



Discover Engineering

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U.S. AIR FORCE
R·O·T·C





**“Scientists discover the world that exists;
Engineers create the world that never was.”**

-Theodore Von Karman,
Aerospace Engineer

Scientist vs. Engineer

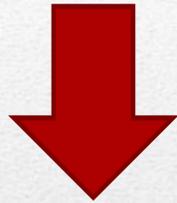


The science, skill, and profession of
acquiring and applying scientific, economic, social,
and practical knowledge,
in order to design and build structures, machines,
devices, systems, materials and processes.

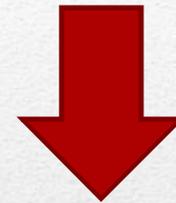
-Wikipedia

Engineering

Aeronautics & Astronautics

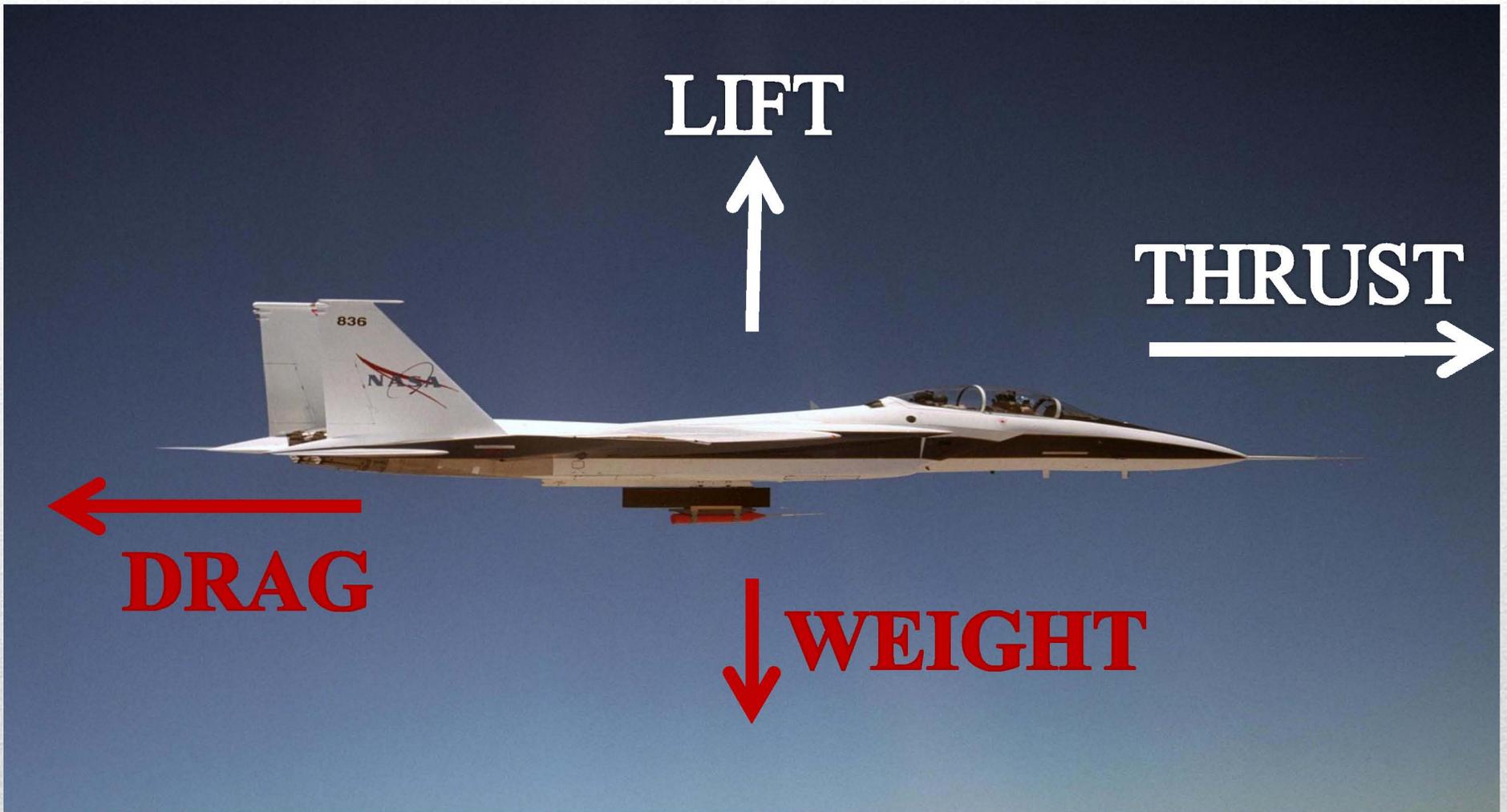


The way air
moves around
objects



Navigation
beyond Earth's
atmosphere

Aerospace Engineering

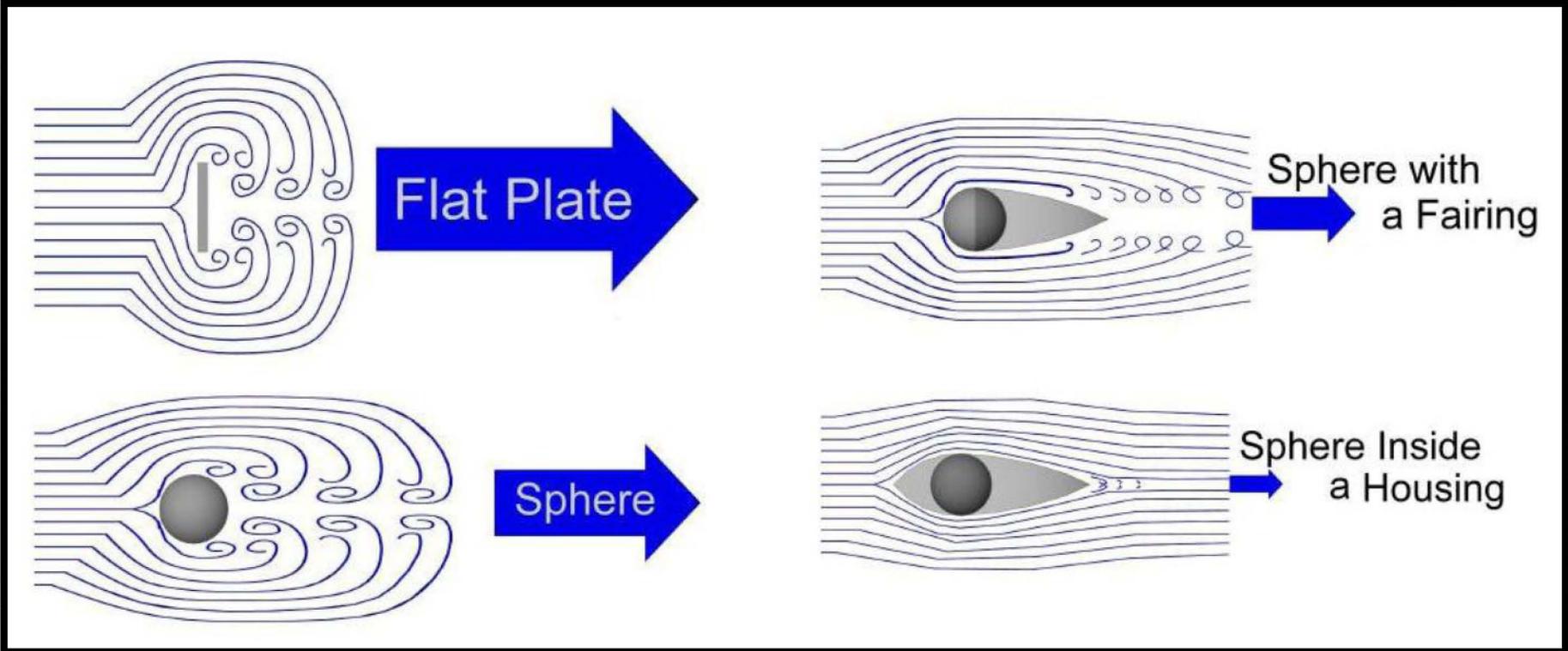


Science of Flight – 4 Forces

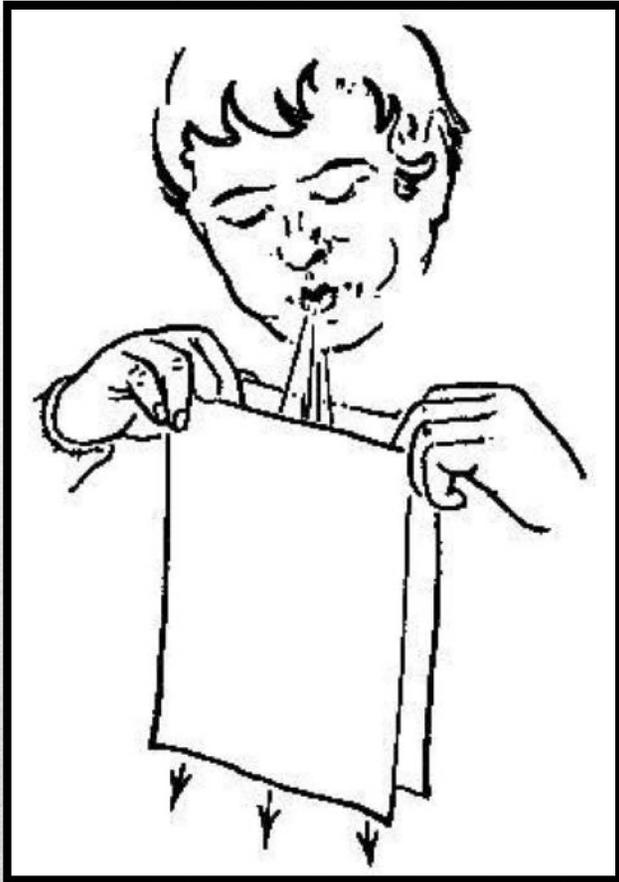


