



Low Cost Electric Propulsion

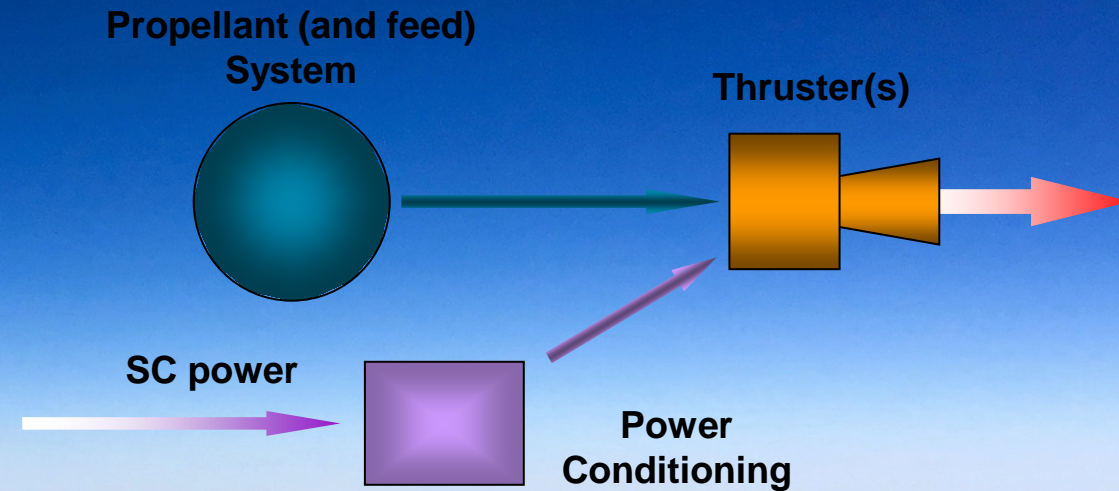
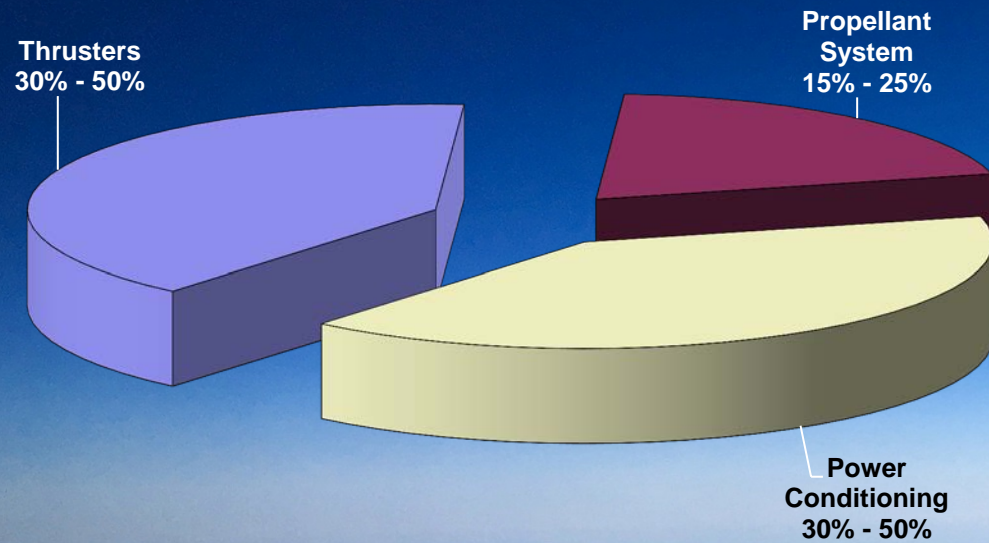
Electric Propulsion Technologies for Small Satellites
and New Markets

