

**David B. Clayton, Ph.D., P.E.**  
**Senior Engineer**

**Professional Profile**

Dr. David Clayton is a Senior Engineer in Exponent's Thermal Sciences practice. Dr. Clayton specializes in the engineering investigation and prevention of fires and explosions by utilizing his background in combustion physics, chemical kinetics, fluid mechanics, and heat transfer. Dr. Clayton performs small, medium, and large-scale origin and cause investigations of residential, commercial, and industrial incidents. Dr. Clayton's project experience includes investigations related to combustion equipment, melting furnace explosions, cooking equipment, natural gas and propane appliances including carbon monoxide (CO) exposure, thermal related failures of consumer products, nitro methane and fuel oil related fires, vehicles, marine vessels, and other heavy equipment including tractors. Additionally, he designs, builds, and performs ignition and flammability tests of combustible materials and gaseous mixtures.

Dr. Clayton has also investigated dust explosions and fires involving materials such as aluminum, paper, rubber, and foam. These investigations have included determining origin and cause, laboratory analysis, evaluating material dust explosion properties, and assessing facility compliance with standards and codes for the prevention and mitigation of dust explosions and fires, including OSHA's Combustible Dust National Emphasis Program (NEP). Dr. Clayton serves as an alternate member on the National Fire Protection Association (NFPA) Technical Committee on Agricultural Dusts responsible for NFPA 61, *Standard for the Prevention of Fires and Dust Explosions in Agricultural and Food Processing Facilities*.

Prior to joining Exponent, Dr. Clayton was a Visiting Researcher at the Korea Institute of Machinery and Materials in Daejeon, South Korea. His research focused on experimental investigation of the propagation characteristics and instabilities of laminar edge-flames. During this time, Dr. Clayton studied advancing and retreating flame fronts in both premixed and nonpremixed configurations.

As part of his graduate work, Dr. Clayton was a Research Assistant in the Aerospace & Mechanical Engineering Department at the University of Southern California in Los Angeles. He collaborated with NASA engineers on radiation induced flows and transport phenomena by designing and conducting microgravity experiments in the 2.2 Second Drop Tower facility located at the NASA Glenn Research Center.

**Academic Credentials and Professional Honors**

Ph.D., Mechanical Engineering, University of Southern California, Los Angeles, 2007  
M.S. Mechanical Engineering, University of Southern California, Los Angeles, 2002  
B.S. Mechanical Engineering, University of Illinois at Urbana-Champaign (*with honors*), 2000  
B.A. Physics, Augustana College (*summa cum laude*), 1999

NASA Graduate Student Researchers Program, 2003–2006; University of Southern California Doctoral Fellowship, 2000–2003; Phi Beta Kappa (member); Pi Tau Sigma (member); Sigma Pi Sigma (member)

Fire Origin and Cause Determination Training (1A), State of California, Office of State Fire Marshal; Vehicle Fire/Arson Investigation Training (Live Burn), California Conference of Arson Investigators

### **Licenses and Certifications**

Registered Professional Mechanical Engineer, California, #M35163

OSHA Hazardous Waste Operations and Emergency Response certification (29 CFR 1910.120); OSHA Confined Space Entry for General Industry certification

### **Publications**

Clayton D, Cha MS, Ronney P. Propagation rates and stability modes of low Lewis number edge-flames in a counterflow slot burner. Spring Technical Meeting, Combustion Institute, Western States Section, Los Angeles, CA, March 17–18, 2008.

Clayton D. Experimental investigation of the propagation and extinction of edge-flames. Ph.D. Dissertation, University of Southern California, Los Angeles, 2007.

Clayton D. Study of edge-flame propagation rates. 8<sup>th</sup> Doctoral Students Conference, Association of Pacific Rim Universities, Keio University, Tokyo, Japan, July 30–August 3, 2007.

Clayton D, Cha MS, Ronney P. Propagation and extinction of premixed edge-flames in a counterflow slot burner. 5<sup>th</sup> U.S. Combustion Meeting, Combustion Institute, San Diego, CA, March 25–28, 2007.

Clayton D, Cha MS, Ronney P. Edge flame propagation for twin premixed counterflow slot burner. Proceedings, Korean Society of Combustion 2006; 33:60–64.

Clayton D, Cha MS, Ronney P. Propagation rates of premixed edge-flames. Poster, 31<sup>st</sup> International Symposium on Combustion, Combustion Institute, Heidelberg, Germany, August 6–11, 2006.

Clayton D, Cha MS, Ronney P. Characteristics of edge flames for premixed flames in a counterflow slot burner. Proceedings, Korean Society of Combustion 2006; 32:7–12.

Mackin T, Noe S, Ball K, Bedell B, Bim-Merle D, Bingaman M, Bomleny D, Chemlir G, Clayton D, Evans H, Gau R, Hart J, Karney J, Kiple B, Kaluga R, Kung P, Law A, Lim D, Merema R, Miller B, Miller T, Nielson T, O’Shea T, Olson M, Padilla H, Penner B, Penny C, Peterson R, Polidoro V, Raghu A, Resor B, Robinson B, Schambach D, Snyder B, Tom E,

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Tschantz R, Walker B, Wasielewski K, Web T, Wise S, Yang R, Zimmerman R. Thermal cracking in disc brakes. *Engineering Failure Analysis* 2000; 9:63–76.

## Reports

Reza A, Clayton D. Hazard Evaluation of Foam Dust Accumulations in the Rebond Department at Flexible Foam Products, Inc., Archbald Pennsylvania. Exponent Failure Analysis Associates, September 2008.

Reza A, Clayton D. Iron Mountain Dust Explosion Investigation. Exponent Failure Analysis Associates, March 2008.

Saraf S, Medhekar S, Reza A, Dillon S, Lieberman D, Clayton D. BP Whiting Refinery—RGP/PGP Storage Area Gap Analysis. Prepared for BP Products America Inc., Whiting Business Unit. Exponent Failure Analysis Associates, November 2007.

## Invited Lecture

Clayton D. Propagation and extinction characteristics of edge-flames in a counterflow slot-jet burner. Shibaura Institute of Technology, Tokyo, Japan, July 26, 2007.

## Prior Experience

Visiting Researcher, Korea Institute of Machinery & Materials, 2005–2007

Research Assistant, University of Southern California, Aerospace and Mechanical Engineering Department, 2000–2007

Intern, Seagate Technology, 2000

Teaching Assistant, Augustana College, Physics and Astronomy Department, 1996–1998

## Peer Reviewer

- Journal of Hazardous Materials
- SAE 2008 World Congress

## Professional Affiliations

- American Society of Mechanical Engineers
- Combustion Institute
- California Conference of Arson Investigators
- National Fire Protection Association
  - Technical Committee on Agricultural Dusts, NFPA 61, *Standard for the Prevention of Fires and Dust Explosions in Agricultural and Food Processing Facilities* (alternate)