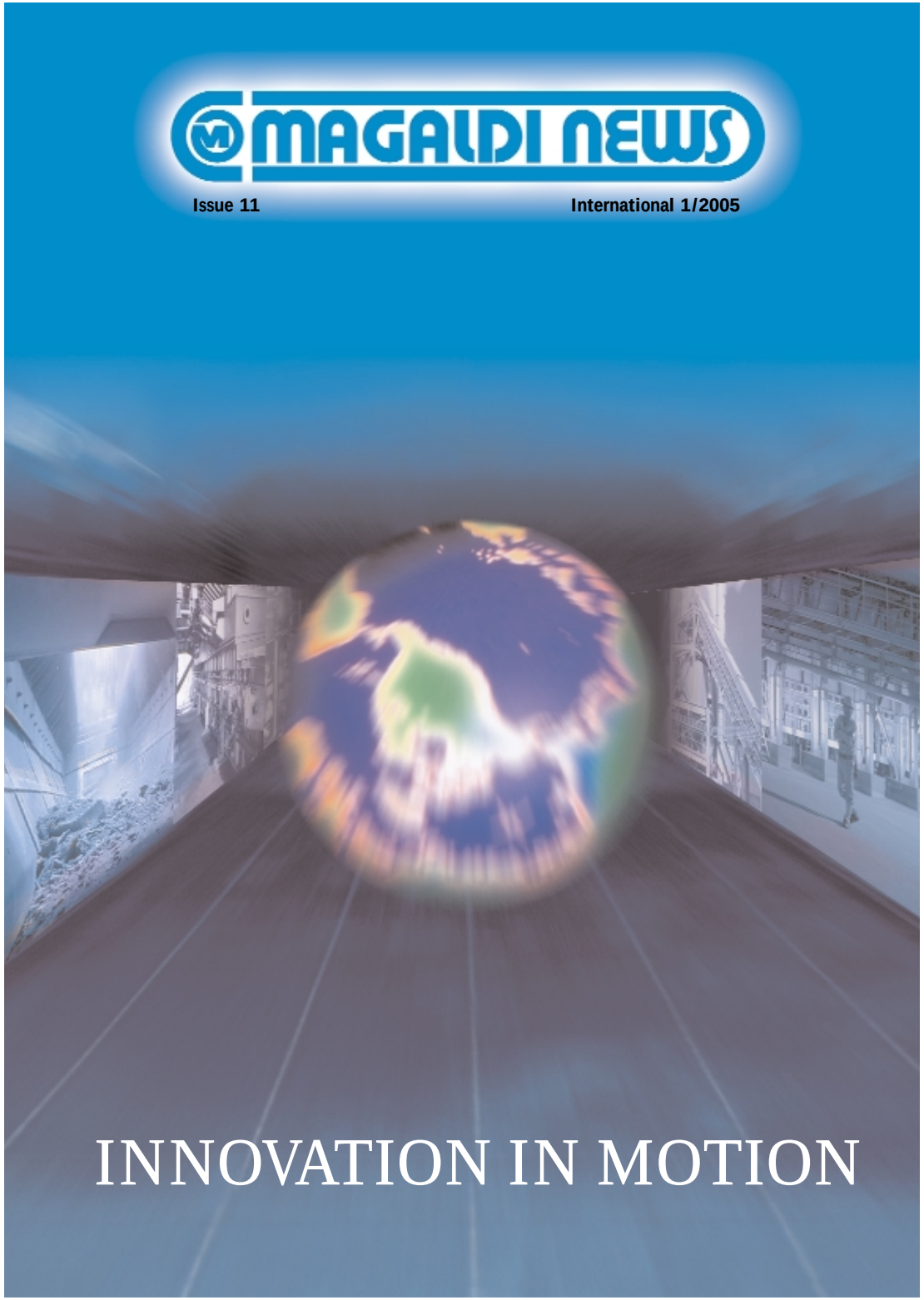
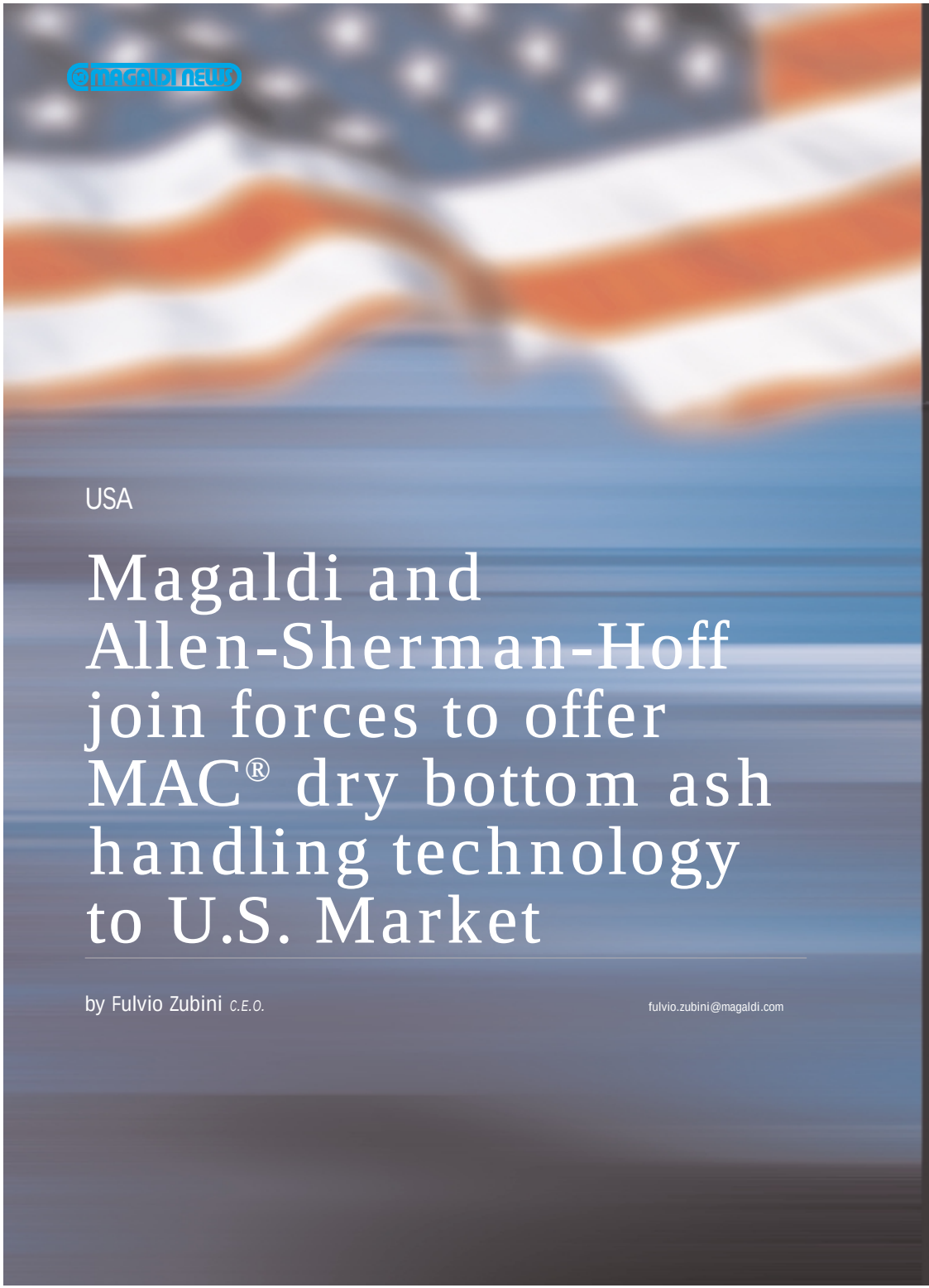
MAGALDI NEWS

