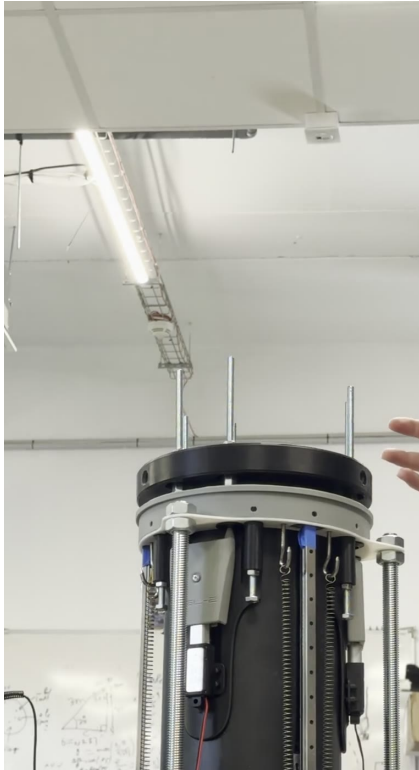


ESL-2 recovery system, nose cone ejection prototype

Florian Havard, ESTACA

ESL program, ESO student society, 2025 to 2026

ESL is a multi-year experimental rocket program. After the maiden flight of ESL-1 (July 11, 2025, about 2,800 m apogee), I led the recovery team of ESL-2, the program's second rocket. The nose cone ejection mechanism fits in a 25 mm thick annular volume (200 mm outer diameter, 150 mm inner diameter) that also has to clear a 10 m² parachute. Spring stiffness sized in Matlab, all the recovery system CAD in Fusion 360. Prototype built from a machined steel tube and PETG and nylon printed parts. The three large threaded rods outside belong to the prototype bench frame only. The rings are at the 200 mm nominal diameter, ready to receive the carbon composite skin section.



Locked. The nose cone is held by 6 axial pins released by electric linear actuators. The lock stays closed without power, which reduces the risk of a board reset under liftoff vibration freeing the nose cone.



Released. Once the pins are pulled, the spring-loaded catapult ring pushes the nose cone out. The ring runs on linear rails to limit the risk of binding.

Most subassemblies worked the first time. Issues found during assembly, such as tight clearances and an under-constrained actuator mount, were fixed, and the current system works. Ground, structural and integration tests are planned for 2026-2027.

Full video



youtube.com/shorts/Lv7lk7pJxE



Close-up. Linear rail and carriage, springs, electric linear actuators and 3D printed mounts.