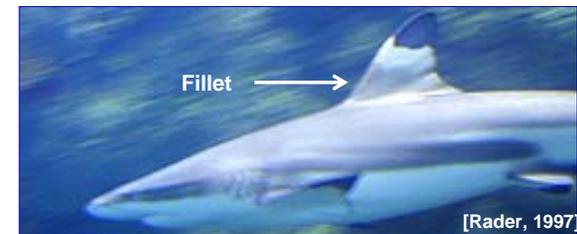


# Rethinking the Design of Presentation Slides

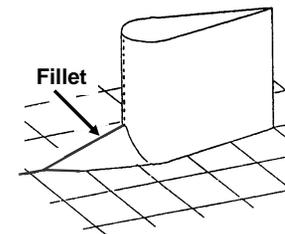
Michael Alley  
College of Engineering  
Penn State

Fillets reduce leading edge vortices in nature and in engineering

Fillet on dorsal fin of shark



Fillet on Seawolf submarine



[Devenport et al., 1991]

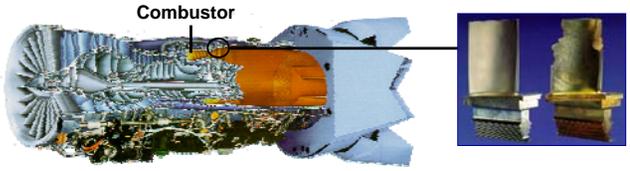


[Zess and Thole, 2001]

# This presentation presents a slide design that is more effective than PowerPoint's default design

more readily understood

We propose to test a fillet design for turbine blades and vanes downstream of the combustor



The diagram shows a cross-section of a turbine engine. A label 'Combustor' points to the central orange-colored chamber. A line extends from the combustor to a circular callout on the right, which shows a close-up of a turbine blade with a fillet design at its base. The fillet is a curved, rounded transition between the blade and the vane.

[Pratt&Whitney, 2000]

The purpose of the fillet design is to reduce vortices that disrupt the film cooling of the blades and vanes



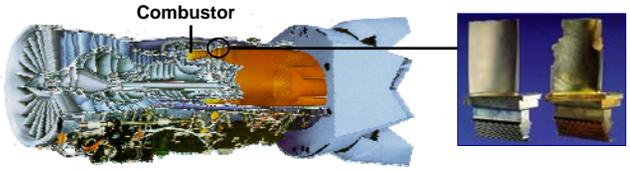
The Virginia Tech logo is located in the bottom right corner of the slide content area.

[Alley, 2003]  
[Alley and Neeley, 2005]

# This presentation presents a slide design that is more effective than PowerPoint's default design

more readily understood

We propose to test a fillet design for turbine blades and vanes downstream of the combustor

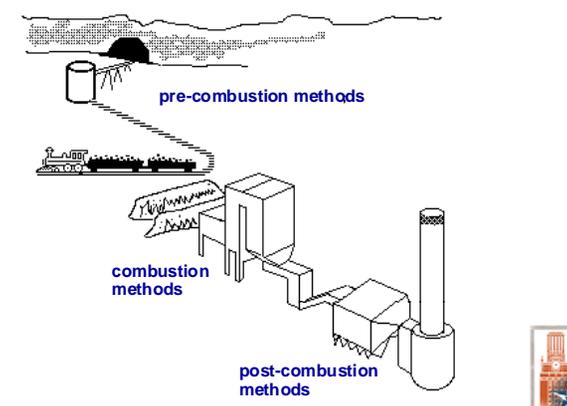


[Pratt&Whitney, 2000]

The purpose of the fillet is to disrupt the film cooling

more memorable

This presentation compares several methods for reducing emissions of sulfur dioxide



pre-combustion methods

combustion methods

post-combustion methods

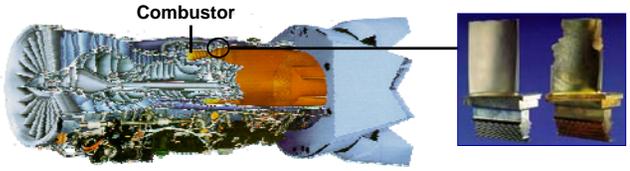
[Alley, 2003]

[Alley and Neeley, 2005]

# This presentation presents a slide design that is more effective than PowerPoint's default design

more readily understood

We propose to test a fillet design for turbine blades and vanes downstream of the combustor



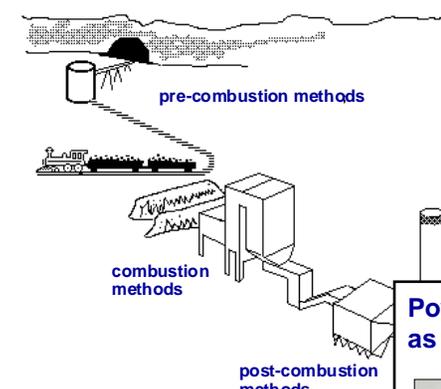
Combustor

[Pratt&Whitney, 2000]

The purpose of the fillet is to disrupt the film cooling

more memorable

This presentation compares several methods for reducing emissions of sulfur dioxide



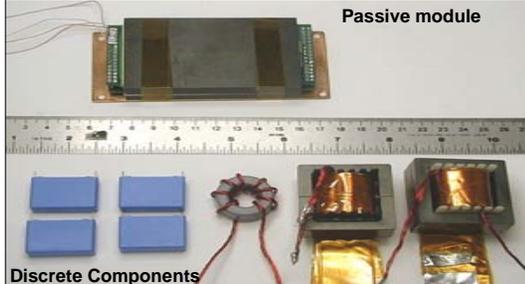
pre-combustion methods

combustion methods

post-combustion methods

more persuasive

Power passive modules perform the same functions as discrete circuits but with smaller volumes



Passive module

82 cm<sup>3</sup>

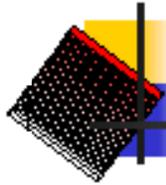
Discrete Components

168 cm<sup>3</sup>

The total volume is cut by more than half

[Alley and Neeley, 2005]

# For a slide to be effective, the audience has to be able to grasp its content quickly



## Literature Review

- Hefner developed a dynamic electro-thermal model for a temperature-dependent IGBT silicon chip, package and heat sink. The temperature-dependent IGBT electrical model describes the electrical behavior in terms of the instantaneous temperature of the silicon chip surface. The instantaneous power dissipated in the chip is determined using the electrical model and determines the instantaneous power applied to the surface of the silicon chip thermal model. Hefner implemented this methodology into the *SABER* circuit simulator.
- Adams, Jones and Borja considered thermal interactions between the heat sources and the enclosure walls as affected by the thermal conductance of the walls and the geometry of the enclosure. The intent of determining which physical effects and level of detail are necessary to accurately predict thermal behavior of discretely heated enclosures.
- Chen, Wu and Borojevich are modeling of thermal and electrical behavior using several commercial softwares (I-DEAS, Maxwell, Flotherm and Saber) and 3-D, transient approaches.

