



**Fundición
Dúctil Molina s.l.**

Ctra. De Valdepeñas, km. 36,600
Apdo. Correos 040
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1. - GENERAL INFORMATION.

Trade name: FUNDICIÓN DÚCTIL MOLINA S. L.

Company tax code: B - 13266804

Company address: Ctra. Valdepeñas Km. 36,600

Town/city: Miguelturra

Province: CIUDAD REAL

Postcode: 13170

Phone numbers:

926242632

926242848

Fax number: 926242774

e-mail address: fdm@fundicionductilmolina.com

Official website: www.fundicionductilmolina.com

Group companies:

- BASALTOS DEL CAMPO DE CALTRAVA S.L.
- COMERCIAL DE FUNDICION Y ELEMENTOS DE CONSTRUCCION S.L.



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2. - HISTORY OF THE COMPANY: ABOUT US

2.1.- PRESENTATION

Our company Fundición Dúctil Molina, S.L. was established in September 1997 to satisfy the increasing national and international demand on nodular and grey cast iron. The quality of our services is endorsed and guaranteed by more 50 years of experience in the field of Carmelo Molina Ruiz, one of our founding members.

We rely on our experience and high level of professional skills, aided by the latest advances in technology and manufacturing, to meet the legal requirements set by the international community for industrial activities: automotive industry, shipbuilding, railway industry, hydraulics, energy and chemical industries, public works, agricultural equipment, supplies, sanitation etc.

In 2001 FUNDICIÓN DÚCTIL MOLINA S.L. introduced a quality assurance system in accordance with the regulation ISO 9002:1994; we are currently certified ISO 9001:2008, register number 2198, by EQA audit company.

The company is constantly growing, a process of renewal which helps us to adjust and adapt our manufacturing processes to satisfy the needs of our clients. Our company policy is to provide quality as the first goal and to regard our staff as highly-skilled manpower with an active role in the production chain.

We are sure to meet deadlines and we also make sure that our whole team is involved in our clients' demands so that the ultimate aim is achieved:

Our clients' satisfaction.



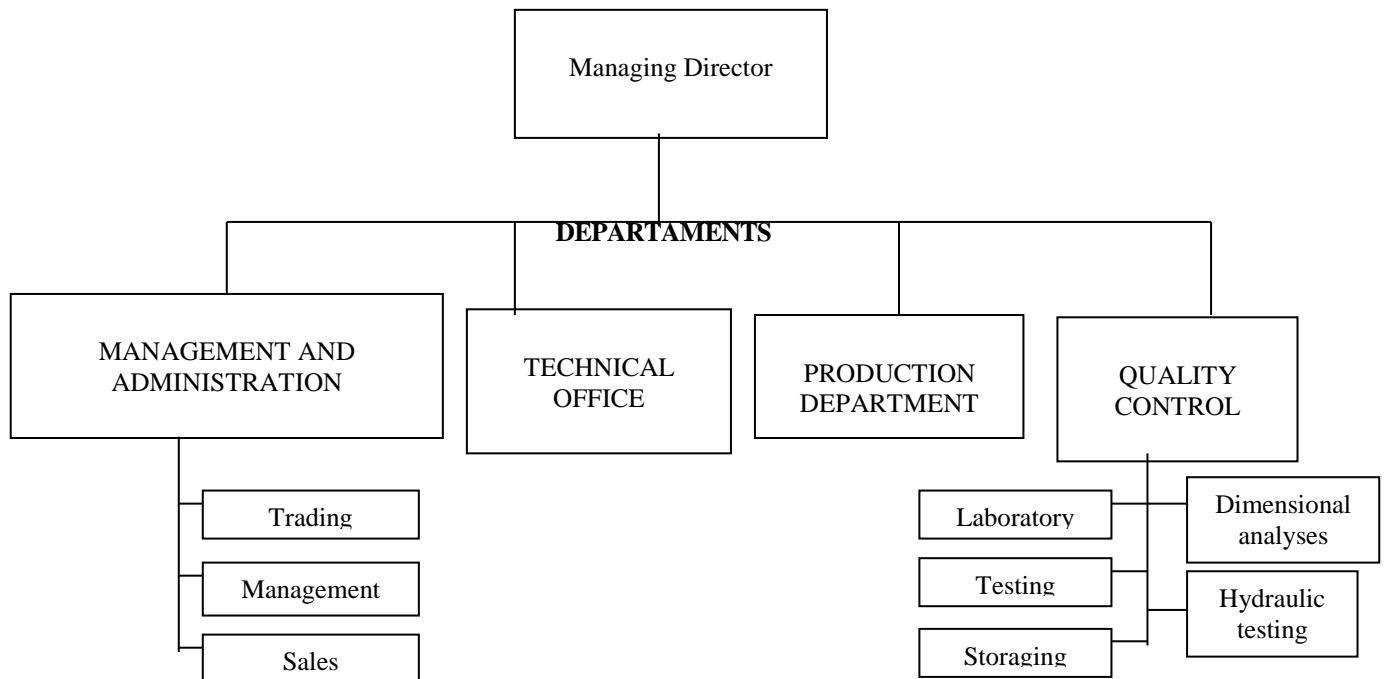
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2.1.1. Organization chart.

