AEROSPACE STARTUPS

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INTRODUCTION

AEROSPACE STARTUPS

- VOLOCOPTER
- IMPULS SPACE
- RELATIVITY SPACE
- SPINLAUNCH

FINAL QUIZ

- QUIZ 1: MULTIPLE CHOICE
- QUIZ 2: OPEN-ENDED QUESTIONS

VOLOCOPTER

VOLOCOPTER

FOUNDATION: 2011

FOUNDERS: Alexander Zosel and Stephan Wolf

HEADQUARTER: Bruchsal, Germany

CEO: Dirk Hok

AIM: The company specializes in the design of personal air vehicles for air taxi use.

"We bring air mobility to life"

PROBLEMS OF URBAN MOBILITY:

- ❑ TRAFFIC CONGESTION
- ❑ LIMITED INFRASTRUCTURE
- ❑ ENVIRONMENTAL IMPACT

SOLUTION → **UAM**=Urban Air Mobility

E-VTOL SERVICES

VOLOCITY

VOLOREGION

VOLODRONE

VOLOCOPTER

VOLOCITY

AIM	Transportation of passengers between key transportation hubs
SEATS	2
ROTORS	18
DISTANCE COVERD	35 km
MAX SPEED	110 km/h
CERTIFICATION	EASA, FAA 2023

SAFE

SUSTAINABLE

QUIET

COST

VOLOCOPTER

VOLOCITY IN PARIS 2024

"We went. We tested. We'll fly there for real"

WHY PARIS?

- DENSELY POPULATED CAPITAL
- POPULAR TOURIST DESTINATION
- PARTNERSHIP WITH GROUPE ADP AND RATP
- SIGNATURE OF A MOU

WHEN?

IN TIME FOR THE 2024 OLYMPIC AND PARALYMPIC GAMES.

ROUTES

- Paris-Charles de Gaulle airport ---- Paris-Le Bourget airport
- Vertiport of Austerlitz barge ---- Paris Heliport
- Paris Heliport ---- Airfield of Saint-Cyr-l'École

IMPULSE SPACE

FOUNDATION: 2021

FOUNDER: Tom Mueller

HEADQUARTER: El Segundo, California

CEO: Tom Mueller

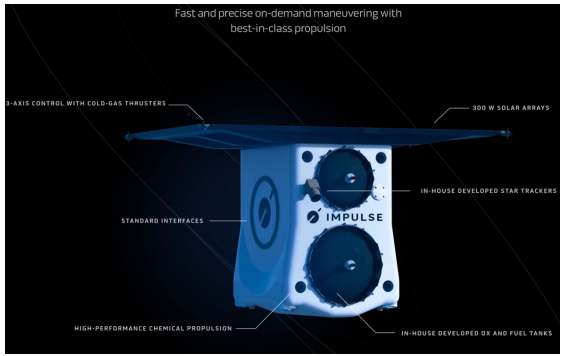
AIM: The company specializes in the delivery of payloads.

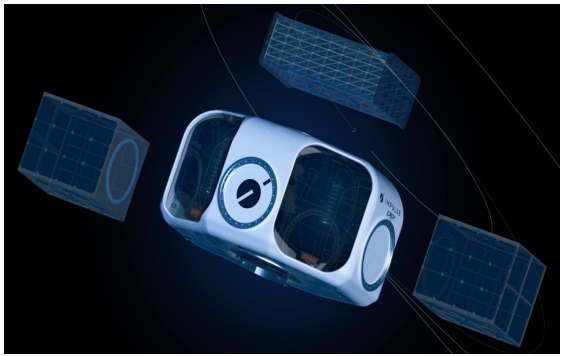
"The next generation of orbital maneuvering spacecraft"

