Mission Statement
The corporate principles that we have developed and followed for several decades are integrity, reliability and respect for man and the environment.

Our mission is to exploit and process mineral raw materials supplying quality products to a broad spectrum of industries and to become the preferred supplier of Magnesia based products and services worldwide by solving customer problems and providing superior value.

Our products serve as raw materials for hundreds of finished goods which in turn are used by millions of people all over the world.

We are committed to a leading role in the international market of magnesite, caustic and deadburned magnesia as well as basic monolithic refractories and to becoming increasingly global in both production and commercial activities.
History
History Of Magnesite Exploitation In Yerakini

- Small scale operation since 1910
- Combination of underground and surface mining in the early years
- Main processing methods: on-site hand sorting, calcination in batch kilns
- Production of ca. 8,000 tpa CCM
History Of Magnesite Exploitation In Yerakini

After 1959 Grecian Magnesite starts investing and growing of the operation:

- First rotary kiln and screening / hand-sorting installations in late ‘60s
- Introduction of the Dense Media Separation method (1973)
- First, worldwide, industrial use of optical sorting technology (1977)
- Expansion of production capacity by the addition of 2 rotary kilns (70’s)
- Acquisition of neighboring mines and facilities (incl. double inclined shaft kiln) creating the only remaining MgO producer in the region (early 80’s – today)
- Manufacture of a state of the art plant for the production of 50,000 tpa basic monolithic refractories (1992)
- Commissioning of the R&D center (1993)
- Continuous acquisitions outside Greece in the production and trading of Magnesia products (late 90’s – today)
- Significant investments in new production technologies (Mobile Screening Unit, Grecco-screens, high intensity magnets, new generation optical sorting - high efficiency camera sorters, Green energy) (00 – today)
• Founded in 1959 by Mr. G. Portolos
• Privately owned company (Portolos family)
• Headquarters in Athens
• Mines and works in Yerakini, Chalkidiki, N. Greece
• Annual production capacity ca. 200.000 tpa of calcined products
• More than 60 grades of CCM, DBM, Basic mixes & MgCO$_3$ for the widest range of applications
• ISO 9001:2008 & GMP+ certified
• Employees in Greece 370 (incl. 30 permanent subcontractors)
• Biggest natural CCM producer and exporter in the EU
• Participation in other MgO producers/traders outside Greece
Activities outside Greece

Van Mannekus & Co B.V
Magnesitas Navarras S.A
Akdeniz Mineral Kaynakları A.S
Our Global vision is to expand our presence in high-growth markets and participate in consolidations in mature markets.

For all growth categories, scale, synergy and timing are important factors together with strict financial discipline.
Magnesitas Navarras S.A
Established in 1945

- Plant and headquarters in the Navarra province, Northern Spain
- Open pit mining. Macro-crystalline type of deposit
- Own mines, beneficiation, calcination and post processing facilities
- Production capacity >180,000 tpa of CCM, DBM & Refractory mixes
- Since 2000 Grecian Magnesite owns 40% of MAGNA (remaining 60% owned by the French Roullier group)
- 186 employees
- 2 subsidiaries in Mexico and USA-Canada
- A Full range of refractory mixes for the iron and steel industry
- CCM for the animal feed, fertilizers and environmental markets
Van Mannekus & Co B.V
Established in 1904

- Plant and headquarters in Schiedam - port of Rotterdam
- Since 2007 Grecian Magnesite owns 50% of VMC (remaining 50% owned by the French Roullier group)
- Total area of 25,000 m² of which 60% is under roof
- 50 employees
- Storage capacity (covered) ~15,000 Mt (raw materials & final products)
- 3 mills with total capacity of ca. 50,000 tpa
- Service handling of other minerals ca. 15,000 tpa
- Sales in all markets/applications of caustic calcined magnesia and magnesium hydroxide (both natural & synthetic CCM)
- 1 subsidiary in Holland / Van MannekusUniversal – in Oudenbosch
- Total area of 20,000m² of which 30% is under roof
- Capacity of 10,000 tpa emery products (various particle sizes)
Activities outside Greece - Our Participations