The force on the object due to gravity

Science of Weight



Science of Drag



**Will the papers move
apart or toward each
other?**

Demonstration

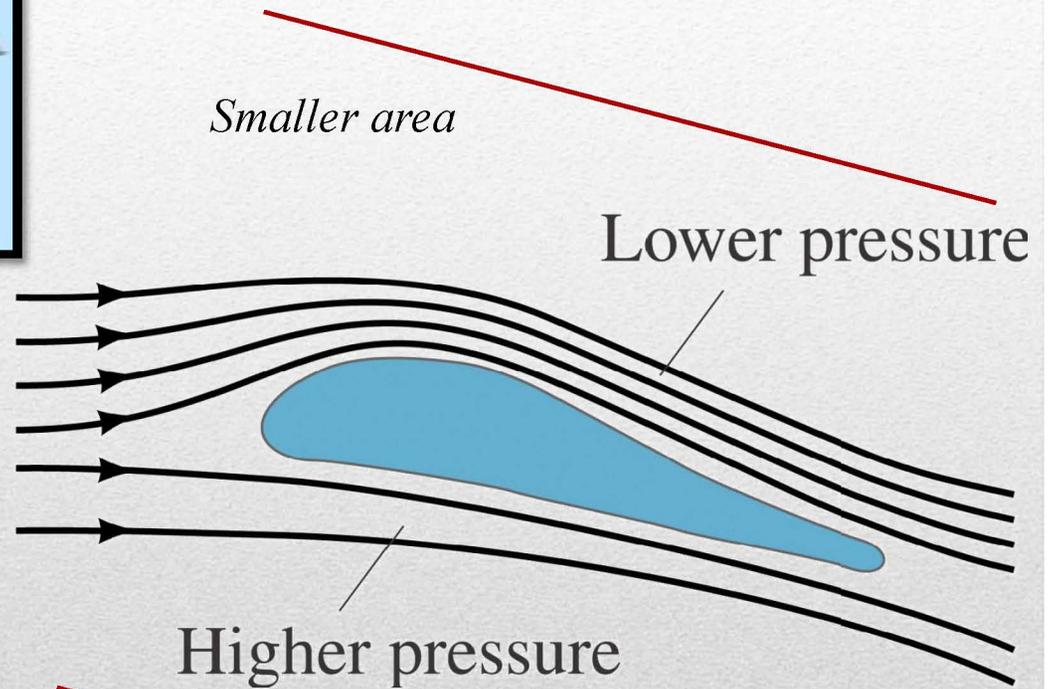


**Increase in speed =
Decrease in pressure**

**Derived from
Conservation of Energy**

***Bernoulli's Principle**

**some constraints apply*

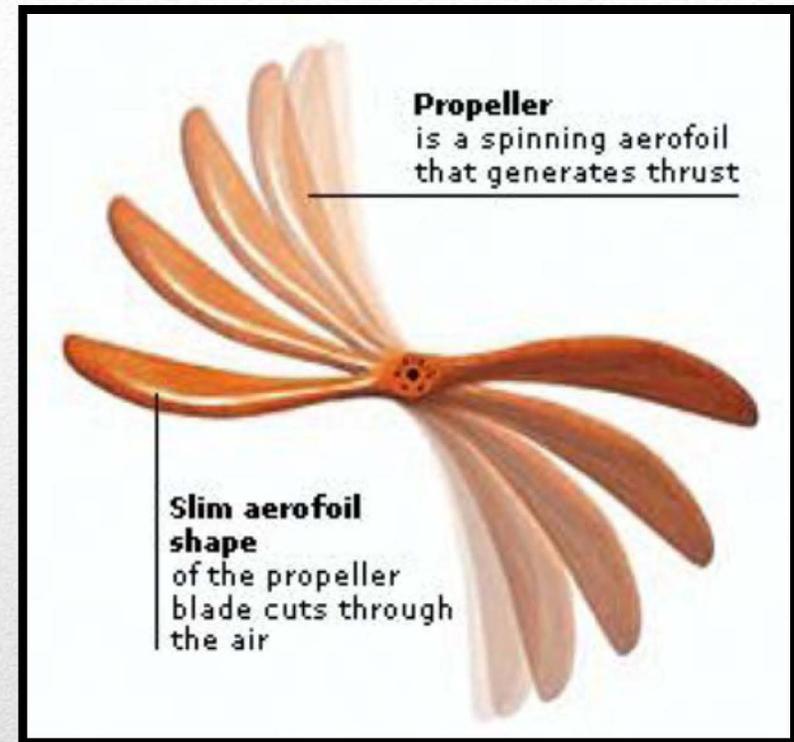
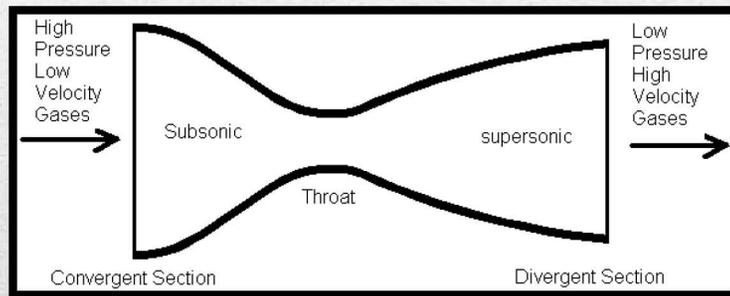
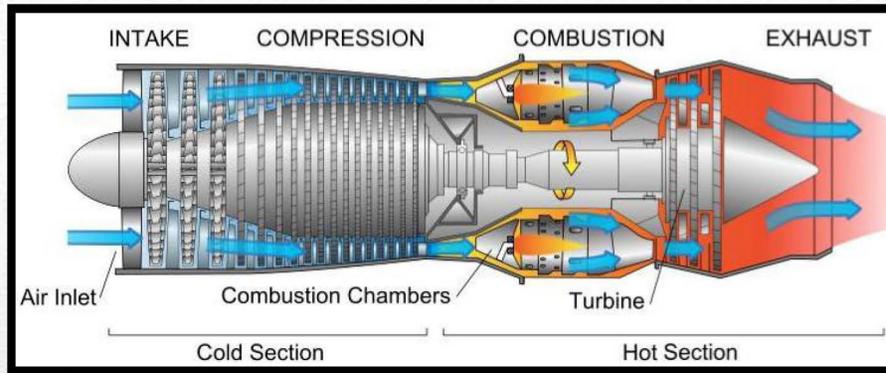