**Too many words**

# For a slide to be effective, the audience has to be able to grasp its content quickly

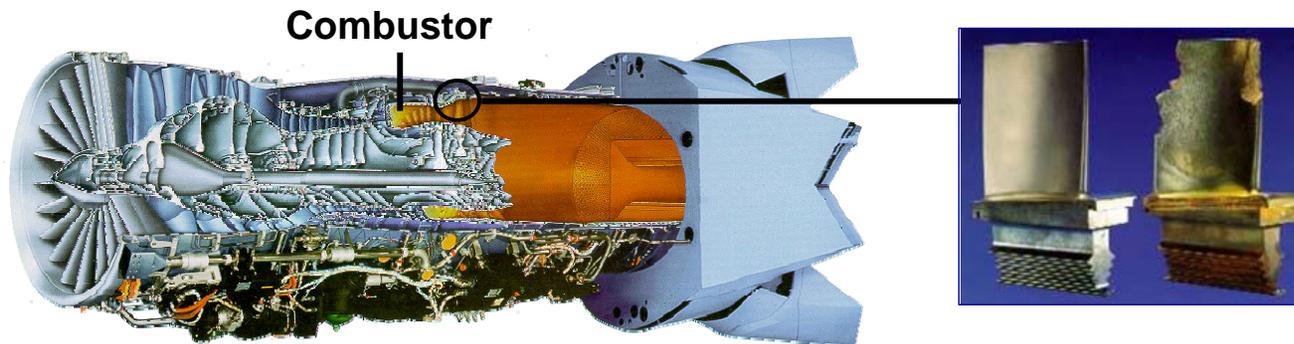
## Observations

- ✦ Segment C (not on the 520 Main Street property) represents the dominant feature of the site.
- ✦ The characteristics of Segment C are vastly different than those of Segments A and B (which are located on the 520 Main Street property).
- ✦ The characteristics of the dominant portion of the site (Segment C) are suggestive of a perennial stream.
- ✦ Direct observations are needed.
- ✦ A detailed technical analysis is needed by a qualified, independent hydrologist.

**Tiresome to read**

# For a slide to be effective, the audience has to be able to grasp its content quickly

We propose to test a fillet design for turbine blades and vanes downstream of the combustor



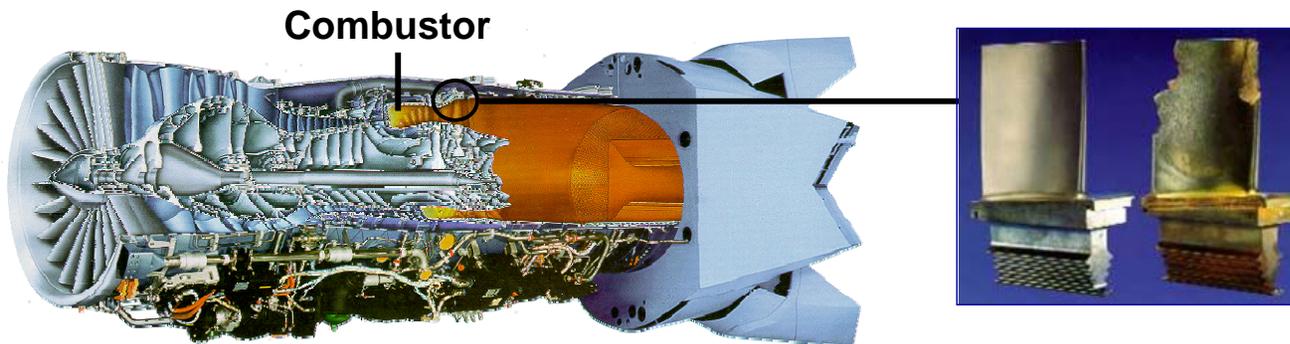
[Pratt&Whitney, 2000]

The purpose of the fillet design is to reduce vortices that disrupt the film cooling of the blades and vanes



# For a slide to be effective, the audience has to be able to grasp its content quickly

**We propose to test a fillet design for turbine blades and vanes downstream of the combustor**



[Pratt&Whitney, 2000]

**The purpose of the fillet design is to reduce vortices that disrupt the film cooling of the blades and vanes**



**Sentence headline**

**Visual evidence**

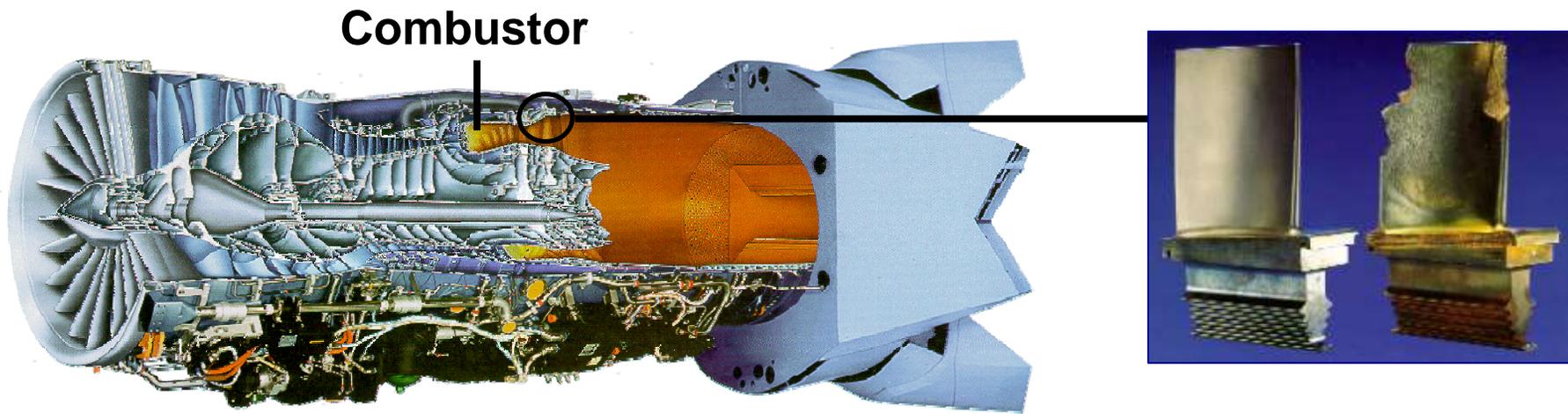
**No bullet lists**

[Gottlieb, 1984]

[Alley, 2003]

[Zess and Thole, 2001]

# We propose to test a fillet design for turbine blades and vanes downstream of the combustor

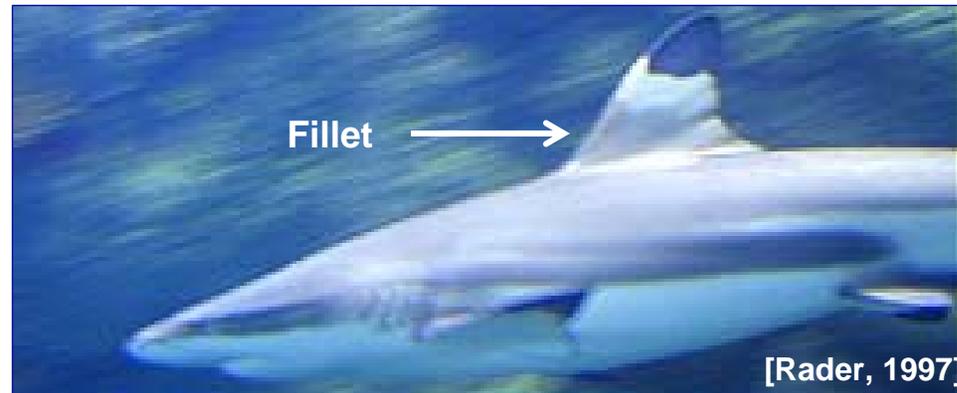


[Pratt&Whitney, 2000]