The functional organization of our company FUNDICIÓN DÚCTIL MOLINA, S. L. is divided into several departments, as shown below:



STAFF QUALIFICATIONS

- Management: 1 BUSINESS MANAGER
- Technical office: 1 INDUSTRIAL TECHNICAL ENGINEER
- Quality control: 1 TECHNICAL ENGINEER, also a SECURITY TECHNICIAN
- Production: 1 INDUSTRIAL TECHNICAL ENGINEER
1 INDUSTRIAL FOUNDRY SPECIALIST
15 SMELTERS



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2.2.- BUSINESS ACTIVITY

The main business activity in our company FUNDICIÓN DÚCTIL MOLINA, S. L. is the fusion of ferrous metals to obtain globular and laminar cast iron in all their range. The resulting manufactured product possesses mechanical features in accordance with the regulations UNE-EN-1563 and UNE-EN-1561.

- Ductile iron is applied to the different sectors in the industry, and it is greatly valued due to its high strength and its high pulling resistance value. For these reasons, ductile iron is commonly used in the following fields:
 - **Automotive industry:**
Manufacturing of camshafts, connecting rods, mechanical linkages, metal stamping and bending of thick steel tools, flywheels, etc.
 - **Fluid control:**
Valves, pumps, impellers, pistons, impeller pumps, hydraulic components, centrifugal and splits case pumps, etc.
 - **Energy industry**
Bushings and hubs, holders and mechanical connectors for the wind sector, motor casings, distributors, sumps, etc.
 - **Railway industry:**
Components for the tautening of overhead power cables, brake blocks, railway components and link-ups.



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- **Shipbuilding:**

Machine bases, ship ortzas, distributors of ship valves, manufacturing of impellers in Ni-Resist, etc.

- **Lifting and jacking up:**

Suministros de hoists and tackle devices, safety lock latches, etc.

-Agricultural equipment:

hydraulic vibrator casings, resilient holders and linkeages, power trains, agricultural engine components, , etc.

-Sanitation and supply:

valves, suction cups, ductile cast iron accesories for water supply etc.

Our manufacturing capacity is organised in long, medium and short series of pieces with an average esteemed weight between 0'3 kilos and 6000 kilos.

- Laminar, also known as grey cast iron, shows great resilience to high vibratory loads and to thermal stress. Therefore, it is widely used in the industry: rope grabs, machinery bases, diffuser, crucibles, liners, pieces for check valves, pump covers, etc.

Main customers

FUNDICIÓN DÚCTIL MOLINA, S.L. It is characterized by diversification in both manufacturing of materials as well as in the range of weights and types of industrial sectors.

Our clients belong to a wide industrial spectrum and we are proud to deserve the trust of international, national and local companies that, within their different fields, companies that manufacture and evolve their products in our facilities/ factory with a philosophy of improvement and continuity that we always appreciate.



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In compliance with the data protection law, no data are referenced from companies, clients or suppliers.

We are currently working with the metal materials research group of the Higher Technical School of Industrial Engineering of Ciudad Real, for the manufacture of industrial parts in special steels made by powder metallurgical processing by injection metal molding (MIM), whose responsible is Dr. Gemma Herranz Sánchez-Cosgalla.

The main objective is the manufacture of complex parts in special materials for the hydraulic sector, energy, automotion sector, etc ...