Issue 11 International 1/2005



INNOVATION IN MOTION

C O N T E N T S



USA

Magaldi and Allen-Sherman-Hoff join forces to offer MAC® dry bottom ash handling technology to U.S. Market

by Fulvio Zubini *C.E.O.*

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MAGALDI NEWS

Allen-Sherman-Hoff
a Division of Diamond Power International, Inc.

MAGALDI
Dependable technologies

In June 2005 Magaldi Power S.p.A and Allen-Sherman-Hoff (A-S-H), a division of Diamond Power International, Inc., signed a licensing agreement for the design and supply of the Magaldi dry-bottom ash extraction system (the MAC® System) in the United States.

Allen-Sherman-Hoff is a division of Diamond Power International, Inc. a McDermott Company.

Since its formation in 1921, Allen-Sherman-Hoff has been a worldwide leader in the design, manufacture and supply of ash handling systems and services for utility and industrial applications. Today its ash handling references in the U.S. total more than 2,000 installations. The addition of the Magaldi MAC® System expands A-S-H's broad range of services and material handling products.

Diamond Power International, Inc. is the leading name in the design, manufacture and service of ash-handling and boiler-cleaning systems, knowledge-based control systems, and boiler diagnostic, sensor and imaging technology. Diamond Power International, Inc., headquartered in Lancaster, Ohio, U.S.A., has more than 80 field sales, service support, distribution, and manufacturing locations worldwide.

Magaldi Power S.p.A., is part of the Magaldi Group and is a provider of Magaldi's dry bottom ash handling systems for solid fuel-fired boilers used in the power generating industry. Its main products are the MAC®- Magaldi Ash Cooler for pulverized coal utility boilers and the FLUIMAC system for fluidized bed combustion boilers. Magaldi Power operates worldwide through a network of representatives and partnerships.

