Turbulence

One Rocket Closer to Space

AGH Space Systems
Team 105

Design and Development of Self-Pressurized Feed System for Bi-Liquid Rocket Engines Using N2O

AGH Space Systems

Non-profit student club from Poland. We take on space-related projects, including hybrid-powered and liquid-powered sounding rockets, planetary rovers, CanSat planetary probes and stratospheric balloons.

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CANSAT PLANETARY PROBE

CANSAT COMPETITION

1ST PLACE

KOnkurs KOnstrukcji Studenckich

NASA

- DEPLOYMENT AUTOMATION
- ONBOARD COMPUTER
- DESCENT CONTROL SYSTEM
- STILL OBSERVATION
- RECOVERY SYSTEM

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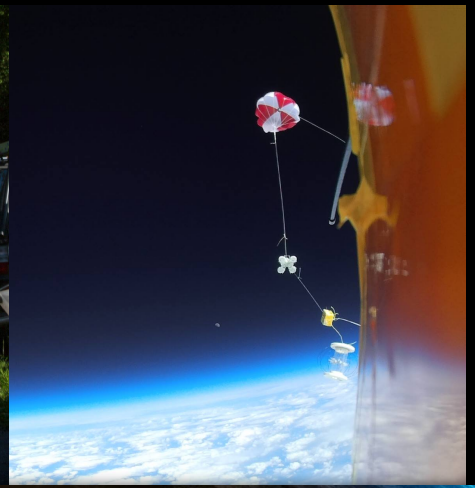
STRATOSPHERIC FLIGHT

GLOBAL SPACE
BALLOON CHALLENGE
1ST PLACE

gsbc



Rocket counter

5

1 still missing

ROCKET SYSTEMS DEVELOPMENT

2015
Brajan 1 *first tested hybrid engine 350N thrust*
Carbonara *our first hybrid rocket for Cansat Competition*

2016
Beta *first experimental hybrid rocket, complete system*

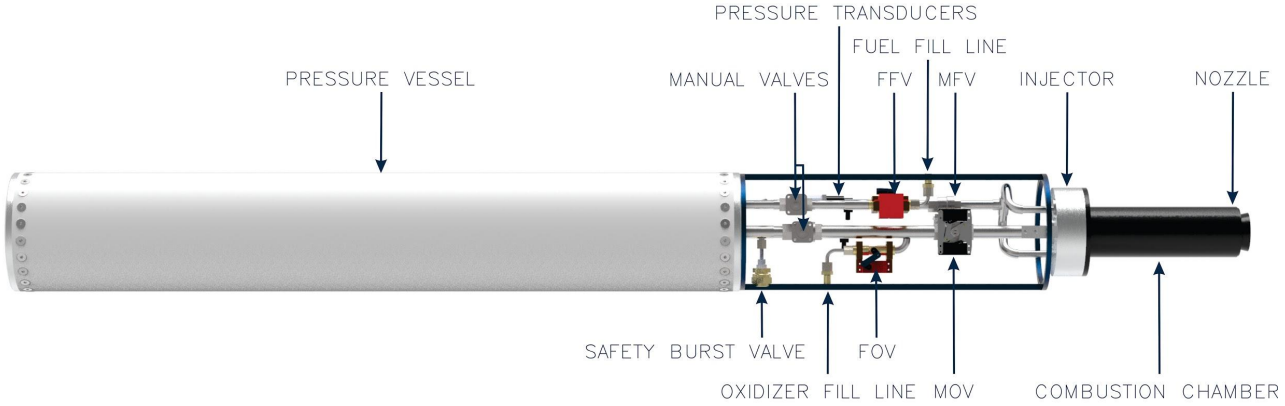
2017
Bagieta *supersonic hybrid propulsion rocket [missing RIP]*
Zawisza *first rocket-scale LRE in Poland*

2018
Turbulence *first LRE rocket project for SA Cup 18*
Panda3 *our hybrid rocket for SA Cup 18*


september 2017
AGH space systems
First rocket-scale bi-liquid in Poland


november 2017
AGH space systems
Start of a new project - Turbulence rocket system