2.3.- MANUFACTURING PROCESS, MACHINERY AND EQUIPMENT

Our company Fundición Dúctil Molina, S. L. makes use of 29.860 m² of land. We have three industrial units, 5.520 m², 1.580 m² and 1.220 m² respectively, where the whole manufacturing process is completed with our own hired staff and under our own quality control system. Outsourcing is therefore not considered.

Business activity in our company can be classified as follows:

- Continuous Production
- Linear distribution
- Circulation in S

The manufacturing process can be split into different basic stages of cyclic repetition:

- SMELTING
- MOLDING
- FUSION and CASTING
- MOLD REMOVAL
- CLEANSING, FINISHING, PAINTING and PALLETIZING.



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We work with core making machines in the Smelting section (16 and 25 L. pistons, Loramendi). For bigger pistons, we opt to work manually.

Depending on the size and weight of the casting, the Moulding process can be completed in two different ways:

- a. Using moulding sand in boxes 1000x750x280 mm.
- b. Using resin casting for bigger casting in size and weight. For this purpose, we use three turbine mixers (6'8 and 12 Tn/h, respectively) and boxes with a huge capacity.

Fusion is completed in electric foundry furnaces Inductotherm (either 1'5 Tn or 5 Tn). We are therefore allowed to achieve an exact control over the chemical composition and the temperature, over the minimum casting losses and the energy. As a result, we obtain homogenous cast iron with constant mechanical features which meet our clients' requirements.

Our manufacturing capacity reaches an approximate figure of 4000 Tn in a year.

Casting is achieved through moulding sand on the transport chain, whereas a gantry crane is used for resin casting.

Cast iron cooling is completed in moulding boxes on the transport chain. We use 104 articulated plates.

Mold removal is done automatically. After that, casting is cleansed by means of steel gritblasting in a tunnelblast.

Lastly, burr is removed from the cast iron with high-potency circular saws. Casting is left for inspection in the Shopping Warehouse.



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2.4.- TESTED QUALITY CONTROLS

In 2002 FUNDICIÓN DÚCTIL MOLINA S.L. introduced the Quality assurance system in accordance with the regulation ISO 9002:1994; the audit company in charge is EUROPEAN QUALITY ASSURANCE SPAIN S.L.

The regulation ISO 9001:2000, together with its replacement ISO 9001:2008 in 2008, have allowed our company to find the way to keep an objective acknowledgement of our own values and commitments.

Regulation UNE-EN-ISO 9001 then helps us to raise awareness for careful work, which has always been part of our policy and attitude towards business. Thus, we include quality guarantee as one of the services we offer our national and international clients,

Quality control is currently carried out following the internal regulation handbook. The procedure includes:

:

- Operation control tickets for the Fusion and Quality control section with an spectrometer.
- Analyses and testing for pistons and moulding sand.
- Operation control tickets for the Manufacturing Process.
- Operation control tickets on the finishing stage. Inspection and final supervision.



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Tensile and hardness tests, dimensional outlines and metallographic analyses are also done in our facilities.

Our clients may choose the laboratories in which the determination tests to identify mechanic features are carried out. There is also the possibility of making use of the laboratories at University of Castilla La Mancha in Ciudad Real due to the agreements between our company and the university.

There are three agreements currently in place: two of them between our company and the School of Industrial Engineering and the other one between our company and the Faculty of Chemistry in Ciudad Real.

Inspection controls take place at three different points: upon reception of raw materials, during the manufacturing process and at the end of the process. In this way, we are allowed to have a statistical results on our own quality control.

2.4.1. ADDITIONAL SERVICES.

2.4.1.1. HYDRAULIC TESTS.

Following our policy of providing our clients with quality and ample services, we have been carrying out pressure tests for the water sector in our facilities since 2009. We aim to guarantee the quality of the pieces before shipping.

The pressure and tightness tests are completed in accordance with the internal hydraulic protocol PH-01. A validity certificate is consequently issued by our qualified staff in our company to ensure our clients' requirements are fulfilled.

2.4.1.2. DIMENSIONAL ANALYSES

In 2010 a new three-dimensional machine was installed in one of our units to carry out dimensional analyses on models, piston boxes and newly-manufactured pieces to prevent extra expenses and to verify their dimensional validity before the



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manufacturing process begins; thus, we reduce the number of potential rejected materials on the grounds of tool defects.

