

COMPANY PROFILE

THE COMPANY

CARLOS FERNÁNDEZ CASADO S.L. OFICINA DE PROYECTOS

(CFCSL) is an independent civil and structural engineering consulting company based in Madrid (Spain) devoted to the research, study, development and supervision of structural engineering projects.

CFCSL provides highly specialized services that include feasibility studies, preliminary and detailed design, independent checking and construction supervision of any kind of structures.



The company has designed and supervised many major and hightechnology structures all over the world, particularly bridges some of which hold world records.



CFCSL employs highly trained and specialized engineers. The firm has gained a worldwide reputation since its foundation in 1964 for its contribution to the development of structural engineering technology and for its innovative and original structures.

CARLOS FERNÁNDEZ CASADO S.L. OFICINA DE PROYECTOS











QUALITY POLICY

Since 1998 CFCSL has implemented an **Administration Quality System** following **ISO 9001** requirements with the aim of improving our services and customer satisfaction.

All our staff is deeply committed to improve the quality of our projects following this Quality System.



MEMBERSHIP

TECNIBERIA: Spanish Association of Engineering Consultancy Companies. www.tecniberia.es ACHE: Spanish Scientific and Technological Association of Structural www.a-ache.net Concrete. AFGC: Association Française du Génie Civil (France). www.afgc.asso.fr ACI: American Concrete Institute (USA). www.concrete.org IABSE: International Association for Bridge and Structural Engineering. www.iabse.org IACM: International Association for Computational Mechanics. www.cimne.com/iacm **IASS:** International Association of Shell and Spatial Structures. www.iass-structures.org FIB: Fédération International du Béton. www.fib.epfl.org

AWARDS

Throughout its near 50 years of uninterrupted activity the work of the company has gained great national and international prestige that is reflected in numerous awards:

- Sercometal award for the most outstanding steel structure, 1975
- > ECCS European award for steel structures, 1975.



- > Urban Planning and Architecture prize, The City of Madrid, 1987.
- > Chamber of Castilla and León Contractors prize, 1990.
- > Architecture and Public Works, The City of Madrid, 1991, 1996.
- Construmat award, 1985, 1993, 1995, 2003, 2004, 2005.
- > Association of Spanish Architects annual award, 1994.
- > Architecture and Urbanisme award, 1999. Murcia Autonomous Government.
- Special Mention in the FIP awards for outstanding structures, 1998. (Bridge over the Lerez River)
- Association of Civil Engineers of Castilla-León award to the best work in the period 1976-2002. (Barrios de Luna Bridge)













Brunnel award in railway transportation, 1996 and 2005.

HISTORY OF THE COMPANY

The firm **CARLOS FERNANDEZ CASADO S.L. OFICINA DE PROYECTOS** was established in 1964 by **Prof. Carlos Fernández Casado** with two young partners, **Javier Manterola Armisén** and **Leonardo Fernández Troyano.** Since its foundation the company has carried out an uninterrupted activity and has played a key role in the Spanish and International Bridge Engineering world.



The beginnings of the company were marked by its close relationship with *Huarte y Cía*, one of the main Spanish contractors at that time, currently merged into the large international construction group *OHL*.

CFCSL was gradually opened out to other clients, including Public Administrations, constructions companies and private customers. From its early stages to the present day the firm has participated in some of the most important engineering and architectural works in Spain.

The international activity of CFCSL began soon, mainly in projects done in collaboration with *Huarte y Cia* in South America where *Prof. Fernández Casado* enjoyed a high reputation thanks to his technical books and his teaching activity. The international presence of the company has steadily increased since then and currently is a major part.













A milestone in the company's history was reached with the construction of two remarkable cable-stayed bridges, the **Sancho el Mayor Bridge (1979)** over the Ebro river designed by Dr. Fernández Troyano and the **Barrios de Luna Bridge (1984)** designed by Prof. Manterola. The latter, a 440 m prestressed concrete cable stayed bridge, held at its conclusion the world record in both concrete and cable stayed categories and was given the name *Carlos Fernandez Casado* by the Spanish Ministry of Public Works in recognition of the Professor career. These two works gave the firm a considerable international projection.

Throughout nearly 50 years of activity the company has participated in more than 1000 high-technology projects, many of them bridges but also including other types of special structures done in collaboration with other engineers and architects: high buildings, large roofs, dams, transportation stations, major sport facilities and rehabilitation of historical constructions.



