



STEEL BRIDGES

CENTUNION



CENTUNION, Española de Coordinación Técnica y Financiera, S.A. is a Spanish engineering company that undertakes responsibilities of general contractor, co-ordinating the various technical, economic and financial matters for the performance of industrial plants, from the project stage up to their start up.

The design and supply of considerable amounts of steel structure, account for a very important part of **CENTUNION's** engineering activities when implementing industrial plants projects.

CENTUNION's modular steel bridges system is designed to satisfy the needs of infrastructure to those places which are located in remote areas with difficult access, thus promoting the communication networks necessary for the development of the regions.

CENTUNION has a significant experience in the design, supply and erection of modular steel bridges, having participated in important projects in Southeast Asia and South America.

The erection of the modular steel bridges is very simple, the auxiliary means needed are very few and it is not necessary the use of qualified manpower.

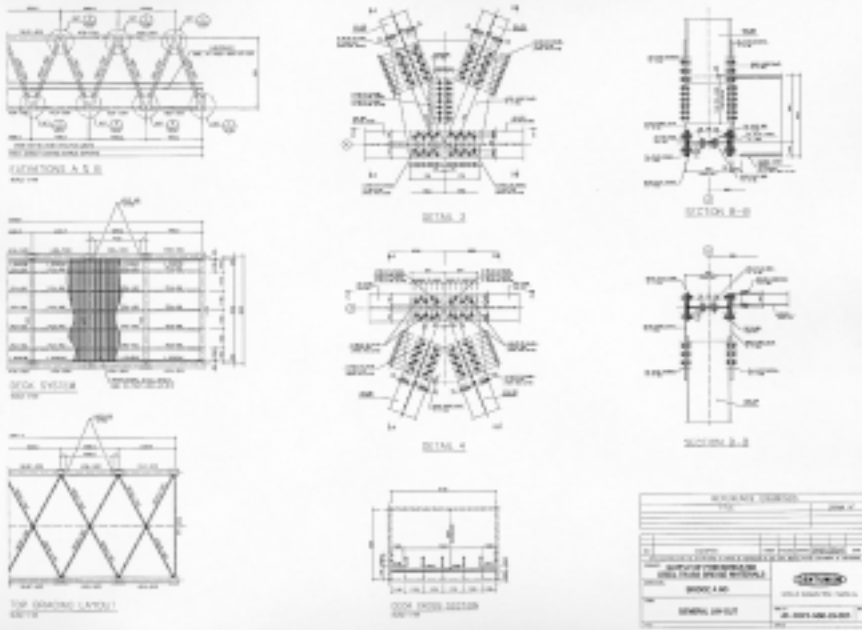
The supply of the modular steel bridges is complete, including reinforced neoprene bearings, seismic buffers, handrails, as well as the necessary hydraulic jacks and tools for the erection of the different components of the bridge.

This modular system has been designed for low maintenance requirements, and for that purpose the steel structure and bolts are hot dip galvanized. The basic procedures for maintenance are described in the erection manual, which is delivered together with each bridge.



STRUCTURAL DESIGN

Truss bridges



STRUCTURAL DESIGN

The design of the steel structure of the bridges is in accordance with the STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES: AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO).

