



Contact:
Erik Franks, CEO

Mission

The space transportation
company offering
revolutionary propulsion

Team of Rocket Scientists



Erik Franks

B.S. Economics
M.S. Space Studies
Founded startup w/
50 employees, 9yrs,
and 1.6m items sold



Jake Teufert

B.S. Aerospace
M.S. Space Systems
10 years in industry:
10 rocket designs flown
in space with Space
Shuttle and Aerojet



Jeff Gibson

B.S. / M.S. Aerospace
10 years in industry:
Guided Missiles for
United Technologies



Tesseract founders principle engineers on DARPA XS-1 program.
Built largest 3D printed rocket ever fired. 25,000 lb of thrust (111kN)

Current Toxic Fuel

- Dangerous to handle
- Just the fueling operation costs \$500,000 per satellite
- Unusable for small, inexpensive satellites



Hazmat technicians fueling a satellite before launch

Tesseract In-Space Thruster

- Low-toxicity propellant and modern manufacturing
- **Eliminates** \$500k fueling cost
- Twice the propulsion, half the price
- **90%** reduction in manufacturing cost



Thruster prototype

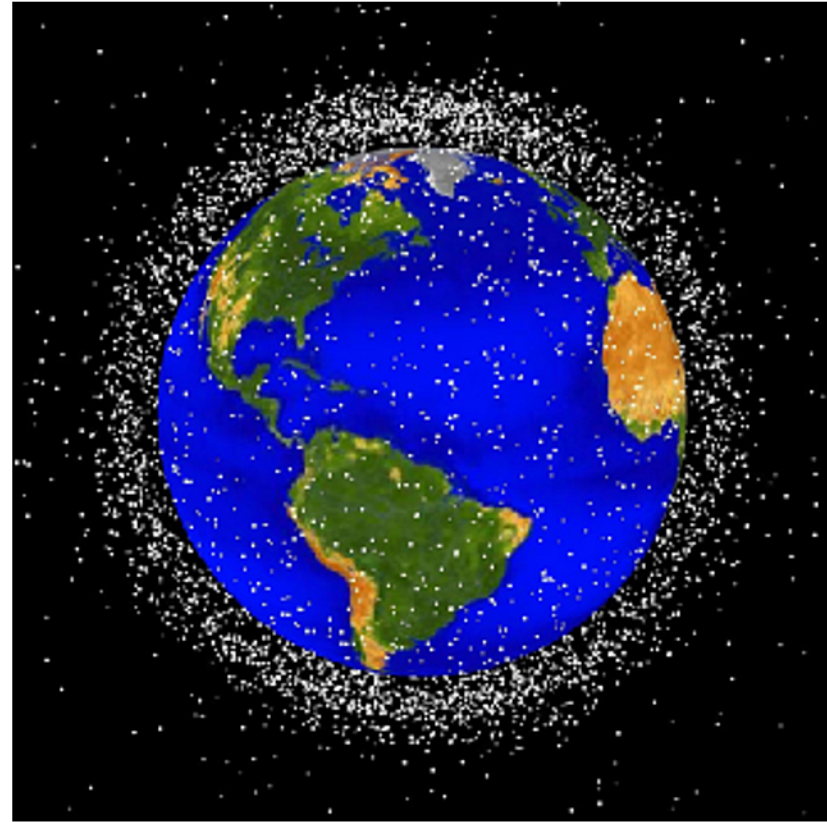
Successful Prototype

- Thruster designed, built, and successfully fired in only 8 weeks
- 2nd prototype ready to be fired in vacuum chamber simulating space



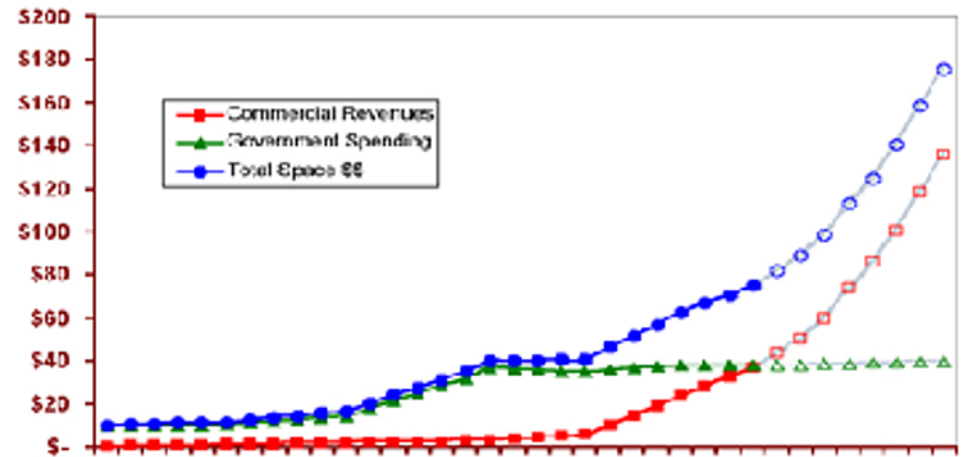
Timing is right

- Small satellite constellations are reshaping the industry
- 1st wave: Earth observation
- 2nd: Telecom mega-constellations
- No affordable propulsion available
- EU banning toxic propellants in 2020