Science of Lift

**What is the
reaction when
blowing over the
top of a piece of
paper?**

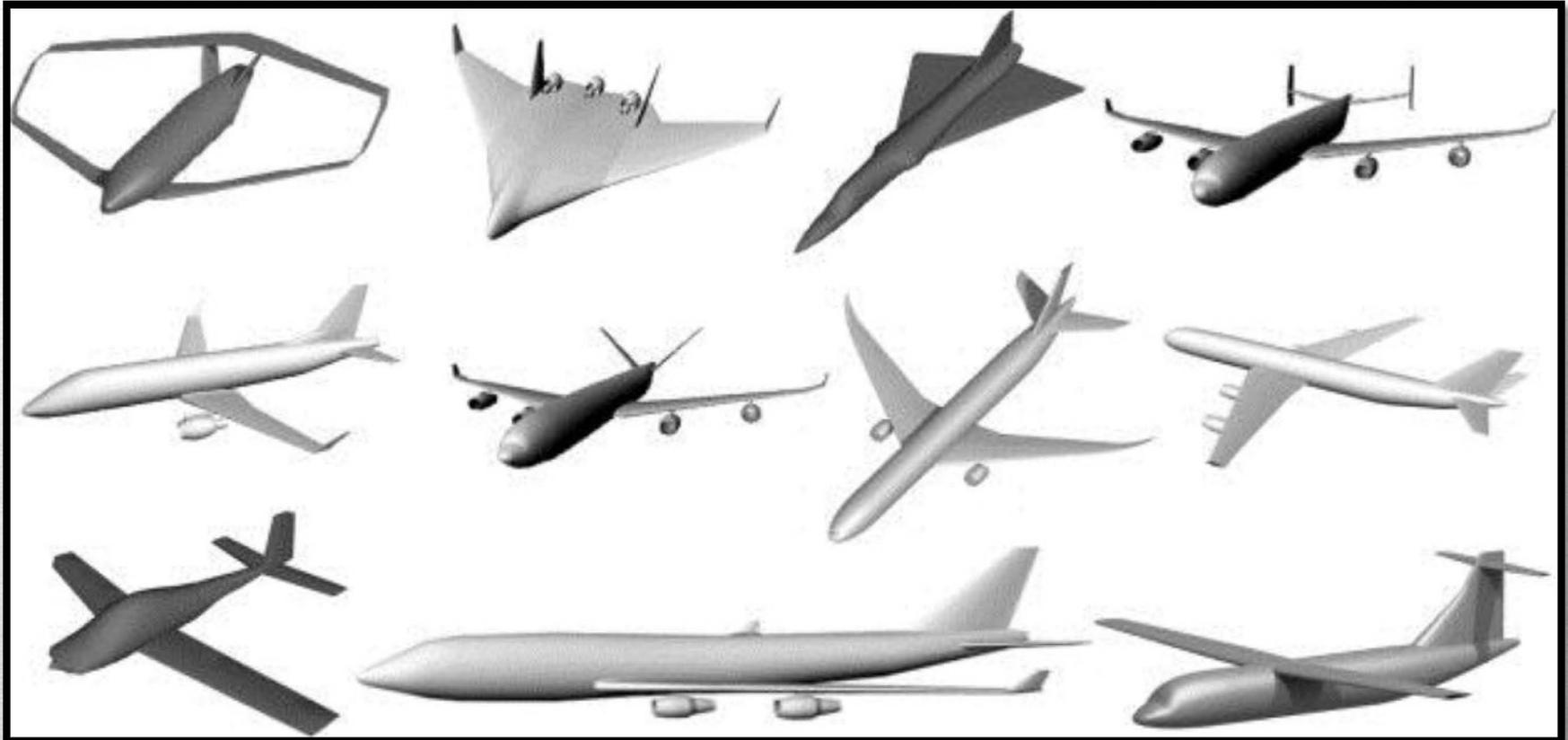


Demonstration



Propulsion system to overcome drag

Science of Thrust



Science → Engineering

Shuttle Carrier



Bell X-1



Space Shuttle



North American X-15

Science → Engineering

- 
- 1) Investigate new design concepts**
 - 2) Find and fix aircraft design problems**
 - 3) Demonstrate levels of performance**

