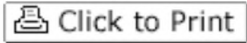




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How Regulation and Innovation Have Shaped Respiratory Protection

Jan 1, 2009 12:00 PM, By William P. Herris

Personal protective equipment has come a long way since ancient Romans first wore animal bladders to help protect themselves from lead dust in mines.

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Today's personal protective equipment (PPE) includes clothing, helmets, respirators, goggles and other gear to reduce exposures the wearer experiences from chemicals, heat, electrical hazards, infection and more.

One aspect of PPE, respiratory protection, has been used for hundreds of years. As far back as the first century, Pliny the Elder described a filtering device for use against vermillion dust. Leonardo da Vinci (1452-1519) was concerned with providing respiratory protection against chemical warfare agents and suggested using a wet cloth. Also in the 16th century, Agricola described the respirator-like devices used in mines.

In the United States, as in Europe in the 18th and 19th centuries, the search for respiratory protection centered on the fire services. Firemen often were required to have a full beard. They would soak their beards with water and clamp them in their teeth before going into a smoke-filled area in an effort to block some of the larger airborne particulates.

The first U.S. patent for an air-purifying respirator was granted on June 12, 1849 to Lewis P. Haslett. The Haslett's Lung Protector used a moistened wool filter or similar porous material and one-way clapper valves to filter dust.

As late as early last century, fire departments still had few options for respiratory protection devices. In 1910, former firefighter Robert Wells described the Berkeley, Calif. department's methods for combating smoke inhalation. "The boys used to have a plug of tobacco ... they would chew in their mouth to breath less smoke and drink ample amounts of steam beer afterward to cleanse their lungs."

In the 20th century, as technology improved, government regulations were enacted to protect the safety and health of workers, particularly those in high-risk industries such as mining. At various times, these regulations have driven innovation, and sometimes innovation has exceeded what the regulations require, eventually resulting in changing regulations.

At times, regulations have been the impetus for the development of increasingly advanced technologies and created the incentive for companies to develop new, state-of-the-art respiratory protection products. In countries that lack an effective regulatory structure, workers and citizens are taking responsibility to protect their health, occasionally using makeshift respiratory protection devices when nothing else is available.

LEGISLATIVE HISTORY

Congress established the United States Bureau of Mines (USBOM) in 1910, following a decade in which the number of coal mine fatalities exceeded 2,000 annually. The bureau was charged with conducting research and working with mining companies to adopt improved safety procedures to help reduce accidents in the coal mining industry. (By comparison, from 2003 to 2005, an average of 25 fatalities per year occurred in U.S. coal mines.)

At the time of World War I, gas masks were developed to protect soldiers from chemical warfare agents. These were rubber facepieces fitted with charcoal cartridges or particulate filters. Soon, this technology could be used in industry to protect workers, and in 1919, the USBOM began approving respiratory protective devices for use in industrial and mining workplaces.

In the 1930s, America's greatest industrial catastrophe occurred when over 470 workers died from exposure to silica dust while building a tunnel in Gauley Bridge, W.Va. In addition, as many as 1,500 workers were disabled from silicosis.

These workers worked without any measures to control the dust, such as dust masks, respirators, mine ventilators or dust suppressors. Congressional hearings were held, and the findings of these hearings spurred calls for greater oversight of mine worker safety and resulted in several decades of health and safety legislation.

By 1938, the predecessor to the American National Standards Institute published a standard (ASA Z2) to guide occupational health and safety managers on the use of respiratory protection. As with many early OSHA standards, the respirator regulation later promulgated by the agency largely was based upon the subsequent ANSI guidance standard.

In the 1950s, the USBOM expanded its approval schedules for many types of respirators as published in Title 30 in the Code of Federal Regulations. In subsequent years, two federal acts (the U.S. Federal Coal Mine Safety Act and the U.S. Federal Metal and Nonmetallic Mine Safety Act) were enacted to improve mine safety. At this time, respirator use still was focused on workers in the mines and the military.

DUST MASKS AND RESPIRATORS

In the late 1950s, a large medical products manufacturer that was selling surgical masks considered entering the industrial market. However, surgical masks, then and now, are designed to protect the patient from the doctor's germs but do not protect the wearer from particles in the air.

By the early 1960s, a team looking to develop new products took those surgical masks to industries in their area, and asked if they could use a similar device for filtering airborne particles in the workplace. As the team listened to these potential customers, members realized there was a definite need for an inexpensive, easy-to-use dust mask for industry.

The device developed had a simple design, consisting of a nonwoven fiber cup, an adjustable metal nose clip and a strap that secured the dust mask to the wearer's face. In the early 1960s, the dust mask was introduced for use against non-harmful particles. However, the need still existed for a more comfortable, government-approved respirator that workers could wear all day.

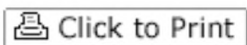
In the late 1960s, development was underway of a single use (filtering facepiece) respirator that was more comfortable and more readily accepted by workers, and that could meet the approval requirements of the USBOM. In the early 1970s, the design of a filtering facepiece respirator was advancing, but there still were two things missing: USBOM approval schedules for filtering facepiece respirators and regulations governing the use of respiratory protection in general industry.

The Occupational Safety and Health Act of 1970 (OSH Act) marked the beginning of a new era in the history of public efforts to protect industrial workers from harm on the job. The act established a federal program designed to protect workers from job-related death, injury and illness. The Department of Labor established the Occupational Safety and Health Administration (OSHA) to implement the act. OSHA published several standards in 1972, including the General Respiratory Protection Standard (1910.134) that regulates the use of respiratory protection in the workplace. Today, 29 CFR 1910.134 mandates that employers have a complete written respiratory program including medical evaluation, fit testing, training and recordkeeping.

In 1971, the National Institute for Occupational Safety and Health (NIOSH) was created. Among other tasks, NIOSH was charged with testing and certifying respirators. The respirator approval schedule at the time, however, did not include approval criteria for filtering facepiece particulate respirators, because a filtering facepiece device had not been developed that could meet all the requirements for particulate respirators. Development of filtering facepiece devices with higher efficiency filters prompted NIOSH, in cooperation with the USBOM, to create approval criteria for filtering facepiece respirators, which were referred to as single-use respirators.

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