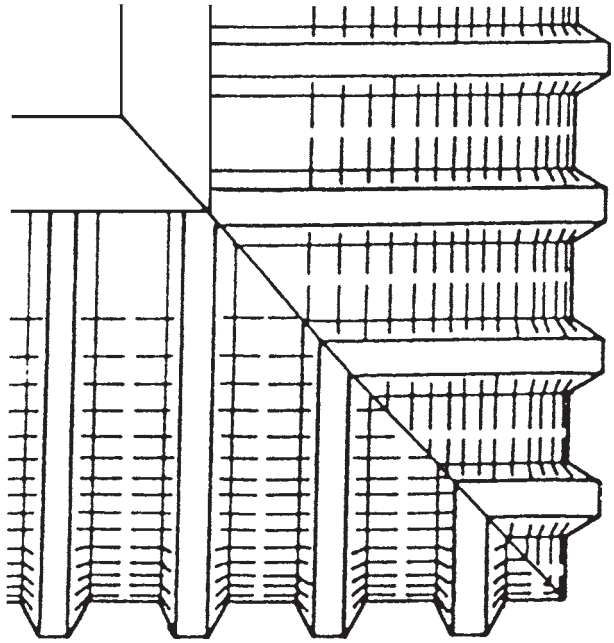

FIGURE 13.11 Mitered corner. (*Centria.*)

The third method is to construct a true, if small, pre-engineered building, complete with the usual main frames, girts, purlins, rod bracing, and metal roofing. The bay spacing of such pre-engineered structures ranges between 6 and 10 ft. A rigid-frame gable building can be quite appropriate for a large contemporary residence with an open floor plan and cathedral ceilings. The system, however, is unfamiliar to most residential designers and builders. It also differs so much from the traditional construction that to present it as a framing substitution for already-designed projects is difficult. Furthermore, the commonly available commercial-style components of metal building systems such as doors, windows, siding, and roofing might not be in line with the owner's expectations. Since few homeowners dream of a house sheathed in metal siding, either a brick or a wood exterior is desirable. These traditional finishes normally need to be backed by $^3/_4$-in-thick plywood sheathing, which can span about 4 ft between the metal supports.

The problem of thermal bridging can be solved by applying rigid insulation to the outside of steel studs. Polyisocyanurate insulation offers excellent insulation value (see Chap. 8) and is available in the form of insulating sheathing. Rigid insulation can also be incorporated in the EIFS exteriors, as discussed in Chap. 7. A typical high-quality exterior wall may consist of 6-in steel studs covered with $^3/_4$-in plywood and 1-in insulating board coated with an EIFS finish. The studs may be filled with 6-in fiberglass insulation covered with a heavy-gage plastic vapor retarder and $^5/_8$-in drywall.[6]

Those interested in designing and building metal houses can subscribe to *Metal Home Digest,* a magazine mentioned in Chap. 2, Sec. 2.10.

13.4 COMPUTERIZATION OF THE INDUSTRY

In one word, what has helped to transfer "pre-engineered" designs of old into the modern metal building systems? Computers! Heavy reliance on these machines has allowed metal building manu-

facturers to discard the old menu of a few predesigned building configurations in favor of unlimited design choices. Indeed, nearly every metal building constructed today is custom-designed for a specific project.

While the architects celebrate the new design freedom, the owners are pleased with the speedy price quotes. Advanced software allows the quotes to be produced in as few as 5 min, a task that used to take days. The builders, in turn, are amazed by the fast delivery schedules: It is not uncommon to compress the delivery time to 5 weeks, a task that only recently required at least 3 months.

The major manufacturers race to develop the most comprehensive and user-friendly software systems that, based on the input data, produce a price quote, design calculations, shop drawings, and even presentation materials. Investment in such premium systems gives the biggest industry players a clear advantage over the small shops. Not surprisingly, the aptly named Butler Advantage System won first place among hundreds of entrants in the manufacturing and distribution category in the Windows World Competition in April 1995, as well as other awards. (Windows World is sponsored by the Microsoft Corp., and by *Fortune* and *Computer World* magazines.) Reportedly, this software is already used by over 1000 Butler builders.

VP Buildings has developed its own Command Computer System which features excellent graphic capabilities and allows order placement 24 hours a day. Some examples of the program's output are reproduced in Chap. 9.

Smaller manufacturers who cannot afford major investment in software development can purchase one of the many off-the-shelf computer programs such as one offered by Loseke Technologies, Inc., of The Colony, Tex., or Metal Building Software, Inc., of Fargo, N. Dak.

Computerization allows manufacturers to centralize job costs, accounting systems, and inventory control—and to produce more accurate quotes. Furthermore, it permits farsighted manufacturers willing to make the investment to compete in the world of many building codes, languages, and measurement units and to react to market changes faster.

Technological advances are likely to affect the construction side of the industry as well. The Standard Commodity Accounting and Tracking System (SCATS) allows bar-code tracking of every piece of steel on the project. Some Louisiana fabricators of structural steel are already using SCATS to keep track of materials on fast-track projects. With their fabled speed of construction, erectors of metal building systems cannot be far behind.

13.5 MULTISTORY METAL BUILDING SYSTEMS

While the vast majority of metal building systems are single-story, the multistory market presents a major growth opportunity. With rising land costs and little available space in built-up areas, multistory pre-engineered buildings are a logical answer to those owners that need more than one level of usable space but still want to capitalize on the advantages offered by the metal-building industry. By some estimates, pre-engineered framing can save about 15 percent of the structural cost in a four-story office building.

Metal building systems utilizing bar joists work well with conventional metal deck and concrete fill floor structure. The systems based on light-gage C and Z sections may face some acceptance problems relating to their fire-rating, deflection, and vibration properties. The designers who wish to specify multistory pre-engineered buildings are wise to inquire first whether local dealers have any experience in this type of construction.

Some manufacturers offer multistory metal building systems that include open-web steel joists supported by moment-resisting rigid frames running in two directions (Figs. 13.12 and 13.13). These systems come quite close to their conventionally framed cousins in composition and appearance. Indeed, the office building of Figs. 13.12 and 13.13 is sheathed in elegant brick veneer, as can be seen in Fig. 1.5 in Chap. 1.