IMPULSE SPACE PRODUCTS

MIRA

HELIOS

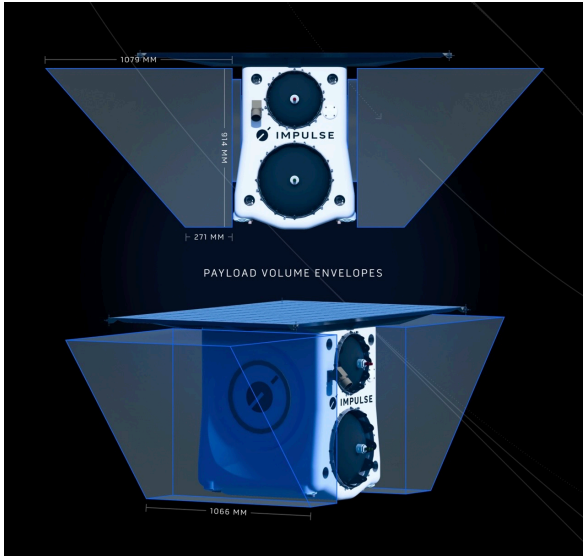


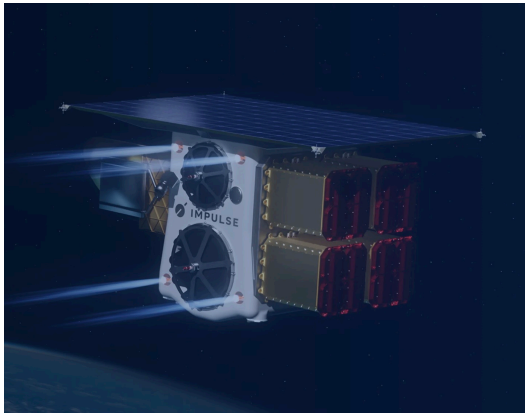


IMPULSE SPACE

MIRA

PAYLOAD CAPACITY	Up to 300 kg
PAYLOAD VOLUME	50 x 73 x 50 cm (x2)
DELTA-V	600 m/s
MIRA WET MASS	250 kg
PROPELLANT	Ethane and nitrous oxide





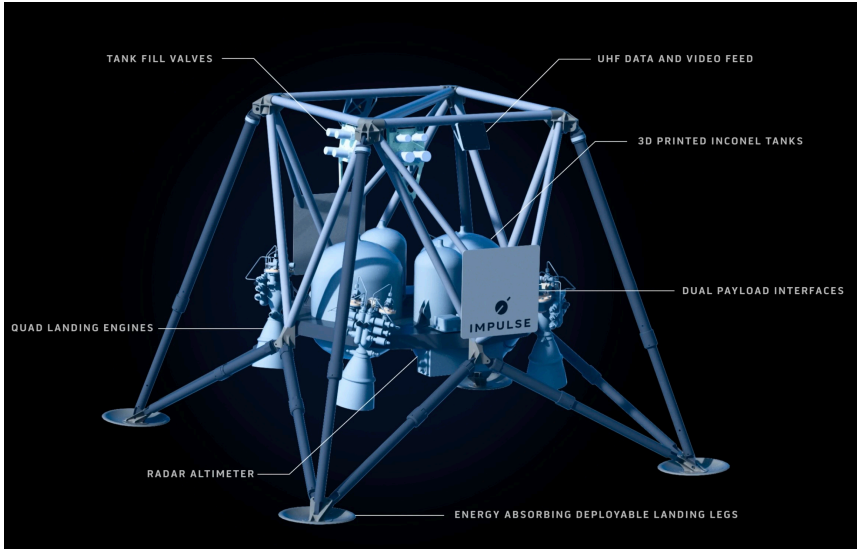
ALTITUDE

INCLINATION

CONTROLLED ATMOSPHERIC RE-ENTRY

STARTUP PIONEERS IN SPACE TRASPORTATION

- ❑ MARS MISSION
- ❑ SERIES A FUNDING ROUND ($45 million)
- ❑ SEED FUNDING ROUND ($30 million)
- ❑ MARKET LEADERSHIP GOALS
- ❑ VERTICAL INTEGRATION



RELATIVITY SPACE

Relativity

FOUNDATION: 2015

FOUNDERS: Tim Ellis and Jordan Noone

HEADQUARTER: California, US

CEO:Tim Ellis

AIM: Make 3D printed rockets with all parts being made in-house.

3D Printed Rockets

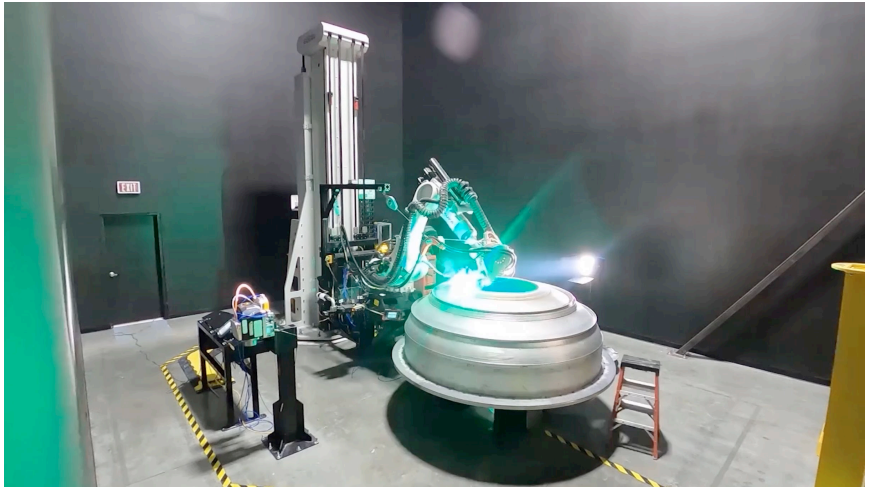
PROBLEMS OF MANUFACTURING:

- ❑ THOUSANDS OF PARTS
- ❑ CONTRACTORS
- ❑ NON-SCALABLE

SOLUTION → **Use 3D printers to DIY at every step**

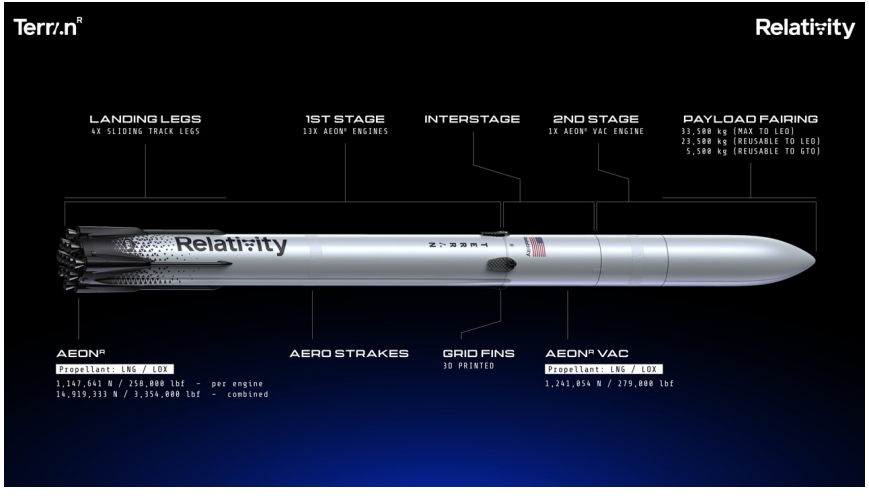
TERRA 1

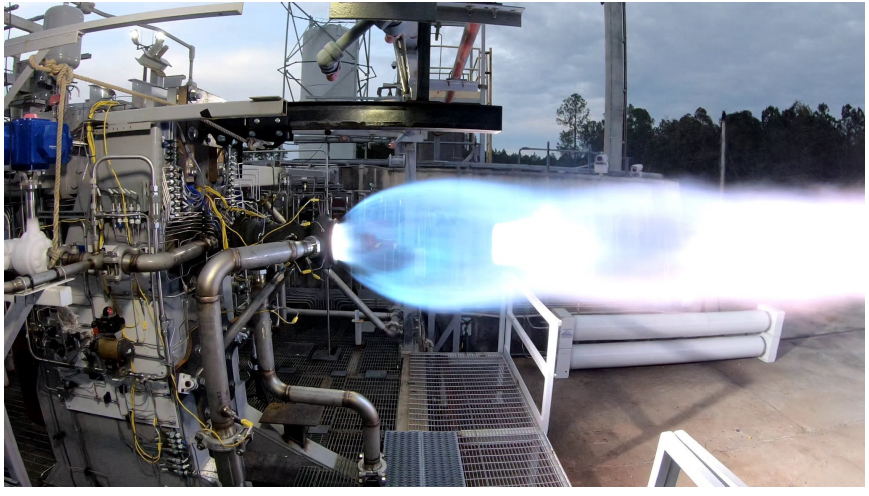
AIM	Reach Orbit with the first 3D printed rocket
DEVELOPED	2017-2023
LAUNCHED	2023
ENGINE CYCLE	Methalox



TERRAN R

AIM	Reusable 3D rocket capable of supporting Martian missions
DEVELOPED	2022-PRESENT
LAUNCH	SET FOR 2026
ENGINE CYCLE	Methalox





SPINLAUNCH

Problem SpinLaunch is trying to solve: Rocket Equation

Equation 1:

$$\Delta v = k \cdot \ln\left(\frac{m_0}{m_f}\right) \tag{1}$$

Equation 2:

$$\frac{m_f}{m_0} = e^{-\frac{\Delta v}{k}} \tag{2}$$

Equation 3:

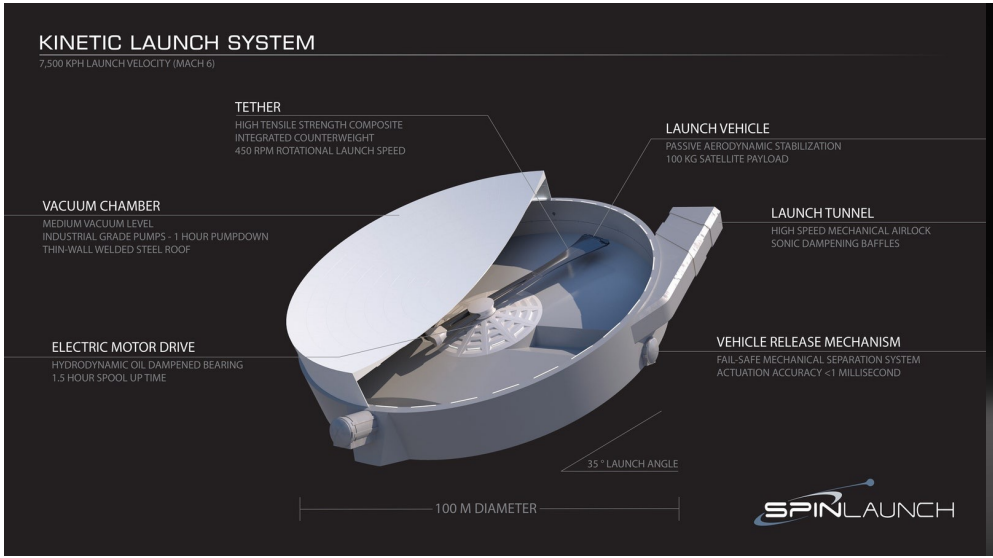
$$m_0\left(1 - \frac{m_f}{m_0}\right) = m_{fuel} \tag{3}$$

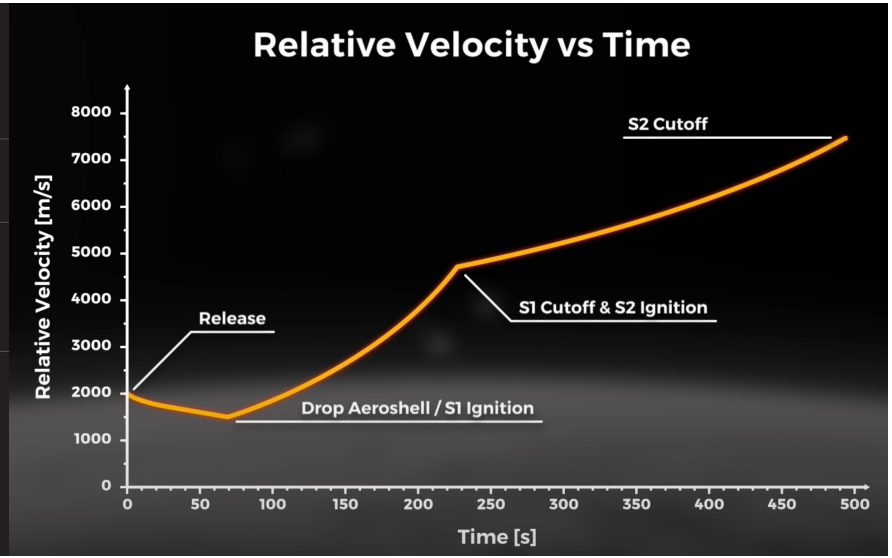
Caption:
m_0 = initial mass of the rocket,
m_f = final mass of the rocket,
Δv = velocity variation,
k = constant.

Solution proposed: electric reusable launcher that releases a rocket at hypersonic speed.

Rocket reaches 72 km of altitude using kinetic energy only.

