

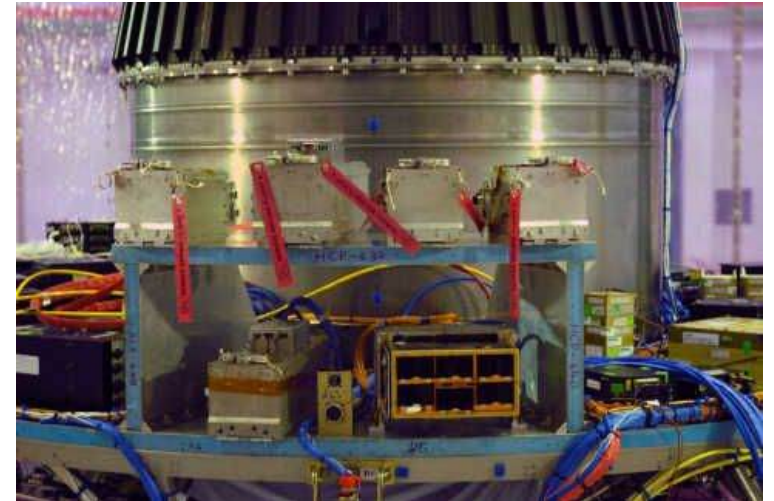
AAUSATLAB - student satellites @ Aalborg University, Denmark



AAUSATLAB

Dep of Electronic Systems
Aalborg University(AAU)

2025



Facilities of today (2025)

- AAUSATLAB – C4-109 – “SATLAB” 90 m2
 - Students only 24/7/365
 - Develop and meeting lab
 - HW, SW, Mission ,...
- AAUSATLAB – C4-107 – “CLEANROOM” 32m2
 - Students and Ben Krøyer only 24/7/365
 - Clean room
 - Assembly room
 - Soldering platform (microscope) and much more
- AAUSATLAB – A3-105 – “GND” (ground control room) 18m2
 - Radio systems for RX,TX
 - GND control (radio layer)
 - Rotor control room
 - Studnets 24/7/365 and as well as for other “roof” users
 - Direct access to roof for cvables (pipes)
- AAUSATLAB – A3-3xx – “ROOF”
 - Parabol dish (Ørsted)
 - Other dish antennas
 - Yagi UHF (and CHF antennas)
 - 24/7/365 access for students
 - Roof shared with other “root antenna” users



Students are in control

- AAUSATLAB is on control by students
- They plan activities
- Weekly coordination meetings
- SATLAB, CLEANROOM are open for students 24/7/365 – It's STUDENTS LAB !
- Working in lab
 - Project project
 - Voluntary work for finalizing the satellites
- No other "foreign" activities takes place in the facilities
- WITHOUT THESE FACILITIES NO STUDENT SATLAB

- Gives them ownership
- Gives high "work load" by the students

- Gives engineers with much more than the normal curriculum can give them

- The model ...



A typical AAU cubesat megaproject takes 2-5 year its all about engagement and additional voluntary work

STEP 1 – Row call project startup/prolog - time to define next mission !!

- Payload camera, space junk detector, AIS ship tracker, you name it
- Initial breakdown of design
 - OBC: OnBoard Computer
 - EPS: Electronic Power System
 - PL: PayLoad
 - ADCS: Attitude Determination & Control System – maneuvering of satellite
 - Tentative budgets: power, communication, weight, volume, ...

STEP 2 – Teaching, AAU project based learning

- Starting point: “step 1”
- Choose a project which fits step 1 and the thematic for the semester and your interests
- Result 1: A functional prototype maybe with not 100% functionality
- Result 2: Result 1 integrated in a functional satellite prototype
- A semester ($\frac{1}{2}$ year) is 50% courses and exercises and 50% project work

STEP 3 – From step 2 to Flight – voluntary work

- Flight is about construct the satellite which shall to to spaced
- Not part of educational CV – its purely voluntary work
- At least same amount of work as step 1 + step 2 !!
- Students set requirement for them self high
- Not all from step 1 + step 2 continue to step 3 and step 4.

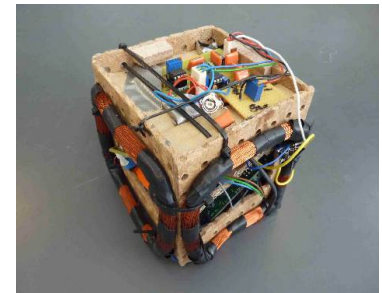
STEP 4 – Final qualification test for launch, and operations – voluntary work

- Handover to launch provider (vibration, temperature, vacuum, functionality,...)
- Launch – you may wait for days, weeks, month
- 1-2-3-4-5-6-7-8-... months/years “ of operations” from your local ground command center



At upper right: AAUSAT II before leaving AAU for launch.

At lowerright: simple 1 semester non magnetic mockup for testing mag coil attitude actuator



Vertical project management

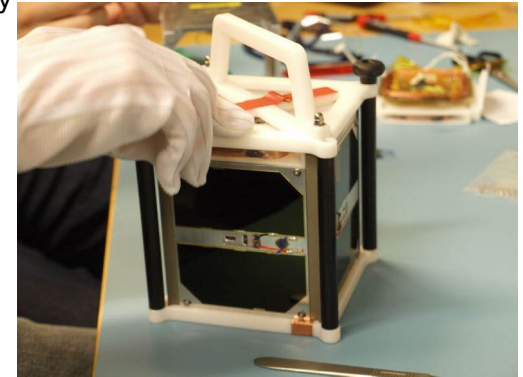
- 1) The three most important things
 - 1) It must be fun for the students
 - 2) It must be fun for the students
 - 3) It must be fun for the students
- 2) Its the students project or mission
 - 1) Ownership → responsibility and engagement
- 3) Students are in control of project at all levels
 - 1) Steering group
 - 2) Project/subsystem/... groups
- 4) Responsibility, operational capabilities etc is an integral part of all management levels
- 5) You have to be ready to be “evaluated” by the rest of the whole crew/team
- 6) Some tough decisions like not flying deployable solar panels due to high risk often involves staff
- 7) Staff are here to help – also learning handling not-easy situations and decisions
- 8) Life is not always easy – like in real life



Participants

interested students

- We do not distinguish between master and bachelor students.
- A satellite has parts which are suitable for bachelor students and other for master students
- Lot of study/education work for all
- **Continuity**
- Important the knowledge and skills is passing from one generation to the next
- “Apprenticeship” from old/alumni students to new students is part of continuity
- Older students conduct voluntary courses and instruction seances
 - 2023+ Rust as new programming paradigm in our cubesats
- **This might be the most important thing which keep continuity at AAUSATLAB**
After more than 20 years



AAUSAT3 in clean room