The analysis is performed by means of a comparison between the solid in 3D designed by our client to the final dimensions of the casting in our facilities. As a result, we obtain a real dimensional verification of the prototyped pieces or manufactured parts on a sample basis.

2.4.1.3. INSPECTION

We also carry out thickness controls at specific points chosen by our client by means of an ultrasonic inspection unit. A technical control report is later granted.

At our clients' request, and as an additional service to our manufacturing, an internal inspection can also be done; we use manholes and inspection chambers to check critical control points and the internal finishing.

3.- PATENTS

The Research and Development department in Fundición Dúctil Molina has developed and patented a series of utility models on the Patents and Brands Office, which have granted us our clients' credit and recognition.

The utility models are on the market since 2001, the year when the Research and Development department was created. These are the models manufactured in our company:

- UTILITY MODEL SAFETY LOCK LID+FRAME 600 of DIAMETRE.(20102952)
- UTILITY MODEL ABSORBING SYSTEM TYPE F-900.(200501472)



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Some others registered articles in industrial design for urban furniture have been developed:

- INDUSTRIAL DESIGN FOR AN ACCESIBLE FOUNTAIN. (507.544)
- INDUSTRIAL DESIGN FOR ANTI-VANDALISM PLANT STAND (509.090)

4.- TECHNOLOGICAL INNOVATION.

The main technological innovation which is carried out and developed in our company FUNDACIÓN DÚCTIL MOLINA, S.L is the computer simulation procedure for the cast iron solidification modelling and cooling. Thus, we prevent any type of technical problems, whether thermal, mechanical or metallurgical, derived from the casting process.

We obtain an optimum design with the simulation for each particular piece in order to prevent additional costs in trial/error tests which are normally used. Simulation has now become standard procedure before manufacturing, and is regarded as preventive measure in the design of pieces in the company.

Our company Fundación Dúctil Molina, S. L. has been carrying out a prolific activity in our own Research and Development projects, some of them in collaboration with the University of Castilla la Mancha, for nine years. The research projects have been completed in agreement with the School of Industrial Engineering in Ciudad Real, as well as the Polytechnic School in Almadén and the Faculty of Chemistry in Ciudad Real.



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Agreements University-Company allow us to make improvements on our technical and manufacturing procedures and to ensure the evolution and improvement on the quality of our products and services.

As a result of this prolific activity in the Research and Development department and the improvement of our products and procederes, we have reached the following goals:

- Two cooperation agreements University-Company between the University of Castilla la Mancha and FUNDICIÓN DÚCTIL MOLINA S. L. in 2003:
 - A cooperation agreement between the School of Industrial Engineering and FUNDICIÓN DÚCTIL MOLINA, as a result of which four final projects were tutored and completed.

Title: “Research on austenite nodular cast iron resilience to oxidation”, by Guillermo Jorge Andrada García. Cum Laude.

The aim of the research project was to analyse how austenite nodular cast iron reacts to oxidation. The conclusions reached in the project are meant to introduce improvements on the development of the smelting process to guarantee higher resilience to oxidation for industrial pieces and components.

Título del Proyecto: “Influence of alloying elements and Thermal Treatments on the grey cast iron mechanical behaviour”, by Carlos Sánchez Bautista. Cum Laude.



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The project carries out an analysis on how the materials affect industrial alloys and the following mechanical behaviour of the pieces after several different thermal treatments.

Title: “Influence of nodulization on the mechanical behaviour of ductile cast iron”, by José Luis Corrales Mora. Cum Laude

The Project is aimed at introducing improvements on the achievement of ductile cast iron by means of magnesium-based nodulised reactions in different types of nodular smelting in the industrial and public works sectors.

Title: “Simulation for the Solidification in iron smelting procedures” , by Francisco José García Pérez. Cum Laude.

Computer simulation of the smelting of industrial components which allows to identify and correct beforehand those potential defaults originated during the casting and solidification stages.

- Cooperation agreement between the Polytechnic School in Almadén and FUNDICIÓN DÚCTIL MOLINA SL, as a result of which one final project was tutored and completed.

Title : “Improvement on the mechanical properties in ductile cast iron when applied to industrial components under thermal treatments” , by Javier Manuel Arroyo Vera. Cum Laude.

This Project is presented as an study on thermal treatments applied to industrial components in ductile cast iron. It provides us with guidelines



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which suggest an improvement on their mechanical properties, especially if they are under constant strain for friction and metal fatigue.

