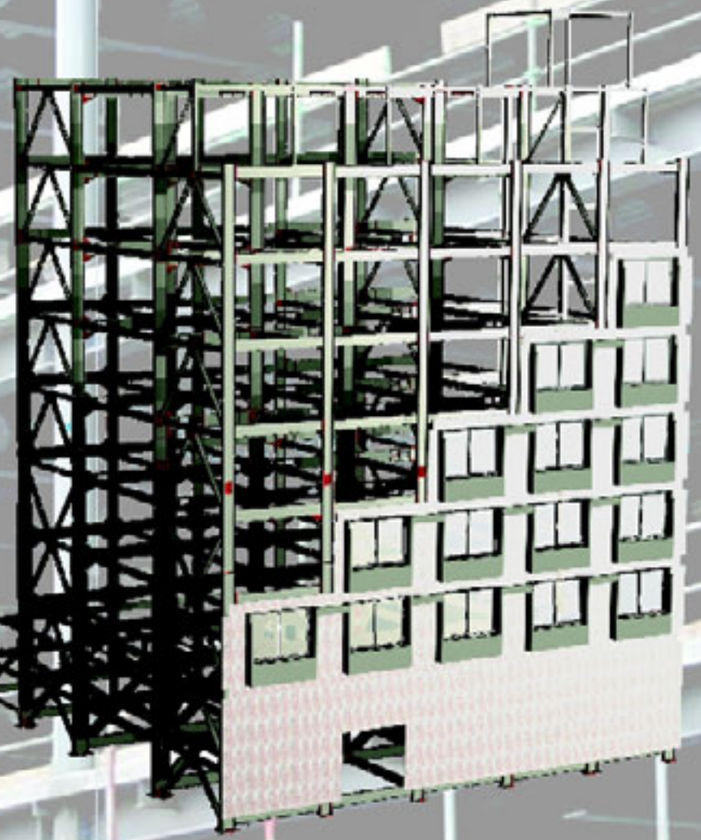
Composite Buildings



COMPUTER CONTROL SYSTEMS ENGINEERING RESEARCH & DESIGN A.E.

1925
Ν. ΦΡΑΓΚΟΠΑΝΑΓΙΩΤΗΣ Α.Ε.Κ.Ε.

PAPATHANASSIOU S.A.

NAPOLEON ROUSSOS S.A.

TECHNIMA METALLON SARL

DS STEEL S.A.
ELECTROMECHANICAL & COMPOSITE STRUCTURE
Kimis Ave. & Electra 6, 151 22 Marousi, Athens
Tel: +30 210 28 28 080, Fax: +30 210 28 28 664
e-mail: sales@dssteel.gr

SYMMIKTES S.A.
COMPOSITE STRUCTURES
Ag. Konstantinou 56, 15124 Marousi, Athens
Tel: +30 210 61 07 743, Fax: +30 210 61 06 714
e-mail: office@symmiktes.gr www.symmiktes.gr

SYMMIKTES S.A.
COMPOSITE STRUCTURES

Applications

Multi-storey Car Parking

Large number of benefits of composite structures:

- Larger spans between columns (hence more usable free space without columns)
- Lighter structure and therefore less excavations and less total volume of foundation
- Reduction of floor depth (hence reduction of the overall building height for the same number of stories)
- Excellent resistance behavior in seismic actions

lead to construction of new, modern, special structures, like multi-storey car parking. Thanks to all these good sides of composite structures, multi-storey car parking offer many and different architectural choices and allow designing alternative constructions with innovative character and contribute in development of a well built and aesthetic environment.

SYMMIKTES S.A.

The main objectives of SYMMIKTES S.A. are:

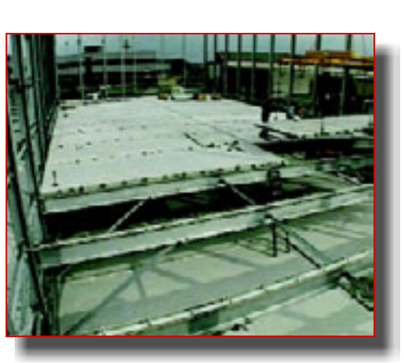
- Promotion of composite construction. This will be achieved through seminars, exhibitions, events, and knowledge dissemination to architects and civil engineers.
- Realization of structural design projects.
- Technical Consulting Services (advisor role for composite buildings).
- Establishment of an industrial unit for the production of cold rolled profiles and composite deck.

SYMMIKTES is mainly focused on multi-storey buildings such as offices, hospitals, hotels, parking, commercial centers, schools, etc. The company will be active in Greece and the Balkan states. Potential clients are the contractors, engineering companies, real estate organizations.

