Energy and Water Treatment Technologies

Three Cannon Group companies are fully dedicated to energy production and water treatment technologies: BONO Energia, ARTES Ingegneria and BONO Sistemi.

**Energy and Water Treatment Technologies**

Cannon is an international Group supplying worldwide a wide range of industries with dedicated engineering solutions. Main fields of activity are currently Plastics Processing Technologies (for Polyurethanes, Composites and Thermforming), equipment for Energy & Ecology, Aluminium Die-casting machines, Industrial Electronic Controls.

Independence, Innovation, Internationality are three "Ts" that characterize and have contributed to the success of this dynamic Group. Continuous involvement of Cannon in their Customer’s needs and success, in their Partner’s vision and strategy, in the continuing evolution of their technologies have kept the Group ahead and well alive, in spite of the turbulences of the economy and the difficulties of a highly-competitive business environment.

Today more than 1,000 employees work in 12 Manufacturing Centers and in more than 50 Locations and Agencies, servicing more than 25,000 industrial Companies all over the World.

**Making “Energy Efficiency” means “to make more with less”. Being helped by an expert means making this route more quickly, avoiding mistakes and wrong investments. The mission of BONO is to assist our clients in this delicate process of efficiency improvement of their own energy sources, respecting the environment and the local rules, using the available subsidies.**

The term “making energy efficiency” is defined as “a set of actions involving programming, planning and implementation of operative tools and strategies allocating for the consumption of less energy to obtain the same results”. Energy efficiency, in these terms, should not be confused with energy saving. As the EU says in their Green Paper for Energy, making energy efficiency does not mean “saving” but “making more with less”.

Where and how is it possible to make “energy efficiency”? At home, we can work on the intelligent use of domestic electrical appliances, using them when it’s more convenient and at a higher rate of exploitation. Or, using the energy conservation concept, by providing a better thermal insulation of the periphery of the house (roof, walls and windows). Or by using condensing boilers for the heating system.

At work we will apply the same “domestic” cares, only on a larger scale, on the most energy-hungry components of our equipment: industrial motors, fans, boilers, coolers, air conditioning.

In order to achieve measurable results we need to define and measure the energy requirement of our activity, identifying those areas where we mostly waste energy and those where we can be more effective to improve our efficiency. Since, in most cases, we are not structured to run this audit with internal resources, we’ll need a consultant able to define where we are wasting and how to avoid this in future. At this point BONO can help.

Innovative producer, for more than 50 years, of thermal plants and water treatment systems, BONO offers a specialised consultancy for the energy efficiency improvement process to industry, communities, power plants. We developed innovative technological solutions and we can analyse, measure, economically quantify the energy waste of any production site.

We own the technologies and the solutions to increase the energy efficiency of the burners up to the highest limits defined by the thermodynamics laws.

We know how to produce energy from renewable resources, as biomass and biogas deriving from various industrial processes (forestry and wood, paper and pulp, sugar mills, breweries, wineries, food).

We know how to reduce the consumption and the volumes occupied by the treatment of primary and secondary water.

We exploit the integration with other Cannon Group companies – we’re part of it since 25 years, in 2013! – to apply the latest electronics to monitor the emissions, with closed-loop control in real time of all the combustion parameters.

Most of all, we do this since the very beginning, improving the efficiency of thermal units still able to guarantee good yield and running costs economy for many years to come. By applying these innovative solutions all over the World, we got used to work side-by-side with domestic and international authorities in charge of the implementation of global energy efficiency programs.

Today, more than ever, an increasing number of governments understood that it is convenient to award the entrepreneur that saved fuel in its industrial process, and that it pays to contribute financially when he invests in innovative equipment that will provide him with further savings in energy and contribute to preserve the environment by emitting less noxious gases.

In Europe these thermal subsidies are already effective, opening new frontiers to companies willing to invest in R&D, even in cooperation and joint venture with other firms of the same field of activity or territory. BONO already helped numerous clients in this exercise, successfully sealing a number of efficiency projects assisted by domestic and European public boards.

You will find in this Cannon News several examples of innovative technologies, for both thermal energy and water treatment, that might help you solve one of your current problems: why don’t you talk with one of our companies?