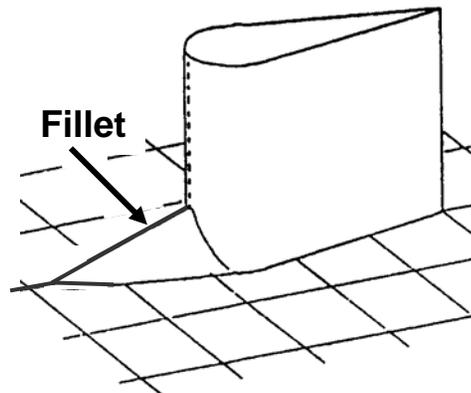
The purpose of the fillet design is to reduce vortices that disrupt the film cooling of the blades and vanes

# Fillets reduce leading edge vortices in nature and in engineering

**Fillet on dorsal fin of shark**



**Fillet on Seawolf submarine**



[Devenport et al., 1991]

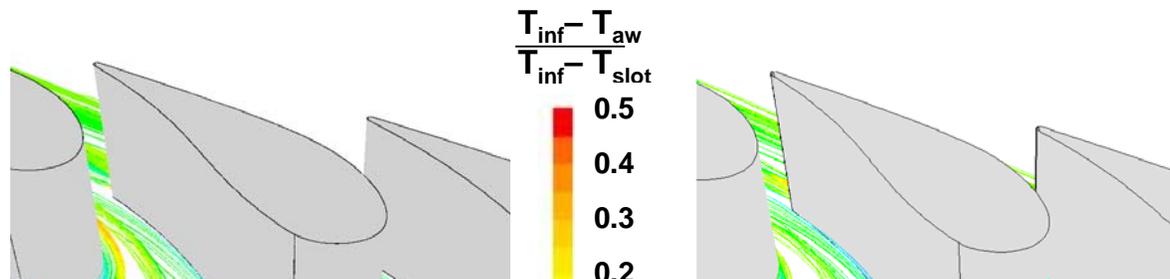


# The sentence headline should state succinctly the purpose or assertion of the slide



Sentences orient the audience much better than phrases do

Computations show that the fillet prevents the leading edge vortex and delays the passage vortex