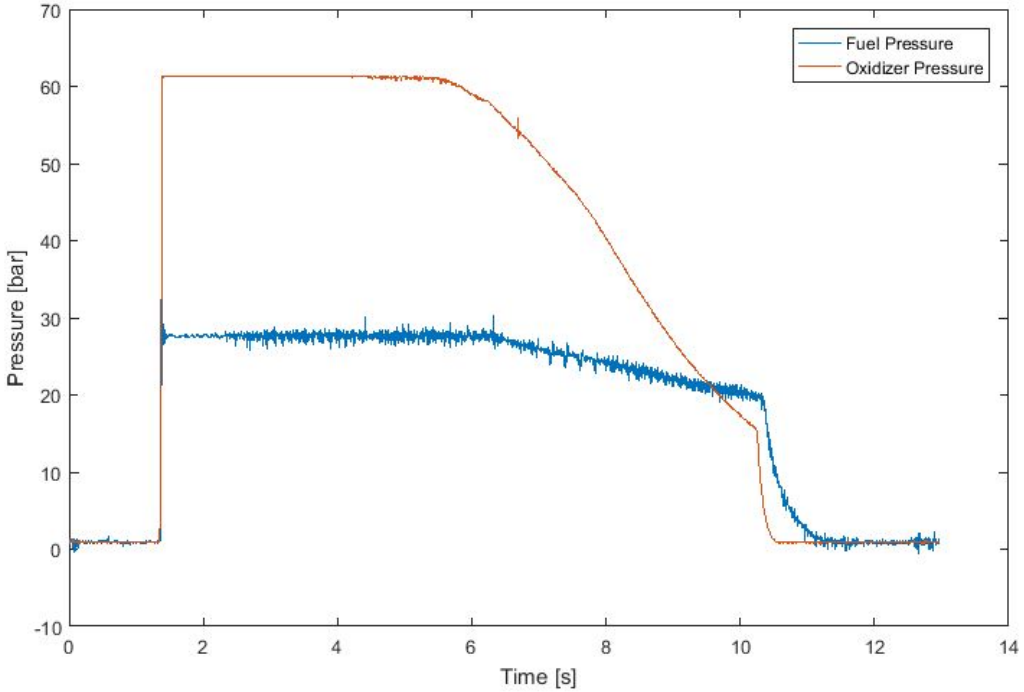
*The Turbulence rocket in BS10 configuration is propelled by **liquid rocket engine** designated as Zawisza Z3000, which is currently developed, built and tested by the members of AGH Space Systems.*



*It uses **ethanol and nitrous oxide** as rocket propellants in a unique pressure-fed cycle.*

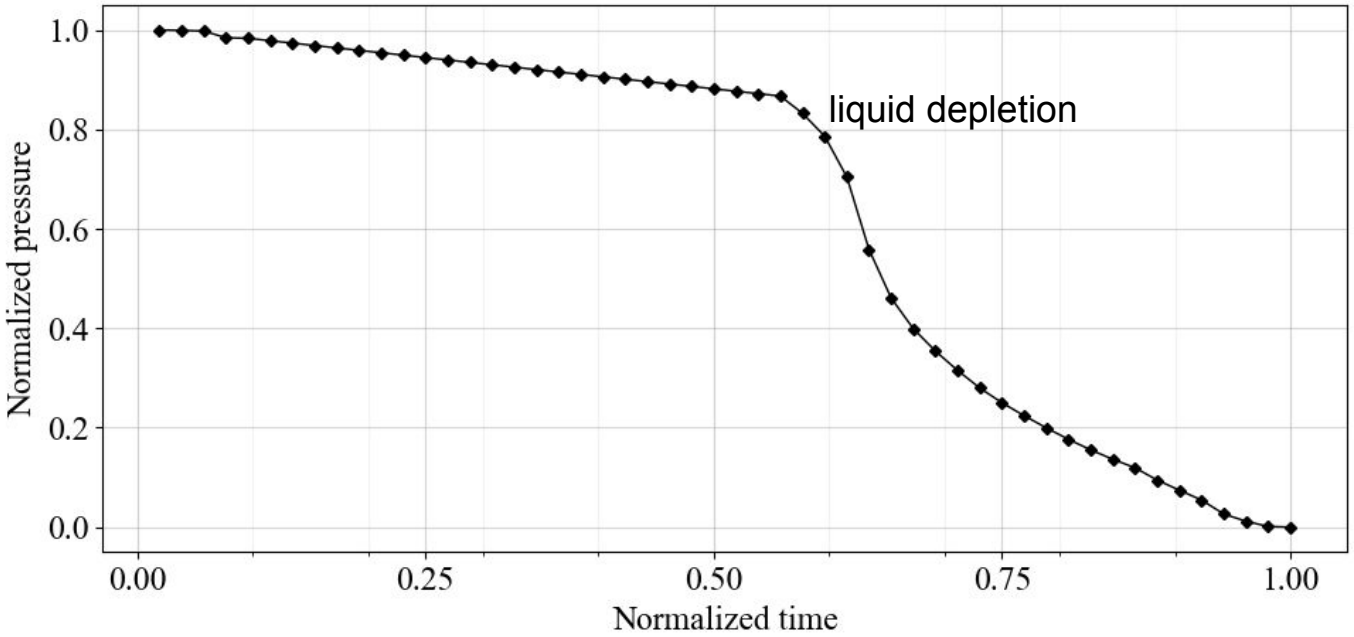
Previous experience with N2O bi-liquid rocket engines.

