

AGENCY

Students use Concurrent Engineering to design a Moon mission with impact!

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As Earth's natural satellite, the Moon is a well-studied celestial object. However, many secrets remain, and unmanned probes are an excellent way of continuing our investigations. This was the theme of ESA Academy's latest Concurrent Engineering Workshop, held from 20 – 23 February 2018.

Hosted at [ESA Academy's Training and Learning Centre](#), ESA-ESEC, Belgium, and attended by 22 university students from 12 different ESA Member and Associate States, this Workshop sought to give participants an intensive introduction to the Concurrent Engineering design method. On-hand to assist were two System Engineers from ESA's Systems and Concurrent Engineering section at [ESTEC](#).

The Workshop began with an introduction to Concurrent Engineering and the Academy's [Concurrent Design Facility \(CDF\)](#). Then there were exercises for students to familiarise themselves with the Open Concurrent Design Tool ([OCDT](#)), which is the actual tool used by ESA in professional CDF studies. Once the participants had demonstrated an understanding of the core concepts, their mission was revealed: use Concurrent Engineering to design a mission to the Moon! . The mission involves a stack of two micro satellites that shall reach the Moon and separate before arrival.

— The Moon is a tantalising target for exploration.

The LUNar Crash mission – or LUNCH for short – had an ambitious goal: observe the crater, scan for water particles and ejecta plume generated by crashing an impactor into the surface of the MoonTo achieve this, the students needed to design an impactor and an observer. As an additional challenge, the observer would then be tasked with crash-landing on the surface, but also with continuing its observation after impacting with the Moon itself. A difficult task indeed!

A British student from the University of Surrey explained, *"The Workshop was an amazing opportunity to gain experience in a realistic, multi-disciplinary and multi-lingual environment. It's amazing how much you can achieve with the right support and direction!"*

- The students were divided into teams to cover the different subsystems:
- The LUNCH mission would see a probe crash into the Moon, and analyse material ejected
1. Configuration
 2. Structure & Mechanisms
 3. Propulsion
 4. Mission Analysis
 5. Attitude and Orbit Control Subsystem (AOCS)
 6. Power
 7. Thermal
 8. Optics & Sensors
 9. Communication & Data Handling

On the Workshop's second day the students started their task in earnest. Each team began designing their subsystems, defining their concept of operation and making simulations. Their first iteration was a good attempt, but the design required further refinement in order to meet the mission. Undeterred, the students spent their remaining days refining and improving, until they finally froze their design.