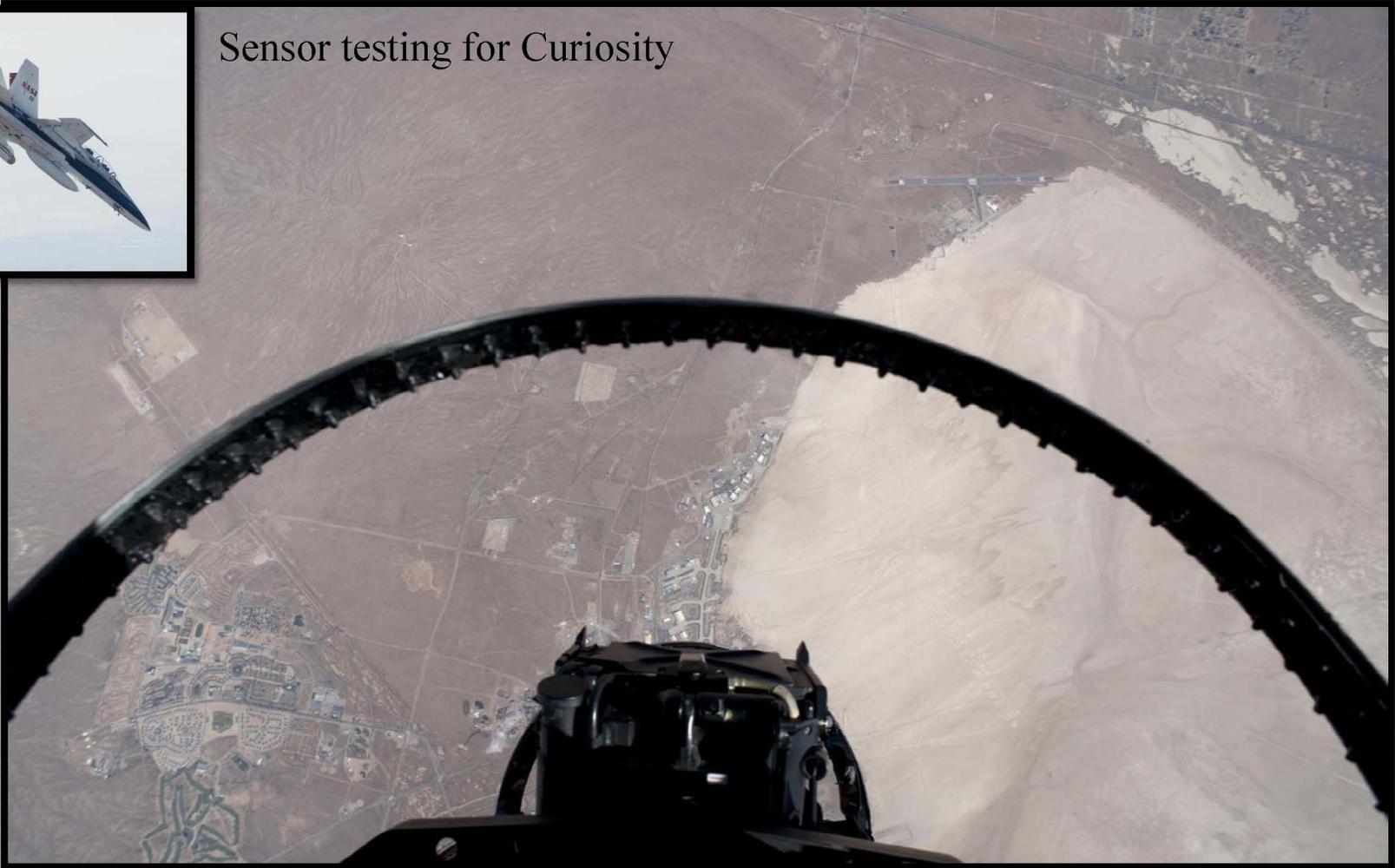
FLIGHT TEST ENGINEERING



Flight Test Nation - Edwards

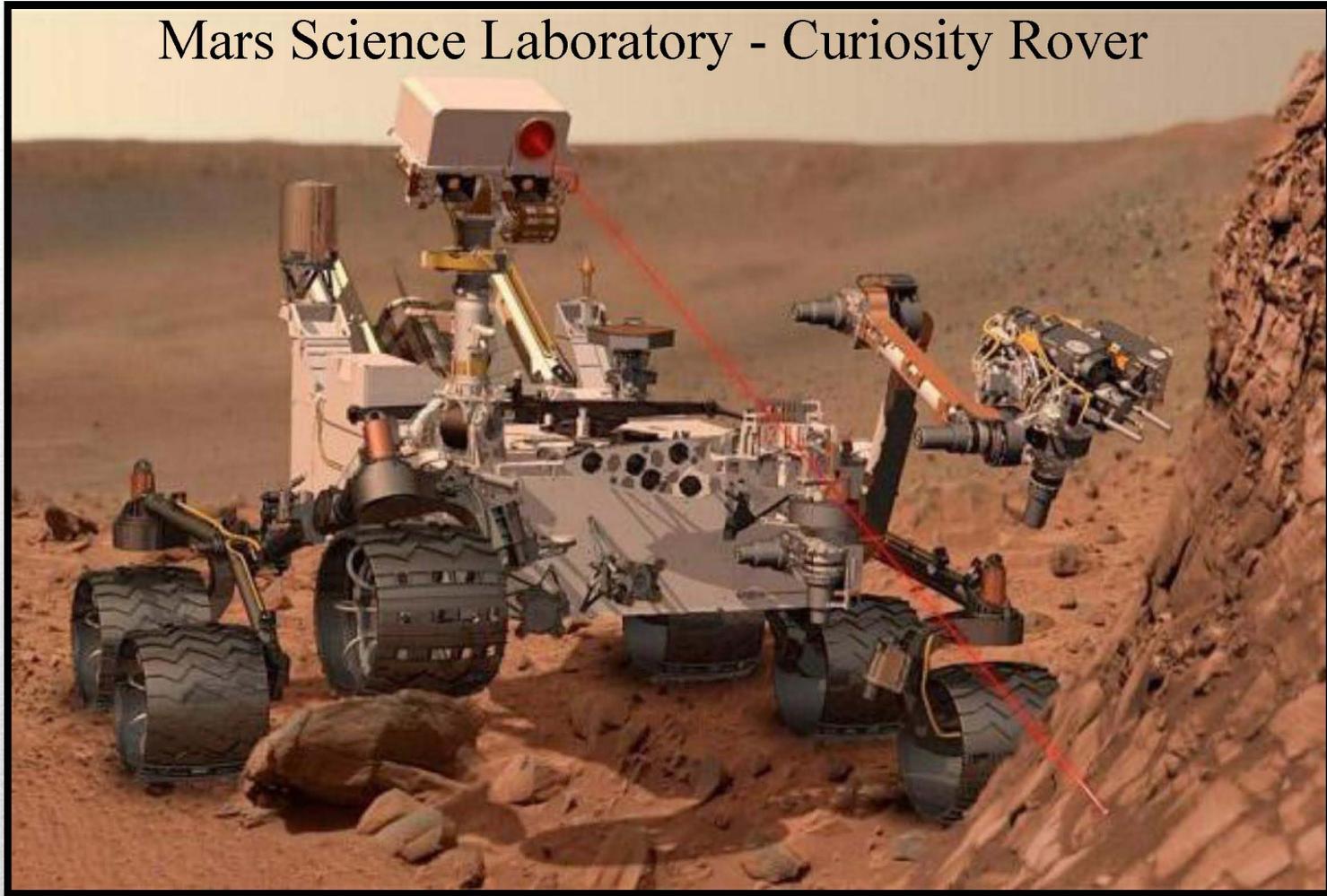


Sensor testing for Curiosity



Flight Test Supporting Space