# The sentence headline should state succinctly the purpose or assertion of the slide

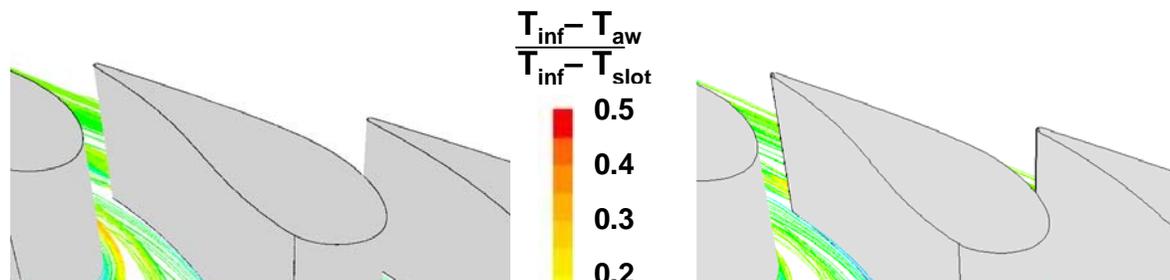


Sentences orient the audience much better than phrases do

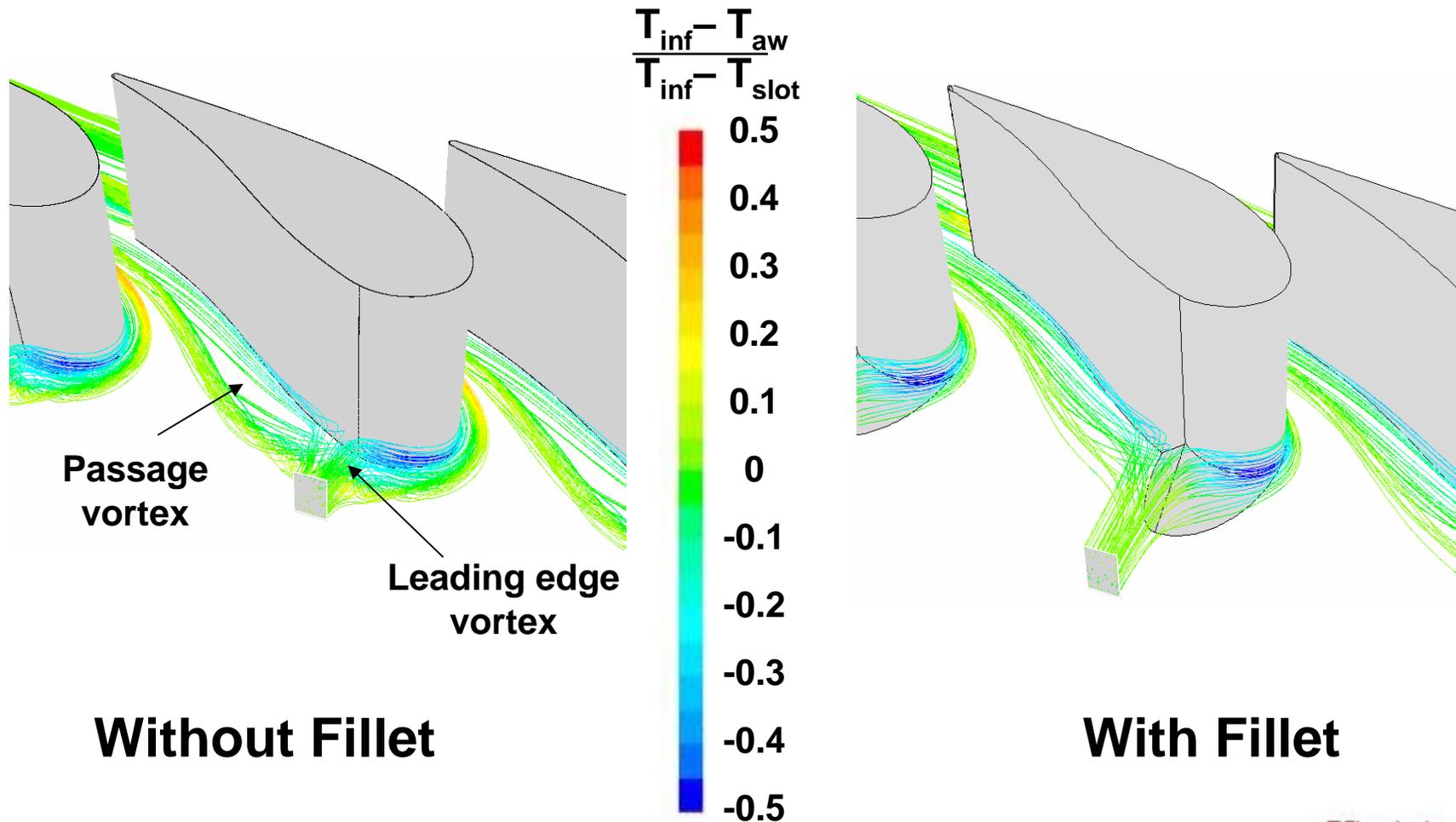


Sentences force the presenter to wrestle with the argument

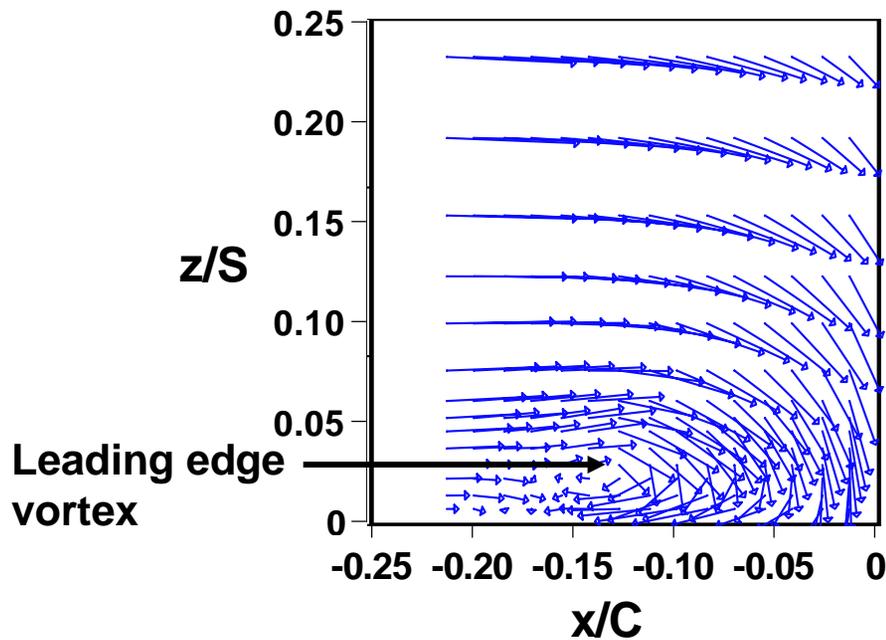
Computations show that the fillet prevents the leading edge vortex and delays the passage vortex



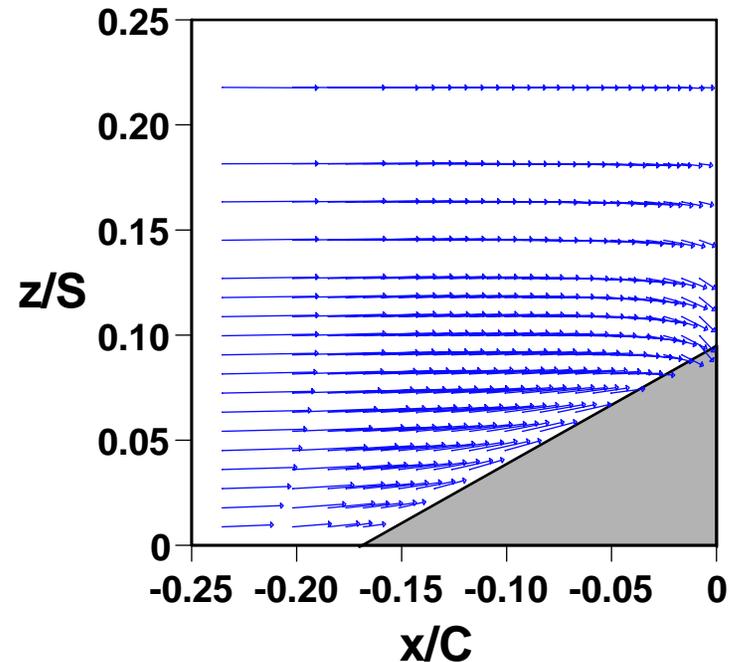
# Computations show that the fillet prevents the leading edge vortex and delays the passage vortex



# Measurements show that the fillet prevents formation of the leading edge vortex



Velocity profile:  
vane without fillet



Velocity profile:  
vane with fillet

# To make slides memorable, you have to consider what to include and what to exclude

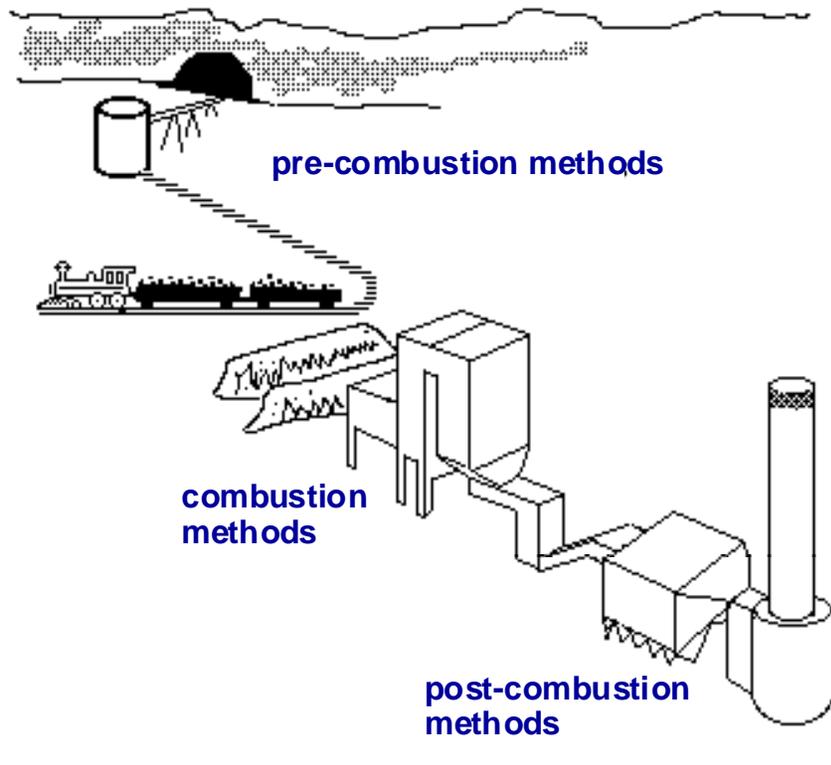
## Presentation Outline

- Introduction
- Background
- Pre-Combustion Methods
  - coal switching
  - coal cleaning
- Combustion Methods
  - atmospheric fluid bed
- Post-Combustion Methods
  - adsorption
  - absorption
- Conclusions
- Questions?

