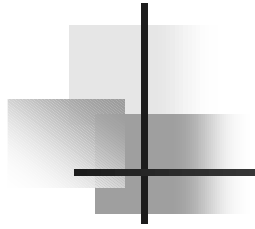




**cesearch**  
“ce-ing into the future”

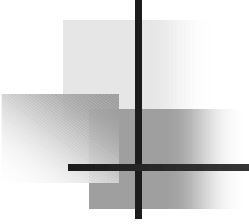
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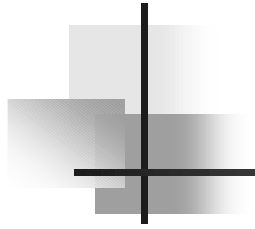


- Bryan Nicholson, Ph.D.
  - Graduated from Clemson University
  - Doctoral research in fire resistant materials
  - Began Cesearch with Kevin Anderson in 1985
- Kevin Anderson, PhD.
  - Graduated from Clemson University
  - Doctoral research in skyscraper structural analysis

**CESEARCH**

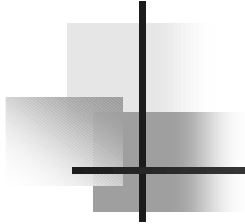
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- Consulting services
  - Pay based on billable hours
  - Typically hired by companies and government agencies to analyze building failures and provide recommendations

**CESEARCH**



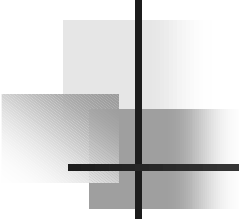
- Twin Towers
- Importance of Research
- Direction of Research

**CESEARCH**

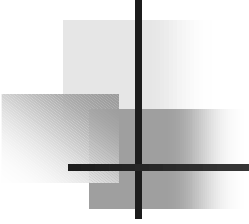


On September 11th, two of the world's most well-known structures collapsed.

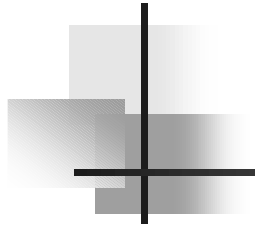
**CESEARCH**

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- The World Trade Center towers were built in the 1960's, boasting their titles as the world's tallest buildings. The collapse opened our eyes to re-examine out-dated building codes in fire resistance.

**CESEARCH**

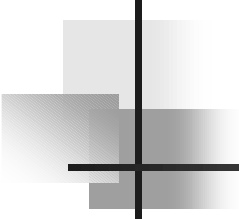
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- TIME Magazine - "Shattered"
  - TIME Magazine - "It Didn't Seem Real"

**CESEARCH**



- The World Trade Center's design actually saved thousands of lives by standing for well over an hour.
- Its design also withstood the bomb attack of 1993 and the strong distributed wind loads acting on a high-rise building
- Why did it fail?

**CESEARCH**

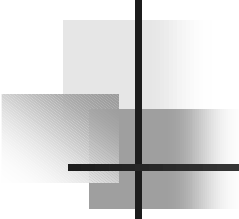


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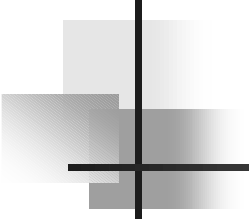
“It was the fire that killed the buildings --  
nothing on earth could survive those  
temperatures with that amount of fuel  
burning.”

- Chris Wise  
Structural Engineer

**CESEARCH**

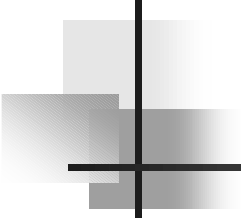
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- A better design, however, could possibly allow for more time before collapse or prevent the collapse.

**CESEARCH**

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- “According to some experts, US engineers have never really taken seriously the idea that buildings can collapse in this way.”

- Dr. David Whitehouse, BBC News

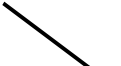
**CESEARCH**



To assess the need for new fire  
resistance modifications to  
building codes

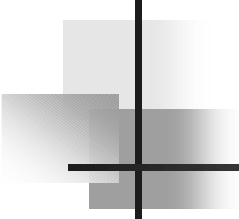


Give the public a better feeling of  
security

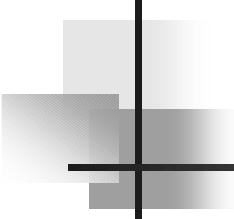


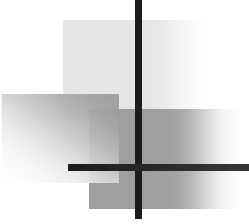
Prevent future steel failures

**CESEARCH**

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- Interview professionals in the civil engineering field for viewpoints and ideas
  - Assess current building codes
  - Search for similar fire-related failures
  - Provide NIST with a set of recommendations to improve fire resistance in sky scrapers

**CESEARCH**

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- Properties of steel
  - Failure modes of steel relating to temperature
  - Specifics of steel used in the WTC
  - Properties of current aviation fuels
  - Fire resistant coatings
  - Current building codes
  - Relationship between our research and the structural layout
- CESEARCH**

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- Our research will provide society with enhanced and up-to-date building codes.
  - This research will be an invaluable benefit to society.

**CESEARCH**