Mars Science Laboratory - Curiosity Rover

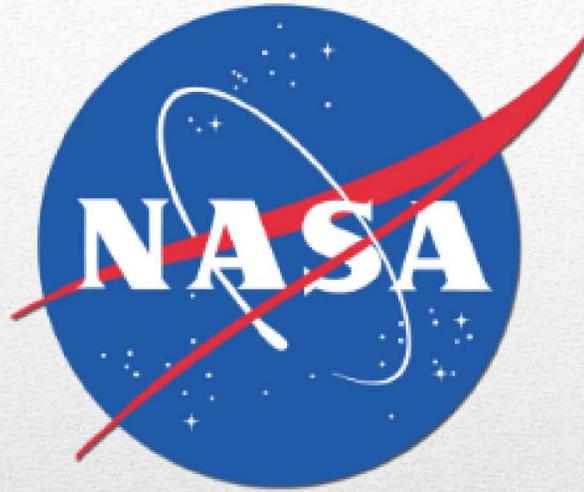


Engineering in Space



Dare Mighty Things

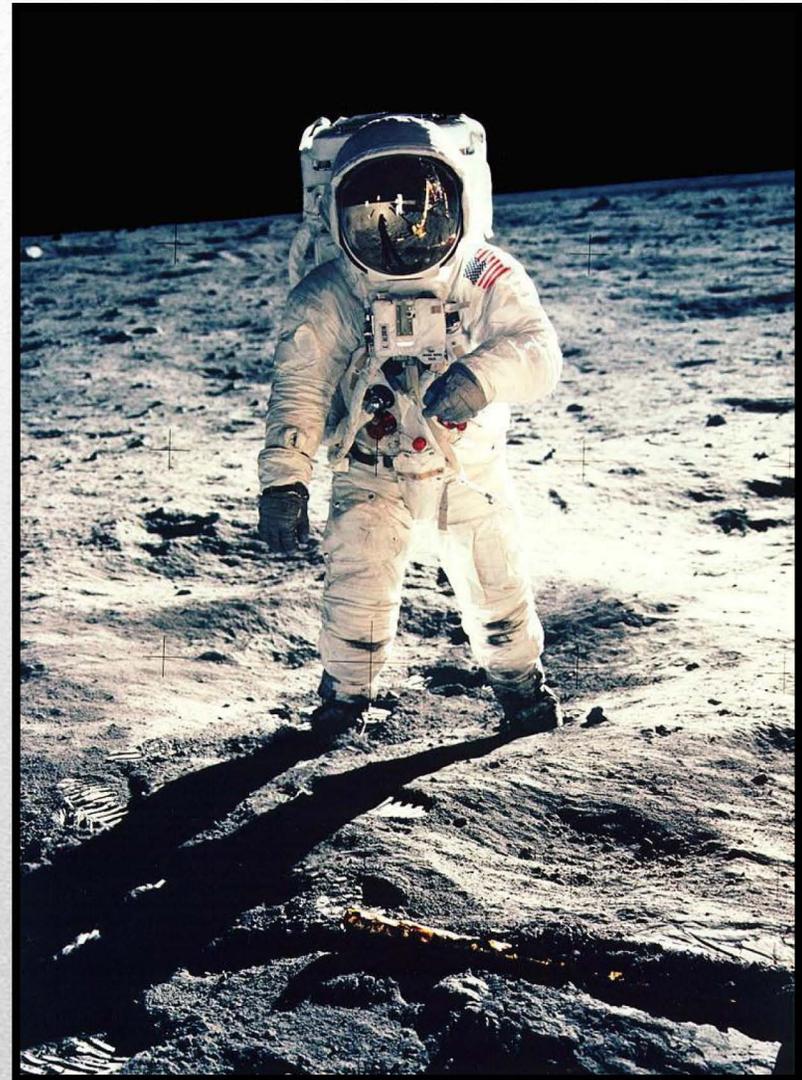
Video - “7 Mins of Terror”



