PARTS FOR INDUSTRIAL SECTOR

30 YEARS OF INNOVATION AND DEVELOPMENT
MAFODER Group is a Moroccan family holding founded in the mid-80s and historically known for its foundry activity. With 30 years of experience, the group currently operates in five business segments; manufacturing and marketing of castings with high added value, production a line of precast concrete products, design and manufacture of street furniture, development and manufacture of specific security products and finally production of a line of Roads and Infrastructure products.

MAFODER Foundry is the parent company of the business group. It specializes in the manufacture of castings and steel parts ranging from a few kilograms to five tons. These articles are intended to different sectors; quarries, mines, cement plants, brickyards and chemical industries. Mafoder Foundry now offers a full range of metallurgical fonts: high chromium content, ductile iron, manganese steels, austenitic steels, and more. Nowadays, the foundry segment wants to be more powerful than ever.

Tools and material at the forefront of technology: rapid prototyping, revolutionary process that eliminates the step of wood model manufacturing and integrated numerical simulation in several manufacturing steps. The Certification of quality system by TUV earned by Mafoder testifies the process control and attention given to respect its commitments in terms of time, quality and cost.
MAFODER WORLDWIDE
Mafoder products are present in more than 15 countries in Europe, Middle East & North Africa Sub-Saharan Africa
# Manufacturing Capacity

## Factory Area
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total area</td>
<td>20,000 m²</td>
</tr>
<tr>
<td>Surface covered</td>
<td>10,000 m²</td>
</tr>
<tr>
<td>Surface for administration</td>
<td>1,200 m²</td>
</tr>
</tbody>
</table>

## Our Technical Capabilities

### Moulding Department
- 2 rapid prototyping machines
- 50 ton continuous mixer
- 20 ton continuous mixer
- 3 ton continuous mixer
- Semi automatic box moulding line for 1850*2500 mm
- Fast loop system for cake moulds for 1400*1000 mm
- Chain manipulator
- Flood coating unit
- Thermal reclamation unit 500kg/hour

### Melting Department
- 2 x 1500 kgs 800 kw medium frequency induction furnace
- 1 x 1000 kgs 600 kw
- 1 x 500 kgs 600 kw
- Bottom pouring ladles capacities -2t, 1.5t, 1t, and 750kgs

### Trimming / Finishing
- Swing frame grinders
- Flexible grinders
- Arc cutting
- Hardfacing weldings
- Sand and shot blasting

### Heat Treatment
- 2 Heat treatment furnaces capacity 3.5 & 5T

### Machining
- Vertical and parallel lathes
- Boring, drilling machines
- Mortaiseuse, milling, CNC machines

### Inspection and Testing
- Spectro-meter
- Microscope
- Mobile hardness tester
- Measuring instruments, 3D machine, Pressure test equipments
- Ultra-Sonic and magnetic particle test equipments
- Impact test machine

## Our Metallurgies
A range of metal with high added value through flexible manufacturing:
- manganese steels
- Refractory Steel
- Stainless Steel
- Ductile Iron
- Cast Ni-resist
- 30% chromium
- other metallurgical specifications resistant to corrosion, abrasion and shock.
The machining of molds and cores directly into the sand, can eliminate the step of making wooden patterns. This innovative technology offers the following advantages:

- Reduction of time.
- Reduction of lead manufacturing costs.
- Dimensional accuracy and surface quality.
- Improved customer service in case of last-minute change.
- Removed the cost of storage, and the risk of deformation of patterns.

**RAPID PROTOTYPING MACHINE**

Patternless process®

The machining of molds and cores directly into the sand, can eliminate the step of making wooden patterns. This innovative technology offers the following advantages:

- Reduction of time.
- Reduction of lead manufacturing costs.
- Dimensional accuracy and surface quality.
- Improved customer service in case of last-minute change.
- Removed the cost of storage, and the risk of deformation of patterns.

**MOULDING LINES**

By moulding, you get pieces of small and medium series. Chemically bonded sands used to make moulds.

A production unit that respects the environment and uses a sand regeneration station, one mechanical and one thermal, two vibrating grids with dust collectors, dust collector with a scrubber, a blasting chamber with dust collector ...