By working together, difficult problems find an easier solution! Enjoy the reading.
We share your success, since 1958

Efficiency and Safety for the food industry

Since the very beginning of its history BONO has been cooperating with the food industry, by supplying technical solutions aimed at the highest energy efficiency and to the reduction of consumptions and emissions, limiting the environmental impact of the industrial processes.

A recent example of this philosophy can be found at Peroni (SAB Miller Group), an Italian leader in the production of beer. A BONO Energia fire tube boiler, with a steam production capacity of 20 ton/h at 15 bar, can be fired with natural gas, diesel fuel and a blend of natural gas and biogas, made available by their production process.

Thanks to its condensation concept this boiler guarantees an efficiency higher than 99%. Characterized by a very low emission level – with NOx lower than 100 mg/Nm3 and CO lower than 50 mg/Nm3 – this boiler is an example of a new generation of efficient thermal machines for environmentally- and budget-conscious industrial clients.

Another prestigious reference comes from Galbani (Lactalis Group), an historical Italian leader in dairy products. Their 10-t Baba steam generator hits a 96,5% efficiency higher than 99%. Characterised by a very wide scope of supply offered to BONO the possibility of the environmental footprint of the production processes.

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BONO fire tube boilers: when one pass less provides more advantages!

Simplicity often means reliability and provides higher performances! This is the case with the “2-passes” fire tube boilers designed by BONO Energia. First of all, their simple pressure structure provides higher reliability thanks to the complete accessibility to the tube sheet, tubes and fireplace, both from the burning system side and the fire inversion zone. Cleaning and maintenance operations require less time, thus avoiding long stops that will affect productivity.

This product is characterized by a wet-back fire inversion zone, where a water tube section not only positively contributes to the heat exchange but also permits a direct access to the tubes. The solution adopted to connect the inversion zone to the body of the machinery also permits the free expansion of both the body and the tubes, avoiding ties that often weaken considerably the machine. The wide fireplace and the flat distribution of the tubes not only ensure a balanced heat exchange but also obtain a very efficient combustion for both natural gas- and oil-firing boilers. All tubes are also exposed to the same heat exchange conditions, avoiding the considerable imbalance between the second and the third pass in the “3-passes” models. Furthermore, the absence of the third pass provides the steam room with a wider space, allowing for a quicker adjustment in case of sudden variations of output. The structure, wholly designed by BONO Energia, also permits the introduction of an integrated heat recovery system, which further enhances the boiler efficiency up to 95 %. Therefore – with BONO “2-passes” boilers – simplicity is a synonymous of reliability and high performances!

Using Waste Fats of Animal and Vegetable Origin? Get higher reliability and efficiency!

The “2-passes” solution described above, easy to be controlled and inspected, is particularly appreciated for critical applications, where the fuel contains high levels of impurity even after the combustion, as bottom ash depositing on the fire side. In this case it is mandatory to frequently clean the tubes, even monthly, otherwise these impurities will settle down affecting the heat exchange rate and the overall boiler performance.

BONO matured numerous and significant experiences in the field of animal and vegetable origin fuels and waste fats.

The complete plant, of which the steam boiler is a component, was designed and supplied by Soffimat, a French company specializing in sustainable energy production and transformation. This high-quality, tailor-made steam boiler resulted highly competitive in terms of quality and of running costs. The ease of maintenance is only one of the advantages provided by this BONO product: the special competence deriving from 50+ years of experience in combustion processes resulted in the installation of a proprietary “Cliconic” burner, famous for its reliability and flexibility with heavy fuels. The “Cliconic” is entirely designed and made by BONO Energia, that also guaranties the maintenance and spare parts services.

Another significant achievement in this field is represented by the recent installation of a multi-tubular hot oil heater OMP 400 and a fire tube boiler SM 500 in two industrial laundries in Cagliari, Sardinia, both utilising fuels of animal origin. These two boilers not only are able to burn a low-sulfur fuel but also can be fed by an oily fuel resulting from the waste oil from animal meat (cows, chickens and pork) in a nearby slaughterhouse that obviously allows for significant economic savings in running costs.

