

John J. Mooney

Carl D. Keith

Brief Biography:

**INVENTION, DEVELOPMENT AND COMMERCIALIZATION OF THE
THREE-WAY CATALYTIC CONVERTER**

John J. Mooney and Carl D. Keith are the principal inventors of the key automotive emission-control catalysts now used throughout the world - the three-way catalyst (TWC) and its predecessor, the monolithic oxidation catalyst. Mooney and Keith were not only co-inventors of these catalyst technologies, they were instrumental in bringing them to commercialization. They found durable, rugged substrates and developed mass production methods. They also worked closely with the automotive industry to gain acceptance of the new technology.

Among the most important pollution abatement device ever invented, the catalytic converter is now a key component of every car manufactured and driven in America. Without their converters, the air we breathe in metropolitan areas would long ago have become highly polluted, negatively impacting the health of millions of people.

Since its commercialization in 1976 to 2001, the TWC catalytic converter has destroyed an estimated three billion tons of hydrocarbons, three billion tons of oxides of nitrogen, and 30 billion tons of carbon monoxide before they ever reached the atmosphere.

This technology was the major innovation necessary to achieve the goal of a 90 percent reduction in automobile emissions called for in the U.S. Clean Air Act Amendments of 1970. The TWC catalytic converter is directly associated with the elimination of atmospheric lead, a pervasive air pollutant negatively affecting children's mental health.

In an October 1997 report to the U. S. Congress, the Environmental Protection Agency (EPA) largely credited the catalytic converter with cutting nationwide NOx emissions by 30 percent, volatile organic compounds (or hydrocarbons) by 45 percent and carbon monoxide emissions by 50 percent between 1970 and 1990. The report notes that these reductions were achieved during a period in which the U.S. population grew by 22.3 percent, the national economy grew by 70 percent and the number of vehicle miles traveled increased by 120 percent. The EPA concluded that these and other improvements in air quality saved over 100,000 lives and prevented hundreds of thousands of occurrences of a variety of respiratory ailments.

Today, the TWC catalytic converter is recognized by the Society of Automotive Engineers as one of the ten most important inventions in the history of the automobile. It introduced catalytic chemical processing to every-day life and facilitated improvements in fuel economy and engine power. Annual catalytic converter production reached more than 40 million units worldwide in 2001. Over 500 million catalytic converters have been produced since 1975. Engelhard Corporation is a leading global producer, supplying most of the world's carmakers. The company, its subsidiaries and partners have manufacturing plants in the United States, Germany, Japan, South Korea, South Africa, Brazil, China, Thailand, Russia and India. Environmental technologies - largely advancements and extensions of the TWC technology - are now a major contributor to the sales and profit of Engelhard Corporation, and a significant share of the company's annual \$82 million R&D budget is devoted to this segment. Engelhard employs more than 1,000 people in its environmental technologies business.

Carl D. Keith retired from Engelhard in 1985. John J. Mooney, before his retirement in 2003, led a team in cooperation with an engine manufacturer to successfully develop catalyst emission control systems for highly polluting 2-stroke engine lawn and garden equipment. Currently he is actively helping to make world environments cleaner with clean fuels and efficient vehicles through the final ban of lead in gasoline, lower sulfur fuels and cleaner diesel engines.

The contributions made by Carl D. Keith and John J. Mooney are important victories in the fight to improve air quality. Thanks to their efforts billions of people throughout the world live healthier lives.