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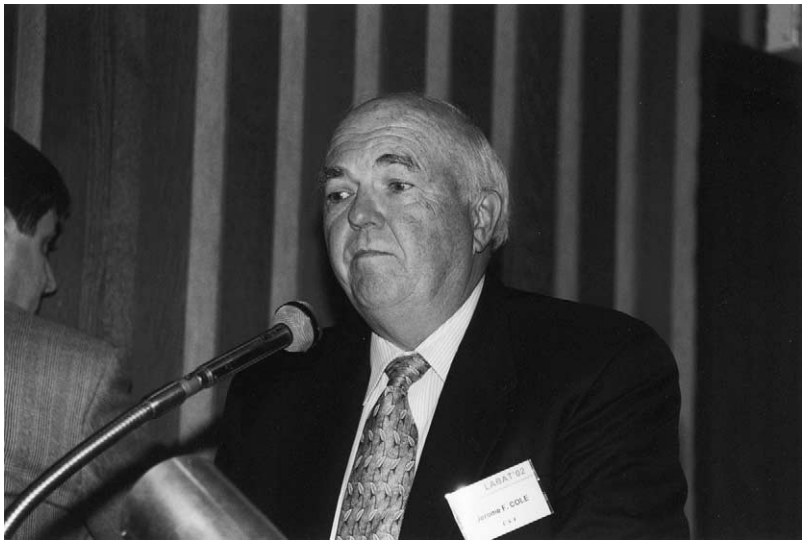
The 2002 Gaston Planté Medal Acceptance Speech



It is a great honor for me to accept on behalf of the members and staff of International Lead Zinc Research Organization Inc., (ILZRO) the Gaston Planté Medal. We are indeed grateful to the Bulgarian Academy of Science and the Planté Committee for recognizing ILZRO's contribution to lead–acid battery science.

ILZRO was founded in 1958 by miners and metal producers of lead and zinc. It was founded to sponsor and manage research projects on behalf of its members. These projects are limited to products using lead and zinc and to environment and health issues pertaining to these metals. ILZRO does not sponsor research on mining technology, mineral beneficiation or in any areas that are considered to be competitive among our members. ILZRO's funding is derived from member dues and member investments in specific research programs. This funding is augmented to a significant extent by customer entities and governments. After developing research program plans, ILZRO contracts the research work to universities, private laboratories and governments throughout the world. There are currently over 100 different entities sponsoring ILZRO research. These entities are headquartered through the world.

ILZRO's research is divided between zinc and lead research. Currently, major areas for zinc product research include continuous zinc coatings of steel for automotive use, zinc die-casting and batch galvanizing programs. ILZRO's lead product research is almost entirely focused on the lead–acid battery. ILZRO also maintains a program of environment and health research for both lead and zinc. ILZRO's emphasis on the lead–acid battery is certainly justified by the changing market for lead. In 1960, a total of 2.4 million tons of lead was consumed and batteries accounted for approximately 25% of the market. In 2000, the total lead market was 6.6 million tons and the lead–acid battery represented over 70% of that use. Therefore it is clear that the lead industry is overwhelmingly dependent on the lead–acid battery to maintain its viability.

ILZRO's first involvement in lead–acid battery research came in 1961, 3 years after ILZRO was founded. That work was a quite fundamental piece of work carried out at Cambridge University in England. Over the years, considerable fundamental knowledge was gained through the ILZRO program. Of particular note was work in the mid 1960s at Brooklyn Polytechnic Institute on the mechanism of gas recombination in a lead–acid battery. As you know, gas recombination is the principle that has allowed the development of the valve-regulated or ''maintenance free'' batteries. During the 1970s, most of ILZRO's battery work was carried out at the US Naval Research Laboratory under a mutually beneficial arrangement with the US Navy. This work resulted in a much better understanding of the failure mechanisms of lead–acid batteries and led to steps to

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improve battery life. During that same period, ILZRO has its first involvement with electric vehicle research. Through a cooperative agreement with the General Electric Company, ILZRO developed a small van, powered by lead–acid batteries. Of course, electric vehicles had been around for a very long time, but were supplanted by the internal combustion engine and the availability of cheap petroleum-based fuel. The OPEC petroleum shortages of the 1970s provided incentive for the development of electric vehicles as alternative fuel vehicles. However, as OPEC weakened and petroleum became more plentiful and cheaper, the momentum toward the development of EVs slowed and eventually died out.

During the 1980s ILZRO collaborated with the Electric Power Research Institute and the Southern California Edison Company to install the world's largest lead–acid battery according to the Guinness Book of World Records. This 40 MW h battery was designed as a load-leveling battery. However, load leveling did not prove to be economically attractive. What was attractive was the battery's ability to provide frequency stabilization and stand-by reliability. Such applications do not require such a large battery, however, and follow-up projects have used much smaller batteries.

Renewed interest in electric vehicles came about largely because of the mandates in California calling for the introduction of electric vehicles into the state beginning in 1998. Other states in the US followed California's lead, and worldwide momentum began again to develop better batteries to power the coming fleet of EVs. In 1992, the US Advanced Battery Consortium (USABC) was formed by the US Big Three automakers and the US Department of Energy. They committed to spend US$ 273 million over 4 years to develop advanced batteries for electric vehicles. However, they made it clear that none of the money would be spent on lead–acid technology, which they had written off as ''dinosaur'' technology.

The Advanced Lead–Acid Battery Consortium (ALABC) has had three different programs. The first two focusing on involving the lead–acid battery for use in EVs. The most recent program has had a broader focus which includes EVs, hybrid EVs, off-road EVs, remote area power supply systems (RAPS), telecom, and the 36/42 V SLI systems.

The major accomplishments of the ALABC to date include significantly longer life for valve regulated lead–acid batteries, lighter weight and fast recharge. In addition to ALABC, ILZRO has sponsored over 30 different programs aimed at improving materials, manufacturing techniques and maintenance for the various markets that have been addressed.

In accepting this Planté Medal, I wish to particularly call attention to and to thank the ILZRO research managers who have been responsible for battery research over the years. These include: Bert Cook, Jim Doe, Dodd Carr, Bob Nelson, David Rand, and the current Manager, Electrochemistry for ILZRO, Pat Moseley.

Finally I wish to extend our sincere gratitude to the Chairman of the ALABC Technology Committee, Dr. David Prengaman, who is the Planté Medalist for 2002.

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