

AGENCY

Concurrent Engineering takes students to the edge of the Solar System

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30 university students from 12 different [ESA Member States and Canada](#) have begun the new year in style by attending [ESA Academy's latest Concurrent Engineering Workshop](#). Held from 14 to 17 January 2020, the event took place at [ESA Academy's Training and Learning Facility, ESA-ESEC, Belgium](#) -- which is also home to [ESA's educational Concurrent Design Facility \(CDF\)](#). Providing tuition and technical expertise were two [ESA Systems Engineers](#), supported by a [National Trainee](#) as a [Systems Engineering Assistant](#), all from [ESA's Systems and Concurrent Engineering Section](#).

The workshop's goal was to familiarise students with the [Concurrent Engineering](#) approach, and its many benefits for spacecraft design. Participants would also gain experience with the [Open Concurrent Design Tool \(OCDT\)](#) used in [ESA's CDF](#).

— University students learning about the Concurrent Engineering approach

On the very first day, the students were given their challenge: use Concurrent Engineering to design a mission, called EDGE, to explore our Solar System's heliopause – the

limiting region where the Sun's solar wind is dissipated by the interstellar medium. To make this ambitious task even more difficult, EDGE would need to be very low-cost, making [CubeSat's](#) technology the practical choice. Could the students work together to complete their design in just four days?

A French student from Institut Polytechnique des Sciences Avancées explained, *"It was amazing to share a few days with people with the same passion for space, because if you put them together you can only have an amazing result. It was perfectly balanced between working hard, being super focussed, having fun, improving technical skills, communication skills, working as a big team and celebrating all together."*

The participants got to work right away, splitting into different teams to cover the vital aspects:

1. Configuration
2. Structures
3. Trajectory Analysis
4. Propulsion
5. Attitude and Orbit Control Subsystems (AOCS)
6. Power
7. Thermal
8. Communications & Data Handling
9. Optics & Sensors

The [ESA Systems Engineers](#) encouraged the students to create several iterations of their designs, with each one an improvement on the previous effort. Assessing the needs and functions of each team was an important early step, before proceeding to consolidate the overall design.

It did not take long before the scale of the task became apparent. Reaching the edge of the Solar System is hugely challenging, especially when restricted to only CubeSats! To tackle the volume and mass constraints while guaranteeing the scientific performance of the mission, they had to consider many different trajectories and system options, including electrical propulsion, gravity assists, a large deployable antenna and a solar reflector.