Necessity for reducing time and building costs, and increasing precision and quality of manufacturing on one side, as well as development of technique and technology on the other side, provide appearance and development of new structural floor systems with number of advantages afore classical way of building.

Fully Automated Manufacturing

Entire manufacturing process is performed in completely controlled conditions in factory and it's fully automatic, which gives increased precision of dimensions and quality of final product.



Easy Transport

Products with required dimensions are easy for storage, which increase transport efficiency and reduce costs to minimum.

Quick Assembly Time

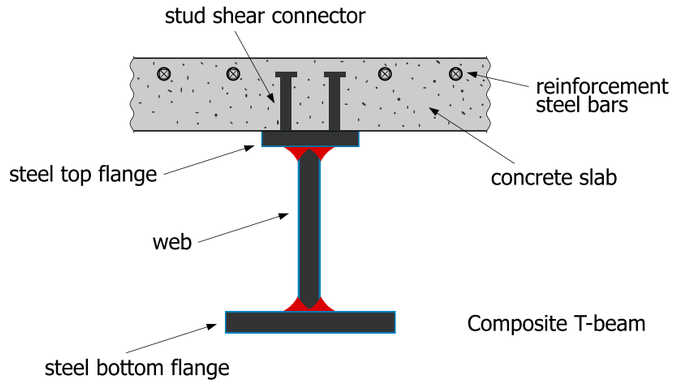
Finished products are easy for handling on site. Use of traditional formwork and "cast on site" is avoided which results in "just in time" erection process.

Perfect Lower Finish

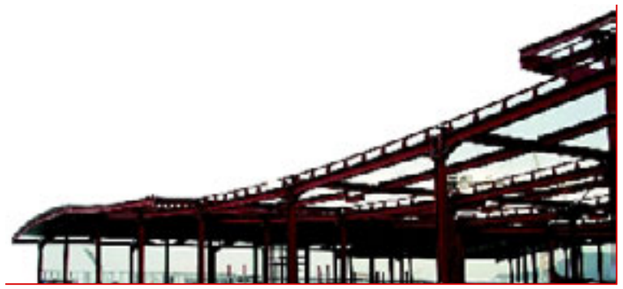
Prefabricated floor panels ensure that no additional work (plastering) on prefabricated units is needed, which results in reduced building costs.

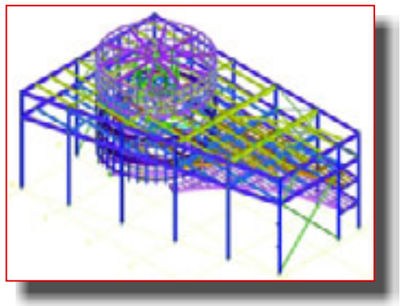
Composite steel-concrete structures are used widely in modern building construction. A composite member is formed when a steel component (such as "I" section beam) is attached to a concrete component (such as floor slab).

In such a composite "T"-beam, the comparatively high strength of the concrete in compression complements the high strength of steel in tension. The fact that each material is used to take advantage of it`s best attributes makes composite steel-concrete construction very efficient and economical.



No other materials combination can provide so many advantages: low cost, quick erection process, high strength and resistance to corrosion, abrasion and fire.



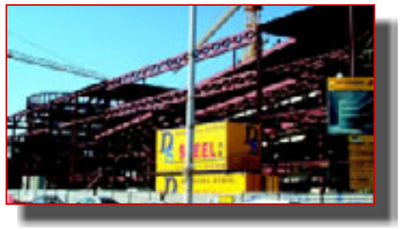


Static Resistance and Safety

In composite steel-concrete structures, connection between steel and concrete parts is achieved through mechanical shear connectors which allow transfer of compressive forces from concrete slab to steel beam and also prevent vertical separation of the concrete and steel components. This type of system, which consists of grid of steel beams connected with concrete slab, provides good horizontal rigidness and stability of whole building which results in good static behavior of structure even in seismic active zones.

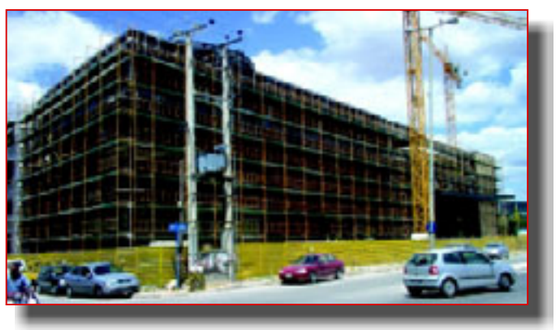
Quick Erection Process

Systems with concrete slab cast in mould from sheet plate or usage of prefabricated floor panels eliminate the necessity for traditional wooden formwork and additional temporary propping which speeds up erection process and results in quick, simple and time saving building process.



