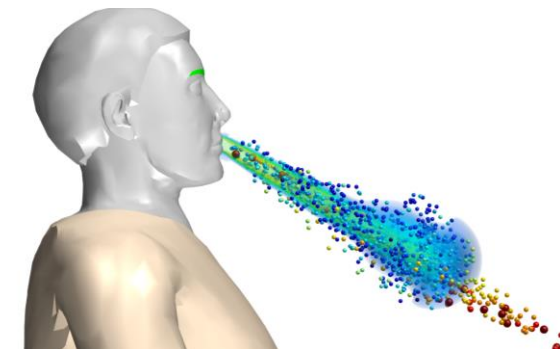
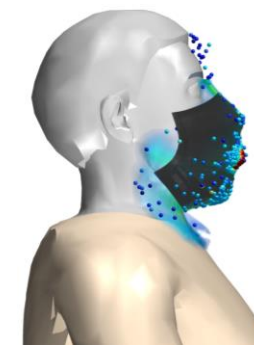
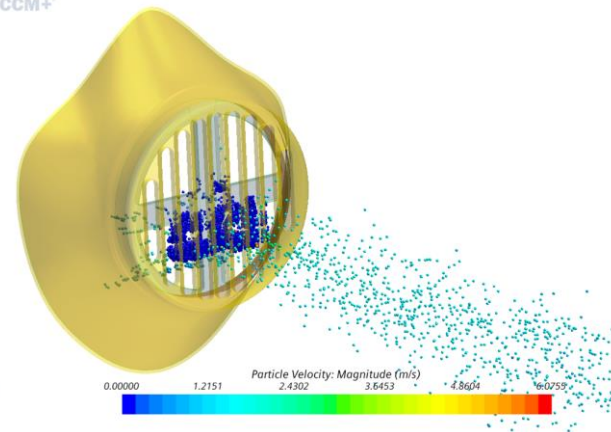


Simulating breathing / coughing / sneezing / mask on / mask off conditions

- Realistic mass flow rates, particle counts and sizes taken from available literature.
- Mask filter design optimized based on mask fit and filtration performance.



STAR-CCM+



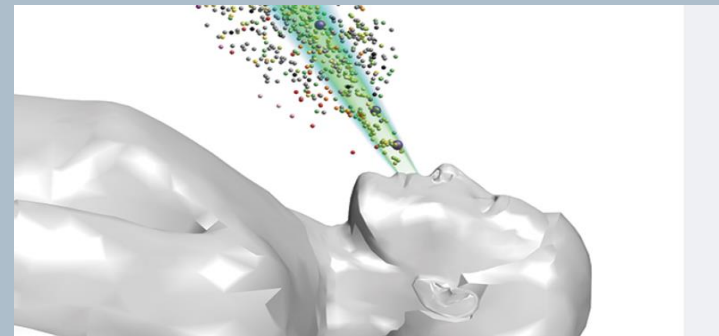
Medevac Cabin Analysis

Potential COVID-19 Contamination

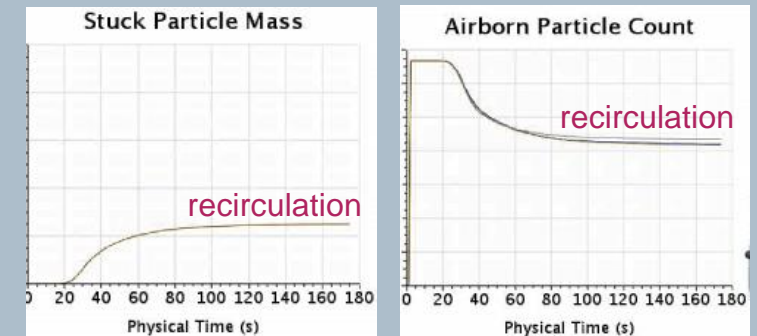


- Precondition with steady state RANS cabin airflow
- Turbulence modeled
- Transient multi-phase cabin with +100,000 Lagrangian particles
- Solve quickly using High Performance Computing cluster

Sick passenger contaminants injected and tracked throughout the aircraft cabin using STAR-CCM+ multi-phase functionality



Simulation tracks particles in time and predicts where different size particles land



Particle incident mass and residence times predicted

- Output aides in the design of the cabin ventilation & aircrew safety procedures
- Design optimization possible varying cabin, patient density or air flow conditions

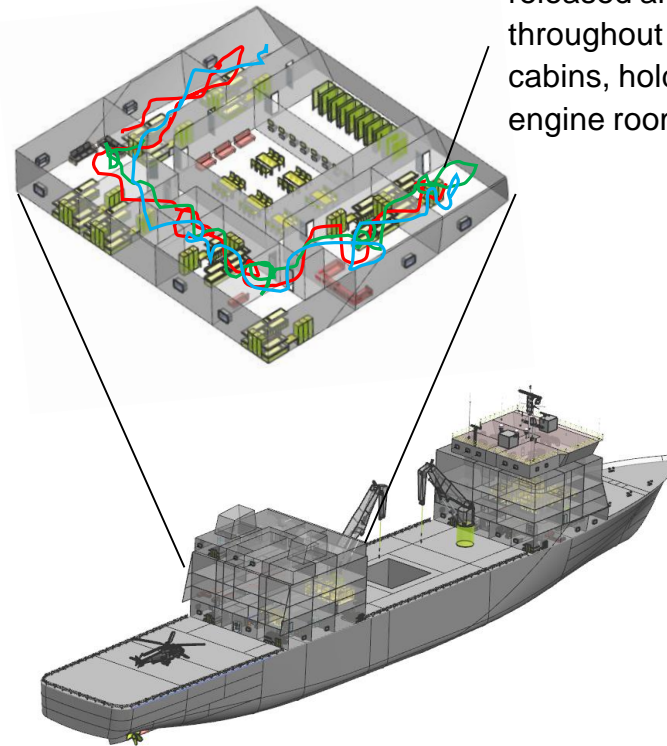
“The airflow study enables mission planners to visualize how the air and any entrained droplets would move inside the plane’s flight deck and cargo bay so they can implement measures to control the movement of droplets and best mitigate the risks to airmen.”

Kevin Newmeyer, Def. Dept. HPC Acting Deputy Director
Source: www.defenseone.com, 4/13/2020



Simulating complex airflow in a ventilated environment

- Large complex interiors or detailed small confined areas can be modeled easily using the STAR-CCM+ surface wrapping feature.
- Ventilation and room air flow conditions can be established with HVAC fans, filters & heat exchangers included.
- Multi-phase CFD simulations predict particle paths and residence times for different size contaminants.
- Design optimization can aid in ventilation system performance and help establish quarantine guidelines.



Contaminants can be released and tracked throughout the ship cabins, hold, bridge or engine room.

