High-rise history

When you turn back the pages of history to the period immediately after WW I you can clearly see that Europe was faced with a massive reconstruction challenge and at the same time attempting to deal with the long term impact of the industrial revolution.

Swiss Architect Charles-Édouard Jeanneret-Gris came up with a concept for what was essentially a mass-produced "manufactured housing unit" based on the utilization of a standardized concrete form that were designed to be stacked on top of one another. What we now term "apartments."

(He was in fact re-inventing the wheel because this form of housing in one form or another has been around since the Roman and Egyptian Empires. Conclave is one Latin equivalent of 'apartment' that means 'chamber' or 'rented space'. In English the word apartment was originally derived from the French word "appartemente")

This avant-garde Swiss architect, better known as Le Corbusier, also began to envision what he called the "Garden City" in response to the overcrowding and devastation of urban areas caused by the war and industrialization that had brought workers into urban areas at an explosive rate.

He believed that "modernist" architecture would be able to provide solutions that would raise the quality of life by providing "space, light and order" which he considered absolutely essential.

Vertical cities

These early conceptual designs, most of which were never actually constructed until the late 40s were the beginnings of what we now recognize today as high-rise residential skyscrapers. Eventually, these designs were modified and executed to re-build the urban infrastructure after the devastation of WW II. In 1947, he designed and constructed buildings in Marseilles that featured large 12 story apartment blocks that served as a model for future high density housing schemes around the world.

rise condominiums that were built before the end of the 1980s. This represents a fairly large proportion of our condominium housing stock that has been in service for close to 30 years.

As a rule, these buildings were constructed at a time when energy performance was not given the priority and attention we see today and in general construction materials and technology have advanced very rapidly since they were built.

We also have over 200 condominiums which are approaching 20 years of service life.

Predictably many condominium boards have replaced some of the building components that may have reached the end of their effective service life.

However there are fairly large number of examples in the US where existing condominiums have utilized the installation of what is known as comprehensive overcladding which allows renewal and upgrading while the building is still occupied. This is seen by many building scientists as a unique feature of overcladding technologies as opposed to recladding which normally requires the occupants to vacate the building.

Rainscreen principals

The majority of these new cladding technologies introduced into the marketplace employ what is known as pressure equalized rainscreen wall technology. The concept behind rainscreening focuses on designing and building walls to prevent rain driven water penetration and the idea is by no means new.

In fact the Norwegians employed the rainscreen concept quite successfully for many years when they utilized ventilated claddings on timber buildings and were the first to begin formal research on the topic. (Norwegian builders managed to find a way to clad their timber barns utilizing drained and back-ventilated cladding with joints that allowed water drainage and enabled evaporation of any moisture that managed to penetrate the cladding.

In the 1960s researchers began to examine the scientific principles relating to rainscreen wall systems and recognized that this approach, originally developed almost by intuition, substantially reduced the risk of uncontrolled rain penetration. Efforts eventually turned to eliminating the forces that drive water through openings - namely kinetic energy, capillary suction, gravity, surface tension, air currents and pressure differentials.

The rainscreen principle involves intentionally leaving the joints in the façade open in order to allow air to move freely between the exterior environment and the interior cavity. This results in pressure equalization between the two.

In a rainscreen the air is trapped in the cavity. Therefore the air pressure equalizes between the exterior and the interior. In theory when the pressure outside and inside equalize - the pressure to push water into the cavity is zero. The vent holes at the bottom the wall permit any water that has managed to penetrate the cladding is permitted to drain.

Air that is continuously flowing through the open joints also provides ventilation for the interior cavity which is important because it provides natural air conditioning and prevents heat build-up. It also protects the thermal insulation and vaporizes any penetrating humidity in colder climates.