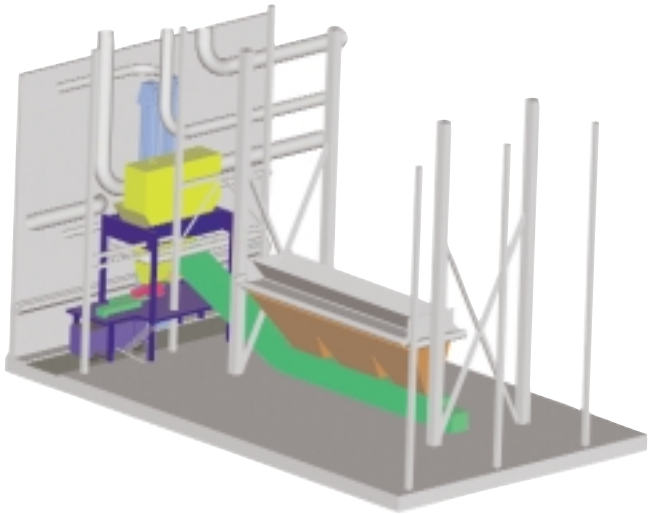
Magaldi and Allen-Sherman-Hoff have a well established presence in the industry. Their activities started in the 1920's, and since that time, both companies have acquired and maintained an international reputation as quality system designers and manufacturers.

"We are excited about the addition of the MAC® System to our product portfolio. It will enable us to offer customers the most comprehensive line of ash-handling solutions for their specific applications," said Stephen Scott, General Manager, A-S-H Engineered Systems.

Spain

In the green Asturias, an environmental ash handling choice in Aboño P.P.

by Giacinto Giubileo *Project Manager* giacinto.giubileo@magaldi.com



Environmental regulations context is asking for more and more strict requirements from energy utilities in order to reduce the polluting load from power plants effluents.

Many efforts have been dedicated to this aim particularly for gaseous emissions. Liquid effluents as well have to be taken under control and possibly reduced.

To cope with such an high standard of requirements new technologies have to be developed, especially in these days where high oil and gas price is paving the way to the return of coal.

In the Spanish coal fired power plant of Aboño, owned by Hidroelectrica del Cantábrico, a project has been carried out to eliminate completely the use of water in bottom ash handling and, at the same time, to determine a recovery of energy, by retrofitting the existing "sluice to decanting pool" wet bottom ash system with the Magaldi MAC® dry extraction and cooling technology.

Hidroelectrica del Cantábrico is one of Spain's leading utilities, providing electricity to more than 550,000 customers and natural gas to nearly 530,000 customers; the company also operates about 2,600 MW of electric generating power capacity. Aboño Power Plant is located in the valley with the same name, between the cities of Gijón and Carreño, at approx. 30 km west of the first, and it is linked trough a conveyor belt to the Aboño Coal Plant.

Its proximity to the Aceralia factory in Veriña, facilitates Aboño´s use of the iron and steel gas surplus proceeding from it. It consists of two units with a power of 360 and 543 MW, and it uses imported and domestic coal as fuel, mainly from the central coal field of Asturias, and gas surpluses from blast furnace and coke batteries.

The unit 2, object of this retrofit project, is a 543 MW power rated system, with a Foster Wheeler natural circulation boiler, able to produce 1725 t/h of overheated steam.

The MAC® project has been focused on the following main benefits and operational improvements:

- elimination of the water in the bottom ash process;
- increase of bottom ash system reliability;
- improving of boiler efficiency;
- possible reuse of pulverized bottom ash;
- potential CO_2 emission saving.

Initial conditions of the wet bottom ash handling at the power plant were analysed and compared with the expected performance of the dry technology.

The results obtained were evaluated by the client management, leading to a "green light" decision for the project.

From the environmental point of view, the elimination of any water discharge and treatment and by increasing ash market possibility, avoiding ash disposal, will give an invaluable contribution to environmental amelioration, which in Asturias, beautiful region of Spain able to attract million of tourists for its natural beauties, will be very much appreciated.

Other decisional factors for this project were also given by the boiler efficiency increase and from MAC® system expected improved reliability, reduced auxiliary power consumption and maintenance costs.

The existing bottom ash system for unit 2 was equipped with water impounded hoppers, which have been causing high operation and maintenance costs for the ash handling.

The Magaldi supply is composed as follows: MAC® extractor, primary crushers, bucket elevators, silos, vibrofeeders and mixers.

The ash is extracted, collected and crushed by the MAC® extractor and the primary crusher. Downstream there are two bucket elevators installed that convey the crushed ash to two steel silos (total capacity 300 mc) in order to store the dry crushed ash.

The discharge of each silo is carried out by a vibro feeder and related mixer to trucks.

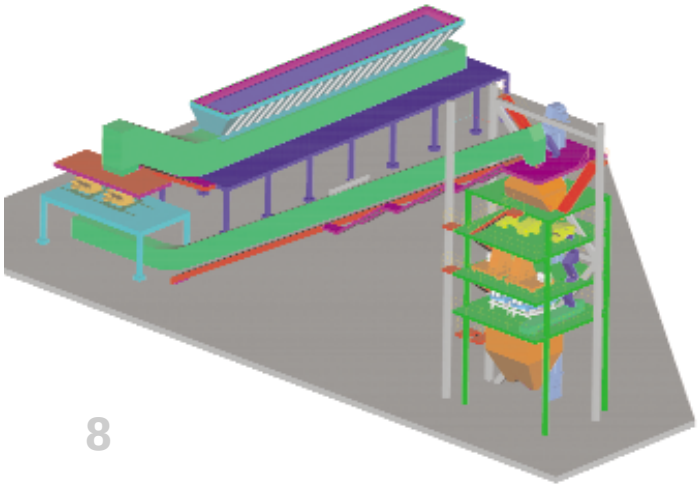
Magaldi's MAC® dry technology is expected to improve plant operations, reduce the overall cost for ash handling, eliminating the use of water and making Aboño a better place to work and the surrounding locations a better place to live.