Coupled blow-down with VaPak



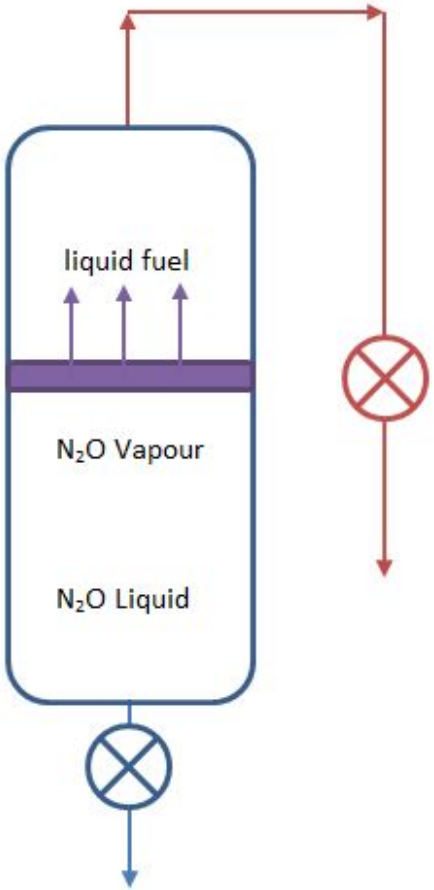
OF shift due to bad feed system coupling

Better solution?



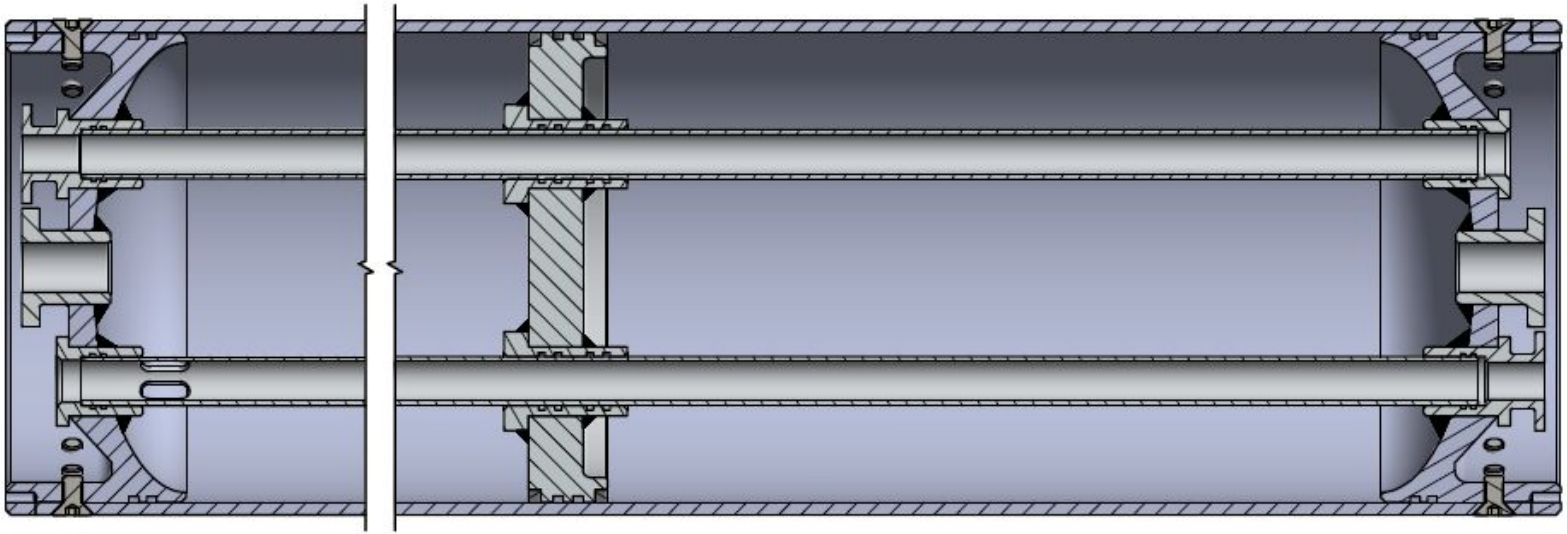
Better solution?