**Not memorable**

# To make slides memorable, you have to consider what to include and what to exclude

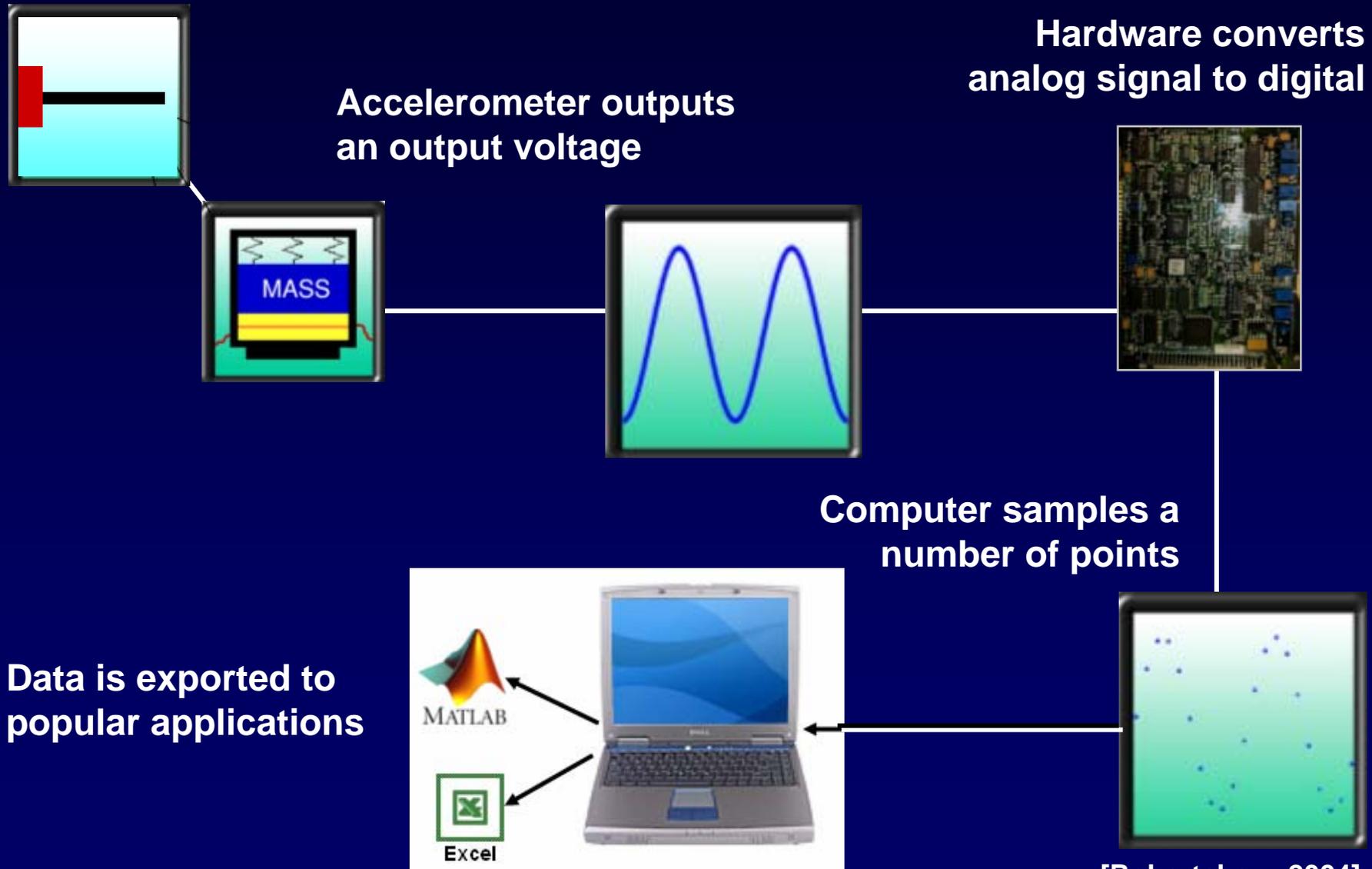
This presentation compares several methods for reducing emissions of sulfur dioxide



# Bullets are not memorable, because bullets do not show the connections

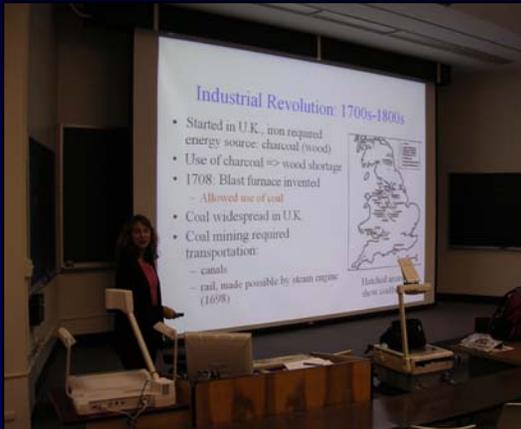
- Accelerometer outputs an analog voltage
- Hardware converts analog signal to digital
- Computer samples a number of points
- Data is exported to popular applications

# Audiences can remember more when details are presented visually



[Robertshaw, 2004]

# In a pilot study, we tested this new design in the teaching slides of a large geology course

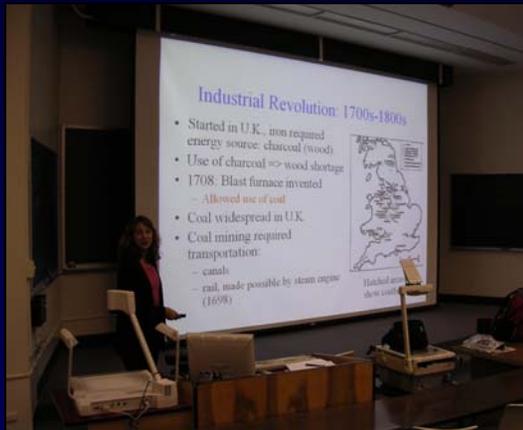


**Message delivered with typical slide design**



**Students: Fall 2004**

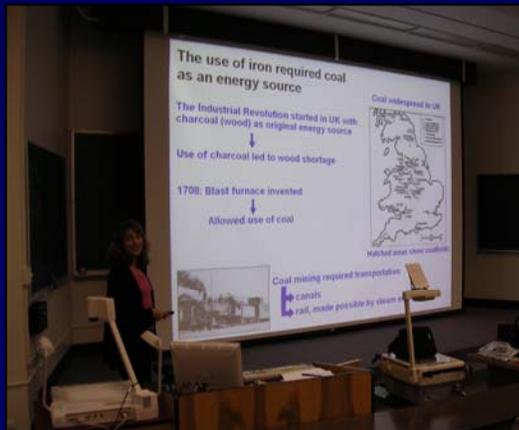
# In a pilot study, we tested this new design in the teaching slides of a large geology course