**National Aeronautics
and Space Administration**

To reach for new
heights and reveal
the unknown so that
what we do and
learn will *benefit all
humankind*

NASA Vision



6,300 patents with US government to date



Invisible braces
Scratch resistant lenses
Ear thermometer



Long distance telecommunications

Cordless tools

Water filters

Etc!



NASA In Your Life

Dryden Flight Research Center



Primer Flight Test for NASA



“We Turn Ideas Into Reality”

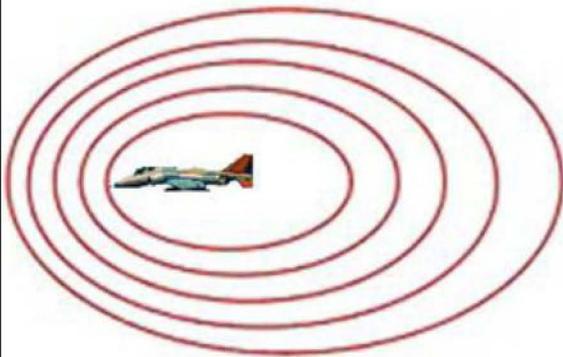
Video – NASA Dryden



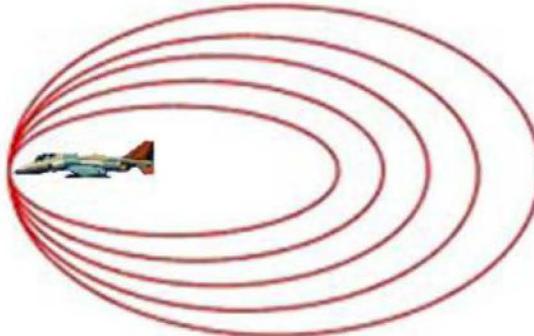
What are your ideas?