Italy

ENEL Torrevaldaliga repowering project

by Vincenzo Quattrucci *Sales Manager* vincenzo.quattrucci@magaldi.com

Enel is Italy's largest power utility, with more than 42,000 MW installed in the country, and with plans to increase this generation capacity with the development of new power generating stations, not only within Italy but in other countries as well.



The entire ENEL production comes from almost 600 power plants, distributed all over Italy, the majority of which are producing power from renewable sources.

The great care of ENEL towards the environment is reflected in the design choices made for Torrevaldaliga Nord repowering project, located some 50 km northwest of Rome near the town of Civitavecchia on the Tyrrhenian sea, and since 1986, year of the four units start up, has been considered one of the most important thermal power station in Italy with a total generation power capacity of 2640 MWe.

Enel, for this plant, has decided to replace its four oil-fired systems with three coal fired supercritical units, having the aim of attaining higher generating efficiency with the use of the most updated technologies for a clean use of the coal.

The solutions used for this project, responding to strict parameters for quality, innovation and environmental protection, have procured to ENEL the award of one of the most important recognition in the international energy sector for the clean coal reconversion, the Power-Gen Award for Technological Innovation 2005.

The new Torrevaldaliga Nord station will have a capacity of 1980 MWe, with a plant efficiency net increase, passing from the old 39% to an excellent 45%.

The more efficient production will be attained with environmental low impact technologies: the emissions control will be extremely tight, with emissions of NOx, SOx and particles well below the international standard limits.

Also CO_2 production of the entire plant will be reduced by a -17,8%, in line with ENEL commitment to the Kyoto protocol requirement.

Liquid effluents from the power station will be also strongly reduced, with the strong commitment that not a single drop of waste or process water will be discharged from the plant into the sea. In this optic, the elimination of water in the extraction and cooling of bottom ash has been made possible by the use of a Magaldi MAC® system, the dry bottom ash system designed and manufactured by Magaldi Power.

The hot ashes, falling from the supercritical boiler having a steam production of 1918 t/h, will be transported at a rate of approx. 7 t/h and cooled down by the MAC® extractor; ashes will then be crushed, milled and transported to a storage silo by mean of a pneumatic transportation. The dry ash could then be discharged in trucks, for a potential sale as by product in the cement industry.

The application of the MAC® system in the three units of Torrevaldaliga will allow the achievement of the following benefits:

- Removal of water from the bottom ash process, in line with the power station environmental criteria.
- Possibility to reuse the bottom ash into the production cycle, instead of disposing it into the environment. The recycling of bottom ash in the cement will allow the cement plant to save a considerable amount of CO_2, which is given by the production of corresponding quantity of cement.
- Operational cost savings in terms of improved efficiency of the boiler, lower maintenance costs and bottom ash system reliability; this improvement will consent also a reduction of CO_2 emission from the plant.

Magaldi Power will supply the three MAC® units to Ansaldo Caldaie, in charge with their consortium partner Babcock-Hitachi of the supply of the three supercritical boilers. The commercial operation of the first unit is scheduled on June 2008 while the other units will be operated after the first commissioning, within few months.

The order from Ansaldo is marking a confirmed trust of ENEL in Magaldi MAC® technology and their good overall evaluation of all the other MAC® systems supplied by Magaldi to ENEL, serving almost all their coal fired units in Italy. With the acquisition of Torrevaldaliga repowering project Magaldi Power once again confirms its presence in the world bottom ash market with a more referenced approach to power development projects in Europe and the rest of the world.

P.R. of China

The Baoshan experience

by Simone Savastano *Area Manager* simone.savastano@magaldi.com

In March 2005 Magaldi Power was awarded for the MAC® retrofitting of Unit # 1 of the 3x350 MW Baoshan power plant Units.

Baoshan power plant provides electricity to the entire Baosteel complex in southern Shanghai area.
A client like Baosteel is a client to be proud of for Magaldi: the biggest iron and steel producer in China, currently ranking second among the top 100 listed companies in this country. In 2005, World Steel Dynamics has identified 23 companies as World Class Steel Makers based on their comprehensive competition, and Baosteel ranked the third position.
Such a top of the world company, like Baosteel is, could only chose a top of the world dry bottom ash extraction system, like the MAC® system is. The logic consequence was that the contract for the retrofitting of the first Unit was signed in Shanghai in March 2005.
Given the thigh timeframe available for the supply of the equipment, the performance required from Magaldi factory had to be an impressive one. And it was. The MAC® extractor, the Post Cooler and all the side equipment were ready for boarding at Naples seaport as early as August 14th, 2005. The exact day our Customer required.
The complete installation is going to be completed by late November 2005 and is due to substitute the existing water impounded hoppers.
The outstanding performance achieved persuaded Baosteel to grant Magaldi with the order for the retrofitting of the next Unit, the # 3, well before the installation of the first Unit was completed. The new agreement has been signed in September 2005 and the installation will start in March 2006.
The contract for the last Unit # 2, is due to be signed in January 2006 with the relevant equipment to be delivered on September 2006.
The complete MAC® retrofitting of all the Units of Baoshan Power Plant will give its valuable contribution to the ambitious “zero water discharge” environmental goal Baosteel is willing to achieve for its Baoshan Power Plant.

