

Location: Spain/Madrid

Sex: Male

Nationality: Spanish

✉ **E-mail address:** mcuadrado@ciccp.es

Senior Engineer in Railway Infrastructure
36 years of experience

SHORT DESCRIPTION

Over the past 36 years, I have acquired a solid and extensive experience in many aspects of railway engineering, especially in the field of infrastructure-engineering structures, having developed the analysis of dozens of railway bridges, conventional and high speed.

I have also conducted several national and international railway R&D projects. During these years, as well, produced many monographs and communications for national and international rail congresses, worth highlighting WCRR (Tokyo, Köln, Montreal, Seoul and Milan) and UIC High Speed (Beijing and Tokyo) and participated in the organization of international conferences (International High-Speed conferences Córdoba 2007-17).

I was also invited to participate as a specialist in the drafting of railway standards, as a member of Spanish, European and international technical committees.

Finally, from December 2017, I have been participating as Infrastructure Assessor and Lead Assessor in several Rail Safety & Interoperability assessments, as Infrastructure expert and as Slab-track expert.

WORK EXPERIENCE

From 17/11/2017 to present

CERTIFER Safety & Interoperability Infrastructure Assessor

- Safety assessment of Developpement du Fret Ferroviaire du Port de Port-La Nouvelle. France. 2025-present. Infrastructure expert.

- Safety and Interoperability assessment of Projet « EOLE » - Modifications de l'infrastructure sur le site de Mantes-La-Jolie. France. 2025-present. Infrastructure expert.
- Safety and Interoperability assessment of Amenagements Ferroviaires au Sud De Bordeaux. France. 2025-present. Infrastructure expert.
- Safety and Interoperability assessment of Nancy-Contrexeville Line (section Xeulley-Vittel). France. 2025-present. Infrastructure expert.
- Safety and Interoperability assessment of Vestfyn Line (RFB). Denmark. 2024-present. Infrastructure expert.
- Safety and Interoperability assessment of the Projet MR URBOS - LIGNES 1/2/3 and 4 of the Tramway of Montpellier. 2024- present. Infrastructure expert.
- Safety and Interoperability assessment of the Projet "AFNT" - AMÉNAGEMENTS FERROVIAIRES AU NORD DE TOULOUSE. France. 2024-present. Infrastructure expert.
- Safety and Interoperability assessment of the Modernisation of the line Montrejeau-Luchon. France. 2023-present. Infrastructure expert.
- Rail Baltica trackside infrastructure TSI conformity assessment. Estonia, Latvia and Lithuania. 2020-today. Infrastructures expert.
- Safety and interoperability assessment of Charles de Gaulle Express project. France. 2020-today. Track expert.
- Safety assessment of the reconstruction of the set of tracks at Mole Graveleau. France. 2020-today. Infrastructures expert.
- Safety and interoperability assessment of "Saint Jean de Maurienne/Telt" project. France. 2020-2022. Infrastructures expert.
- Interoperability assessment of HS2. Great Britain. 2020-today. Infrastructures expert.
- Safety assessment of change in fastening system in Eurotunnel. France. 2020. Slab-tack expert.
- Safety assessment of the extension for Tramway T1 Bobigny-Val-de-Fontenay. France. 2020-today. Infrastructures expert.
- Interoperability assessment of the Ferrocarril Central Project. Uruguay. 2020-today. Infrastructures expert.
- Safety Assessment: two extensions of the Dubai Metro Red Line. 2017-2019. Infrastructures expert.
- Safety & Interoperability Assessment: Ringsted-Femarn Line (RFB). Denmark. 2018-today.
- Safety & Interoperability Assessment: New Storstrom Bridge, Ringsted-Femarn Line (RFB). Denmark. 2018-today. Lead assessor.
- Interoperability Assessment: Hatrival Line. Belgium 2018-2019. Infrastructures expert.
- Safety Assessment: Tramway line 5 Montpellier. 2021-today. Infrastructures expert.
- Safety & Interoperability Assessment: Upgrading line Aix-Marseille (Project MGA2). 2021-2022. Infrastructures expert.
- Safety Assessment: Automatization of Paris Metro line 13. 2021-today. Infrastructures expert.
- Interoperability Assessment: Construction of a railway bridge at Mertert, Luxemburg. 2022. Infrastructures expert.
- Interoperability Assessment: Construction of a railway bridge at Clervaux, Luxemburg. 2022. Infrastructures expert.