Air Travel Improvements

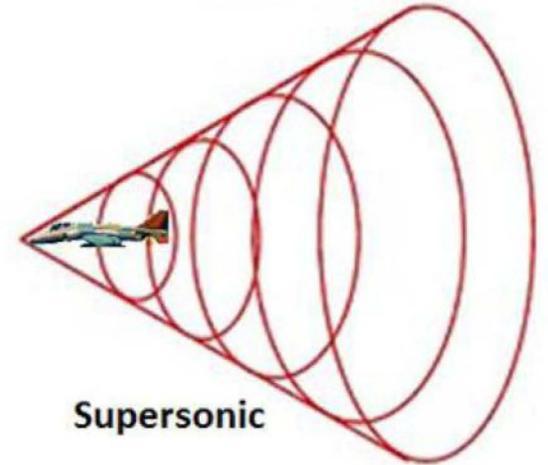
Stationary wave



Subsonic

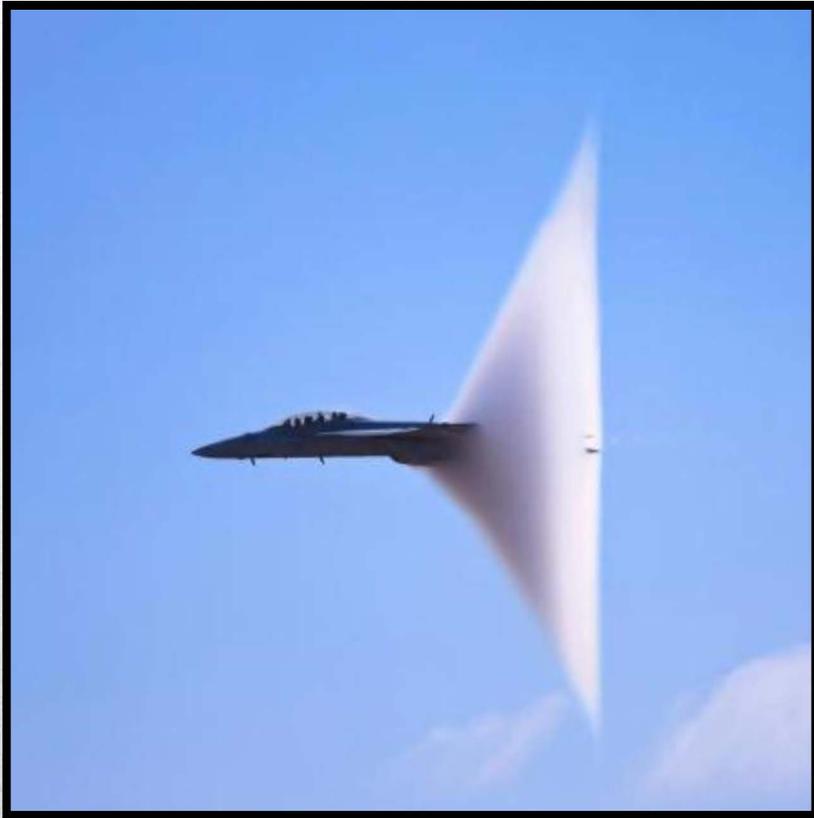


Sonic

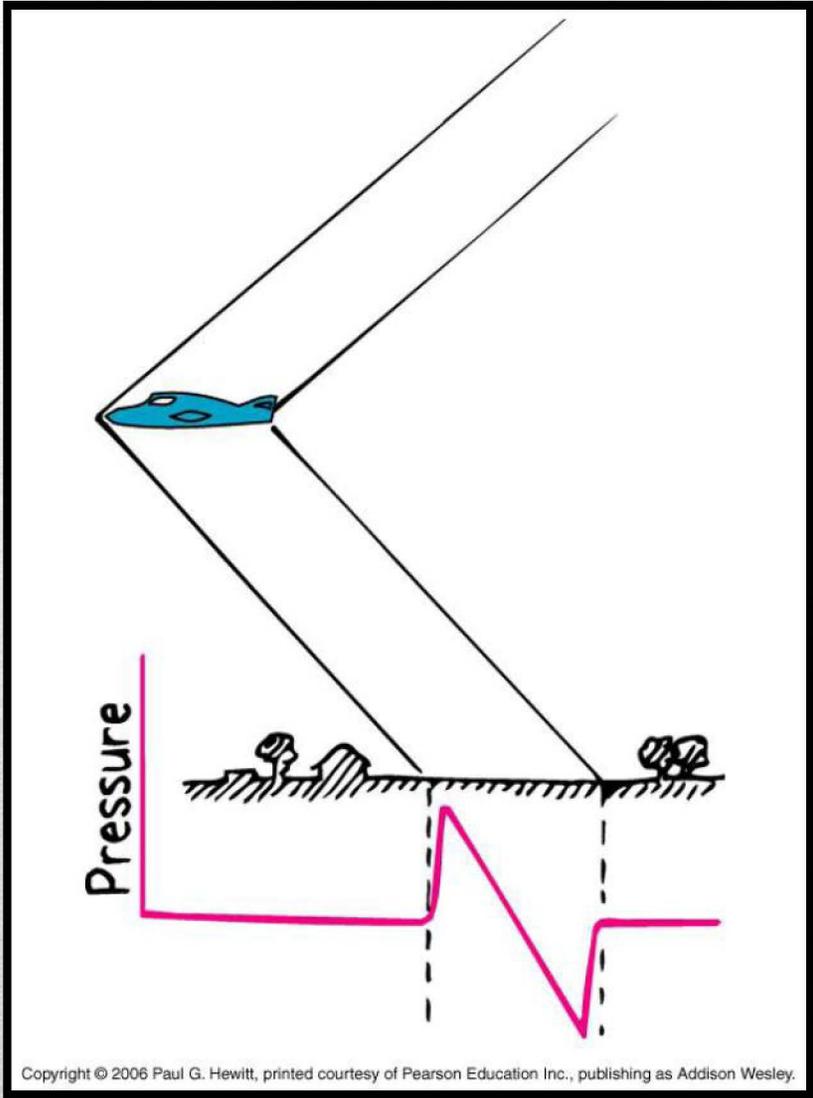
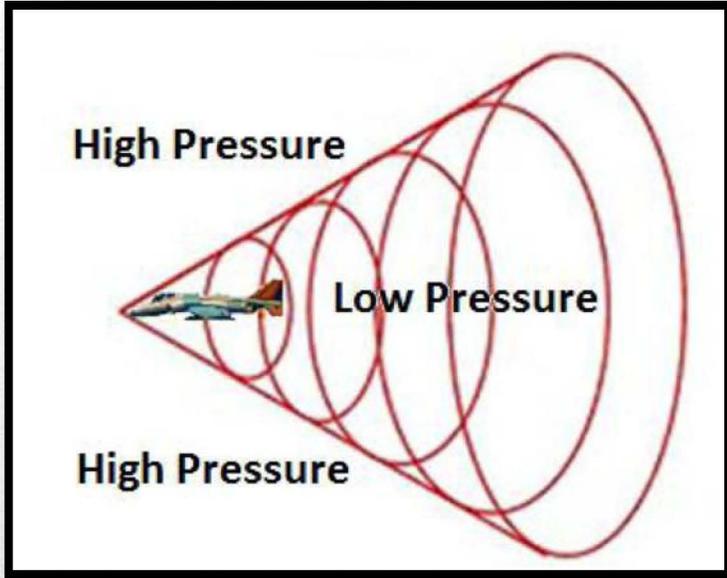


Supersonic

Science of Sound Waves



Shock Waves



Sonic Booms



Quiet Spike



**What skills are needed in
Engineering?**

Engineering Skills

- Agricultural
- Biomedical
- Ceramic and Materials
- Chemical
- Civil
- Computer
- Electrical
- Environmental
- Industrial
- Marine & Ocean
- Mechanical
- Nuclear
- Petroleum
- MORE!

Other Types of Engineering

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Neil Armstrong &
Lt Kate Pavlock

Questions?