The Magaldi post-cooler during erection under unit 3

The three units of Baosteel Power Station

Baosteel Reception Center

South Korea

Korean Market: first MAC® units shipped to TAEAN Power Plant (2x500 MWe)

by Celestino Agresta *Area Manager*

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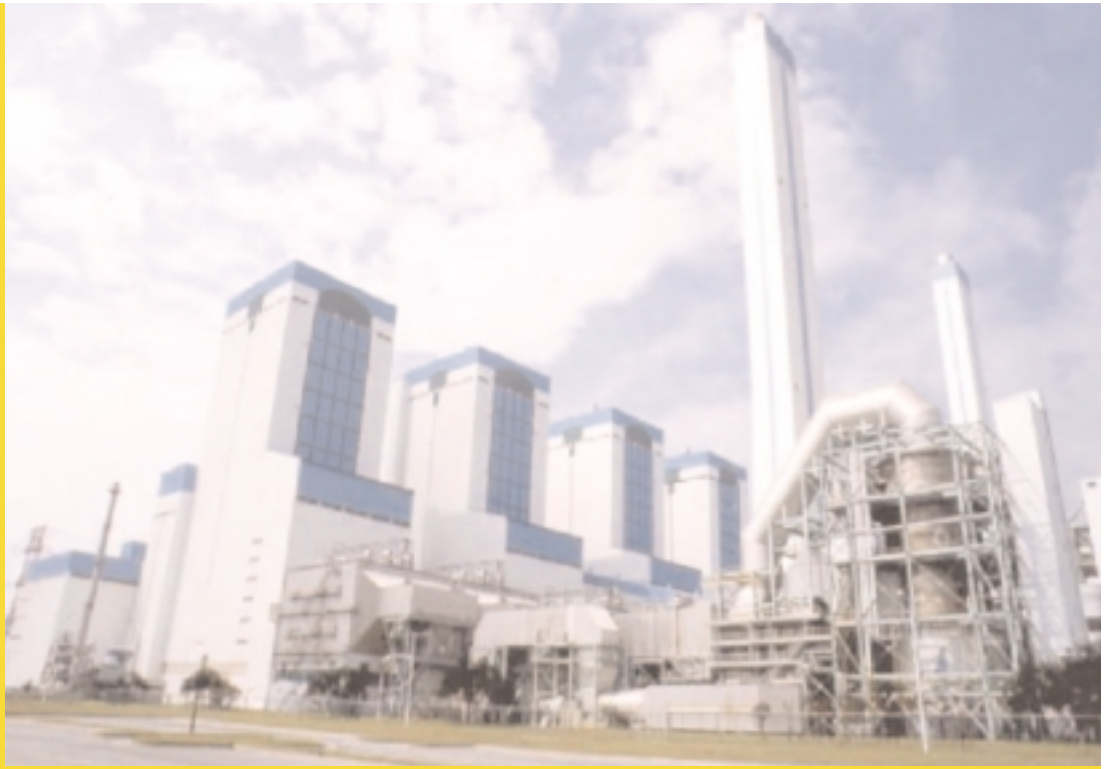
Magaldi Power S.p.A. after 10 years of successful Licensee Agreement with Kawasaki Heavy Industry Ltd. enjoying 5 orders from Japanese Market, decided to extend the agreement to the Republic of Korea for the new 5 projects (Dangjin 2 x 500 MW, Taean 2 x 500 MW, Poryong 2 x 500 MW, Hadong 2 x 500 MW, Yongheung 2 x 870 MW). The bottom ash dry technology has been specified in the General Technical Specification for four of those projects, meaning a strong change also in Korean conservative energy sector. Taean has been the first of the contracts expected from Korea awarded at the end of 2004 and the equipment has been recently shipped to Democratic Republic of Korea.

Korea is a very large market for Magaldi's technology: 48 operating coal fired units for a total generation of 20,083 MW, and 10 boilers under construction and planned, for an additional future total generation of 6,060 MW. After the introduction of MAC® technology, Magaldi Group has prepared a strategy to start the marketing activities for the exiting units and hopefully commencing the retrofit projects shortly. The benefits deriving from the large water saving, boiler efficiency increase, sale of bottom ash, safety in operation, reduction of O&M costs are very important and evident drivers for a short Return on Investment. The good understanding of the dry ash handling system by the five Korean Generation Companies and local companies involved in this business will lead in the short-medium term to the complete conversion of technology adopted for the bottom ash extraction.