Message delivered with typical slide design



Students: Fall 2004

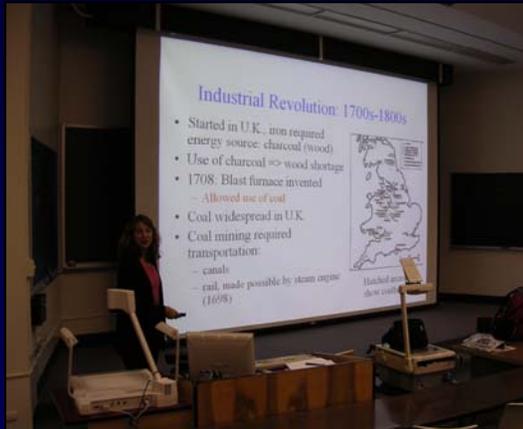


Same message delivered with new slide design



Students: Fall 2005

# In a pilot study, we tested this new design in the teaching slides of a large geology course



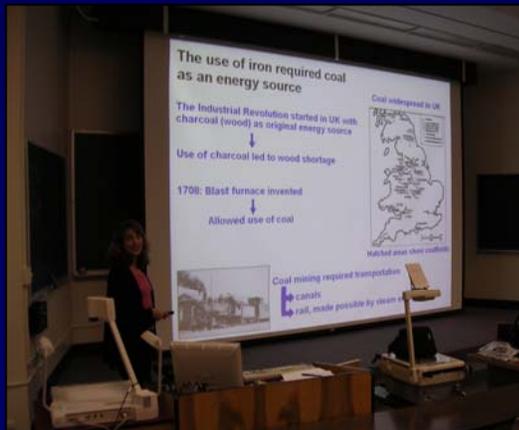
Message delivered with typical slide design



Students: Fall 2004



Comparison:  
Test scores on  
same questions



Same message delivered with new slide design



Students: Fall 2005



[Alley et al., 2006]

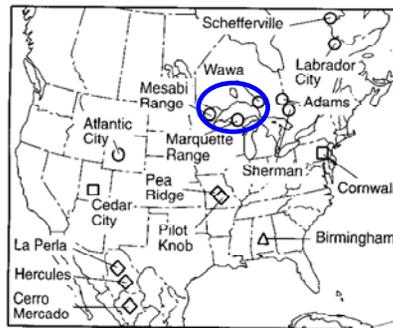
# When the tested assertion was in the sentence headline, students performed significantly better

Q: How abundant is iron in the earth's crust?

## Iron

- An abundant metal, makes up 5.6% of earth's crust
- Properties:
  - shaped, sharpened, welded
  - strong, durable
- Accounts for >95% of metals used
- Iron ores discovered in 1844 in Michigan's Upper Peninsula
- Soon found other ores in upper Wisconsin and Minnesota

Iron Ore Distribution



Kesler 1994

Iron ores make up 5.6% of the earth's crust and account for 95% of the metals used

Iron Ore Distribution



Is strong and durable

Can be shaped, sharpened, and welded

[Kesler 1994]

Led to 59% recall

Led to 77% recall

Level of significance < 0.001

# When answers resided in the sentence headlines, students scored higher on identical test questions

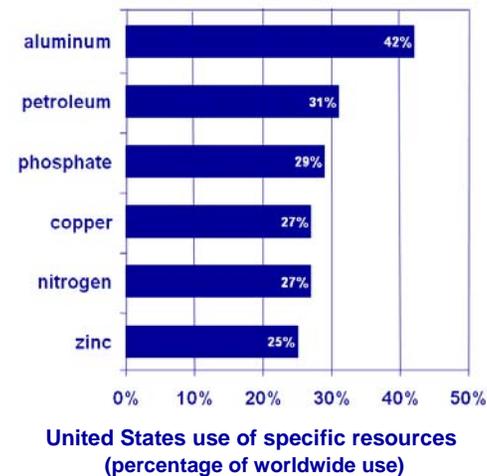
Q: Percentage of world's resources that the U.S. uses?

## U.S. Resource Use

- The United States uses:
  - 42% of all the aluminum produced worldwide
  - 31% of all the petroleum
  - 29% of all the phosphate
  - 27% of all the copper
  - 27% of the nitrogen
  - 25% of the zinc
- Approximately 30% of all resources worldwide



Although the U.S. has 5% of the world's population, we use an average of 30% of all resources

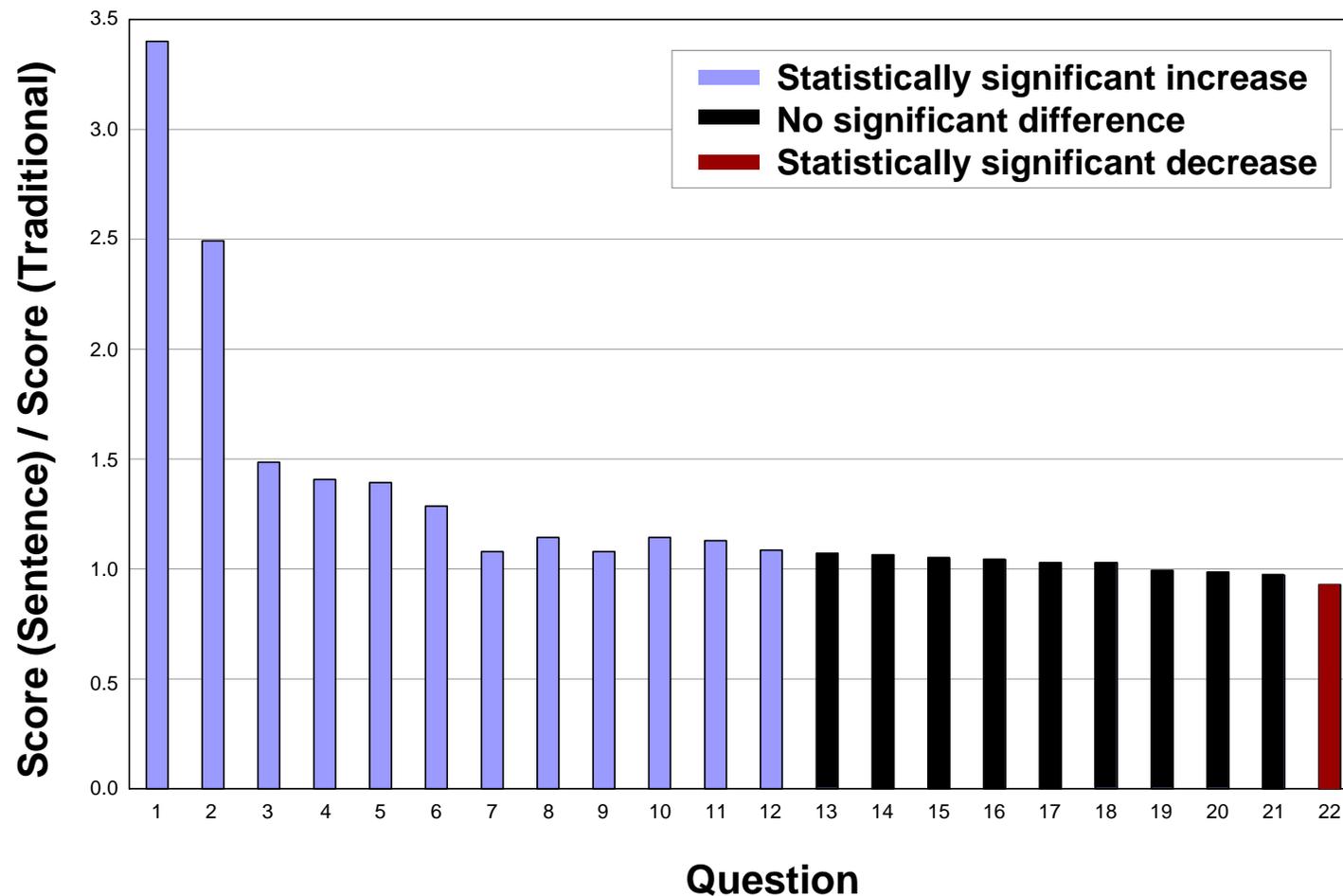


Led to 71% correct

Led to 82% correct

$p < 0.025$

# When the tested assertion was in the sentence headline, students performed significantly better



Overall percent correct (traditional headline):

