The Future Arrives

Wall and Ceiling Contractors Are Running Into the Future Now as New Technologies and Approaches Emerge

By Harold Manson, Architectural Consultant

Wall and ceiling contractors are running into the future now. The asbestos controversy—now consuming much of the industry’s brainpower in the areas of removal, encapsulating, and treatment—represents the environment so far as the improvement of life is concerned.

On the straight technological side, one merely has to regard the swiftly emerging exterior insulating industry. Fifteen years ago, these energy-efficient lightweight wall panels were oddities—something to inspire and amuse, but definitely for someone else to build, install... and especially to sell.

But these two developments which I just mentioned are responses to clear and present needs. Asbestos left ex-

(3) In the July edition of CONSTRUCTION DIMENSIONS, author Manson discussed the cities and new environment under which construction would function. This issue deals with some of the new materials that may be in the offing.)

posed is dangerous; energy inefficient exterior walls have no place in today’s energy-conscious building world.

But several recently developed materials foreshadow future construction possibilities. These newcomers were actively considered by the World Future Society in this manner:

• Plastics. The strength, light weight, molding capability, and even light-transmitting properties of plastics make possible an almost endless variety in the design of components and entire structures.

• New forms of steel. Today’s lighter, stronger steel permits the construction of extremely long spans.

• Filament Wound Systems. Based on aerospace component technology, the filament wound system involves the wrapping of continuous strands of resin-coated glass filaments around a collapsible mold to produce on-site housing shells. In effect, a builder can “spin” a building at the site.

• Ferrocement. A builder working with ferrocement first creates a framework of metal reinforcing rods and chicken wire. He then coats the structure with cement. The metal supports and strengthens the cement, making it
A German future city protects inhabitants against exterior pollution with a lightweight air-supported membrane container.

Possible for the architect to sculpt buildings according to almost any design.

- **Concrete.** An old friend with new possibilities, concrete can now be manipulated in an unlimited variety of expressive and inspiring ways by using free form steel rod reinforcing systems.

- **MASC Extrusion Process.** Developed by the Midwest Applied Science Corporation, this process makes it possible to “spin out” or extrude buildings in one piece by using plastic foams that rise and harden very rapidly.

- **Urethane Foams.** Originally developed as an insulation material with three times the insulating capacity of fiberglass, urethane foam can be sprayed on a variety of molds or forms to create exciting structures and interior spaces. After the recent earthquake disaster in Turkey, a reusable inflatable plastic mold was sprayed with urethane foam to provide instant shelter for the homeless.

### New Systems

#### Free Design

But new materials are not the only technological developments that the construction industry may absorb. Recent developments in building systems will also play a part.

Here are some systems mentioned by Architect Roy Mason in a recent article on construction futures:

- **Kinetic structures.** Usually featuring a combination of inflatable and hydraulic components, these collapsible structures can be transported from site to site.

- **Fiberglass sandwiched component systems.** Precast sections of fiberglass can be connected by flexible corridors to permit many design variations. Lightweight and movable, the structures fold up like an umbrella for transportation, or are laid out in all sorts of shapes to meet specific needs.

- **Modular Housing.** The rising costs of land, labor, and materials have made the relatively unattractive and uninspiring mobile homes a potent factor in the home-building industry. One alternative to the mobile home is flexible modular housing. In this system, prefabricated panels—made by panel construction experts in their own shops—are shipped to building sites for assembly on the spot.

  Modular housing is not yet competitive with traditional housing, because of such factors as high transport costs, the opposition of building trade unions, and the lack of high volume.

### New Structural Forms Designed

The new materials, combined with new management and building systems, provide an enormous variety of...
The new materials, combined with new management and building systems, provide an enormous variety of potential structural systems and forms.

Presently, they may seem somewhat farfetched, but the increasing need for lightness, energy efficiency, and cost may accelerate their introduction.

Some of these new building forms include:

**Cellular**: This approach consists of single modules, with the walls serving not only as space dividers but structural supports as well. The modules can be aggregated in a variety of ways to create even larger systems, yet can also be added onto existing structures to increase the available area.

Israeli architect Moshe Safdie’s world-famous Habitat—for the Montreal world’s fair—is the most notable approach to cellular construction. There Safdie stacked 160 residential units, made of 354 precast sections, into a visually striking apartment complex.

**Clip-on, Plug-in Architecture**: A plug-in structure consists of two parts: a central stable core and one more removable modules.

The core provides structural support and houses the service facilities. Individual modules can therefore be added or removed as desired.

Such a building has already been constructed in Japan where the core is finished and individual modules are being marketed through a department store. The sales price includes the cost of installation.

**Bridge Structure**: Just as its name implies, the bridge structure consists of either girder or cable systems stretching between tower supports. These structures can span long distances and function independently of local topography and/or previous development.

The Japanese have already utilized this content in its Tokyo Bay Project.

**Diagonal Structures**: This structure makes full use of terraced hillsides, or cuts into level ground on the diagonal.

Consequently each living unit has its own deck and outdoor garden. Unlike other architectural approaches, the diagonal structure provides much natural light and spatial variety.

In the case of pyramidal forms, terraces can be constructed on all sides, i.e., Buckminster Fuller’s tetrahedonal macrostructure designed to accommodate 1-million people in a single enclosure.

**Container Structures**: As very big buildings whose outer skins or shell encompasses a large unbroken interior, container structures may well be the thrust of the future.

Polluted air—an increasingly more serious problem and especially so if coal assumes a larger future role—would be impetus enough—not counting other advantages.
A pure example comes from Buckminster Fuller and his spherical geodesic dome, which has been erected in various forms throughout the world. Germany’s Frei Otto performed his own variation with the famous tensile structure which served as the stadium for the 1972 Olympic Games in Munich.

Most of today’s container research concentrates on light-weight inflatable or pneumatic structures which permit the creation of instant and mobile environments.

One specializing in exterior and/or interior walls can easily see the ramifications of such an approach, with its insistence on lightweight—and moveable—partitioning systems.

Other possible building systems of the future involve the biostructures, the marine structures and the space structures.

With a biostructure, one can easily imagine an exoskeleton, or second skin, which can serve as an extension of the human body and as a life support system. A quick recall of the NASA spacemen on the moon shows the possibility of humanity walking around with its home strapped to its back.

As for marine structures, heavy research is already underway in this area. With 7/10s of the earth’s surface covered by oceans, marine structures offer one possible answer to the urban crises.

Future colonization of space seems inevitable. With the landing on the moon by men, lunar buildings in orbit aren’t too far behind. The success of the Columbia in 1981, shows that serious space structures are in the immediate offing.

All in all, construction has a magnificent future—and the contractor will have a place front and center.