

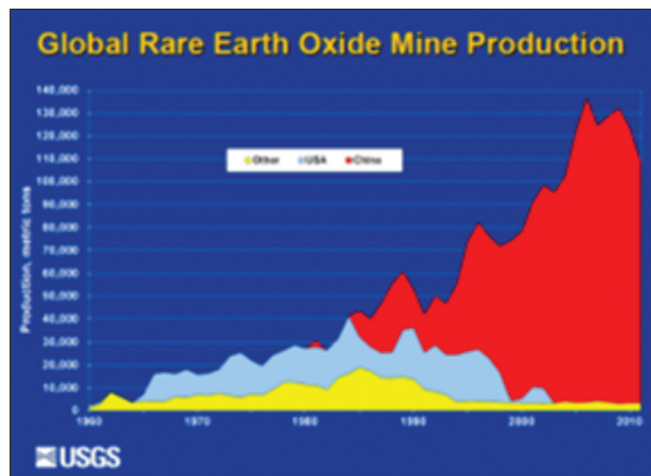


It's About the Cerium

It might seem strange that an article about a rare earth element that is not usually associated with magnets would appear in *Magnetics Business & Technology Magazine*, yet the commercial future of cerium may have more influence on the per-

manent magnet industry than the neodymium, samarium, dysprosium or terbium we currently use in our rare earth magnets. The reason cerium is important to consider is because of a concept rare earthers call balance. In order to minimize the processing costs, miners need to balance the sales of rare earths into the marketplace with the rare earths they are extracting from the ground. This is an impossible task, rarely accomplished, because supply and demand are so independent of each other. Yet the need to balance supply and demand cannot be ignored; severely out of balance operations have difficulty being profitable.

These days, neodymium and dysprosium are the rare earths that are driving the business, an unprecedented event in the rare earth industry. In the past, cerium and lanthanum alternated as the prime rare earths. Mining to recover neodymium for the magnet market creates large amounts of cerium and lanthanum, which are now difficult to sell in the volumes necessary to balance supply and demand.



Historically, there have been two ways to push the market toward a more balanced position, pricing and application development. In terms of pricing, the market responds the way you think it should. It creates upward price pressure on the rare earths in demand and downward pressure on the prices of rare earths that are in excess. This pricing encourages the market to move in the right direction.

Most people are familiar with the chart from the USGS, which shows the growth of the rare earth industry over the last 50 years and the shift of production to China. But behind the graph is the story about how rare earth markets grew. From 1960 through about 1990, the growth in the rare earth market was primarily due to new application development work by a number of companies and institutions, and pricing took a back seat. These applications included catalysts, glass polish, magnets and phosphors. Since about 1990, growth in the rare earth industry has been largely due to pricing alone. Activities to develop new applications for cerium and lanthanum have been drastically reduced. Any recent growth in applications has been more organic than active application development.

We have now entered a stage where we need again to be in the active development of new applications of less popular rare earths. Molycorp has its Sorbx product, a step in the right direction, to be sure, since it uses cerium. But we need more than one potential new application for cerium on the horizon to save the day; we need several of them, if we are to have the hope of keeping supply and demand reasonably balanced in the long run.

The permanent magnet industry will be much happier when it is not driving the rare earth industry, as it is today. Increasing the demand for cerium, and to a lesser extent lanthanum, will put us in a much better place.

About the Author - Dr. Stan Trout has more than 35 years' experience in the permanent magnet and rare earth industries. Dr. Trout has a B.S. in Physics from Lafayette College and a Ph.D. in Metallurgy and Materials Science from the University of Pennsylvania. Stan is a contributing columnist for *Magnetics Business & Technology* magazine. Spontaneous Materials, his consultancy, provides practical solutions in magnetic materials, the rare earths, technical training and technical writing. He can be reached at strout@ieee.org.