Moulding plate sizes in fast loop and semi automatic lines
Size of site: 1400 x 1000
2000 x 2000

**MACHINE SHOP**

Integrated machining to make finished or semi-finished parts. Welding and assembly of those parts by a wide range of processes is possible.

- Vertical machining
- Numerical milling Borers
- Conventional horizontal Borers
- Conventional milling
- Radial drilling,...
- CNC Centers

**LABORATORY CONTROL**

Mafoder has means to execute checks to ensure quality, metallurgical and dimensional compliance, namely:

- Mechanical tests,
- The non-destructive testing (x-ray, ultrasound, magnetic particle test, dye penetrant test)
- Held in the service of parts delivered,
- Improving the life of parts

Spectrometer
Balance capacité 400g
**MELTING AND CASTING**
- 2 induction furnaces of capacity 1500 kg
- 1 induction furnace of capacity 1000 kg
- 1 induction furnace of 500 kg capacity
- 2 pockets preheating stations gas
- Pockets conuilles
- Pockets teapots
- Pockets normal
- Electric cranes: 10 T and 5 T
- Electronic scale of capacity 2T
- Electronic balance suspended of capacity 2 tons

**HEAT TREATMENT FURNACES**
Heat treatment options:
- Water quenching
- Air quenching
- Oil quenching
- Annealing
- Normalizing

**MANUFACTURING PROCESS**
1. Design
2. Pattern making
3. Molding
4. Melting
5. Heat treatment
6. Machining
7. Quality control
### PUMP PARTS FOR DREDGING

- **Impeller for phosphoric acid segregation in 30% Cr**
- **Mixer blades in 30% Cr**
- **Pump steel 42CD4 casing**
- **Stainless steel rotor in 26-5**

**Work environment:**
- Seawater
- Phosphoric acid segregation
- Aggression high abrasive

**Materials used:**
- Ferrite 30% Cr
- Stainless 25-20-4

**Key features:**
- Very good to corrosion and abrasion

### PARTS FOR RAILWAY

- **Housing carbon steel en acier**
- **Electrical motor body for locomotive in carbon steel**
- **Support in carbon steel**
- **Bogie plates in carbon steel**
- **Housing**

**Elements of the electric motor casing steel castings for locomotive**

### PARTS FOR THERMAL POWER SECTOR

- **Roller type A**
- **Liner**
- **Wear plate**
- **Nozzle element**
- **Side W.P**

**Material:**
- Cast highly alloyed chromium wear resistant
- White iron highly alloyed nickel chrome, abrasion resistant
- High-alloy steel to manganese
**PHOSPHATE & DERIVATIVES INDUSTRY**

- **Distributor**
  - Material: Lamellar graphite cast

- **Cone**
  - Material: Low alloy steel

- **Duck foot elbow**
  - Material: Lamellar graphite cast

- **Collector element**
  - Material: Low alloy steel

- **Sproket Wheel**
  - Material: Steel alloyed with chromium and nickel, corrosion resistant

- **Pinion**
  - Material: Steel alloyed with chromium and nickel, corrosion resistant

- **Wear cover**
  - Material: High chrome Corrosion resistance

- **Pump casing**
  - Material: cast high-alloy chrome molybdenum

- **triangular grid**
  - Material: gray cast iron chromium alloyed copper

- **Turbine pump**
  - Material: Steel alloyed with chromium and nickel, corrosion resistant

**WEARING PARTS FOR OTHER INDUSTRIES**

- **Crown pinion**
  - GS 42 Cr Mo4

- **Wheel**
  - GS 42 Cr Mo4

- **Gear wheel**
  - FGS

- **Roller**
  - GS 42 Cr ME4

**Industries various**: These sectors rely on steel alloy Cr, Mo, Ni and ductile iron

**Areas of use**: These parts are subject to shocks, crushing, grinding, the impact of mass, and the impact of small particles
**QUARRY & CRUSHING INDUSTRY**