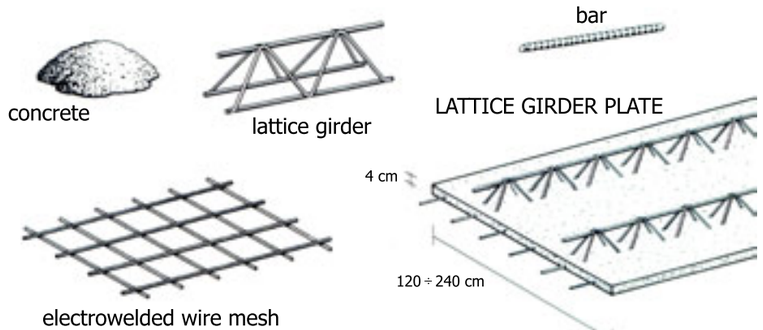
Reduced Building Costs

Using materials in their natural position (concrete subjected to compression and steel to tension) and avoiding the conventional construction method (without concrete slab cast on site in wooden formwork), quick, simple and cheap structures are achieved with great savings in materials, labor and erection time. As an overall result the construction cost is reduced.



Lattice girders are made of simple and inexpensive materials that can be easily found on the market and transported, like electro welded lattice girders, reinforcement steel and concrete.

They are formed from reinforcement steel bars electro welded between them to form spatial triangular truss with double stirrups which have 20 cm spacing, and which connect concrete and reinforcement in a very effective way. An improvement of the previous system is the Lattice Girder Plate Floors. Plate Floors having a width overcomes previous system for over 20 times, which help manufacturing low weight prefabrication



Lattice girder together with additional steel bars is placed in clay mould, and filled with concrete cast in mould. After hardening of concrete, Lattice Girder Plank is ready for transport and assembling. These planks are put on appropriate distance between them and space is filled with lightweight concrete or clay blocks. Then layer of reinforcement steel is placed on top, and concrete slab with small thickness is cast, without necessity of additional formwork. In this way lightweight, cheap, easy for assembling floor system is achieved.

Electro welded lattice Girders have brought radical innovation in the floor slab construction techniques and today it is one of the most frequently used systems for different types of structures. Because of their flexibility of use, static safety, easy handling, positioning and construction speed, they become most suitable for application in both industrial floors and bridge decks.

Low Weight

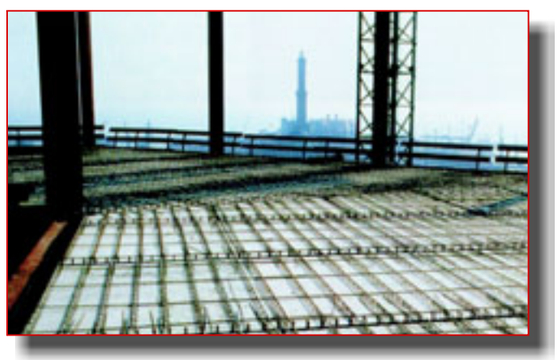
Using appropriate material and the appropriate static system, a structure with an extremely light floor is achieved. This is especially important for multi-storey buildings. Due to low weight of all components, and to their very high flexural rigidity, transport and all on site assembling operations is very easy.

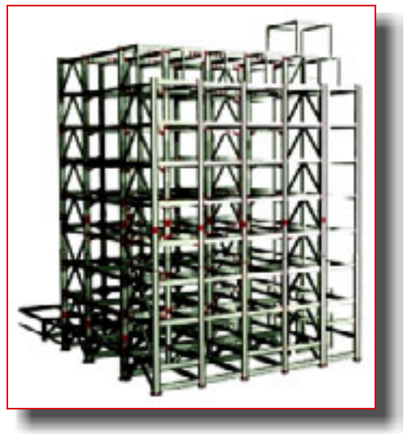
Static Safety and Flexibility

The way of manufacturing of these floor systems provides good static behavior of structure even in seismic active zones. Plates can be designed according to all structural needs because they can be produced in a variety of dimensions. In this method the plates are prefabricated.

Simply and Economic

Floor system is made of simple and inexpensive materials (electro welded lattice girder, steel bars for reinforcement and concrete). This type of structures are easy for transport, handling, positioning and installation which results in quick, cheap and simple for building floor structure.





In Greece the sector of steel and composite structures has been growing very rapidly in the last three years. Our country was behind compared to the international trends in this field, mostly due to the cost of the primary material (imported steel).

The resolution of this problem (tax reduction of imported steel), along with the known advantages of steel structures (faster erection, large spans, seismic resistance) has led the sector in a continuous growth, mainly in the domains of industrial buildings (plants, warehouses etc) and infrastructures (pedestrian brigades etc).