- Safety assessment for Delhi – Ghaziabad – Meerut corridor, India. 2022-today. Infrastructures expert.
- Safety Assessment: Automatization of Paris Metro line 6. 2022-today. Infrastructures expert.
- Interoperability assessment. Pompidou and L tack at Lyon Part Dieu Station. 2022-today. Infrastructure expert.
- Safety Assessment: Automatization of Paris Metro line 12. 2023-today. Infrastructures expert.
- Interoperability assessment: Railway line between Roissy Charles de Gaule-Creil. France. 2023-today. Infrastructures expert.
- Safety assessment. New third Toulouse Metro line. 2022-today. Track and infrastructure expert.
- Interoperability assessment of the Beljakovce-Palanka line in accordance with the Infrastructure, PRM and SRT Technical Specification of Interoperability. 2023-today. Infrastructure expert.
- Safety assessment. NEOM Project. 2023-today. Infrastructure expert.
- Assessment of Track System Tests for Lima Underground. Perú. 2020-21.

From 01/10/1998 to present

Associate Professor

Carlos III University of Madrid, Madrid (Spain)

Lecturer professor: Continuum Mechanics and Structural Analysis Department.

From 01/02/1997 to 31/12/2005

Independent Engineering Consultant

Madrid (Spain)

Civil (mainly Railway) engineering and construction projects.

From 01/06/2005 to 31/08/2018

Project Manager and Member of the Technology Committee

Spanish Railway Research Foundation, Madrid (Spain)

Management of national and international R&D Projects and High Technology Consultancy.

From 01/07/1995 to 30/09/1996

Programme Manager

Planitec (Setec group), Toulouse (France)

Building project management.

From 01/10/1992 to 30/01/1994

Project Manager

Egis Eyser, Madrid (Spain)

Project management of Railway and Road engineering projects.

**From 01/05/1992 to
31/10/1992**

Project Engineer

Setec Bâtiment (Setec group), Paris (France)

Engineer of Building projects.

**From 01/11/1991 to
31/05/1992**

Project Engineer

Egis Eyser, Madrid (Spain)

Engineer of Railway and Road engineering projects.

**From 01/09/1989 to
31/10/1991**

Project Engineer

Acciona engineering, Madrid (Spain)

Engineer of Railway and Highway engineering projects.

EDUCATION & TRAINING

**From 01/09/1984 to
30/09/1989**

**Master's Degree in Civil engineering (6-year professional degree,
Ingeniero de Caminos, Canales y Puertos)**

Polytechnic University of Madrid, Madrid (Spain)

**From 15/11/2016 to
11/07/2023**

Ph.D. in Mechanical Engineering and Industrial Organization

Carlos III University of Madrid, Madrid (Spain)

**From 01/09/2013 to
27/02/2014**

**PhD training in Engineering of Structures, Foundations and
Materials**

Polytechnic University of Madrid, Madrid (Spain)

Doctorate program devoted to research in the field of Civil Engineering. Subject: Dynamic of bridges.

**From 01/10/1996 to
30/06/1998**

PhD training in Advanced design of structures

Polytechnic University of Madrid, Madrid (Spain)

Doctorate program main subjects: Dynamic and seismic analysis, Finite element method, Arch

from 01/10/1996 to 30/09/2000

Master's in Theoretical & Practical Application of Finite Element Method and CAE Simulation

Spanish National Distance Education University (UNED), Madrid (Spain)

Basic and specialized theory of Finite Element Method and practical applications.

PERSONAL SKILLS

Mother tongue(s)

Spanish

Other language(s)

French

English

UNDERSTANDING		SPEAKING		WRITING
Listening	Reading	Spoken interaction	Spoken production	
C2	C2	C2	C2	C1
C1	C2	C1	C1	C2
Cambridge certificate in advanced English.				

