Construction sector to drive base metals demand

- Metalworld Research Team

Construction plays a pivotal role in the economic growth of a nation and India is not an exception. The growth in the construction sector be it road, housing and construction or other types of structures; directly indicates the economic growth of India. Hence, the construction sector is considered to be a barometer of the economic growth of India which truly reflects the economic growth i.e. gross domestic product (GDP).

The size of Indian construction industry is estimated at around Rs 250,000 crore with an employment level of over 30 million, the second largest employer after agriculture. It is a sector which constructs a building or infrastructure. Indian construction industry comprises 10 per cent of India's GDP which starts with planning, design, and financing; and continues until the project is built and ready for use. Large-scale construction requires collaboration across multiple disciplines. An architect normally manages the job, and a construction manager, design engineer, construction engineer and project manager. Those involved with the design and execution must consider zoning requirements. Large projects normally are termed as megaprojects.

Building construction is the process of adding structure to real property or construction of buildings. The majority of building construction jobs are small renovations, such as addition of a room, or renovation of a bathroom. Often, the owner of the property acts as laborer, paymaster, and design team for the entire project. Although building construction projects consist of common elements such as design, financial, estimating and legal considerations, projects of varying sizes may reach undesirable end results, such as structural collapse, cost overruns, and/or litigation. For this reason, those with experience in the field make detailed plans and maintain careful oversight during the project to ensure a positive outcome. Commercial building construction is procured privately or publicly utilizing various delivery methodologies, including cost estimating, hard bid, negotiated price, traditional, management contracting, construction management-at-risk, design & build and design-build bridging. Residential construction practices, technologies, and resources must conform to local building authority regulations and codes or practice. Materials readily available in the area generally dictate the construction materials used (e.g. brick versus stone, versus timber).

- **Copper in construction**

Copper tubing, which comes in two main types, is often used to construct pipes in buildings. Rigid copper tubing is ideal for hot and cold tap water pipes in buildings. Soft copper, on the other hand, is frequently used to make refrigerant lines in HVAC systems and heat pumps. Copper ductile, malleable metal is resistant to corrosion from water and soil, and is also recyclable. Copper tubing is also

easily soldered, forming lasting bonds. All of these properties make this metal ideal for piping and tubing. One reason for the wide use of copper as a construction material is its natural formation of a visually appealing green tarnish - known as patina - that results from the weathering and oxidization of copper. Aside from its aesthetically pleasing appearance, architects and designers prefer the metal because it is lightweight, durable, corrosion-resistant, and easy to join.

USE OF COPPER	
Sector	**Applications (%)**
Electrical	65
Construction	25
Transport	7
Others	3

Apart from silver, copper is the most effective conductor of electricity. This, combined with its corrosion resistance, ductility, malleability, and ability to work within a wide range of power networks, makes the metal ideal for electrical wiring. Virtually all electrical wiring, save for overhead power lines (which are made from more lightweight aluminium) are formed with copper. Bus bars, conductors that distribute power, transformers, and motor windings are also all dependent upon copper's conductivity. Owing to its effectiveness as a conductor of electricity, copper transformers can be up to 99.75 percent efficient. Electrical applications, including computer technology, televisions, mobile phones and portable electronic devices, have in recent decades become a major consumer of copper. Another industry that is heavily reliant on the element is telecommunications. Finely twisted copper wires are used in ADSL and HDSL wiring for local area network (LAN) internet lines. Unshielded twisted pair (UTP) lines contain eight color-coded conductors, which are constructed of four pairs of thin copper wires. And despite the increase in wireless technology, interface devices such as modems and routers remain dependent on copper. The renewable energy sector has also benefitted from copper's conductive properties. The base metal is used in the production of both copper-indium- gallium-selenide (CIGS) photovoltaic cells and wind turbines. A single wind turbine, for example, can contain up to 1 metric ton (MT) of the metal. Besides the production of electricity, copper is also integral to the motors and distribution systems associated with alternative energy technology.