Bi-liquid Vapour pressurization



Better solution?

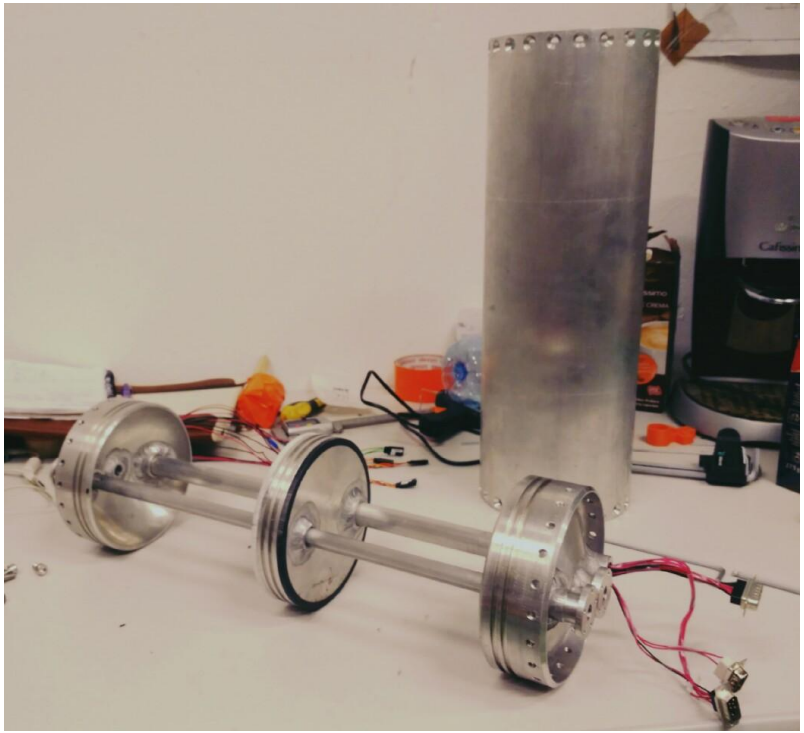
Bi-liquid Vapour pressurization



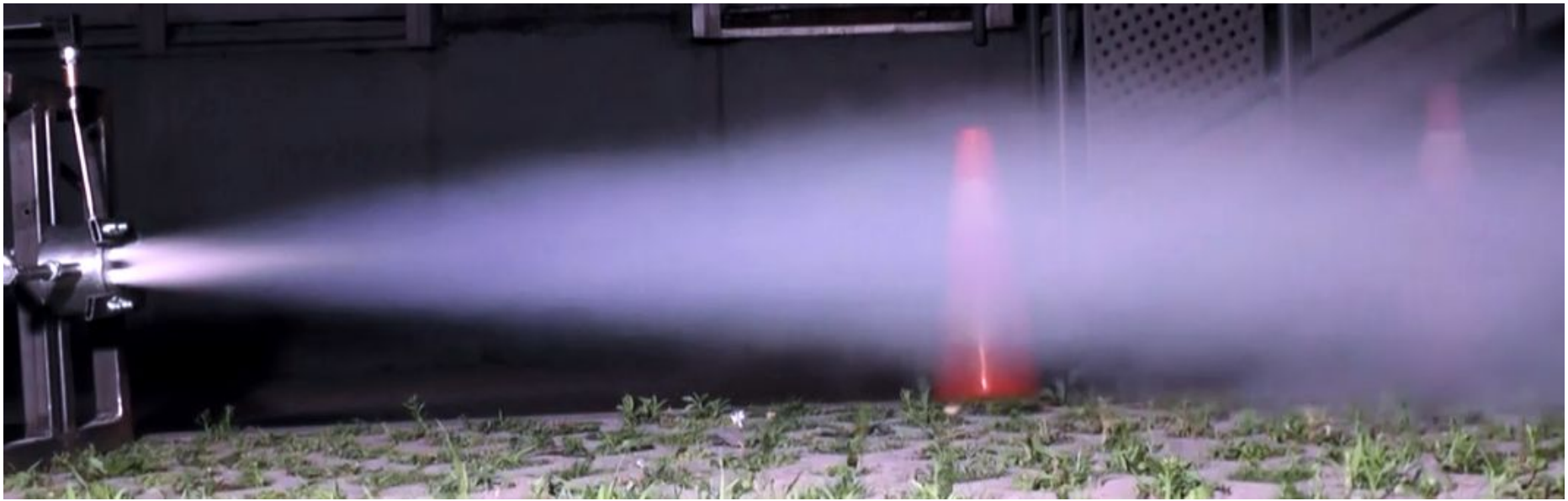
Trade-off analysis
Why not try?