Levels: A1/A2: Basic user- B1/B2: Independent user – C1/C2: Proficient user
Europass - European language levels - Self Assessment Grid

Organisational /Managerial skills

Two years of experience as Programme Manager in building projects involving multiple institutions.
Technical coordinator of Spanish and international research projects involving multiple institutions.
21 years of experience in research and engineering project management.
Founding partner of a Research and Engineering Consultancy Company (CIDI S.L.).
Organizer of 11 High Speed International Conferences (Córdoba 2007-17).

Job-related skills/ RAMS

33 years of experience on design of railway bridges, stations and track, analysis of noise and vibrations (see main railway project in the annex) and other civil and building engineering projects (see main projects in Additional information)
Participation in 17 projects obtained in public competitive calls and other 15 projects founded by private entities (see list of main projects in Additional information).
Member of de «Standards Working Group for the drafting of UIC International Railway Standards (IRS)» : IRS 70002. Maintenance of High Speed Lines ; IRS Série 70100. Implementation of a high-speed railway, features and definition; IRS 70727 Railway Application – Track superstructure decision-making.
Member of the Drafting Committee of the Spanish Standard for Railway Bridges (IAPF 2010). Group 3: Serviceability Limit States, track-bridge interaction, slab track.
Member of the European Committee for Standardization, Group Eurocode 1: Actions on Structures, Traffic load on Bridges, Track-Bridge Interaction. 42 congress papers (29 international, 13 national); most relevant in Additional information.
2 railway books Authored or Edited and chapters in 5 Railway Book (see Additional information).

Experience as teacher in Railway seminars and Master Lectures on Railway Technologies.

Computer skills

Good command of Microsoft Office™ tools

Good command of FEM software (ANSYS)

Good command of Program Management software

Software developed:

DINAM: dynamic of bridges

EXPLA: dynamic of rolling stock

ADDITIONAL INFORMATION

Main railway projects

- 33 bridge structure projects
- 19 other structures projects
- 11 linear constructions projects (8 railway lines)
- 10 railway noise and vibration analysis
- 2 projects as Programme Manager
- 40 others civil engineering projects, mainly railway projects

Railway bridges design:

- Railway expert for the Independent Checking of Storstrom Bridge Project. Denmark 2019-present. Slab-tracjk expert.
- Safety and Interoperability assessment of bridges in Ringsted-Fehmarn Line (RFB). Denmark. 2018-present.
- Safety Assessment of bridges of the two extensions of the Dubai Metro Red Line. 2017-2019.
- Safety & Interoperability Assessment of structures of Hatrival Line. Belgium 2018-2019.
- Railway consultancy for the New Storstrom Bridge Tender Process. Denmark 2016.
- Analysis of the dynamic effects of Talgo train hotel. 2015.
- Detailed Design Project for the "Test Facilities associated to the Railway Technological Centre of ADIF in Málaga, High Speed Ring". 2012.
- Basic Design Project for the "Test Facilities associated to the Railway Technological Centre of ADIF in Málaga, High Speed Ring". 2012.
- Complementary project n ° 1 to construction project for the High-speed line León-Asturias. La Robla-Pola de Lena (variante de Pajares). Section: La Robla- Pajares tunnel. Bernesga river bridge. Structural design checking. 2008.
- New Levante High-speed Railway Access. Madrid-Castilla la Mancha-Valencia- Murcia Region. Section: Villena-Sax. Several bridges structural design checking. 2008.
- Bridges for High-speed railway line in Romania. Definition of Design Basis. 2008.
- Modified project for High-speed line Bobadilla-Granada. Section: Arroyo de La Viñuela - Quejigares. Arroyo de La Viñuela Bridge. Structural design checking. 2008.
- Oran tramway. Basic design of bridges. 2008.
- Dynamic analysis of frameworks and underpasses. Spanish HSL. 2008.

