

Physics

At Work

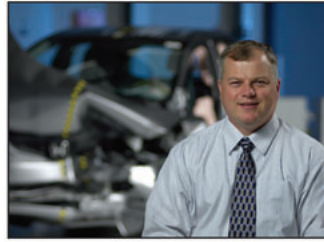
Joe Nolan

Senior Vice President, Vehicle Research Center;
Ruckersville, VA

Joe Nolan realizes his career, much like automobile accidents, was not planned. While earning his graduate degree in engineering, he realized he needed a research position to graduate. "The only research position available was at the Automobile Safety Lab at the University of Virginia's School of Engineering," said Nolan. Today, he is the senior vice president at the Vehicle Research Center for the Insurance Institute for Highway Safety, located in Ruckersville, Virginia.

The Insurance Institute for Highway Safety is a nonprofit, nongovernmental research organization. It is funded by insurance companies and performs over 100 full-scale crash tests per year. The Vehicle Research Center currently reproduces three different real-world crashes to test a vehicle's safety: frontal offset collisions, side impacts, and rear-end whiplash tests. "In the front and side tests, we observe the way the dummies move in the car, the way the restraint system works, and how the car's structure holds up," he said.

While automobile manufacturers continue to upgrade their safety features, Nolan believes that new drivers still need to be more responsible behind the wheel. "Car crashes are the number one cause of death for people under the age of 18, even though vehicles are getting better and belt use is going up," argues Nolan.

**Marjorie Cooke**

Marine Safety Expert,
Robson Forensic;
Fairfax County, VA

Dave Cooke

Professional Engineer,
Robson Forensic;
Fairfax County, VA

Dave and Marjorie Cooke met at the State University of New York Maritime College, and have been working together for over 30 years. According to the couple, their job is never routine. "We may be inspecting a ship or boat to determine its condition, or we may be interviewing someone to determine what happened during the incident."

The couple's understanding of physics is vital during an investigation. "You have to be able to determine what direction and the amount of force applied to various components. In boating accidents, there are no skid marks to help you out."

Michael Jackson

Emergency Medical
Technician (EMT);
North Apollo, PA

Michael Jackson is an Emergency Medical Technician (EMT) at Allegheny Valley Hospital, located in Natrona Heights, PA. A typical day involves responding to a variety of emergencies, from shortness of breath and chest pains, to automobile accidents. The most severe automobile accident Jackson responded to in his seven-year career was a vehicle that had gone over a hillside. "The passengers were young adults, and luckily, both survived," said Jackson. Jackson believes that most car accidents are caused by speeding, especially when road conditions are poor. "So many accidents could be prevented if people would drive at safe and appropriate speeds for the current road conditions."



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Active Physics

Physics At Work

This section provides examples of how the physics concepts presented in this chapter are applied in the real world. The examples support the relevance of the *Chapter Challenge* as a real-world application. Emphasize how the investigations performed in the chapter provided hands-on experience of the science concepts needed to complete the challenge. From the examples,

discuss how physics is embedded in our everyday lives, and how it helps us to analyze accidents, design safety systems to keep us safe, and create driving rules. Emphasize to the class that there are no geographic, ethnic, or gender barriers for people who apply physics in their professions. It is not necessary to have an advanced degree or be a scientist to employ physics. The different profiles presented show how people from diverse backgrounds

use the physics concepts from this chapter and vehicle safety in their lives and their jobs. Discuss with the class each profile.

Discuss how Joe Nolan, Senior Vice President of the Vehicle Research Center, was introduced to his career while earning his graduate degree in engineering. Describe how his company conducts over 100 crash tests on vehicles per year with crash-test dummies. Emphasize that the crash tests they perform are analyzed using the same physics principles presented in this chapter. Ask students what some of those principles are and how they are used to analyze a crash. Point out that insurance companies fund the research conducted and ask the class why insurance companies might be interested in crash studies.

Describe how Marjorie and Dave Cooke investigate boat accidents and determine the condition of boats and ships. Emphasize how vital the physics concepts in this chapter are to their work. Discuss the last quote in the student text and ask students what information they might use to help them analyze a boating accident, since no skid marks are left on the water. Ask students to compare what they think the safety features are on a boat to those found in a car.

Connect observations made by the emergency medical technician, Michael Jackson, with the need for safety devices and appropriate driving laws.