Currently the company is involved in several outstanding projects, among others the bridge over the Cadiz Harbour (cable-stayed 550 m long main span -new Spanish span record- and total length 3000 m), the Bucaramanga (Colombia) cable-stayed bridge (280 m long main span), the new Pumarejo Bridge over the Magdalena river in Colombia (cable-stayed 380 m long main span and total length 2200 m) and the Calafat bridge over the Danube River in Bulgary (continuous extradosed cable-stayed bridge with 180 m long main span and total length 1790 m).













LEADERSHIP AND MANAGEMENT

Pr. Dr. Carlos Fernández Casado (*Logroño, 1904-Madrid, 1988*) was the first chairman of the company until his retirement in 1984. He has left a long lasting legacy in the Spanish civil engineering world, not only due to his expertise in construction and structural engineering but because of his intellectual prestige and his studies on history and aesthetics of public works.

Before establishing the company that still carries his name, he had ad distinguished professional career as an independent consultant and as lead design engineer in the Bridge Department of the Spanish Public Works Ministry, where he designed many bridges.



His education and early professional work coincided with the golden age of reinforced concrete in Europe, a construction material that Prof. Fernández Casado studied deeply and which he used to make most of his early projects which are regarded as milestones of their kind in Spain.

Nevertheless, he is probably best reputed for the introduction and development of the prestressing concrete in Spain, a technology he studied enthusiastically from the early 1960's. With his recently founded company he use it to build some of the more remarkable bridges and buildings in the period 1960-1980.













He also held the chair of Bridge Engineering at the Madrid Polytechnic University for more than 20 years. His lessons and his technical books about strength of materials, structural analysis and bridge design contribute decisively to the education of several generations of Spanish civil engineers. Two of them "*Cálculo de Estructuras Reticulares*" (Structural Analysis of frame structures, the first book published about the Hardy Cross method) and "*Puentes de Hormigón Armado y Pretensado*" (Prestressed concrete bridges) where at its time reference books in Spain and were also highly regarded in Latin American countries.

As a result of his contribution to the development of prestressed bridge technology he was awarded many prizes, among them the **Gold Medal of the Féderation Internationale de la Précontrainte (F.I.P.)** in the 1974 International Congress in London, the first Spanish engineer to win this prestigious prize.





His special interest in the artistic and historical aspects of public works –his books on Roman Engineering are essential works in this subject- made him the first structural engineer to be elected for the **Royal Academy of Fine Arts of San Fernando in Madrid**.

This concern for the aesthetical aspect of public works was passed on to his successors and it remains to this day, with its highly reputed technical capacity, the distinguishing hallmark of the company.















Sinc Prof. Fernandez Casado retirement in 1984, the direction of company has been shared by the two other co-founders:

Dr. Eng. Leonardo Fernández Troyano (Madrid 1938), is the current co-chairman of the company. He has developed his entire professional career there. His activity includes taught on Bridge Engineering at the Polytechnic University of Madrid during several years.

His work covers most of the bridge typologies; among them many remarkable works such as the cable stayed bridge Sancho el Mayor *bridge* over the Ebro river, one of the references of the company.

He has participated in several projects of transportation facilities

joining multidisciplinary teams with engineers and architects and also has been involved in the rehabilitation and strengthening of many historical constructions.

Among other distinctions, he was awarded John A. Roebling Medal in the ESWP International Bridge Conference, USA 2007 for his lifetime achievement in bridge engineering and the Santo Domingo de la Calzada award granted by the Colegio de Ingenieros de Caminos, Canales y Puertos de España (Spanish Institute of Civil Engineers).













He shares with Prof. Manterola several other awards in recognition of their contribution to the development of the art of structural engineering such as the *Architecture and Urban Planning Prize of the Madrid City Council* (1992) and the *Professional Associations of Engineers and Architects of Spain Award* (1994)







In addition to his bridge engineering work *Dr. Fernandez Troyano* has carried out a considerable research on the history of public works history and bridge construction technology. This work is reflected in numerous publications and books, as well as in his participation in Technical and Historical Conventions. One of his more known books, *"Bridge Engineering. A Global Perspective"* has been translated into English and Italian.









Prof. Dr. Javier Manterola (Pamplona 1936), is currently cochairman of CFCSL. Before joining the company he worked as researcher in the *Institute of Construction Materials Eduardo Torroja* of Madrid where he obtained his doctoral degree.