- HSL Córdoba-Málaga. Dynamic lateral effects on the viaduct Arroyo de las Piedras. 2007.
- HSL Ankara-Istanbul. Viaducts 2 and 3, crossing the Proşuk River. 2006.
- HSL Lisbon-Madrid (Ota/Montemor-o-Novo). Typological analysis of viaducts. 2005.
- HSL Lisbon-Oporto (Soure-Mealhada). Typological analysis of viaducts. 2005.
- HSL Madrid-Jaén (A. de San Juan-Manzanares). Verification of existing viaducts. 2004.
- HSL Vitoria-Bilbao-San Sebastian (Arrazua-Legutiano). Viaduct N-I, A-3002 and Zadorra River. 2004.
- HSL Córdoba-Málaga. Flying junction structure Almodóvar del Río. 2002.
- HSL Madrid-Barcelona (Lleida-Martorell, Subsection IX). Viaducts 3 and 8. 2000.
- Underpass at Tartanga. Bilbao Metropolitan Railway. 1990.

Track-bridge interaction: (methodology statement and tens of bridges analyzed):

- Spanish railway standard (IAPF) application examples. 2003.
- HSL Madrid-Barcelona (Madrid-Zaragoza). Viaduct over Manzanares River. 2003.
- HSL Madrid-Valencia-Murcia (Buñol-Cheste). Viaducts over CV-50 and A-3. 2004.
- HSL Madrid-Barcelona. Section Zaragoza-Pina de Ebro. 2001.
- HSL Madrid-Barcelona. Section Madrid-Zaragoza. 2001.
- HSL Córdoba-Málaga. Section III (Arroyo del Salado-Herrera). 2000.
- Madrid-Alicante line, By-pass PK 316 to PK 363. 2000.
- Calculation method for track-bridge interaction. HSL Córdoba-Málaga. 2000.

Railway stations:

- Regional rail station at Puerta del Sol-Gran Vía. 2005.
- Terrasa underground railway station. 2003.
- Railway entry tunnel in Gijón. 2002.
- Pueblo de Barajas station (Madrid Metropolitan Railway). 1997.
- Palos de la Frontera station (Madrid Metropolitan Railway). 1990.
- Footbridge at Barajas Airport station (Madrid Metropolitan Railway). 1998.
- Empalme station (Madrid Metropolitan Railway). 1991.
- Córdoba HSL station. 1990.
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Railway noise and vibration analysis:

- Basic platform project for the North-Northwest HSL Ourense-Santiago. Section: access to the railway station at Santiago de Compostela. 2007.
- HSL Madrid-Valencia-Murcia. Section Villena-Sax. 2006.
- HSL Madrid-Valencia-Murcia. Section SA de Requena-Requena. 2004.
- Underground railway and intermodal station at Palma de Majorca. 2004.
- Basic project for the Vitoria-Bilbao-San Sebastian HSL. Section: Amorebieta-Lemoa. 2003.
- Background study for the Lisbon-Oporto HSL. 2003.
- Background study for the integration of the railway at Gasteiz. 2003.
- Rail network in Madrid affecting Historical Buildings and the Museumt

Reina Sofía. 2001.

Railway track:

- Track design for section 3 of the “Tren Maya”. Mexico. 2020.
 - Track design of the light train of Mexico DF. Mexico. 2020.
 - Slab Track design for Tel Aviv Metropolitan LRT Green Line. Israel. 2020.
 - Railway expert for the Independent Checking of slab track for Storstrom Bridge Project. Denmark 2019-present.
 - Safety and Interoperability assessment of the track in Ringsted-Fehmarn Line (RFB). Denmark. 2018-present.
 - Design of slab track for Tel Aviv Metropolitan Lrt Green Line. 2020.
 - Design of track bed for light train in México D.F. 2019.
 - California High-Speed Rail System. Expert assistance on track performance. 2016.
 - Slab-track for Intercity Rai Mexico-Toluca. Expert assistance on track performance. 2015.
 - Expert Advice on High Speed Railway Technologies for Trafikverket. 2011.
 - Olavide- Alcalá de Guadaira Line. Slab track on subgrade. Design. 2007.
 - Slab track inception for the upgrade of the Burgos-Miranda line. 2007.
 - Slab-track design for the Port of Avilés. 2006.
 - Project for an underground railway construction and intermodal railway station in Palma de Majorca. Design of a slab-track superstructure. 2004.
 - HSL Madrid-Valencia-Murcia (Horcajada section). Slab-track design. 2004.
 - Tenerife Metropolitan Railway. Structural study of cantenary. 2004.
 - Metronorte infrastructure (Madrid Metropolitan Railway). Design of superstructure. 2004.
 - Reopening Empalme-Arta Station, Empalme to Manacor station. Analysis of buckling risk on the track. 2004
 - Feasibility study for the Xian Metropolitan Railway. Superstructure Study. 2004.
 - HSL Madrid-Alcázar de San Juan-Jaén. Section Alcázar de San Juan-Manzanares. Three rail track (analysis of mechanical behaviour and buckling risk). 2004.
 - Trak basic design. Sevilla Metro Line 1. 2002.
 - Preliminary design for Gasteiz Railway Access. Slab track design. 2003.
 - “Projeto Sul de Trens Metropolitanos de Sao Paulo”. Tender process. Structures and track. 2002.
 - Upgrade of “Puerta de Atocha-Cerro Negro-Santa Catalina” railway. Drafting of Technical Specifications. 2001.
 - Córdoba-Malaga High-speed line. Track design. 2000.
 - Upgrade of section Albacete-Murcia-Cartagena. Track design. 1999.
 - Slab track desig for Metrosur Project. Madrid Metro Line. 1999.
 - Slab track design for Castellón Station. 1997.
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Main R&D railway projects

- Hammer. 'New system of vibration-based methods for the structural health monitoring of railway infrastructure'. CDTi 2017.
- Desman. 'DEcision making and Slab-Track MANagement'. UIC. 2017.
- Viadintegra. 'Monitoring of railway bridges applied to infrastructure management & maintenance system'. 2010-13.

Most relevant congress papers

- Viadintel. 'Intelligent Viaducts'. 2009-10.
- 'High speed railway track technical options. Suitability assessment guide'. International project founded by UIC. 2013-14.
- 'Research on Optimum Speed for High Speed Lines'. International project founded by the UIC. 2012-2013.
- 'High performance base plate pads system for switches and crossings'. 2013.
- 'Artificial ballast'. 2018-11.
- 'Effects of cross winds on railway vehicles: limit values'. 2007-10.
- 'Study of medium and long-term behaviour of railway ballast and slab track structures'. 2007-09.
- 'Reducing variations of vertical track stiffness: design criteria, reception and maintenance of railway infrastructure'. 2006-08.

- "New System for Structural Health Monitoring of Railway Infrastructures Using Vibration-based Techniques (Hammer Project). 10th UIC World Congress on High Speed Rail. Ankara 2018.
- "Mechanical characterization of baseplate pads for switches and crossings". International Conference on Train/Track Interaction & Wheel/Rail Interface. Beijing 2016.
- "High performance base plate pads system for switches and crossings". 11th World Congress on Railway Research. Milan 2016.
- "Track gauge influence on the risk of derailment". 8th World Congress on High Speed. Tokyo 2015.
- "Lateral vehicle-structure dynamics: simplified analysis based on deformed track geometry". 7th World Congress on High Speed. Beijing 2010.
- "Analysis of lateral displacements in large railway viaducts under traffic loads. Impact on ride safety and passenger comfort". 8th World Congress on Railway Research. Seoul 2008.
- "Numerical methods for the analysis of longitudinal interaction between track and structure". Track-Bridge Interaction on High-Speed Railways. Porto 2007.
- "Small Structures in the core (nucleus) of the embankment in High Speed Lines. Effects of the variation of the Global Stiffness of the Track and design recommendations". RailFound 06. Birmingham Sept 2006.
- "Modelling the calculation of lateral accelerations in railway vehicle bodies due to track alignment singularities". 7th World Congress on Railway Research. Montréal jun 2006.
- "Small Structure in de core (nucleus) of the embankment in High Speed Lines. Effects of the variation of the Global Stiffness of the Track and design recommendations". 5th World Congress on Railway Research. Köln Nov 2001.
- "Infrastructure for new High Speed Lines. Interface Earth-Works/Structures. Optimization of design and calculation". 4th World Congress on Railway Research. Tokio Oct 1999.