The last 3-4 years steel fabricators have been investing in infrastructures (new facilities, re-engineering of production lines) and machinery (CNC systems) and as a consequence Greece today has some of the most modern steel fabrication facilities in Europe. Significant impact was given to the sector from the Olympic projects, since the majority of steelwork has been assigned to Greek fabricators.

The Deck Panel Floor systems are widely used in multi-storey buildings. This system offers large free spans, reduced erection time without the extra cost for formwork and temporary props.

Static Resistance

Structural system consists of grid of transversal and longitudinal beams, that gives lateral stability and horizontal rigidness, which results in good static resistance of building.

Quick Erection

Sheet plate eliminate the requirements for traditional wooden formwork and temporary propping which results in quick, simple and inexpensive way of building.

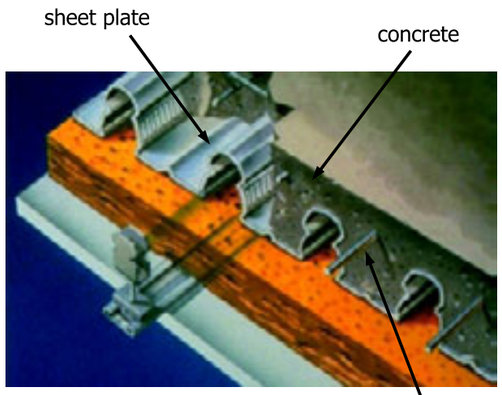
Good Thermal and Acoustic Insulation

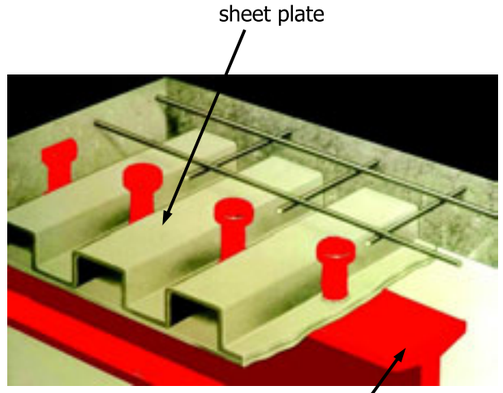
Sheet plate together with "cast in site" concrete slab, forms composite structure with very good insulation parameters.

Esthetic Freedom

The usage of different types of girders (with holes in webs, castellated, non-symmetrical), provide architectural freedom in conceiving aesthetic solutions.

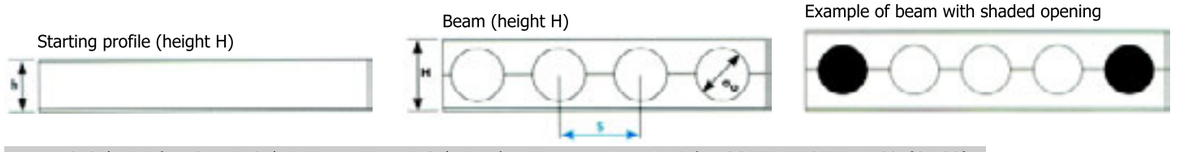
This system is characterized with cast of concrete plate in prefabricated mould of trapezoid sheet plate based on steel beams.





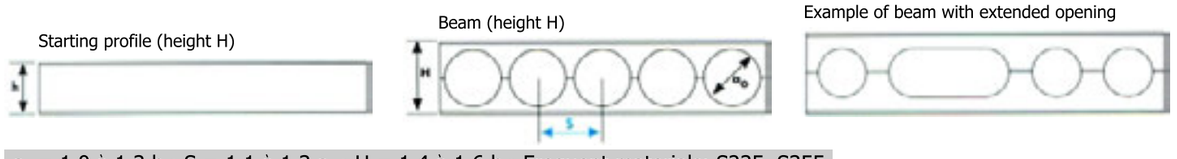
Steel beams, manufactured in the workshop are erected on the structure, forming a grid, on which a trapezoidal sheet is placed. After setting up additional reinforcement steel bars the plate is cast on site. This method provides a cheap, simple and rigid multi-storey building.

- Floor, optimization of ratio load/weight



a_0 = 0,8 à 1,1 h • S = 1,2 à 1,7 a_0 • H = 1,3 à 1,4 h • Frequent materials: S355, HISTAR 460 (S460)

- Roof, optimization of ratio height/weight



a_0 = 1,0 à 1,3 h • S = 1,1 à 1,3 a_0 • H = 1,4 à 1,6 h • Frequent materials: S235, S355

- Beam example has variable inertia. Long consoles (tribune of stadium...), continuous beams (links...), cross sections.