Akdeniz Mineral Kaynakları A.S
Established in 1993

- Majority shareholder (89.6 %)
- Mines, processing plants and factory in the Eskisehir area, North-Western Turkey / Headquarters in Istanbul
- Open pit mining. Micro-crystalline type of deposit
- Significant mining concessions (totaling 4,238 hectares) with vast proven and probable reserves
- Own mines, beneficiation, calcination and post processing facilities
- 60 employees + 40 seasonal
- Production capacity >30,000tpa CCM and >80,000tpa Raw Magnesite
- Big variety of CCM and MgCO₃ products for a wide range of applications (natural CCM with MgO content up to 98% & S.S.A up to 100m²/g)
Markets – Products – Applications
Caustic Calcined Magnesia

GM produces and commercializes a great variety of caustic calcined magnesia products for the widest spectrum of applications, namely agricultural, industrial/technical & chemical, construction, environmental, steel / refractories.

Our products are acknowledged as top quality in their various fields of applications due to their low impurity levels, low heavy metals & trace elements, controlled physical characteristics (reactivity, surface area etc.) and above all, consistency.

Characteristics of available natural CCM grades from Grecian Magnesite’s Greek & Turkish operations (ranges of typical values)

<table>
<thead>
<tr>
<th></th>
<th>MgO</th>
<th>SiO₂</th>
<th>CaO</th>
<th>Fe₂O₃</th>
<th>Al₂O₃</th>
<th>SO₃</th>
<th>SSA</th>
<th>L.O.I.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range</td>
<td>75-98%</td>
<td>0.4-13%</td>
<td>1.0-4.0%</td>
<td>&lt;0.05-0.50%</td>
<td>0.1-0.40</td>
<td>0.01-1.50%</td>
<td>10-100 m²/g</td>
<td>1.0-5.0%</td>
</tr>
</tbody>
</table>
## CCM Markets / Applications

### Construction
- Industrial Floors
- Panels
- Abrasives
- Ceramic Tiles

### Industrial / Chemical
- Magnesium Compounds
- Leather Tanning
- Dental Applications
- Heating Elements (electrical powders)
- Rubber & Plastics
- Glass Making
- Catalysts
- Foundries / Metallurgy
- Fillers
- Pulp & Paper
- Fuel Additives
- Mineral Insulated Cables
- Food Additives
- Nickel Processing
- Specialties
- Uranium Ore Treatment
- Detergents
- Pigments
- Ink applications
- PH adjustor
- Brake Lining

### Agricultural
- Animal Nutrition
- Calf Milk Replacement
- Fertilizers

### Steel / Refractories
- Spinel Production
- Special refractories
- Slag base
- Special Ceramics
- RGFM – Brick Making Grade

### Environmental
- Flue Gas treatment
- Soil Decontamination
- Domestic and Industrial wastewater treatment
Deadburned Magnesia

GM’s DBM grades, due to the forsteritic CaO/SiO$_2$ ratio originating from the magnesite deposit, exhibit high bulk densities with low porosity and high hydration resistance, essential requirements for refractory masses, welding fluxes and other applications. Moreover, the very low iron content and the well-controlled physical properties and microstructure give our products a leading position in applications such as heating elements and leather tanning.

