

Dear Bart, Sebastiaan, and Pap,

Although the precise process and methods will be described in detail in the final report, I would like to use this short presentation to outline the general method used to design the Attitude and Orbital Control System (AOCS).

A first-order sizing of the AOCS used a design process consisting of six distinct steps: requirements determination, attitude control method selection, geometry model, quantification of disturbance torques, hardware selection, and budget updates. Illustrated in the figure on the following page, the orange blocks are the primary steps, the blue blocks represent the sub-categories, and the result or final calculation to be made is highlighted in green. The results of these calculations are summarized in the table below.

Due to many uncertainties in the overall design of the spacecraft, such as the geometric properties of the orbiter and probe, maneuver requirements, or operations requirements, many input variables were estimated using combination of heritage data and rough sizing. Additionally, worst-case scenarios were used for all sizing computations. For example the lowest altitude during aerobraking was used for quantifying the aerodynamic disturbance torques, and the total required torque and momentum considers situations where the actuation of the solar arrays and antennas coincides with the peak external disturbance torques. Naturally, the mission can be planned to prevent these occurrences, but this provides an upper estimate of the performance requirements.

I'm looking forward to your feedback on Thursday.

Kind regards,

Luigi

Parameter	Value	Units
Magnetic Disturbance Torque	0	N m
Solar Disturbance Torque	1.235E-05	N m
Gravity Gradient Torque	3.079E-13	N m
Aerodynamic Disturbance Torque	2.373E-12	N m
Mom storage per orbit	0.032	N m s
RW torque slew	0.001	N m
Max internal dist torque	0.103	N m
Max internal dist momentum	12.323	N m
Force thrust slew	0.005	N
Secular momentum buildup	5.526E-11	N m s
Thrust momentum dump	3.684E-11	N
Thruster pulses	2768.000	-
Propellant mass	0.010	kg
Hardware: RW	Honeywell HR12	
Hardware: IMU	Honeywell MIMU	
Hardware: Star Sensor	A-STR	