The Taean Plant has been designed to withstand to the operating condition as per the client specification and in detail is composed by:



- Mechanical Seal
- Bottom Ash Hopper with Bottom Doors
- MAC® Conveyor
- Primary Crusher
- Postcooler Conveyor

The plant is completed by Kawasaki Plant Systems Ltd. with special Rod Mills, to pulverize the bottom ash at the same size of the fly ash and mix the product together.

The operating conditions are the following:

- Bottom Ash rate: Normal: 4 t/h
  Maximum: 12 t/h
- Storage time into the Ash Hopper: 8 hrs
- Reduction of unburnt carbon content in Bottom Ash: <4%

The first trial operations on Unit #7 are forecasted to start on February 2006, six months later Unit #8 will commence operating as well. Magaldi Group looks forward those days confident in the full success of the operations as well as in all the installations world-wide. This will lead to a positive effect on the market that will quickly have confidence in the MAC® technology and start moving toward the conversion to dry bottom ash handling for the existing units as well.

Italy

MAC®+MAR®: Magaldi integrated system

by Daniele Ricci *R&D Engineer* daniele.ricci@magaldi.com

Dry extraction and recycling of bottom and fly ash, costs reduction and better valorization of " by products"

MAIN

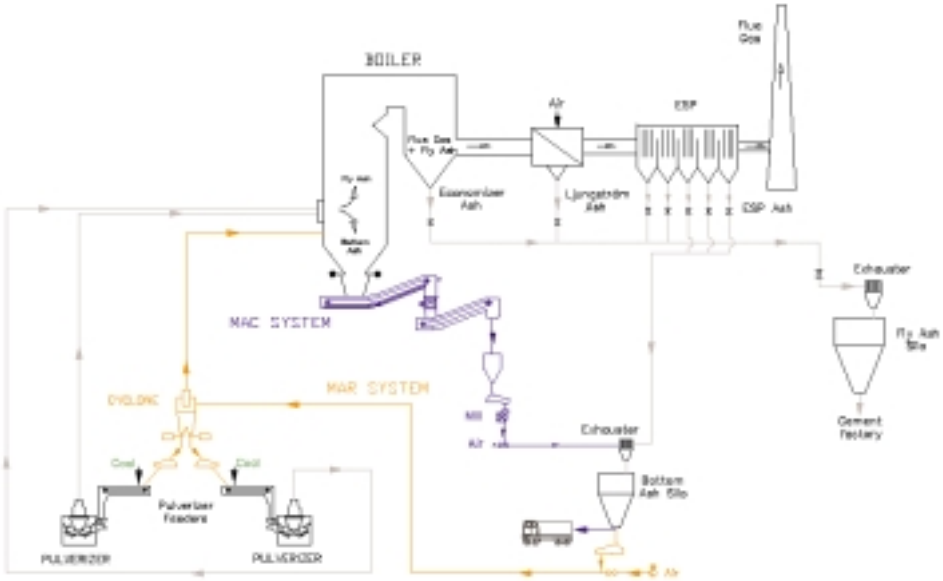
In the last years the respect for the environment has become the main target for many power plants in the world. At the present time all the efforts are focused on the emission reduction (CO_2, NOx, SOx, particulates, etc.) and on the valorisation of the ash considered as a waste till few years ago.
These problems are amplified for the power plants provided with solid fuel fired boilers. Besides, some years ago, there have been effected international standards that regulate the possible uses of the ash as a constituent of cements (ENV 197-1) and concretes (UNI-EN 450). In this way the ash is not a waste anymore, but it can be considered as a source of useful by-products if it respects the limits specified in the above mentioned standards. In order to reduce these environmental impacts and to make ash usable in cements or concretes, MAGALDI has developed and patented a system able to extract, cool and recycle into the combustion chamber, the ash coming from solid fuel fired boilers.
This new system combines the **MAC®** (**M**agaldi **A**sh **C**ooler) System and its development, called **MAR®** (**M**agaldi **A**sh **R**ecycling) System, resulting in an integrated MAC® + MAR® System.
The MAC® System allows to extract, convey and cool the bottom ash of a solid fuel fired boiler in a completely "dry" way, while the MAR® System recycles into the combustion chamber the dry bottom ash mixed with high unburned content fly ash.

MAR® SYSTEM WORKING CONCEPT

Bearing the well known MAC® System working concept in mind, it is possible to focus on the MAR® System one.
The MAR® System allows to recycle the "dry" bottom ash and the fly ash collected by the electrostatic precipitator (ESP) sections with the highest UBC (UnBurned Carbon) content.
The ash to be recycled is temporarily stored in a silo. Then, from this silo, the ash can be conveyed to the coal feeder level in two different ways:

- Pneumatically, through different systems (vacuum, pressurized conveyance or using ejectors).
- Mechanically, through suitable MAGALDI conveyors and bucket elevators.