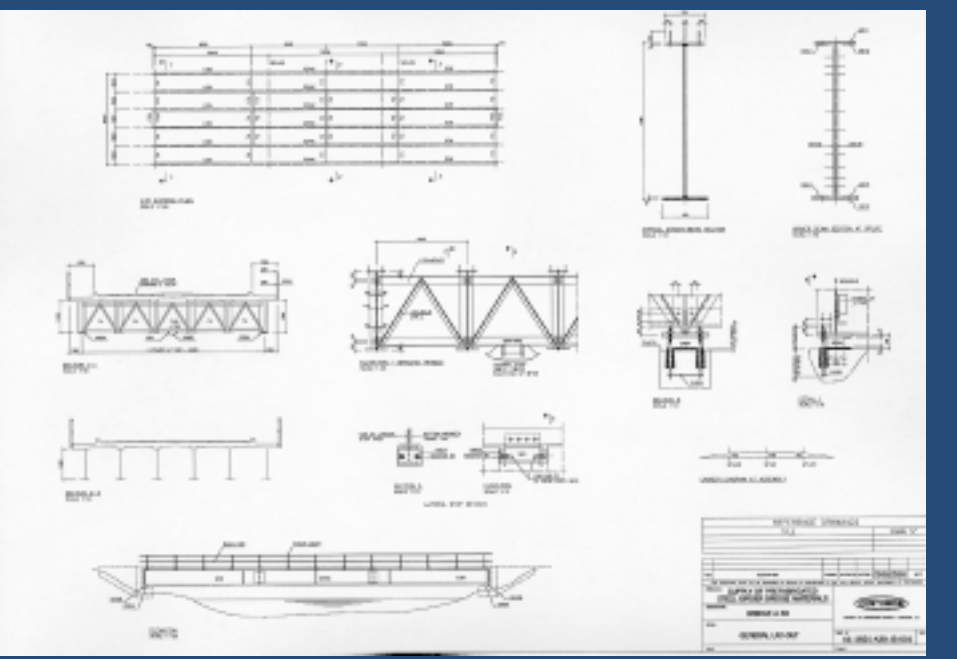
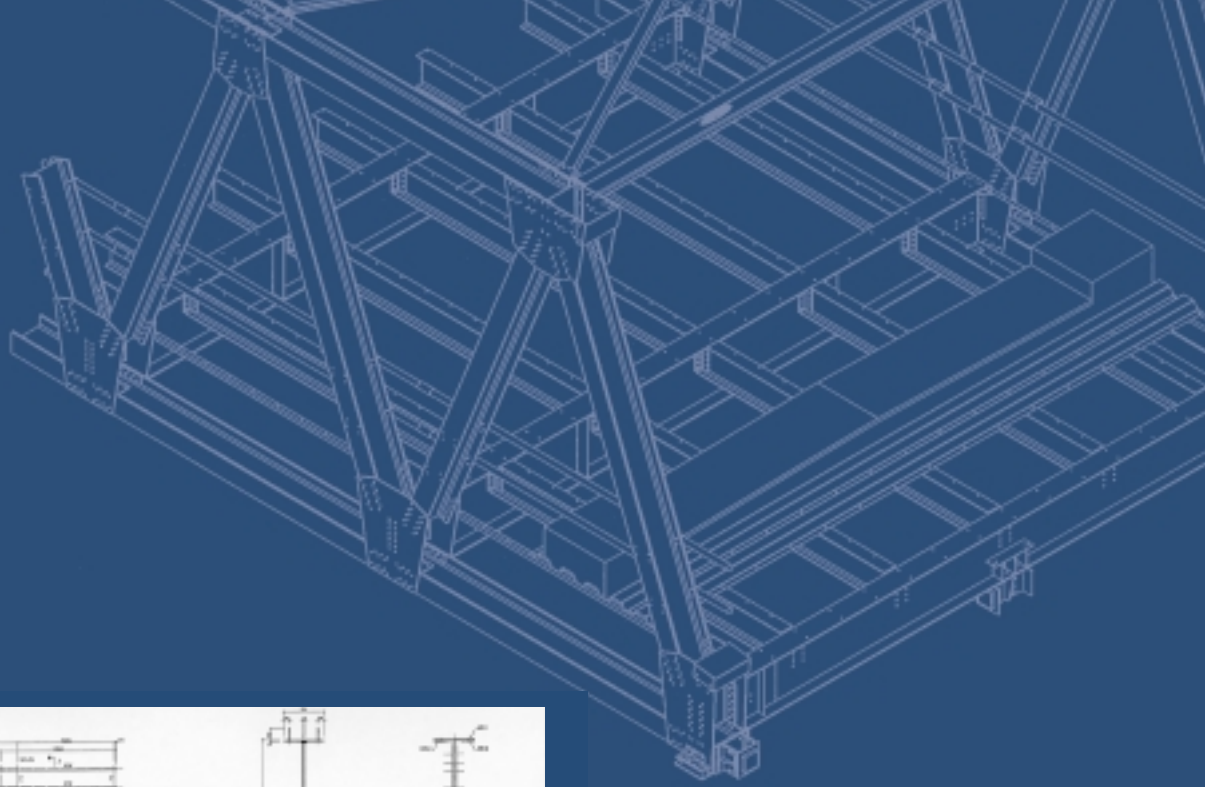
The traffic design loads, as well as environmental loads, shall be adopted to the characteristics of the place where bridges are to be erected.

