

# *NASA AT 50*

## *1960: Transonic Dynamics Tunnel Begins Operation*

### **Teacher's Guide**



**Grade Level:** 6–12    **Curriculum Focus:** Science, Social Studies    **Running Time:** 5 minutes

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### Introduction

*NASA at 50* acquaints students with key innovations and milestones in chemistry, physics, engineering, and space exploration from NASA's fifty-year history. Each clip serves as a gateway for extended lessons in science and history, promoting critical thinking and inquiry as essential components of scientific literacy.

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### Program Description

Considers how NASA engineers used the transonic dynamics wind tunnel to improve a dangerous design flaw in commercial aircraft. The program demonstrates how NASA's research into aerodynamics and lift determined why oscillations and "fluttering" occurred in airplane propellers when the planes reached high speeds.

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### Learning Objectives

After viewing the program and participating in discussion, students will be able to:

- Explain how "fluttering" in an aircraft is highly dangerous;
  - Describe how the innovative NASA transonic dynamics tunnel paved the way for space exploration;
  - Identify how the TDT helped not only NASA, but also commercial and military aircrafts.
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### Classroom Connections

Why was the transonic dynamics tunnel built? What are its characteristics?

Why were the wings of aircraft fluttering and breaking off at high speeds and altitudes?

What are the differences between NASA aircraft, commercial aircraft, and military aircraft?

How long have experiments and tests been occurring in the transonic dynamics tunnel?

Predict the changes in the design of the NASA aircraft to fix the problem of fluttering wings.

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## Classroom Activities

As a class, visit

<http://www.lerc.nasa.gov/WWW/K12/WindTunnel/WTEpKids/index.htm> and review the NASA sponsored PowerPoint presentation on how air tunnels function. Students should pay particular attention to slides 35–39. NASA provides some of the logistical needs of engineering a plane, but what about other general needs for running an aircraft? A plane is built and ready to fly – but now what? How will it fly? Who will use the plane? How much will it cost? Students should brainstorm the needs behind not only the building of an airplane, but the production of an airplane.

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## Target Vocabulary\*

**aerodynamics** - a branch of dynamics that deals with the motion of air and other gaseous fluids and with the forces acting on bodies in motion relative to such fluids

**oscillation** - to swing backward and forward like a pendulum

**wind tunnel** - a tunnel-like passage through which air is blown at a known velocity to investigate air flow around an object

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## Academic Standards

National Science Teachers Association

The National Science Teachers Association (NSTA) has developed national standards to provide guidelines for teaching science. To view the standards online, go to

<http://www.nsta.org/publications/nses.aspx>.

This guide addresses the following standards:

- Science and Technology
- Earth and Space Science

- People, Places, and Environments
- Science in Personal and Social Perspectives
- History and Nature of Science

#### National Council for the Social Studies

The National Council for the Social Studies (NCSS) has developed national standards to provide guidelines for teaching social studies. To view the standards online, go to

<http://www.socialstudies.org/standards/strands/>.

This guide addresses the following standards:

- Time, Continuity, and Change
- People, Places, and Environments
- Science, Technology, and Society
- Individuals, Groups, and Institutions