# Science of the Summer Olympics: Engineering in Sports

**Susan Coady Kemnitzer**

As we watch the XXX Olympics in London, we are in awe of the amazing performances of athletes from all over the world. Each has accomplished a major feat by winning a place on their country's team. There also are many feats of engineering involved in the Olympics which show the pervasive positive impact of engineering on society.

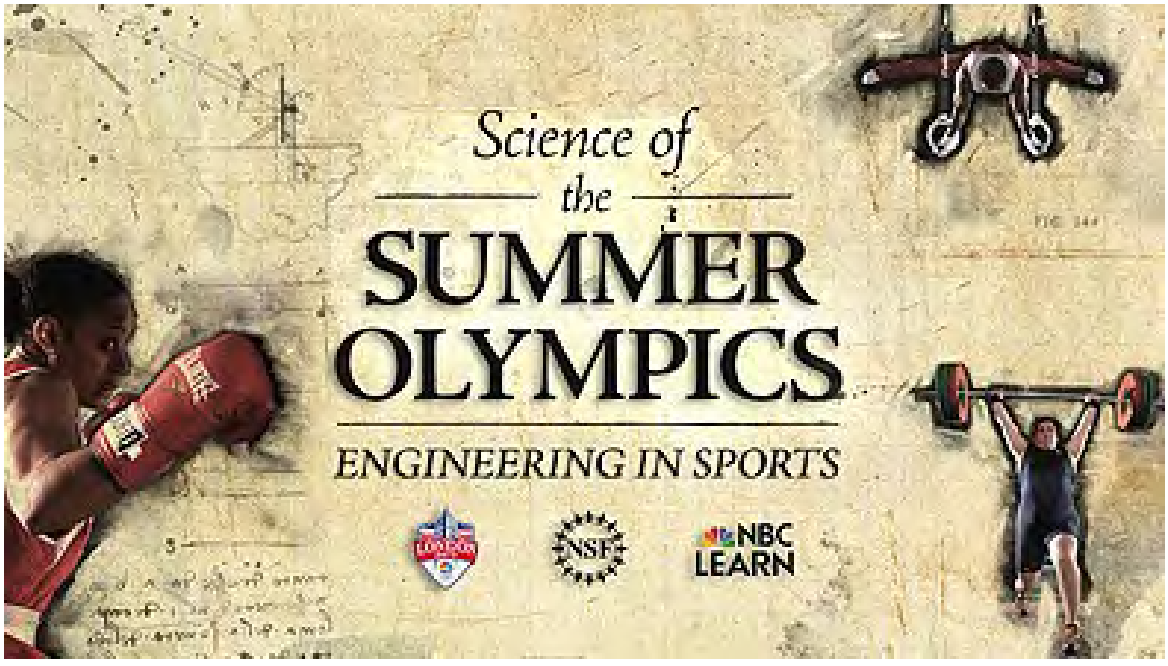
For the London 2012 Olympic Games, the National Science Foundation (NSF), NBC Learn (the educational arm of NBC News) and NBC Olympics, a division of the NBC Sports Group, have launched a series of 10 videos highlighting the engineering that is part of the Olympics, as told by top athletes and engineers. You can watch all 10 videos during the games and anytime on the NSF's Science360 website.

"The work of engineers not only affects Olympic sports, it also helps us perform ordinary activities in better ways," said Thomas Peterson, NSF assistant director for Engineering. "This series will illustrate how engineers can impact both sports and society, and we hope it will inspire young people to pursue engineering."

Each segment features a top athlete sharing his or her sports experiences, paired with perspectives from leading engineers about the technologies that aid the athletes or the mechanics that explain their craft.

The series covers a range of events and topics. Viewers will learn how Missy Franklin cuts through water faster thanks to specially-engineered pools, how a stereoscopic camera system helps Olympic champion decathlete Bryan Clay improve his long jump, how "blades" technology helps Paralympian Oscar Pistorius compete--for the first time--against able-bodied runners in the Olympic Games, and how a pressurized treadmill system helped runner Jenny Simpson heal from injury.
The series also delves into the unique biomechanics of athletes--from the world's fastest man, Usain Bolt, to super heavyweight weightlifter Sarah Robles--and how technology still has much to learn from human achievement.

Each video segment is available for free on Science360.gov. In late August, engineering-focused lesson plans for middle- and high-school teachers developed by the National Science Teachers Association will be posted with them.



The segments feature some of the world's top athletes and record holders, including:

Missy Franklin, swimmer
Queen Underwood, boxer
Sarah Robles, weightlifter
Jenny Simpson, runner
Oscar Pistorius, runner
Usain Bolt, runner
Bryan Clay, decathlete

Each segment also features engineers from some of the world's top universities and institutions:

Timothy Wei, University of Nebraska-Lincoln
Anette (Peko) Hosoi, MIT
Rory Cooper, University of Pittsburgh and 1988 Paralympics bronze medalist
Nikhil Gupta, NYU-Poly
Linda Milor, Georgia Tech
Brian Zenowich, Barrett Technologies
Samuel Hamner, Stanford University
Cris Pavloff, Advanced Technology Engineer for BMW
Melvin Ramey, University of California-Davis and Biomechanist for USA Track & Field
Phil Cheetham, Senior Sport Technologist for the US Olympic Committee

Please take a look and consider using the videos with your students. From these vignettes, we can learn much about the positive contributions of engineering to society and about our Olympic athletes' commitment to excellence.

Thank you.
Sue Kemnitzer

**Ms. Kemnitzer** serves as Deputy Director of the Electrical, Communications and Cyber Systems Division of the National Science Foundation. The Division of Electrical, Communications and Cyber Systems (ECCS) addresses fundamental research issues underlying device and component technologies, power, controls, computation, networking, communications and cyber technologies. ECCS supports the integration and networking of intelligent systems principles at the nano, micro and macro scales for a variety of application domains in healthcare, homeland security, disaster mitigation, energy, telecommunications, environment, transportation, manufacturing, and other systems-related areas. ECCS envisions a research community that will address major technological challenges for the next generation of devices and systems due to convergence of technologies and increased emphasis on interdisciplinary research to achieve the goals of the leading the world in innovation.

From 1990 to 2011, Ms Kemnitzer served as the Deputy Director of the Division of Engineering Education and Centers of the National Science Foundation. Her division supported partnerships among researchers in different disciplines and between industry and universities in order to achieve innovations for the US economy. It also funded research to better understand how students learn engineering in order to attract more talent to engineering, and to better prepare engineers to be innovators and leaders in industry, academe and government. As particular accomplishments, Ms Kemnitzer initiated new NSF support for Veterans to study engineering, established a new center for the education of engineers to be innovators, and started new programs for fostering ethics education for engineering students. On "sabbaticals", she spent extended time in Japan and Italy to advise the science and engineering community on how to stimulate innovation and how to broaden participation in science and engineering.

Previously, Ms. Kemnitzer served as Special Assistant to the Secretary at the Department of the Interior and as Budget Examiner at the Office of Management and Budget. In the 1970s, she co-authored the first three issues of the Science and Engineering Indicators reports of the National Science Board.

In her life outside of NSF, Ms. Kemnitzer is a member of the Board of the National Environmental Education Foundation, and is chair of the Water and Sewer Authority of Shepherdstown, West Virginia. Weekends she is on the golf course continuing her winning streak that started as a member of the UCLA Women's Golf Team which won the NCAA Championship in 1970.

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