He cofounded CFCSL in 1964 and since then has participated in many of the engineering and architectural works of the company, including high-rise buildings, transportation stations and sports centres, but among them he has had special activity in the world of bridges. He is the lead designer of some world record breaking works as the *Barrios de Luna cable stayed bridge* (1984) as well as other national and international bridge achievements.







He held the chair of Bridge Engineering at the Madrid Polytechnic University of Madrid until 2006, forming several generations of Spanish engineers, including the majority of the current members of CFCSL. His technical publications about Bridge Engineering are essential references in the Spanish Bridge Engineering Sector.









His prestigious activity has been recognized with several distinctions, among them the *Féderation International de la Précontrainte* (F.I.P.) *Gold Medal (1996),* the *International Award of Merit (2006)* of the *International Association Structural Engineer (IABSE)*, and the *First National Civil Engineering Prize* granted *by the Spanish Ministry of Publics Works* in 2005.







His outstanding bridge designs and his studies on modern architecture from the point of view of the structural engineer, led him to be elected in 2006 *permanent member of the Royal Academy of Fine Arts of San Fernando in Madrid* following *Prof. Fernández Casado* to receive this distinction in a prestigious organization of multidisciplinary artists.









ORGANIZATION OF THE COMPANY

<u>STAFF</u>

The company currently employs 40 full-time staff, including 24 highly specialized engineers, 12 draftsmen and 4 administrative. Several engineers are professors at the Technical University of Madrid and members of various Spanish and International Technical Committees.

The company is organized in two project work-teams led respectively by Prof. Manterola and Dr. Fernández Troyano. The project management responsibility is shared with several senior engineers.

Senior engineers managed daily development of the different projects being responsible for:

- > Directing appropriate resources to the project.
- > Ensuring that progress satisfies the programme requirement.
- > Liaising with the client's project manager.
- > Meeting the technical challenges of the project.
- > Responsible for delivery of the project on schedule.



The technical staff master several languages (English, French, German, Italian and Portuguese), and have experience dealing with international design standards (AASHTO and EUROCODES) as well as the national regulations of several countries (British Standards, French Codes, Italy, Romania, Mexico, Chile, Argentina, Brazil, Venezuela).

The company operates worldwide, either in collaboration with local firms or as member of *design&build* teams with large international engineering and construction companies. The work is done in parallel from the company's headquarters in Madrid and local offices. Trained engineers of the company are often posted abroad to carry out the development of the projects or to supervise the construction of major bridges.









PROJECT MANAGEMENT

The key technical personnel involved on the development of the different projects are:

- Miguel Ángel Astiz Suárez (1950), Prof. Dr. Civil Engineer. Full professor of Bridge Engineering at the Madrid Polytechnic University.
- Miguel Ángel Gil Ginés (1949), Prof. Civil Engineer. Lecturer of Bridge Engineering at the Madrid Polytechnic University.
- Antonio Martínez Cutillas (1963), Prof. Dr. Civil Engineer. Assistant Professor of Strength of Materials at the Madrid Polytechnic University.
- Celso Iglesias Pérez (1963), Prof. Dr. Civil Engineer. Assistant Professor of Structural Analysis at the Madrid Polytechnic University.
- > Javier Muñoz-Rojas Fernández (1965), MSc. Civil Engineer.
- > Lucía Fernández Muñoz (1968), MSc. Civil Engineer.
- > Guillermo Ayuso Calle (1973). Civil Engineer.

















TECHNNOLOGY AND RESEARCH AND DEVELOPMENT (R&D)

In addition to its design practice, *CFCSL* is an active member in construction research and engineering technology, providing several full or visiting professors to the Technical University of Madrid.

CFCSL is also an active fellow in Spanish and European Technical Committees, its engineers regularly participate and attend conferences and workshops of bridge and constructions engineering.

CFCSL was one of the first Spanish engineering companies that incorporated computing tools and that developed software for structural analysis. The majority of the structural software used in daily work is still inhouse. Highly experienced engineers contribute to renovate and update the required software.