The standard span lengths of the bridges are up to 80 m, with increment modules of 5 m. Bridges with bigger span lengths will have their own specific design.

From the structural point of view, two different bridge designs are used for the standard spans:

- Steel Girder Bridges, for span lengths up to 30 m.
- Steel Truss Bridges, for span lengths bigger than 30 m.

The deck system for the Steel Girder Bridges, is a composite beam made of concrete and steel, with the advantage, when compare with steel truss solution, that the weight of the bridge is much lower.



Girder bridges

The steel girders are assembled longitudinally with transversal bracing, thus allowing a wide range of bridge widths, which will be determined in accordance with the specific requirements.

The Steel Truss Bridges can also be designed in different widths, being the range between 4.5 m and 9 m, with a vertical clearance of 5 m.

The deck system of this kind of bridges consists of a trapezoidal steel sheet, bolted to a beam frame formed by cross-girders and stringers. An in situ non-structural concrete filler is casted on top of the trapezoidal steel sheet. This system facilitates the construction requirements, when bridges are assembled in remote areas where the possibilities of concrete supply and its quality control are scarce.

All steel connections during bridge assembling are bolted, and no welding at all, is necessary while erection of the bridge.

MATERIALS



Hot dip galvanizing

High strength bolts



MATERIALS

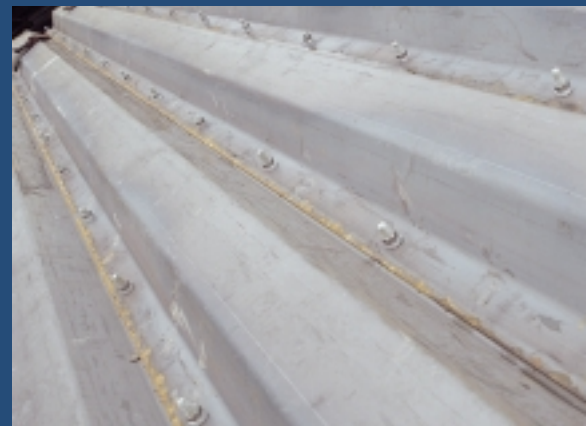
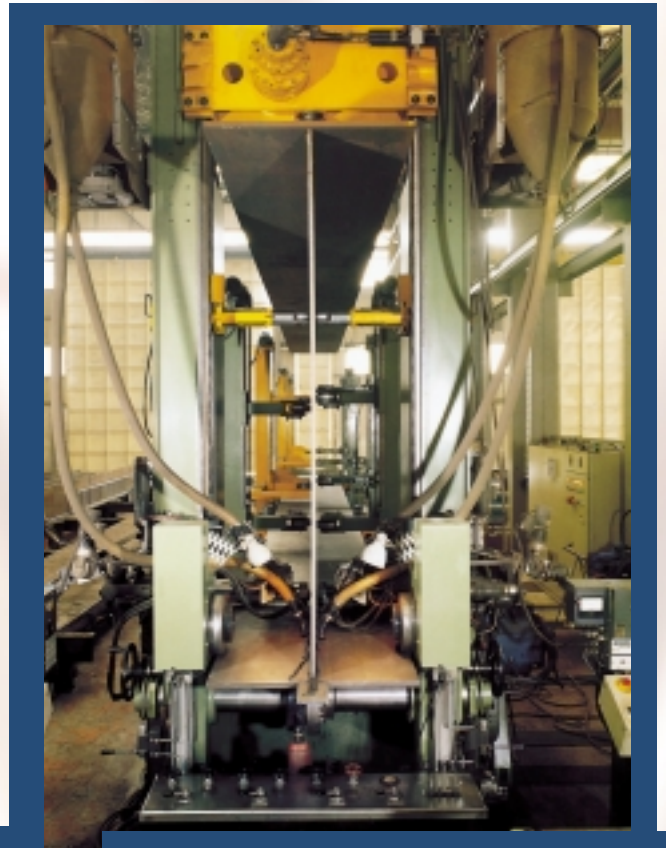
Rolled steel beams and steel plates of high quality are used for the main steel structure of the bridges.