Characteristics of available DBM grades from Grecian Magnesite’s Greek operations (ranges of typical values)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Value Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>MgO</td>
<td>88-96%</td>
</tr>
<tr>
<td>SiO$_2$</td>
<td>1.5-8</td>
</tr>
<tr>
<td>CaO</td>
<td>1.5-2.5</td>
</tr>
<tr>
<td>Fe$_2$O$_3$</td>
<td>0.15-0.3</td>
</tr>
<tr>
<td>Al$_2$O$_3$</td>
<td>0.15-0.3</td>
</tr>
<tr>
<td>BD</td>
<td>3.2-3.4 g/cm$^3$</td>
</tr>
<tr>
<td>L.O.I.</td>
<td>&lt; 0.2%</td>
</tr>
</tbody>
</table>
**Markets – Products – Applications**

**DBM Markets / Applications served**

<table>
<thead>
<tr>
<th>Construction</th>
<th>Industrial / Chemical</th>
<th>Agricultural</th>
<th>Steel / Refractories</th>
<th>Environmental</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Magnesia Phosphate Cements</td>
<td>• Welding fluxes</td>
<td>• Fertilizers</td>
<td>• Basic refractories</td>
<td>• Encapsulation of wastes</td>
</tr>
<tr>
<td></td>
<td>• Leather Tanning</td>
<td></td>
<td></td>
<td>- Phosphate Cement</td>
</tr>
<tr>
<td></td>
<td>• Break Lining</td>
<td></td>
<td></td>
<td>- Nuclear waste encapsulation</td>
</tr>
<tr>
<td></td>
<td>• Heating Elements (electrical powders)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Foundries / Metallurgy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Mineral Insulated Cables</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Dental Applications</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Specialties</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Phosphate Cement
- Nuclear waste encapsulation
Markets – Products – Applications

Raw Magnesite Markets / Applications

- **Construction**
  - Ceramic tiles

- **Industrial / Chemical**
  - Welding fluxes
  - Fillers
  - Specialties
  - Mg Compounds

- **Agricultural**
  - Fertilizers
  - Animal feed

- **Steel / Refractories**
  - Slag conditioning
Markets – Products – Applications

Basic Monolithic Refractories Markets / Applications

A series of basic unshaped refractories, for the steel industry:

**GRECMAGN GUN**
gunning mixes for hot repairs of BOF, EAF, Converters and Ladles

**GRECMAGN RAM**
dry mixes for the initial lining and repairs of the bottom (hearth) of the EAF.

**GRECMAGN FRIT**
dry fettling oiled mixes for hot repairs of hearths and lower banks of EAF

**GRECMAGN TUN**
tundish coating mixes applied on the working lining of tundishess

**GRECMAGN TAP**
olivine based high refractory mixes, used as filler in the Eccentric Bottom Tap hole

**GRECMAGN MORTAR M 90**
mortar for use in the industrial furnaces suitable for Magnesia or Magnesia – Chrome bricks
Active Concessions

A | Concessions 20 & 22 YERAKINI 7Km²
B | Concession 21 KASTRI 23Km²
C | Concessions 15 & 16 ORMILIA 10Km²

Reserve Concessions

D | Various Concessions in Chalkidiki Prefecture 16 Km²
E | Concessions 86 & 284 (Island of Euboea) 4 Km²
Production Process
General Production Flowsheet

**MINING**
- extraction of raw material

**PRE-BENEFICIATION**
- separation of magnesite from the waste rock

**BENEFICIATION**
- qualitative separation of magnesite grades

**CALCINATION**
- MgCO₃ is transformed to MgO

**FINAL PROCESSING**
- Processing of MgO
Mining - Orebody

- Cryptocrystalline magnesite (MgCO₃)
- White color ("lefkolithos" = white stone)
- "Stockwerk type" of orebody – thin veins of magnesite within the host rock
- Waste rock is mainly serpentine and dunite
- Main characteristics of Yerakini magnesite:
  - White color
  - Low iron content
  - Very low levels of heavy metals, P, F, Cl

Mining Operation

- Typical open pit mining
- 8 benches of max 15m height each
- Mining department operations:
  - Exploration, drilling, overburden removal
  - Drilling, explosives loading, blasting
  - Loading and transportation of run-of-mine material
  - Mobile Screening Unit (Old stockpiles)
  - Land restoration
Production Process