The R&D technical direction is coordinated by **Pr. Dr. Miguel Ángel Astiz Suárez (Madrid 1950),** responsible of the software development of *CFCSL*, is also full professor of Bridge Engineering at the Polytechnic University of Madrid since 2006 where he previously taught Structural Mechanics and Materials Science since 1977. His active academic research involves many features from Engineering Fracture Mechanics, Wind Dynamics and FE Analysis. He is a great expert on static and dynamic wind loads on structures, whose experience has been applied to many of the CFC SL's long span bridges designs. He has developed many of the structural analysis programmes of the firm, including general modules for 3D structural static and dynamic analysis, prestress analysis, sectional analysis of concrete, steel, and composite sections, general finite elements software.

Miguel Ángel Gil Ginés (Madrid 1949), shares the responsibility of software development. He is lecturer of Bridge Engineering at the Polytechnic University of Madrid, who has developed many structural analysis applications concerning creep and shrinkage effects on structures, steel and composite analysis

Several others engineers of CFC are involved in the R&D activity to upgrading and improving the in-house structural analysis software.













Current software development involves structure-soil interaction, step by step analysis of creep and shrinkage, non linear analysis of beams and cables, simultaneous stability of large piles, 3D presstress effects, automatic design of slabs with FEM techniques, pre and post-processing applications for an automatic design of standard bridges, ...etc.



In addition to the in-house software, CFC SL has advanced commercial programmes of mechanical and structural analysis, among them the finite elements software *ABAQUS* and *SOFISTIK* used in very complex and non linear problems.











CFCSL was also one of the first Spanish engineering companies that introduced graphic software on its design and drafting work. Design Engineers and Drafting staff handle widespread CAD software as *KEYCREATOR, AUTOCAD* and *MICROSTATION*.







INTERNATIONAL EXPERIENCE

Since its foundation **CARLOS FERNANDEZ CASADO**, **S.L.** has been involved in many international projects:

- **Europe:** Spain, UK, France, Portugal, Ireland, Italy, Rumania, Bulgaria and Andorra
- **South America:** Chile, Argentina, Ecuador, Colombia, Venezuela, Bolivia, Peru, Brasil.
- Central and North America: Mexico, Puerto Rico, Dominican Republic, Panama, Cuba, United States and Canada,
- Asia Quatar, Iran, India, Korea and China
- Africa Morocco

In order to work abroad CFC SL staff has international insurance policies that covers against professional liability.



The company operates worldwide collaborating with local firms or participating in "design&build" teams with big international construction companies.

When required trained engineers are moved abroad to work with local partners and in construction supervision of special works, The headquarters of the company in Madrid provide additional technical support for the design and analysis work.















Recent references of these works are the cable stayed bridge over the River Suir in Waterford (Ireland) with DRAGADOS-ASCOM-OVE ARUP), the Corso Argentina Viaduct in Padua (Italy) with NET ENGINEERING, the Basarab cable-stayed bridge in Bucharest (Rumania) with FCC-ASTALD), the Lowry Centre lifting Footbridge in Manchester (U.K.) with Parkman Ltd.

One singular international project undertaken by CFCSL in collaboration with of COWICONSULT AS (Denmark) was the feasibility study of the crossing of the Strait of Gibraltar by means of a 12 km long suspension bridge with 3000-5000 meters main span.

with the Mexican construction company MEXPRESA.

















CURRENT INTERNATIONAL WORKS

CFCSL current international works of CFCSL on-going or under construction aret the new Pumarejo Bridge over the River Magdalena in Barranquilla (Colombia), the Vidin extradosed bridge over the Danube river in Bulgaria, the arch bridge over the River Arno in Arezzo (Italy), the Cau Cau river bascule Bridge in Valdivia (Chile), the Brennero Highway structures in Italy and the Novena cable-stayed bridge in Bucaramanga (Colombia).





INDEPENDENT CHECKING ENGINEERING SERVICES (ICE)

CFC SL provides services as independent checker of special bridges and as technical advisor design&build tenders of major bridge.

Some references are the design supervision of cable stayed bridge of Rosario Victoria (Argentine) designed by *LEONHARDT UND ANDRÄ* (Germany)(2001), the construction supervision in collaboration with EGT *ENGENHARIA-PROBASE* of the cable stayed bridge of Guamá (Brazil)(2000), designed by *STUDIO MIRANDA* (Italy), in collaboration with *SENER* (Spain) the supervision of several Metro viaducts (Portugal) (2006), the independent checking of the third bridge over Panama Canal (2012),the technical advice for DRAGADO-USA in the competition of the Desmond Bridge (LA), Tappan Zee Bridge (NY) and Downtown and East End bridges over the River Ohio (KY) USA,2011-201).















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