

**Semester project/Master project : Simulation of air ventilation in a rSOC system using Comsol/SolidWorks**

A rSOC (reversible Solid Oxide Cell) system is currently under construction at the GEM laboratory. The system will run either in fuel cell or electrolysis mode, producing or consuming toxic and flammable gases such as H<sub>2</sub>, CO and CH<sub>4</sub>.

The rSOC is enclosed in a ventilated closet. In case of a gas leakage in the system, the gas will accumulate in the closet, leading to a potentially explosive or highly toxic atmosphere. To avoid this, a ventilation must continuously supply air through the system to remove the potential leaks of gases and flush it to the outside of the building.

The ventilation must ensure a certain air flow everywhere in the closet, especially around pipes and valves conducting dangerous gases. There should be no “dead zones” in the closet, where the air flow is too low to remove the potential gas leakages. To ensure this, a preliminary flow simulation must be performed on the system.

In this project, the student will :

- Receive a simplified 3D of the rSOC system and implement it into Comsol or any adapted simulation software to determine the pattern of the air flow in the closet
- Locate any dead zones and propose realistic solutions to delete it
- Present a final design that will ensure a proper ventilation of the whole closet

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