Launcher and Launch stages





Maximal mass of the rocket: 200 kg

FOUNDATION: 2014

FOUNDER: Jonathan Yaney

HEADQUARTER: Long Beach, California

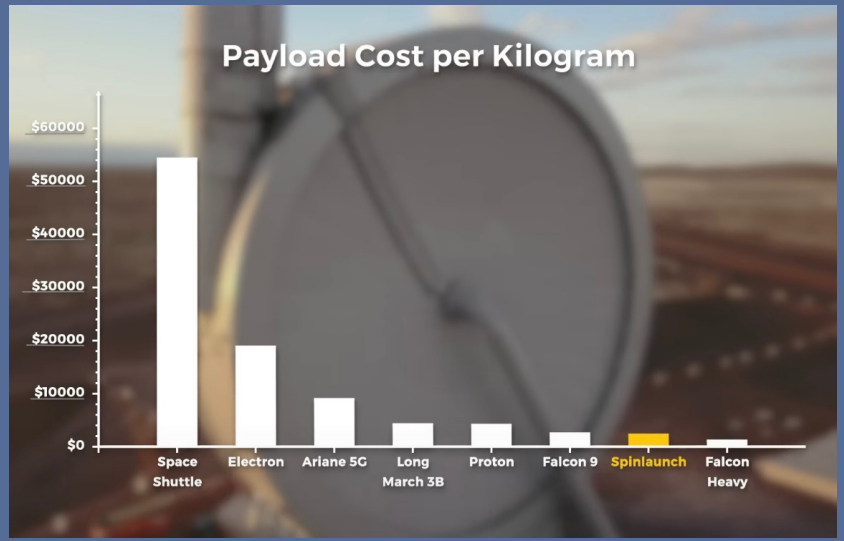
TEST SITE: Space Port New Mexico

RELEVANT INVESTORS: Airbus Ventures, Google Ventures

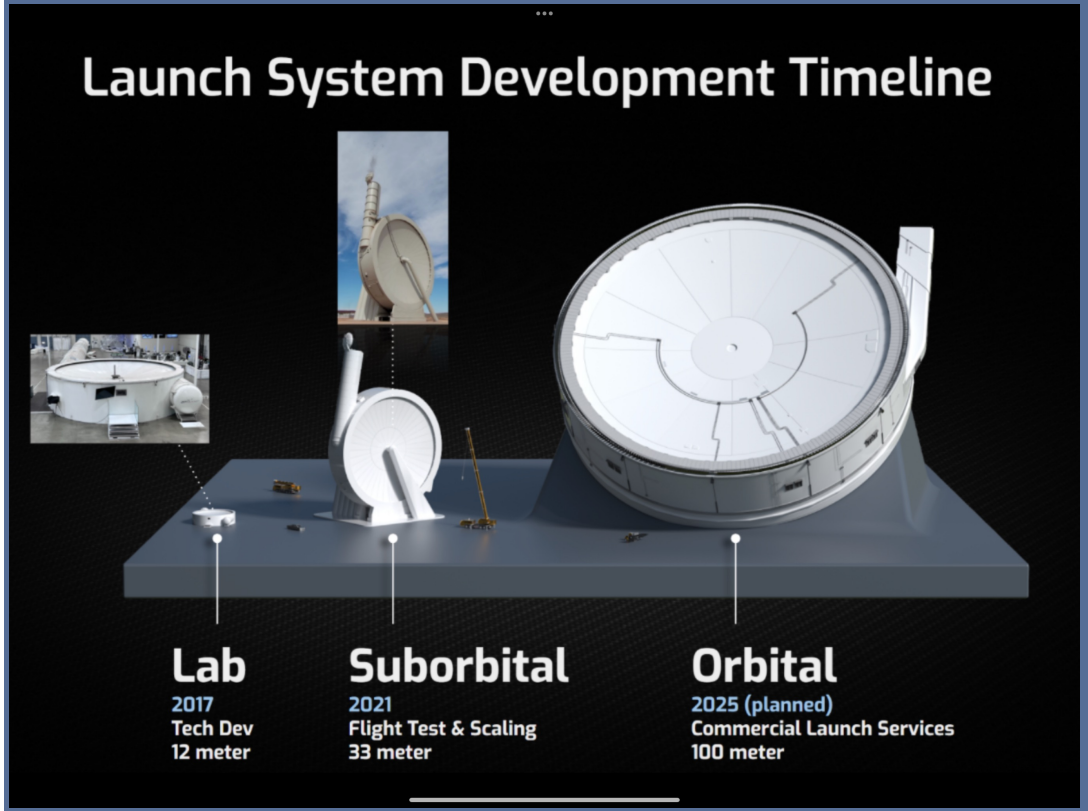
Value proposition: high frequency reusable launcher that requires low fuel quantity per launch.

Objectives:
- Reducing cost per launch per kilogram
- Reducing exhaust emissions
- Using reusable components

SpinLaunch goal: reach price of 2500 $/kg



Results so far



SpinLaunch has been testing inside the Lab and has implemented the suborbital launcher, a prototype that is 1/3 of the envisioned Orbital launcher.

10 test launches has been performed up to September 2022.

THANK YOU
FOR YOUR ATTENTION