Referring to the solution 1), see the ow-diagram, the ash to be recycled is



pneumatically conveyed to a cyclone. In the cyclone the finest ash fraction is directly drafted into the combustion chamber due to its negative pressure, while the coarse ash fraction is dosed to the coal feeders and then it passes through the coal pulverizers before being injected into the boiler by the coal burners.
The choice to recycle the ash through the coal pulverizers is driven by the possibility to reduce the bottom ash grain size up to a value comparable with the ESP fly ash one. Besides, the ash enters the combustion chamber near hot areas that means a fraction of the UBC contained in the recycled ash, can burn thanks to high temperatures and proper residence time.
Referring to the solution 2), the cyclone is not required given that the chosen ash is conveyed to the coal feeder level by suitable MAGALDI conveyors. Then this ash can be dosed to the coal feeders, for instance, by vibro-feeders before going into the boiler with the same path of the previous solution 1).
The choice of the MAR® System configuration mainly depends on the specific project and boiler designer. The MAR® System can be implemented, as a retrofit, downstream the 80 MAC® Systems already in operation in the world.

MAC® + MAR® SYSTEM BENEFITS

In addition to the MAC® System benefits, the MAR® System ones include the following:

- Conversion of bottom ash into saleable fly ash to cement factories.
- Complete elimination of costs associated with bottom ash handling and disposal.
- UBC content reduction in the fly ash due to the dilution factor of dry bottom ash (poor in UBC) and by choosing the ESP sections with the highest UBC content.
- Boiler efficiency increase thanks to the heat recovery by the UBC content reduction in the recycled ash.
- Fly ash in compliance with ENV 197-1 for cement and UNI-EN 450 for concrete (UBC ≤ 5% and fineness ≤ 40% as oversized particles on a sieve hole diameter of 45 µm).
- Respect for the environment: mixing fly ash with cement, CO_2 emissions decrease. The production of 1.0 ton of Portland cement produces about 0.92 t of CO_2 (CO_2 trading ≈ 30 €/t).

Magaldi Ecobelt v/s drag chain conveyors

by Paolo Magaldi *Mktg. Manager - Member of the Board* paolo.magaldi@magaldi.com

The Magaldi Ecobelt is a patented conveyor whose main feature is the ability of handling bulk materials in an enclosed steel casing, which guarantees a total environmental protection.

The technical characteristics of the Magaldi Ecobelt are unique for its capability of handling hot, dusty and abrasive bulk materials of any lump size without limitation of temperature and hardness and with inclination ability up to 45°.

The Magaldi Ecobelt Conveyor is based on the well known technology of the Magaldi Superbelt, a steel belt conveyor with hundreds of worldwide references. The Magaldi Superbelt is totally enclosed in a steel casing but all the rotating components are left outside in order to allow their maintenance while the conveyor is operating.

Moreover the Magaldi Ecobelt is provided with a number of "dragging buckets" that collect the fine particles accumulated at the bottom of the casing and then bring them back on the carrying side of the belt. The Magaldi Superbelt cannot break suddenly; this guarantees the continuing operation of the conveyor even under the most extreme operating conditions such as material high temperature and abrasiveness. For these reasons the Magaldi Ecobelt conveyor is the ideal component for the MAC® Systems (Magaldi Ash Cooler).

In this application it is positioned downstream the primary crusher and thanks to the counter-flowing stream of air, it becomes an air-ash heat exchanger. In today's technology and within certain temperature levels, lump size, inclination and lenght, the alternative equipment able to transport bulk materials in an enclosed casing is the Drag Chain Conveyor.

The following table shows the main differences between the two technologies:

MAGALDI ECOBELT	DRAG CHAIN CONVEYOR
Dependability	
It is with no doubts its best feature. Even if some components break, the belt never stops. There are no possibility of sudden failures. Maintenance can be performed during scheduled shut-downs. Magaldi guarantees no sudden breaks of Superbelt for 5 years.	Any chain can suddenly break in its weakest point. In case of chain breakage, the conveyor stops with consequent loss of production. A chain breakage cannot be predicted.
High temperature resistance	
The Magaldi Superbelt withstands higher temperatures than standard chain conveyors, because the belt components are free to expand in any direction without permanent deformation. And all rotating component are placed outside the steel casing in a cool environment.	Drag Chain conveyors have a limited resistance to high temperatures. Hot environment temperature over (T>350°C – 660°F) causes loss in hardness of chains and sprockets.
Ability to handle big lumps of any hardness	
The Magaldi Ecobelt is based on a belt technology, therefore it can be sized to handle any big lumps. It is available in widths that range from 300 mm (1 ft) to 1.200 mm (4 ft).	Drag chain conveyors work fine with bulk material of almost fine grain size. Should the material contain also very hard lumps or metal pieces, the chain will be subjected to overload with consequent possible chain sudden breakages.
Inclination ability	
The Magaldi Ecobelt can incline up to 45°. The belt is provided with transversal cleats to form a sort of "bucket" conveyor that can efficiently transport any material at high inclination.	Inclination reduces quickly the capacity of drag chain conveyors. The steeper the incline, the lower the tonnage they can handle. This results in a useless over-sizing of the conveyor with consequent cost increase.
Wearing resistance	
The Magaldi Ecobelt, based on a belt technology, simply transport the material without dragging it. Abrasive materials do not affect its life because there is no relative movement between handled material and the belt's pans during conveyance. Even in the heaviest applications the expected life of the belt is 10 years and the belt comes with a standard 5 years warranty.	Drag chain conveyors, as the name suggest, continuously "drag" the material in the conveyor casing. The handled material is continuously "grinded" between the chain scrapers and the casing itself, resulting in a quick wearing of those components. Regular maintenance is therefore required and life of the component can be very short, depending on material abrasiveness.
Low operational cost	
The Magaldi Ecobelt requires less power than drag chain conveyors. It lasts longer and requires less spare parts stock.	Drag chain conveyors require high installed power due to the friction between the transported material and the casing. Moreover they require to have a complete set of spare chain and sprocket because of sudden breakage.

