

was put into commercial operations. These machines follow an entirely different production principle and manufacture floor covering by punching individual tufts, in huge numbers and at great speed, through previously prepared backings. Such machines can produce rugs and carpets from twenty to thirty times faster than they can be produced on mechanical looms and with a small fraction of the labor required to attend such looms.

In the first years of tufting, the process could produce only floor coverings of uniform pile height and of uniform color, and they were generally somewhat inferior to those made by the traditional processes. Recent technological developments, however, have permitted the manufacture by a tufting process of almost any quality or style of floor covering that was previously made on the Wilton and velvet looms. Furthermore, tufted floor coverings, unlike Wiltons and velvets, can be produced from undyed yarn and maintained in gray goods inventories, to be piece-dyed prior to sale in the colors demanded by the markets. This piece-tying process permits tremendous savings in inventories and great flexibility in meeting market demands quickly. Quite recently, processes have been developed to permit printing of designs of several colors on the finished tufted carpets; previously, such designs were the exclusive province of Wilton and Axminster carpets.

The result of these innovations has been that tufted floor coverings are both cheaper and of equal quality or, in some cases, of better quality than Wiltons, velvets, and Axminsters manufactured by traditional processes. As a consequence, tufted floor coverings now dominate the United States market, representing some 90 percent of the volume of domestic production.

The manufacturers who have gained from this revolution in floor coverings are American manufacturers. The technique of tufting was invented and first put to use in this country. The most sophisticated tufting machinery is made in this country and is controlled by American manufacturers. Furthermore, the development of even newer tufting techniques by domestic producers is just around the corner. Processes are being refined for using new and radically different yarns, cheaper and more serviceable backing materials, and, most importantly, faster and finer gauged tufting machines. It is little wonder that domestic industry spokesmen, such as the president of E. T. Barwick Mills, have been stating that "the tufted carpet industry has every reason to be proud of its accomplishments"; a "\$1.3 billion industry" has been built "literally from scratch," and it is expected to triple in volume and dollar value of shipments within the next fifteen years.

(b) *Expansion of domestic carpet market.*—In conjunction with the revolution in manufacturing techniques, there has come an enormous expansion in the domestic carpet market. Rising affluence has permitted increasing numbers of home-owners to purchase carpets. This development has been accentuated by fashion trends in favor of wall-to-wall carpets and by the lower installation and upkeep costs of carpets as compared with hard-surface floor covering. At the same time, a growing demand has developed for contract carpets for institutions and commercial buildings. Twenty-five percent of newly-constructed schools are being completely carpeted. Department stores and supermarkets, as well as hotels and motels have found carpets necessary to improve the comfort and luxury which have become one of their principal competitive selling tools. Vehicles and conveyances of all sorts are being equipped with increasingly durable and easy-to-clean carpets. Finally, carpets and rugs are also being used in areas previously reserved for hard-surface floor covering. This has been made possible chiefly by the development of the "indoor-outdoor" carpet, which is not only of unprecedented durability but is easy to maintain and therefore well suited for use in kitchens, bathrooms, patios, and even athletic fields.

(c) *Growth and profits of domestic carpet manufacturers.*—As might be expected from the foregoing account of the technological developments in carpet and rug manufacturing and of the wider markets for floor coverings, domestic manufacturers are going through a period of rapid growth marked by expanding sales and profits. United States carpet and rug production reached a total of 441,564,000 square yards in 1966, double the total of 1961. In the words of the American Carpet Institute:

"Yardage has increased [since World War II] at an annual average rate of approximately 10 percent per year and dollar value at approximately 6.5 percent. In recent years, however, the rate of growth has been much higher. By way of comparison, over the same period gross national product and personal consump-