Neutron radiography was investigated before World War II in both Germany and England, but it was not until the early 1960's that it began to receive the considerable attention that has led to its present stage of development. Investigations have been limited by the lack of intense neutron sources and good imaging devices. Today improvements in imaging systems and the development of more versatile neutron sources, such as californium-252 and antimony–beryllium, are helping to expand the use of neutron radiography in industrial applications as well as in basic research. That process is used, for example, to inspect more than 200 devices in the Apollo program, ranging from explosive charges that separate the booster stages to charges that trigger the reentry parachutes. Neutron radiography is also used to inspect fuel elements and control rods to assure their proper performance in nuclear reactors. Undoubtedly many more industrial uses for this unique tool will develop in the near future.

Radiation processing

The commercial use of ionizing radiation to improve the properties of existing products and catalyze the synthesis of new materials has been studied for nearly 20 years, but only in recent years has this potential become a reality. The interaction of gamma rays and high-energy electrons with matter can catalyze chemical reactions, change the molecular or lattice structure of solids, and destroy microorganisms. Each of these types of radiation effects has been used by industrial firms to manufacture or process a number of products, and many companies are conducting experimental programs to apply the beneficial effects of radiation to other production operations.

Commercial radiation processing has grown rapidly from virtually nothing a decade ago to an annual volume of irradiated products estimated at more than $200 million. Radiation is used by industry to improve the properties of transistors and diodes, to cross-link polyethylene and other polymers for electrical insulation and packaging film, to initiate the synthesis of ethyl bromide, and to sterilize surgical sutures and other medical supplies. These radiation applications result in products now sold commercially, and there is an even broader spectrum of AEC and industrial research and development on other irradiated products that may soon appear on the market.

Most commercial radiation processes currently use electron beam irradiation. This type of radiation, produced by machines of various