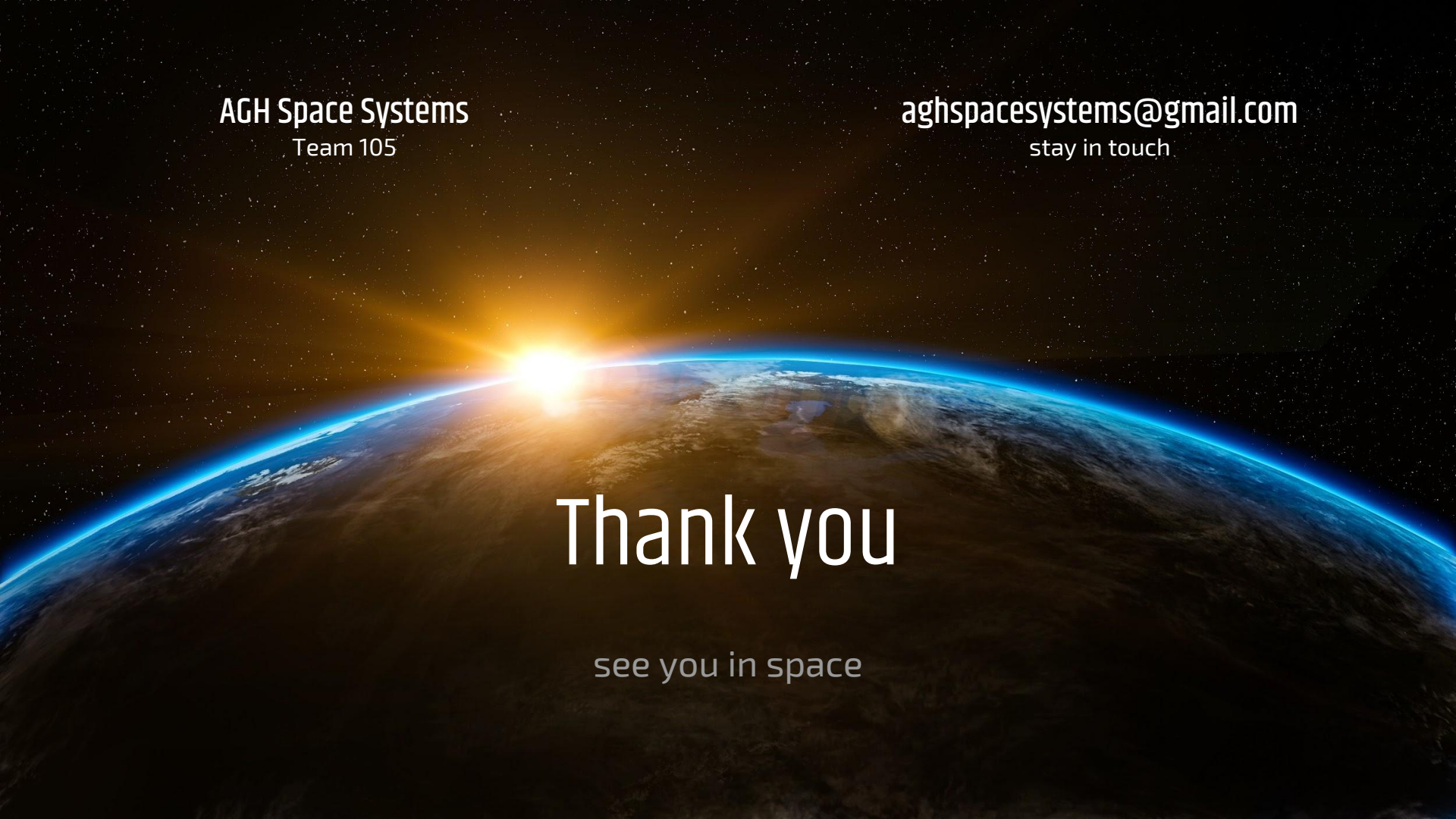
Self-pressurized	External gas	Blowdown
Constant pressure drop ratio	Difficult to control pressure drop ratio	No control over pressure drop ratio
Low pressure drop during burn	No pressure drop during burn	High pressure drop during burn
Complex	Complex	Simple
Medium weight	High weight	Low weight
Propellants usage measurements possible	Easy to control flow	Difficult control over flow

Fabrication of prototypes



Still testing...

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stay in touch
Thank you
see you in space