Advantages

Overcladding can be carried out while the building is still in use with minimal impact

Colour in the urban landscape

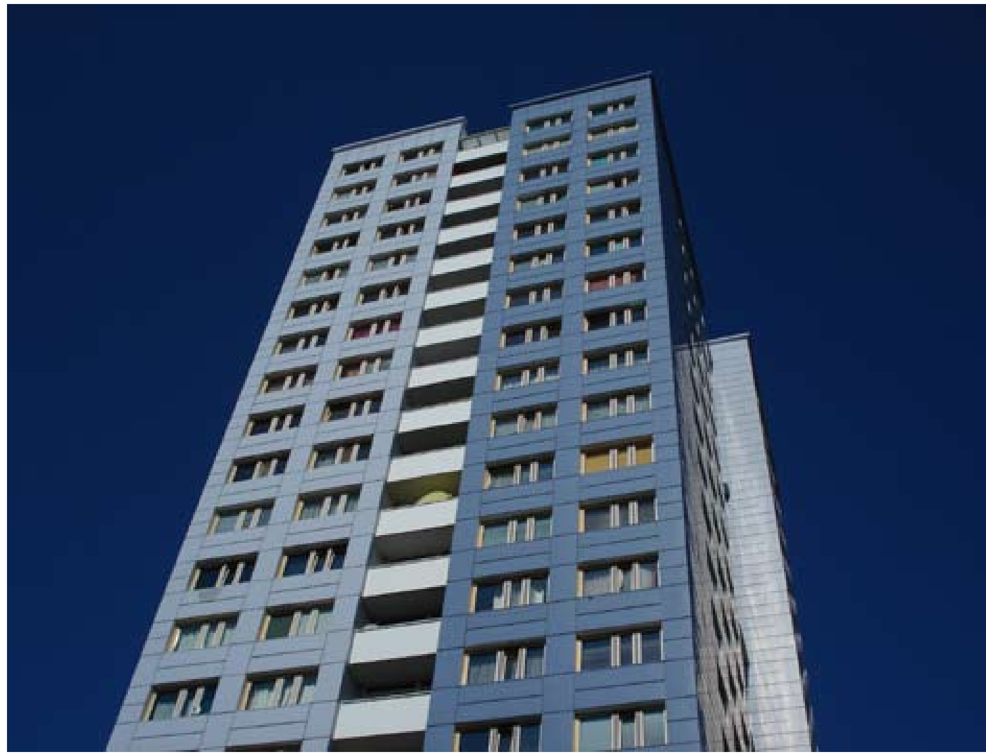
According to Sylvia O'Brien, colour specialist and creative director for Colour Theory, a Toronto-based colour consulting firm, "colour selection is of key importance as one of the many design elements used in updating the building envelope in its public context. Its psychological power seeps into our consciousness either quietly or not."

She adds that with overcladding, which will increase the functionality (therefore the value) of existing high rise structures, colours help redefine the building's brand.

The numerous concrete slabs that have been present in this city's consciousness for so many decades can be given personality and newness with colour in a new skin. Colour manipulation at entry level can make a building a home instead of simply a dwelling.

Thoughtful use of colour in the urban landscape can enhance and depict diversity in relation to the city. A group of identical buildings could achieve more autonomy by use of colour or colour contrast.

The condo boom has refreshed interest in older condominium structures as well as the new. Overcladding and appropriate colour considerations can help attract the potential buyer in a competitive marketplace. Properly executed, the use of colour in overcladding will serve the building for a long time to come.



on occupancy and it improves energy efficiency, thermal performance and air tightness.

It also optimizes use of thermal mass and enables transfer of the dew point outside the structural wall element. The life expectancy and value of the building is increased and the process improves appearance of the structure, lowers maintenance costs and allows upgrading of building services.

It can also improve air quality, sound insulation and helps eliminate internal problems such as condensation and mould.

Simple solutions

Overcladding offers a relatively simple solution to the problem of keeping rainwater out of buildings and improving building performance. There are several variations.

- Basic overcladding which involves the installation of an air barrier and insulation protected by an exterior cladding applied to opaque wall elements (excluding balconies) and includes a replacement of the windows.
- Comprehensive overcladding involves the same approach however the cladding is installed over the entire opaque wall area and over open balconies and also includes a replacement of the windows.
- Integrated overcladding is somewhat more complex in that it involves installation of a secondary framing system that enables updating of building services and allows for natural ventilation and sound control. The ventilated cavity uses the pressure effects of the wind to dissipate the energy of driven rainwater and includes drainage paths that direct the water away from the cavity.

The success of any of these approaches requires a detailed knowledge of the physical principles and materials involved. This knowledge must also be incorporated into the design details. And if the experts are correct, no single approach or system can address all structures and recommend that a feasibility study be completed before initiating an overcladding project. CB

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