Pre-beneficiation

RoM MATERIAL

↓

CRUSHING AND SCREENING UNIT

↓

OPTICAL SORTING / MAGNETIC SEPARATION UNIT

↓

PRE-CONCENTRATED MAGNESITE
Beneficiation

PRE-BENEFICIATED MAGNESITE

WASHING AND SIZING UNIT

DENSE MEDIA SEPARATION UNIT

MAGNETIC SEPARATION UNIT

BENEFICIATED MAGNESITE - KILN FEED

BY-PRODUCTS

NEW OPTICAL SORTING
Production Process

Calcination & Sintering

RAW MAGNESITE

ROTARY KILNS
- No1 1.6x40m
- No2 2.8x80m
- No3 3.0x90m

SHAFT KILNS
- No2 No4 Kastri

MgCO₃ → MgO + CO₂

900-1100°C Caustic Magnesia
- Reactivity
- Specific Surface Area

1800-1900°C Dead Burned Magnesia
- Sintering effect
- Growth of crystals
- Density
- Refractory properties
Final Processing Department

- Crushing, screening and milling installations
- Magnetic separation unit
- Packing in BB’s and / or paper bags
- Milling of CCM with special requirements performed by Van Mannekus in Holland
Warehousing, Loading & Forwarding
• 30 covered storage bins for bulk material (ca. 20,000t CCM &/or 30,000t DBM)
• 30,000m² covered storage capacity for packed – final products
• Product deliveries organized by trucks, containers, rail (for some locations) or bulk vessels according to customer requirements
• Container port – Thessaloniki, 70km from plant
• Bulk Vessels – Nea Moudania port, 12km from plant with own quay and loading installation
Basic Monolithic Refractories and Specialty DBM plant Business Unit
Basic Monolithic Refractories and Specialty DBM plant - Business Unit

- Located 5km from the mines and works of Grecian Magnesite in Yerkini
- Use of Raw materials next to the source (captive production)
- Fully automated - computerized production process
- A full range of refractory mixes (50,000 tpa capacity) for the steel industry such as gunning, dry ramming, dry fettling, tundish coating mixes and EBT fillers.

&

- Processing of DBM powders for high end applications
- 10,000 tpa autonomous installation for the production of Magnesia powders for the electrical heating elements industry
Aggregates production unit

- Dunite rock from lower benches is suitable for road aggregates
- Autonomous crushing and screening unit for production of base layer aggregates (0-30mm)
- Annual production around 300,000t
Support departments
Support Departments

- Laboratory – Quality assurance
- Maintenance and constructions workshops
- Earthmoving equipment maintenance workshop
- Electrical and electronics maintenance workshop
- Dept. for Safety and Health at Work – Education
- Medical Services
- Spare parts warehouse
- Administration
- Dept. for Environmental Issues & legislation, Best Practices and Recycling
Research & Development Center
Research & Development Center

- Located at Vassilika, close to Thessaloniki
- Commissioned in 1993 having an area of some 500 sqm
- Modern, fully equipped R&D facility with state-of-the-art instrumentation
- Staffed with highly qualified and competent scientists
- Main tasks:

  Development of new products for new and existing applications

  Carrying out applied research to continuously improve final products characteristics and application know-how

  Offering specialized technical support and after sales service to the customers
Our People
### Our People

<table>
<thead>
<tr>
<th>Category</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administration</td>
<td>60</td>
</tr>
<tr>
<td>Technical personnel</td>
<td>79</td>
</tr>
<tr>
<td>Labor force</td>
<td>198</td>
</tr>
<tr>
<td>Permanent contractors</td>
<td>30</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>367</strong></td>
</tr>
<tr>
<td>Participations</td>
<td>289</td>
</tr>
<tr>
<td><strong>Grand total</strong></td>
<td><strong>656</strong></td>
</tr>
</tbody>
</table>