70%

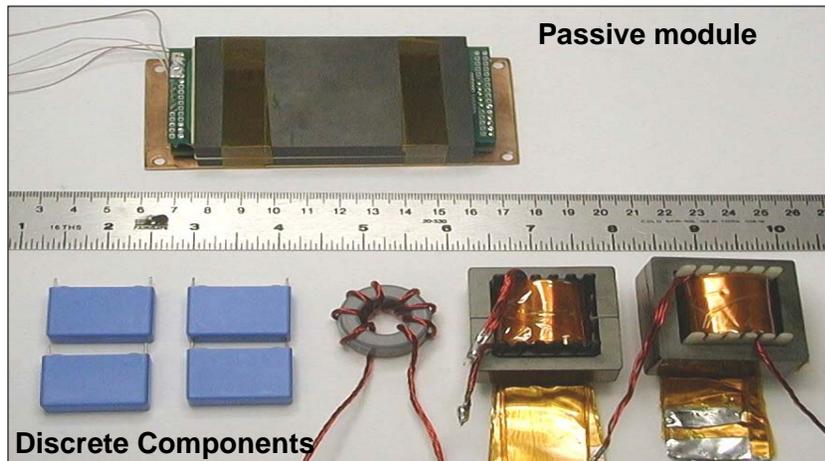
Overall percent correct (sentence headline):

82%

$p < 0.001$

# The slide design presented here is more persuasive than PowerPoint's default design

Power passive modules perform the same functions as discrete circuits but with smaller volumes



The total volume is cut by more than half

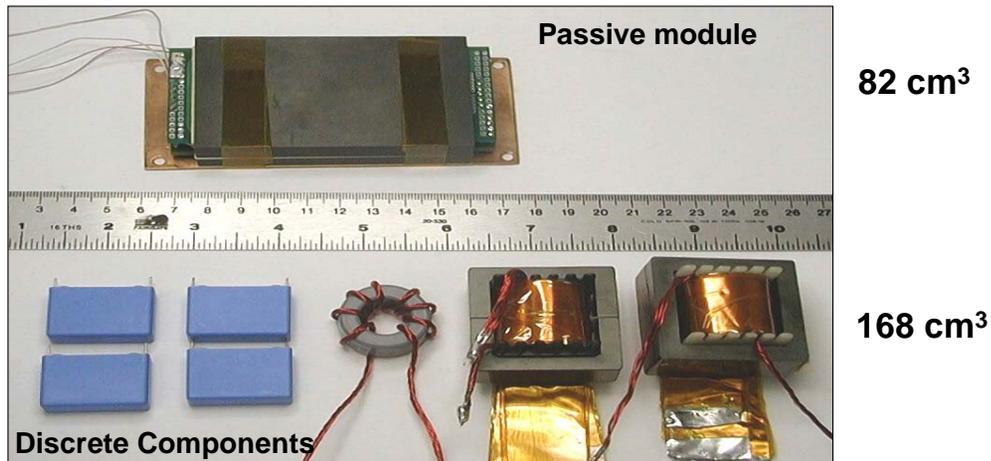


← Sentence headline can clarify assertions

← Images in body can supply cogent evidence

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Power passive modules perform the same functions as discrete circuits but with smaller volumes



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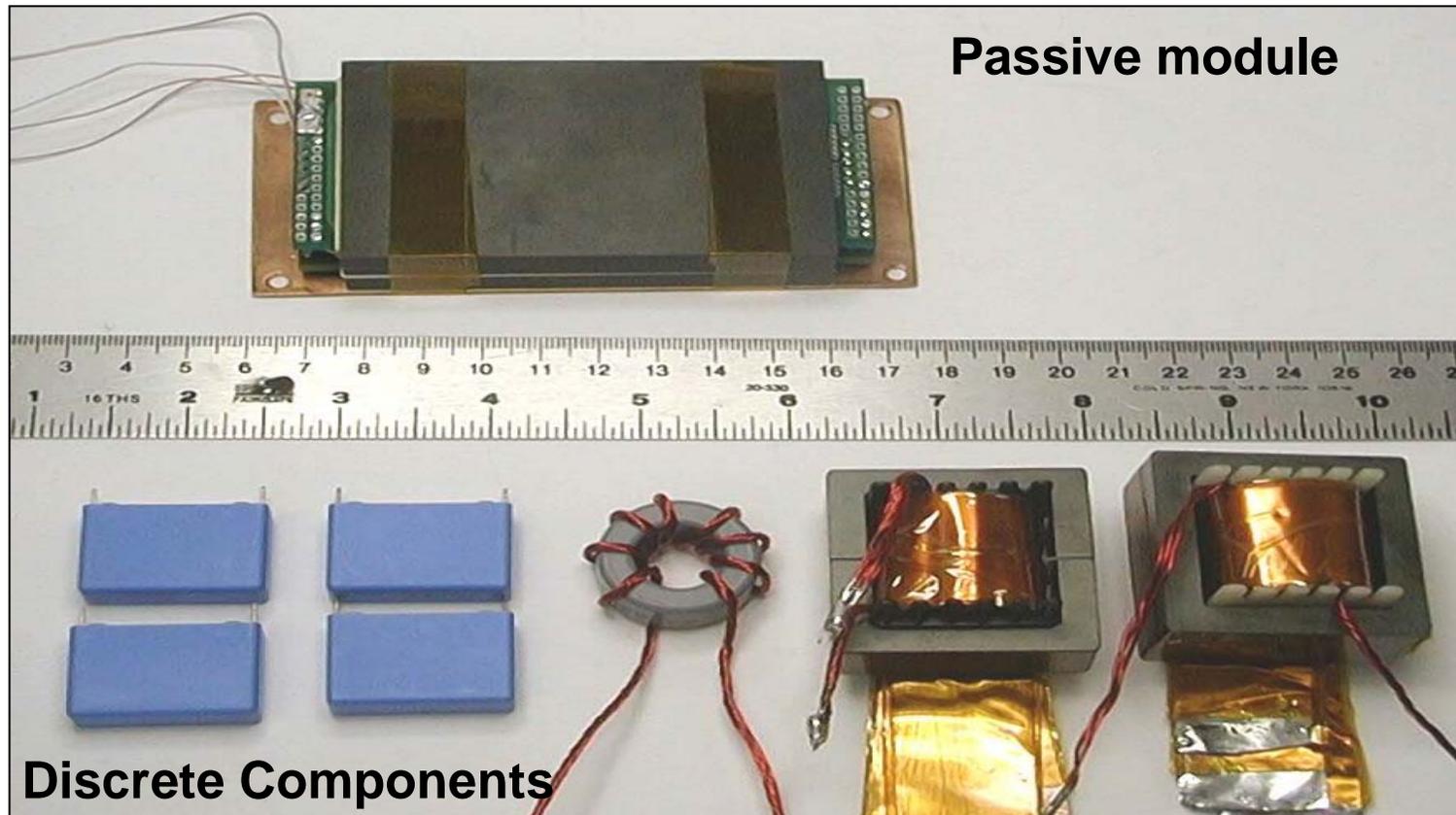
← Sentence headline can clarify assertions

