bridging or linking together of polyethylene molecules was easily accomplished with ionizing radiation. The effect of cross-linking the material is to significantly increase its heat resistance and thereby expand its usefulness. Cross-linked polyethylene wire insulation, for example, became standard in the space program and now seems promising for underground electric cables.

Cross-linking technology has been extended to other polymers and copolymers, including polymers for shrinkable tubing. The polymer tubing is cross-linked with radiation, then heated and expanded. After the sleeve thus produced is slipped over the cable or "bunch" of cables, it is heated again, causing it to shrink tightly around the cable. The same principle is employed in the commercial manufacture of heat-shrinkable polymer widely used for food packaging. A number of specialty copolymers, such as battery separators, also are commercially produced using radiation.

One radiation application that is benefiting virtually everyone is the manufacture of soil-release fabrics. Radiation is used to graft a soil-resistant polymer to a fiber substrate. The desirable properties of the basic fabric are retained, but the grafted polymer makes the material soil resistant. One manufacturer produces 10 million square yards of such fabric annually.

Another radiation-produced product of widespread use is surface-coated panels. By means of radiation, special lacquers and paints can be polymerized on virtually any flat surface, including wood, glass, plastic, ceramics, and metal sheets. These materials can be used in a variety of applications, including outdoor siding, indoor paneling, furniture, and even ping-pong tables. The unique advantage of radiation in this process is that it accomplishes the required polymerization of the paint or lacquer in seconds, whereas conventional heat techniques require hours. At present upwards of 30 million square feet of radiation-produced surface-coated panels are being marketed annually.

These radiation applications, except for wood plastics, employ electron machine radiation. It is gratifying that the basic technology underlying many of the current commercial applications of machines comes from the early AEC-sponsored radiation chemistry research at the AEC's Brookhaven National Laboratory. Today there also appears to be a trend toward radiation processes using isotopic radiation sources.