Market

- >**23,000** small satellites announced
- Planned mega-constellations can handle just 10% of broadband growth
- \$9.2B TAM today and growing quickly



First Product Line

- Propulsion systems for small satellites
 - Competitor price is \$1M /system
 - Tesseract has twice the performance at \$500k
- Developing transportation solutions: space tugs, launch stages, electric, and nuclear



Funding and Milestones

- Seed funds development to initial profitability from first products shipped
- Capital efficient - small team with 70% margin

Iterating thruster designs using rapid prototyping, completing customer requested testing, leading to final design by end of 2018 and first deliveries in early 2019

Tesseract Investment Opportunity

- Tesseract has significant interest from Planet, OneWeb, and Space Systems Loral with LOI's for over \$100M in sales per year

T E S S E R A C T

Tesseract's mission is to power the small satellite revolution by providing cost effective rocket propulsion.

Business Model

We sell rocket propulsion systems to satellite manufacturers for \$500,000 that offer twice the performance at half the cost of competitors.

The Problem

The satellite industry is rapidly changing from a model using small numbers of large, expensive satellites to one with large, networked constellations of miniaturized, low-cost satellites. Legacy satellite propulsion systems are expensive, and are designed to use highly toxic fuels developed in the 1960s. Aside from the high propulsion hardware cost, fueling a satellite with toxic fuels requires the use of a specialist hazmat team, at a cost of \$500,000. For a \$500 million conventional satellite, this cost was acceptable. For cost-sensitive small satellites, these legacy propulsion systems are not acceptable.



Our Approach

We're building rocket thruster systems that use low toxicity propellants, eliminating the high cost and hazards of toxic fuels. Our solution has state of the art performance, and uses modern, low-touch manufacturing to drive costs much lower than legacy designs. Unlike electric propulsion, our system does not require large solar panels and batteries, making it more suitable for low earth orbit (LEO) applications. We've designed, built, and fired our first prototype thruster, and are working on future iterations.

The Market

The current in-space propulsion market is \$9.2B, and is growing 22% year-on-year due to explosive growth in small satellites. This is primarily being driven by huge earth observation and LEO communications constellations. Current plans from leading providers represent > 23,000 broadband satellites for the initial rollout, yet the throughput capability represents only 10% of projected mobile broadband demand in 2022. Broadband mega-constellations will continue to grow at a rapid pace to bring internet access to the other 4 billion people who currently lack it. All of these satellites will require propulsion, and no affordable option is currently available.

Traction

We're working with several satellite manufacturers who are very excited about using our products for upcoming satellite designs. Demand from our first two prospective customers exceeds \$150M in annual revenue. We have a compelling solution in both cost and performance, which will allow us to secure a strong position in a growing market where flight heritage is key.

Competitive Advantage

Spacecraft propulsion has a high barrier to entry due to technical difficulty and the desirability of demonstrated, in-space flight heritage. Because of the in-process paradigm shift to small satellite constellations, there is an opportunity to introduce a propulsion solution responsive to the new market needs and capture the industry. As we scale in production volume and accumulate flight heritage, potential competitors will be unable to offer any performance or cost improvements large enough to compel our customers to switch from a working system.

The Team

CEO: Erik Franks - M.S. Space Studies (ISU) - Founded previous online retail business w/ 50 employees, \$3M/yr revenue
CTO: Jake Teufert - M.S. Space Systems (Florida Tech) - 10 years in rocket propulsion
COO: Jeff Gibson - M.S. Aerospace Engineering (NCSU) - 10 years in aerospace systems engineering
We're a team of rocket scientists with experience in traditional aerospace and space startups. We've worked on rocket engine designs that have flown in space, and understand how to take this technology from concept to a commercial product line.



Tesseract Small Satellite Propulsion System

Propellant	NHMF and H_2O_2
Thrust	$4 \times 1000 \text{ mN}$
Total Impulse	$30.7 \text{ kN}\cdot\text{s}$
Mass	21 kg
Power	20 W (max)