← Images in body can supply cogent evidence



Design leads to fewer slides, which can increase ethos

# Power passive modules perform the same functions as discrete circuits but with smaller volumes



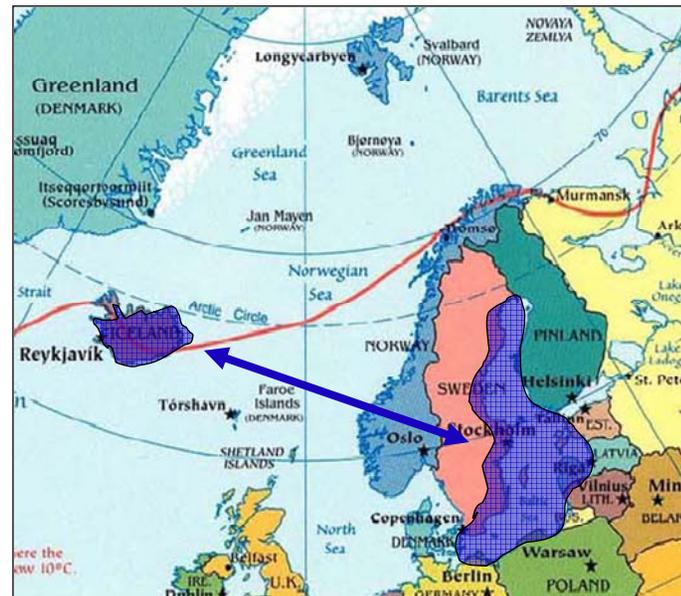
**The total volume is cut by more than half**

# An argument is more persuasive if the audience knows the claims and warrants

The research question is whether the dunlins of Iceland and the Baltic Sea are different subspecies



©Lars Erik Johannessen



<http://www.lib.utexas.edu/maps/polar.html>

If so, because the population of the Baltic dunlins is declining, it may be a threatened subspecies



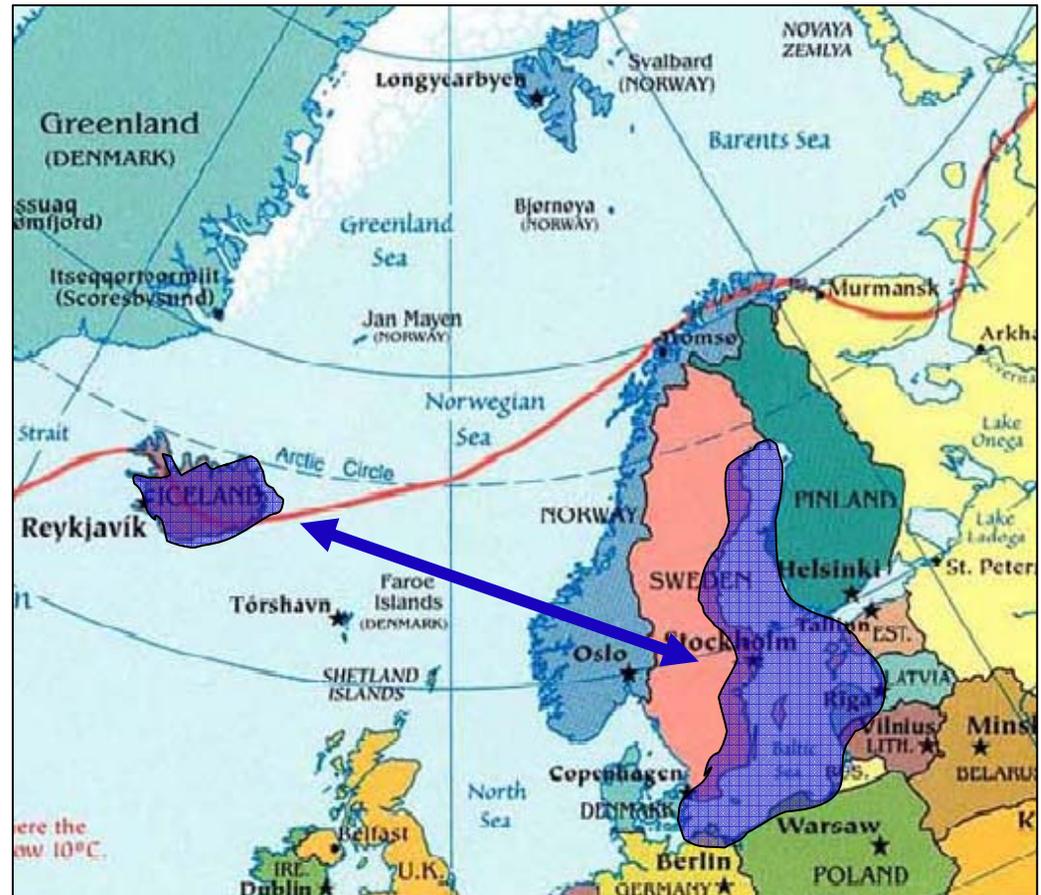
← Claim:  
assertion

← Warrant:  
key background

# The research question is whether the dunlins of Iceland and the Baltic Sea are different subspecies



©Lars Erik Johannessen



<http://www.lib.utexas.edu/maps/polar.html>

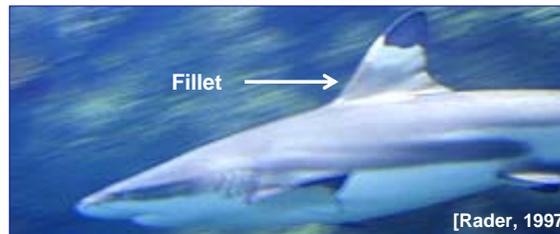
If so, because the population of the Baltic dunlins is declining, it may be a threatened subspecies



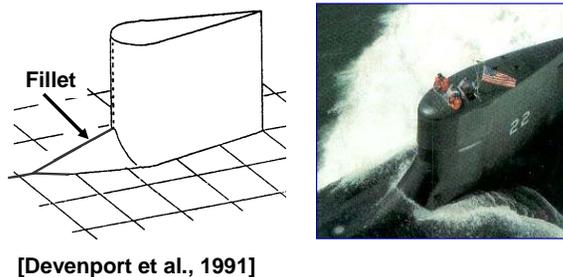
# In summary, this slide design gives a much higher starting point than PowerPoint's default design

Fillets reduce leading edge vortices in nature and in engineering

Fillet on dorsal fin of shark



Fillet on Seawolf submarine



[Zess and Thole, 2001]

more readily understood

more memorable

more persuasive

Templates: <http://writing.eng.vt.edu/slides.html>

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