DEFENCE AND SPACE

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16th of October 2018

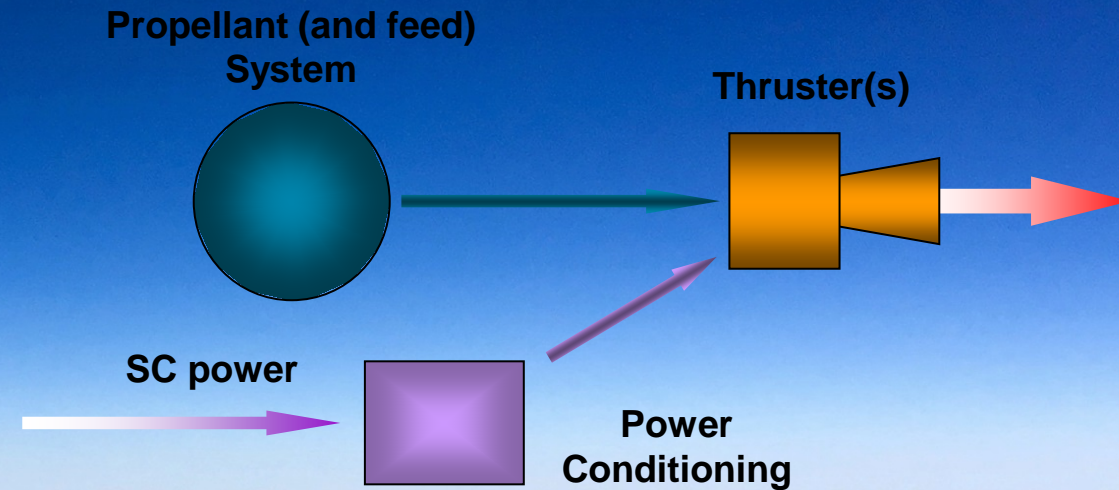
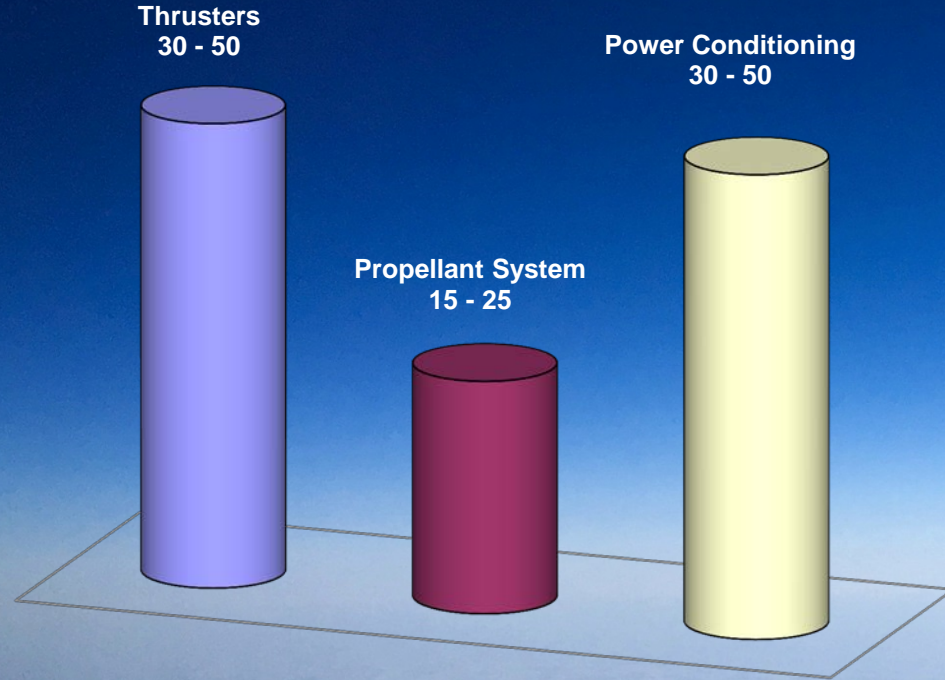
AIRBUS

Cost of a Traditional Electric Propulsion System



- How to substantially reduce the cost of an EP system for small satellites?

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Reducing Thruster(s) Cost

- Reduce the number of needed ancillary elements (flow reg's, pointing mech's
- Reduce number & complexity of I/Fs (mech, therm, fluid, HW, SW) to the bare minimum
- Reduce the number of parts (needed to build one thruster)
- Reduce the required tolerances

Hard core baseline:

- Materials and parts
- Manufacturing and testing

These depend strongly on the EP technology

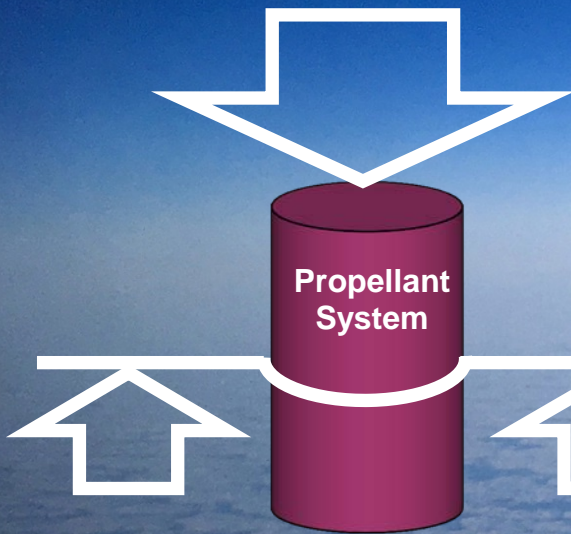


Reducing Propellant (and feed) System Cost

- Maximise propellant/tank mass ratio
- Minimise pressure
- Reduce propellant control (p, T, v) to the bare minimum
- Reduce parts (transducers, valves & filters) to the bare minimum
- Reduce pipes (length & complexity) to a bare minimum
- Reduce the I/Fs to a bare minimum



