

6. MICROWAVE TOWERS

6.1 Introduction

In the present era the technology in communications has developed to a very large extent. The faster growth demands advances in the design and implementation of the communication towers. There are different types of communication towers present now-a-days in the cellular business. The present paper covers the issues related to the types of towers, codal provisions for the communication towers, foundation design of the green field and roof top towers and optimization of the towers through expert ware.

Cold-formed sections are used in many industries and are often specially shaped to suit the particular application. In building uses, the most common sections are the C and the Z shapes. There are, however, a whole range of variants of these basic shapes, including those with edge lips, internal stiffeners and bends in the webs.

Other section shapes are the "top-hat" section and the modified I section. The common range of cold-formed sections that are marketed is illustrated in Figure. The sections can also be joined together to form compound members.

The reason for the additional lips and stiffeners is because unstiffened wide thin plates are not able to resist significant compression and consequently the use of steel in the section becomes inefficient. However, a highly stiffened section is less easy to form and is often less practicable from the point of view of its connections. Therefore, a compromise between section efficiency and practicability is often necessary.

High strength for a given section depth
Ability to provide long spans (up to 10 m)
Dimensional accuracy
Long term durability (if galvanized) in internal environments
Freedom from creep and shrinkage
Can be formed to a particular shape or application
Lightness, particularly important in poor ground conditions
Dry envelope
Delivered to site cut to length and with pre-punched holes, requiring no further fabrication
Ability to be prefabricated into panels etc.
Robust and sufficiently light for site handling

Examples of the structural use of cold-formed sections which utilize these features are as follows:

Roof and wall members

Traditionally, a major use of cold-formed steel in the UK has been as purlins and side rails to support the cladding in industrial type buildings. These are generally based on the Z section (and its variants) which facilitates incorporation of sleeves and overlaps to improve the efficiency of the members in multi-span applications. Special shapes are made for eaves members etc.

Steel framing

An increasing market for cold-formed steel sections is in site-assembled frames and panels for walls and roofs, and stand-alone buildings. This approach has been used in light industrial and commercial buildings and in mezzanine floors of existing buildings.

Wall partitions

A special application is for very light sections used in conjunction with plaster board panels in stud wall partitioning to form a thin robust wall.

Large panels for housing

Storey-high panels can be factory-built and assembled into housing units on site. This is an extension of the approach used for timber framing.

Lintels

A significant market for specially formed cold formed sections is as lintels over doors and windows in low rise masonry walls (Figure 6). These products are often powder coated for extra corrosion protection.

Floor joists

Cold formed sections may be used as an alternative to timber joists in floors of modest span in domestic and small commercial buildings.

Modular frames for commercial buildings.

A prefabricated modular framing system panel system using cold formed channels and lattice joists has been developed for use in buildings up to 4 storeys height (Figure 7). Although primarily developed for commercial building this modular system has broad application in such as educational and apartment buildings.

Trusses

There are a number of manufacturers of lattice girder and truss systems using cold formed steel sections.

Space frames

A space frame (a three-dimensional truss) using cold formed steel sections has recently been marketed in the UK.

Curtain walling

A modern application is in cladding framing to multi-storey mullions and transoms in standard glazing systems, steel buildings, and as mullions and transoms in standard glazing systems.

Prefabricated buildings

The transportable prefabricated building unit (such as the ubiquitous site hut) is a common application of the use of cold-formed steel. Other applications are as prefabricated "toilet pod" units in multi-storey buildings.

Frameless steel buildings

Steel folded plates, barrel vaults and truncated pyramid roofs are examples of systems that have been developed as so-called frameless buildings (i.e. those without beams and which rely partly on "stressed skin" action).

Storage racking

Storage racking systems for use in warehouses and industrial buildings are made from cold formed steel sections. Most have special clip attachments, or bolted joints for easy assembly.

Applications in general civil engineering include:**Lighting and transmission towers**

These are often made from thin tubular or angle sections.

Motorway crash barriers

These thin steel members are primarily designed for strength but also have properties of energy absorption by permitting gross deformation.

Silos for agricultural use

Silo walls are often stiffened and supported by cold-formed steel sections.

The main structural use of cold-formed steel not listed above is that of floor decking which is usually sold as a galvanised product. In particular, "composite" decking is designed to act in conjunction with in situ concrete floors in steel framed buildings to form composite slabs. Composite decking is usually designed to be unpropped during construction and typical spans are 3.0m to 3.6m.

Other major non-structural applications of cold formed steel in building include such diverse uses as garage doors, and ducting for heating and ventilating systems.