**BOWLS AND MANTLES**

**Material:** High Manganese steel grades

**Areas:** quarries, mining and generally any use where there is impact of body mass and repetitive shocks

**Quarry & Crushing Industry**

**BLOW BARS**

**Material:** High Manganese steel
High chrome alloy iron

**Areas:** quarries, mining and cement

**Quarry & Crushing Industry**

**HAMMERS**

**Material:** High Manganese steel grades
High chrome alloy iron

**Areas:** quarries, mining and cement industries
QUARRY & CRUSHING INDUSTRY

JAW CRUSHERS

Material: High alloy steels in Manganese
Abrasion-with shock
Areas: quarries, mining and generally any place where there is impact
Use of body mass and repetitive shocks

MINING INDUSTRY & PUBLIC WORKS

TOOTH POINTS, BUCKET TEETH

Material: Low alloy steels
Areas: abrasive wear resistant metallurgy applied for crushing, grinding, milling equipment parts

BALL MILLS

Material: Manganese alloy steels
Material: Low alloy steels
Crushing: Manganese steels are generally used where there is impact of body mass and repetitive shock, these steels have a good impact resistance and wear.

Clinker and grinding: High Chromium alloy iron and steels are used for the manufacture of liners. Mafoder experience has shown that the best performance is obtained with non-standard material specifications. These steels have good resistance against aggression combined wear abrasion and moderate shock.

Mixing unit and cooling: Heat Resistance steels grades are used:
- A resistance to oxidation, corrosion and heat resistance to a temperature of 1150 °C
- Good resistance to wear and sulfur products
- The correct mechanical properties at high temperatures.

These steels contain chromium and nickel and possibly adding some elements such as tungsten and niobium, and after use and the environment, these steels can be: ferritic, martensitic, or austenitic-austenitic-ferritic.
**Our product range**

The technical department of Mafoder Foundry supports customers in choosing the appropriate Metallurgy for improved operational performance.

### Manganese steel

<table>
<thead>
<tr>
<th>AFNOR</th>
<th>DIN 17006</th>
<th>ASTM A128</th>
<th>COMP. BASIC</th>
<th>BASE % COMP.</th>
<th>HARDNESS</th>
<th>APPLICATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Z 120 M 12</td>
<td>GX 120 Mn 12</td>
<td>Gr B</td>
<td>1.2</td>
<td>12.0</td>
<td>-</td>
<td>≥ 400 HB</td>
</tr>
<tr>
<td>Z 120 Mc 12-2</td>
<td>GX 120 Mn Cr 12.2</td>
<td>Gr C</td>
<td>1.2</td>
<td>12.0</td>
<td>2.0</td>
<td>By hardening</td>
</tr>
<tr>
<td>Z 120 billion 12-2</td>
<td>GX 120 Mn Mo 12.2</td>
<td>MB Gr-2</td>
<td>1.2</td>
<td>12.0</td>
<td>-</td>
<td>Jaw, hammers</td>
</tr>
<tr>
<td>Liners, blow bars, etc</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Alloy steels Cr-Mo base

<table>
<thead>
<tr>
<th>AFNOR</th>
<th>DIN 17006</th>
<th>ASTM A128</th>
<th>COMP. BASIC</th>
<th>BASE % COMP.</th>
<th>HARDNESS</th>
<th>APPLICATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>212CB4</td>
<td>GS 42 Cr Mo 4</td>
<td></td>
<td>0.42</td>
<td>1.0</td>
<td>0.25</td>
<td>21-36 Rc</td>
</tr>
<tr>
<td>50CB4</td>
<td>GS 50 Cr Mo 4</td>
<td></td>
<td>0.50</td>
<td>1.0</td>
<td>0.25</td>
<td>23-29 Rc</td>
</tr>
<tr>
<td>NCB8052NN</td>
<td>GX 30 Cr Ni Mo V 8</td>
<td></td>
<td>0.45</td>
<td>1.0</td>
<td>0.35</td>
<td>31-37 Rc</td>
</tr>
<tr>
<td>30CS8</td>
<td>GX 30 Cr Si 7</td>
<td></td>
<td>0.30</td>
<td>1.0</td>
<td>7/8</td>
<td>≥ 48 Rc</td>
</tr>
</tbody>
</table>