Fundación Dúctil Molina, S. L. has achieved an improvement on our technical and manufacturing procedures and to ensure the evolution and improvement on the quality of our products and services through this policy of research and development in collaboration with different departments in the University of Castilla La Mancha, the School of Industrial Engineering in Ciudad Real and the Polytechnic School in Almadén.

- FUNDICIÓN DÚCTIL MOLINA, S. L. has been awarded with the first prize in the 9th award ceremony organised by the Association of Young Entrepreneurs from Ciudad Real in recognition of our constant development and our support of technological and innovation activities.
- In 2006 four new cooperation agreements were signed between our company FUNDICIÓN DÚCTIL MOLINA S.L. and the University of Castilla la Mancha:

- Agreements for Applied Science, Technological development and Innovation Research Projects in the industry sector.

Title: “Influence of the manufacturing conditions and of the thermal treatments on smelting behaviour of iron.”

- Cooperation agreement between the University of Castilla la Mancha and FUNDICIÓN DÚCTIL MOLINA SL.



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Title: “Influence of alloying elements on resilience to oxidation, corrosion and wearing out of highly-alloyed iron smelting” (Ni-Resist)

This project is to be developed in three years as part of a doctoral thesis.

- Cooperation agreement between the School of Industrial Engineering in Ciudad Real, the Manufacturing department and FUNDICIÓN DÚCTIL MOLINA S. L. to obtain rapid prototyping moulds in resin or aluminium for foundry.

- Research, Development and Innovation carried out in Fundición Dúctil Molina, S. L., as a result of which a new absorbing system for storm drainage in airports, heavy tonnage type F-900, has been created.

- Research, Development and Innovation Project in collaboration with the School of Industrial Engineering in Ciudad Real for the reutilization and valuation of basalt waste from quarries in the Calatrava fields.

- In January 2006 FUNDICIÓN DÚCTIL MOLINA, S. L, together with BASALTOS CALATRAVA, was given an award for our support of technological development in rural areas by the CEDERCAM, the Development Bureau in Castilla La Mancha. This award was given by the President of our region, Mr. José María Barreda.

- In February 2.006 les fue otorgado a FUNDICIÓN DÚCTIL MOLINA, S. L., together with BASALTOS CALATRAVA, was awarded by the Association of Entrepreneurs from Miguelturra (EAM) in recognition of our support of innovation and development.

- In 2010 and 2012:



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- Two more cooperation agreements were signed between the University of Castilla la Mancha and FUNDICIÓN DÚCTIL MOLINA SL.

- Cooperation agreement between the School of Industrial Engineering in Ciudad Real and FUNDICIÓN DÚCTIL MOLINA for the completion of the Project : “Study on the mechanical behaviour and resilience to corrosion in iron smelting”, which will be developed in 12 months.

- Cooperation agreement between the School of Industrial Engineering and FUNDICIÓN DÚCTIL MOLINA for the completion of the Project “Influence of alloying elements and superficial modification on the smelting behaviour of iron”, which will be developed in 36 months.

Schedule of annexes

Our company has been working for twenty years with a growing demand for optimization of thicknesses and finishes that are feasible to perform by powder metallurgical processing.

With this innovation project we pretend to revolution the manufacturing system of industrial castings in a conventional way to obtain COMPLEX PIECES OF QUALITY SUPERIOR TO THE TRADITIONAL SYSTEM by means of MOLDING BY INJECTION OF METALS (MIM). With a low cost and with a total optimization of resources.

We try to achieve a university-business research transfer with the achievement of the following results:

- IMPROVE FINAL MECHANICAL CHARACTERISTICS IN SPECIAL METAL ALLOYS
- MANUFACTURING COMPLEX GEOMETRY PARTS WITHOUT THE NEED FOR PREVIOUS MOLD
- PERFORM QUICKLY AND CONTROLLED COMPLEX PIECES



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- MINIMIZE COSTS WITHOUT LOSS OF MATERIAL AND WITHOUT SECONDARY OPERATIONS
- PROCESS WITHOUT ENVIRONMENTAL IMPACT AND WITHOUT CO2 EMISSION
- GET SUPERFICIAL FINISH WITH NO NEED FOR SUBSEQUENT MECHANIZATION WITH VERY ADJUSTED DIMENSIONAL TOLERANCES