- "Detection of barely visible multi-impact damage on carbon/epoxy composite plates using frequency response function correlation analysis. Measurement, Volume 196, 2022

Papers in international

scientific journals

- "Model updating of uncertain parameters of carbon/epoxy composite plates using digital image correlation for full-field vibration measurement". Measurement, Volume 159, July 2020.
- "Model updating of uncertain parameters of carbon/epoxy composite plates from experimental modal data". Journal of Sound and Vibration (2019).
- "Modelling the Calculation of Lateral Accelerations in Railway Vehicles as a Tool of Alignment Design". International Journal of Railway. Vol.2 No.3. September 2009. Pages 118-123.
- "Analysis of buckling in dual-gauge tracks". Proceedings of the Institution of Civil Engineers Transport. Volume 161. Issue TR4. November 2008. Pages 177-184.

Railway books and monographs

- J.M. Goicolea, M. Cuadrado, J. Viñolas, P. Galvín, E. García Vadillo y A. Mateos (editores), Estudio del comportamiento a medio y largo plazo de las estructuras ferroviarias de balasto y placa, ISBN978-84-7790-528-8, vol M-111, pp. 1–147, 2012. Editor: Monografías CEDEX, Centro de publicaciones, Secretaría General Técnica, Ministerio de Fomento, Madrid, España.
- "Documentos complementarios no contradictorios para la aplicación de los Eurocódigos para el cálculo de puentes de Ferrocarril". Dirección General de Ferrocarriles; Centro de Publicaciones, Ministerio de Fomento. 2014. Co-author chapter: "Estudio del comportamiento de las estructuras Ferroviarias con vía en placa".
- "Research on OPTIMUM SPEED for HIGH SPEED LINES". Union International de Chemin de Fer. 2012. Co-author.
- "Estudio del comportamiento a medio y largo plazo de las estructuras ferroviarias de balasto y placa. M 111". CEDEX; Centro de Publicaciones, Ministerio de Fomento. 2013. Co-author chapters 3 and 7.
- "Ejemplos de aplicación de la IAPF-07. ACHE. Monografía 15. Grupo de trabajo 5/1: Puentes de Ferrocarril". Co-author chapter: Interacción vía-estructura. Madrid 2008.
- "Integración de la monitorización de viaductos ferroviarios en el sistema de gestión y mantenimiento de infraestructuras - Viadintegra". Chapter: "Análisis de medidas de la instrumentación permanente en el viaducto de alta velocidad de Villanueva del Jalón". Fundación Caminos de Hierro. 2012.

Experience as teacher in Railway seminars

- University of California. Berkeley, USA. High Speed Rail California Symposium & Institute. "Infrastructure, main elements involved in High-Speed lines": Masterclass 1 and 2: "Railway structures and track integrated behaviour". Masterclass 3: "Earthworks and track integrated behaviour". May 2017.
- California State University. Bakersfield, USA. International seminar on high-speed technologies on railway systems. Masterclass 1: "Infrastructure, main elements involved in High-Speed lines". Masterclass 2: "Key components to be taken into account for High Speed lines Structures". Masterclass 3: "Main concepts related to high quality track". Bakersfield, March 2016.
- Mineta transportation Institute. California, USA. International seminar on

- high-speed technologies on railway systems. Masterclass 1: "Track system selection: Suitability analysis and selection process". Masterclass 2: "Track-infrastructure integrated behavior". San José, June 2015.
- ADIF. Track geometry specialized course. Masterclass: "Lateral accelerations in railway vehicles as a tool of alignment design". Madrid, June 2011.
 - European University of Madrid. Master's Degree in Infrastructure and rail systems management. Masterclass: "Railway bridges: singular technical and normative aspects". Madrid, June 2014.
 - Engineering faculty of the University of Porto. Masterclass: "Track-bridge interaction: mathematical models and singular aspects of computation". Formação Avançada na Ferrovia. Pontes ferroviárias em linhas de alta velocidade. Porto 2010.