### White alloy iron -Ni Cr Mo base

<table>
<thead>
<tr>
<th>DESIG. FRA</th>
<th>DIN 17006</th>
<th>ASTM A532</th>
<th>COMP. BASIC</th>
<th>BASE % COMP.</th>
<th>HARDNESS</th>
<th>FEATURES</th>
<th>APPLICATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Z120 M 13</td>
<td>GX 120 Cr 13</td>
<td></td>
<td>-</td>
<td>12.0 Cr</td>
<td>48-52 HRC</td>
<td>Parts subjected to shock</td>
<td></td>
</tr>
<tr>
<td>FB 300 C13</td>
<td>GX 300 Cr 13</td>
<td>CL II type A</td>
<td>12.0 Cr</td>
<td>52-60 HRC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FB 300 CD 18-2</td>
<td>GX 300 Cr Mo 18.2</td>
<td>CL II type C</td>
<td>15.0 Cr+Mo</td>
<td>≥ 60 HRC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FB 300 CD 25-2</td>
<td>GX 300 Cr Mo 25.2</td>
<td>CL III type A</td>
<td>27.0 Cr+Mo</td>
<td>≥ 60 HRC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FB 300 CNS 9-5-2</td>
<td>GX 300 Cr Ni Si 952</td>
<td>CL I type D</td>
<td>8.0 Cr 6.0 Ni</td>
<td>≥ 60 HRC</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Stainless Steel

<table>
<thead>
<tr>
<th>AFNOR</th>
<th>DIN</th>
<th>ASTM</th>
<th>COMP.</th>
<th>APPLICATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Z2 CN 18.8</td>
<td>1.4316</td>
<td>A351 CF3</td>
<td>0.02 18 8</td>
<td>Parts subject to corrosion</td>
</tr>
<tr>
<td>Z6 CN 18.8</td>
<td>1.4314</td>
<td>A351 CF8</td>
<td>0.06 18 8</td>
<td></td>
</tr>
<tr>
<td>Z2 CND 18-12</td>
<td>1.4404</td>
<td>A351 CF3M</td>
<td>0.02 18 12</td>
<td></td>
</tr>
<tr>
<td>Z6 CN4D 18-12</td>
<td>1.4401</td>
<td>A351 CF8M</td>
<td>0.06 18 12</td>
<td></td>
</tr>
</tbody>
</table>

### Heat resistance steel grades

<table>
<thead>
<tr>
<th>DESIG. FRA</th>
<th>DIN 17006</th>
<th>ASTM A297</th>
<th>COMP. BASE % BASIC COMP.</th>
<th>TEMP.SERV.°C</th>
<th>Rm</th>
<th>A%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Z65 CNS 27.4</td>
<td>GX 35 Cr Ni if 274</td>
<td>HC VAR Cr 4.0</td>
<td>1100</td>
<td>480</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Z130 CS 29</td>
<td>GX 130 Cr if 29</td>
<td>- VAR 27</td>
<td>1100</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Z40 CN 18.9</td>
<td>-</td>
<td>HD 0.40 29.0 6.0</td>
<td>1100</td>
<td>600</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>Z40 CN 25.12</td>
<td>1.4825 GX 25 Cr Ni if 18.9</td>
<td>HF 0.25 26.0 9.0</td>
<td>900</td>
<td>600</td>
<td>35</td>
<td></td>
</tr>
<tr>
<td>Z40 CN 25-20</td>
<td>1.4837 GX 40 Cr Ni if 25.12</td>
<td>HH 0.40 29.0 12.0</td>
<td>1050</td>
<td>650</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Z40 CN 25.20</td>
<td>1.4848 GX 40 Cr Ni if 25.20</td>
<td>HK - 25.0 20.0</td>
<td>1100</td>
<td>525</td>
<td>27</td>
<td></td>
</tr>
<tr>
<td>Z CR Ni 5050</td>
<td>1.4865 Ni Cr if 50-50</td>
<td>- - 50</td>
<td>1100</td>
<td>500</td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

### Ductile iron grades

| FGS 900-2 | FGS 800-2 | FGS 700-2 | FGS 600-3 | FGS 500-7 | FGS 450-10 | FGS 400-15 | FGS 400-18 | FGS 350-22 |