**These depend strongly
on the EP technology**



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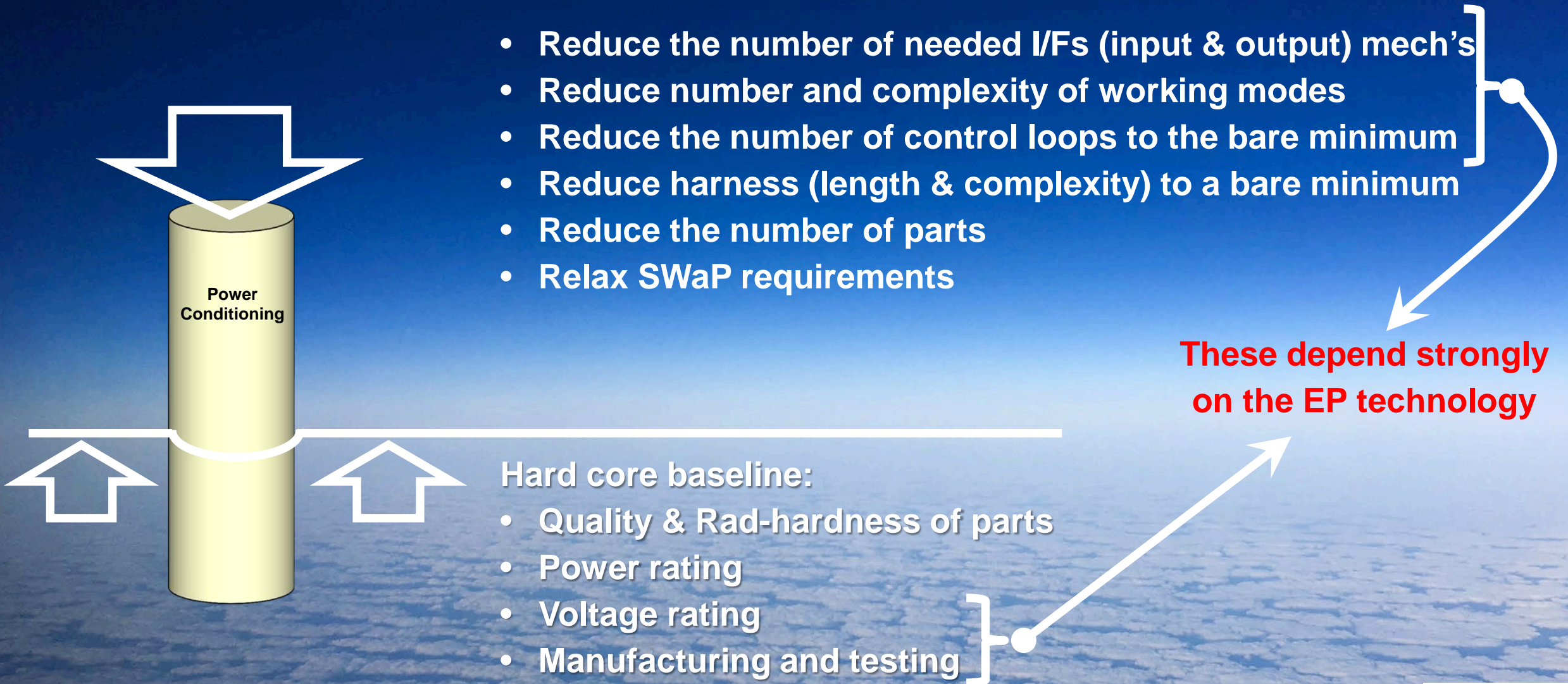
Reducing Power Conditioning Cost

- Reduce the number of needed I/Fs (input & output) mech's
- Reduce number and complexity of working modes
- Reduce the number of control loops to the bare minimum
- Reduce harness (length & complexity) to a bare minimum
- Reduce the number of parts
- Relax SWaP requirements

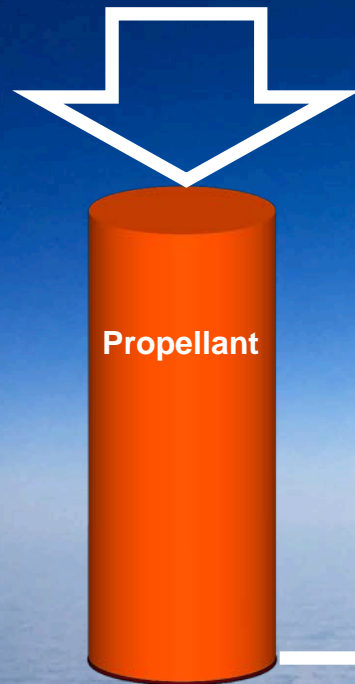
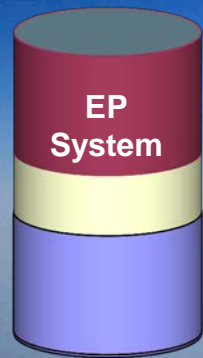
Hard core baseline:

- Quality & Rad-hardness of parts
- Power rating
- Voltage rating
- Manufacturing and testing

**These depend strongly
on the EP technology**



Reducing Propellant Cost



Use propellant that:

- is cheap
- “packs nicely”
- is easy to store and manage
- is not aggressive
- allows similar (or better) performances of what already available

Hard core baseline:

- “air-breathing”

**These have a strong
impact on the EP
technology**

Thank you

Presented ideas and thoughts are those of my own opinion and does not necessarily reflect the opinion of Airbus Defence and Space Ltd.