All bolted connections are by means of high strength bolts with the appropriate quality for nuts and washers; strength indication washers can be used in order to facilitate the connections quality control.

Hot dip galvanizing has been selected as the corrosion protection system for the steel structure. This protection system requires certain additional steel characteristics in order to achieve a high quality galvanizing.

FABRICATION

ISO 9000



FABRICATION

The manufacturing of the steel bridges is carried out in workshops equipped with the most advanced production means, using programming and control equipment and computerized data transmission system for the computer numerical control machines.

The manufacturing process is performed in accordance with the international standards and codes, taking into account the CENTUNION's specifications, Inspection Points Programme and Quality Control Plan.

The Quality Control is closely monitored according to ISO 9000.

ERECTION

Cantilever method



ERECTION

The steel structure of the bridges has been designed in such a manner, that the weight and dimensions of the bridge components minimize and simplify the auxiliary means required for the erection, being not necessary the use of qualified manpower.

Traditional methods are used for the erection of Steel Girder Bridges utilising intermediate supports. In case that the use of intermediate supports are not possible, the erection of the bridges can be performed using one of the steel girder as an anchor span, and assemble the rest of the steel girders by means of rollers and winches.

The Steel Truss Bridges are erected by the cantilever method, assembling component by component without the help of intermediate supports. In case intermediate supports are available, assembling of the components can be done using a framework.



When selecting the cantilever method of erection for the Steel Truss Bridges, it is necessary to use an anchor span with counterweight, and "link sets" to connect the above mentioned anchor span with the truss bridge that is being erected.

In order to facilitate the transport and erection of the bridge steel structure, the weight and length of each component is limited up to a maximum of 2,000 kg and 10 m respectively. In most of the cases the weight of each bridge component is less than 1,000 kg.

To facilitate the erection and make its control easier, every steel bridge component has its specific "mark", thus allowing the erection sequence as indicated in the drawings and the sketches of the erection manual.

LOADING TEST



The main purpose of the loading test is to determine that the actual design and performance of the bridge are as foreseen in the project phase, when the bridge is under the actions of the designed loads.

Full scale tests are carried out in order to measure deflections and stresses before, during and after the application of each stage of the loading test.

Different stages are considered during the loading test, where the bridge is under the following loads:

LOADING TEST

- Its own structural components weight.
- Structural and non structural weights. Dead load.
- Dead load plus 50% of the traffic load.
- Dead load plus 75% of the traffic load.
- Dead load plus 100% of the traffic load.
- Dead load plus 125% of the traffic load.

MAINTENANCE

MAINTENANCE

The design characteristics, steel quality and type of corrosion protection, allow an easy maintenance, being only necessary a periodic cleaning of the steel structure in order to avoid the blockage of the steel beams drain holes. It is also necessary a routine checking of the thickness of the galvanizing, the tightening of the bolts and the state of the neoprene bearings.

OTHER BRIDGES

OTHER BRIDGES

CENTUNION undertakes the design, calculation, manufacturing and erection control of other types of steel bridges which are in compliance with the needs and specific requirements of our customers.





Española de Coordinación Técnica y Financiera, S.A.

C/ Marqués de Villamagna, 3 • 28001 Madrid (Spain)

Tel: +34 91 436 06 37 • Fax: +34 91 436 06 41

e-mail: centunion@centunion.com

Internet: www.centunion.com