MAGALDI AT GLANCE

MAGALDI CELEBRATES ITS 75TH ANNIVERSARY

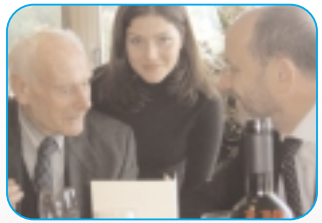
Back in 1930, just one year after the foundation of the Cinghie Magaldi company, Ettore Basile, a young fellow, began his working relationship with Paolo Magaldi, the founder of the company, and he became soon one of the most important associate. Since then, for the past 40 years (also known as "the Captain") remained faithful to Paolo as the Buccino workshop manager.

On December 19th, 2005 in occasion of the 75th anniversary of the Magaldi Group foundation, Mario Magaldi greeted Ettore and his niece Noemi Sacco, enjoing the dinner together.

Noemi, who recently graduated in Chinese Language, works now in our Beijing's office as the assistant of the China's Export Manager.

Paolo Magaldi

From the left
Letizia, Raffaello and Paolo Magaldi



From the left
Emilio Basile, Noemi Sacco and Mario Magaldi

Mario Magaldi (in the center) with his staff

OPENING OF MAGALDI POWER REPRESENTATIVE OFFICE IN BEIJING

Magaldi has been active in China introducing the first MAC bottom ash system to this Country in 1997 at SANHE' power plant in Beijing.
The installation of the first SUPERBELT conveyor in the HUA DONG TEKSID foundry in Shanghai dates back to 2000, and with 106 meters length is still the longer ever designed.
Since then the recognition of the quality of Magaldi products has grown, and to cope with the increased demand of the market, the Magaldi Power Representative Office was opened in November 2005.
The office is located in prestigious Lufthansa Centre in Chaoyang Park district in Beijing and well expresses the willing of Magaldi Power to offer more and more dedicated services to its Chinese Customers.
A committed staff, either Chinese mother tongue or fluent in Chinese language, is at Customer's disposal to offer a wide range of information and services related to our dry bottom ash extraction systems.
Both our existing and potential Customers are warmly invited to take a deep dive into all aspects of Magaldi technologies by contacting Ms. Noemi Sacco and Mr. Yu Qian at the under mentioned e-mail addresses:
noemi.sacco@magaldi.com
yu.qian@magaldi.com
Further information will follow in the next issue of Magaldi News.

SALES AGREEMENT FOR THE USA FOUNDRY MARKET

Magaldi Industrie S.r.l. has recently signed an agreement with Mr. Dan Noll for the sales and service activities in the US foundries.

Dan has an office in Detroit (MI) and thanks to his background, is a very well known name in the foundry market.

His first goal has been the consolidation of the representative network, in order to cover the complete market and to provide the customers with the technical support that they deserve.

We wish Dan a very successful future, for further information do not hesitate to contact him at the numbers below:

Dan Noll
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248-535-3205 mobile
danielnoll@comcast.net

From the left
Fabio de Feo (Magaldi U.S. Area Manager) and Dan Noll

MAGALDI
Dependable technologies

MAC - Magaldi Ash Cooler
Dry bottom ash extraction system

Magaldi Fluimac
Dry ash extraction system
for fluid bed boilers

MAGALDI MRS - Magaldi Mill Rejects System
Dry coal mill rejects handling system

MAR - Magaldi Ash Recycling
Dry extraction and recycling
of bottom and fly ash

MAP – Magaldi Ash Post combustor
Bottom ash post-combustion system

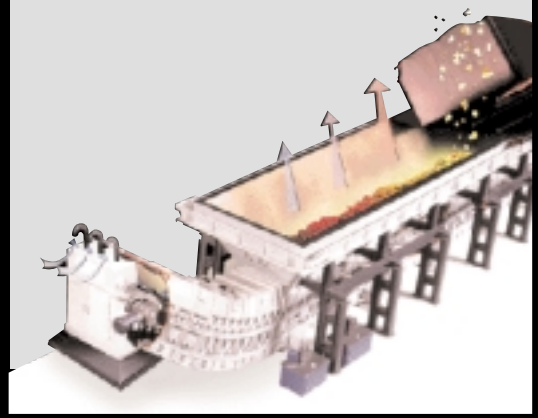
Magaldi Superbelt
Dependable steel belt conveyor

MCC - Magaldi Casting Cooler
Magaldi Superbelt for forced
air casting cooling

Magaldi Superbelt PR
Magaldi Superbelt for casting
sorting over sprues

Magaldi Ecomag - Ecobelt
Dust proof Magaldi Superbelt conveyor

Dependable by innovation since 1929



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