Copper tubing is now the standard material for potable water and heating systems in most developed countries. This is in part due to its bacteriostatic properties, or in other words copper's ability to inhibit the growth of bacterial and viral organisms in water. Other benefits of copper as a tubing material include its malleability and solderability - it can be easily bent and assembled - as well as its resistance to extreme heat corrosion. Copper and its alloys are considered stable and corrosion resistant, which makes them ideal for not only transporting potable water but also for use in saltwater and industrial environments. Some examples of such applications include in; heat exchanger tubes for condensers in steam power stations and chemical plants; irrigation and agricultural sprinkler systems; piping at distillation plants; seawater feed lines; cement pumps for drill water supply; tubes for distribution of natural and liquefied petroleum and fuel gas distribution piping. For hundreds of years, copper has also been used as an architectural metal. Some of the oldest examples of copper's use as an aesthetic, structural metal include the doors of the Precinct of Amun-Re at Karnak, in Egypt, which dates back 3000-4000 years, and the copper shingle roof atop Sri Lanka's 162 foot tall Loha Maha Paya temple, constructed in the third century B.C. Copper decorative and architectural hardware, however, is not limited to external applications. Interior designers often use the metal and its alloys, brass, and bronze for fixtures such as; handles, door knobs, locks, tables, lighting and bathroom fixtures, faucets and hinges. Hospitals and medical facilities, in particular, value copper for its bacteriostatic properties, which has resulted in its growing use as a component of interior fixtures, such as faucets and door handles, in medical buildings.

- **Aluminium in construction**

Aluminum is also commonly used in the industry because it is resistant to corrosion, highly conductive and ductile. Because it is resistant to harsh weather, the metal is used in windows, doors, and wire, as well as outdoor signage and street lights. The metal is processed into sheets, tubes and castings, and also used to build automobiles and trucks, as well as bicycles and marine vessels. HVAC ducts, roofs, walling and handles made of aluminum are also frequently found in the building industry. In terms of quantity, the building and construction industry is the second most important application for aluminium after

transport. The main uses are windows, doors and facades, followed by uses for roofs and walls. Other applications include, for example, fittings for windows, handles for doors and windows, aerials and lightening conductors, and support structures for solar panels and photovoltaic units. A favourable combination of properties is the perquisite for this wide range of applications of aluminium in the building and construction industry.

The high material strength provides the basis for intricate and stable support structures. In addition, it ensures that even thin frames do not warp. The low density enable slightweight support structures to be constructed, which fulfill the requirements of complex building physics and design. In addition, it permits a high degree of pre-finishing of components in the factory, and these can then often be handled at the building site without the need for lifting gear. The corrosion resistance is a particularly important factor with components that cannot be accesses once installation is complete and thus cannot be checked to ensure they are still functional.

- **Zinc in construction**

Zinc is reported to be the 23rd most abundant element in the earth's crust. It is a non-ferrous metal that is not susceptible to rust or corrosion: It's weatherproof, seismic proof, corrosion resistant, and immune to the harmful effects of UV rays, ensuring a very long service life without degradation. This is possible because architectural zinc develops its own protective layer, which is called zinc hydroxyl-carbonate. Once it's formed, that layer blocks moisture and chemicals from penetrating the zinc and, if it's scratched, the hydroxyl-carbonate will reform over time. In other words, zinc heals itself. That's why zinc walls and roofs last on average from 80 to 100 years. Zinc also requires very little energy to manufacture and little to no maintenance, and it is 100 percent recyclable from new construction scrap to the time it reaches its end use. As a result, zinc roofs and wall cladding never end up in landfills. For generations, European architects have specified zinc as a building envelope material for all types of buildings because it would last and endure harsh weather conditions. In the late 1700s, zinc was also one of the most popular materials used for roofing in America, which is why many well-known historic structures, such as the Washington Monument and Thomas Jefferson's Monticello, had metal roofs. Today, architects are becoming more enamored with the material, not only for its durability but also because of the increasing need for environmentally sustainable design and construction. Architects are warming to the use of zinc on commercial, institutional, and government buildings. A few far-sighted practitioners are also encouraging their residential clients to use architectural zinc on their homes – from brand-new construction to renovation and historic restoration. Zinc ultimately costs much less than asphalt shingles when you calculate the life span of the house. Shingles are usually composed of asphalt, a decidedly non-green material, and an average shingle roof will need to be replaced about every 10 years -- four to five times compared to the lifetime of one zinc roof.

Brass, an alloy of copper and zinc, has good resistance to atmospheric corrosion, alkalis, and organic acids. In some potable waters and in seawater, however, brass alloys with 20% or more zinc may suffer corrosive attack. Use of base metals in construction has been increasing with people being more health and economic conscious and the trend is likely to continue in future as well.