BONO Energia recently provided a fire tube steam boiler SG 1000 fed by chicken-processing waste fuel. The equipment is installed at “Hawa Chicken”, a large Lebanese chicken-processing company.
"Energy efficiency, in addition to environmental benefits, reduces energy costs: energy saving means to be more competitive and thus create a competitive advantage for companies"; this is how begins the “Manifesto to increase energy efficiency” drafted by Francesco Perrini, Milano’s Bocconi University professor and director of the CReSV - Center for Research on Sustainability and Value - who presented the results of its survey on energy efficiency and savings in September 2012.

The thesis of the study is that the efficiency should not be seen by firms as a mere obligation imposed by government, but as a tool to create value. The legislative constraints must be kept in mind anyway: the European Parliament has adopted the Directive on energy efficiency on 11 September 2012. This law aims to reduce fuel consumption by 15% by 2020, indicating energy efficiency as the way to achieve this goal.

In fact, it is introduced the obligation for the large companies to accomplish an energy audit every four years; SMEs too are encouraged to do likewise. Beyond the regulatory framework, the Italian industry is losing competitiveness due to the absence of strategies for boosting the efficiency; the situation is even more critical considering that several parts reported alarming statistics.

The Politecnico of Milan, in its “Energy Efficiency Report” released last November 2012, showed that the Italian companies buy energy at a price that is higher than 25% of the European average. Even the research by CReSV Bocconi has noted that the reduction of industrial energy consumption occurred from 2007 to 2010 is not due to a process of increasing efficiency, but to the fall in production due to the global crisis. Professor Perrini also considers that Italy is highly vulnerable as regards their own needs: 70% of its consumption are in fact mainly covered by non-renewable sources, such as natural gas, and imports from sources such as oil and coal. Greater energy efficiency becomes at this point a target that cannot be postponed.

Italian companies are still ready for the challenge. Encouraging signs in this case come from another Bocconi research entitled "The utilities and marketing of energy efficiency services."

The study was conducted by Fabio Ancarani, Director of the Marketing Area at SDA Bocconi, and was aimed at corporate customers of the suppliers of energy. What emerges from the interviews conducted is that the respondents belonging to various sectors, show a high interest across and know-how on the topic of energy efficiency; most of these companies have also stated that they had already received, or at least that they intend to use, efficiency service.

The key drivers identified by investment companies are saving, sustainability and brand image. Companies have, however, very specific requests to be put to utilities: in addition to a relationship with a single supplier, in fact, they want transparency, simplicity, customized solutions, ability to receive offers and to buy modular packages. Whether Fabio Ancarani found these elements as key factors for utilities, Francesco Perrini has instead analyzed what types of incentives should propose the state.

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In the case of smaller companies, the new energy efficiency directives are considered as a ‘tool to create value’, according to a study conducted by the CReSV Bocconi. The study was carried out on a sample of 150 SMEs included in the Valpolicella vineyard (Italy) and shows that: 35% of the companies have already implemented energy saving measures, 29% of which have already obtained positive economic returns; 16% of the companies have introduced energy saving measures for the first time. The study also highlights the need for more information and training on energy efficiency and the importance of setting up an energy management system.

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### OptiSpark, all under control!

**OptiSpark**, developed by Cannon BONO, is the automatic control and management system for industrial boilers and boiler rooms which ensures continuous and safety operation, energy efficiency and lower ownership costs.

Applicable to all types of boilers, it is suitable for any burner and interfaceable with every external supervision system. The human machine interface is user friendly and its touch screen operator panel available in two sizes: 5.7” and 10.4”.

OptiSpark can offer an Integrated Burner Controller BCU (Burner Control Unit) SIL3 certified, burner start-up sequence management and micrometric Gas/Air Ratio Control (GARC). Its capability to provide the management of the inverter installed on the feed water pump and on the fan engine ensures maximum energy savings and reduced noise level.

Moreover, in order to support the achievement of green benefits, it is able to provide energy-saving registration and heat recovery management.

OptiSpark enables an integrated control of the pollutant reduction systems to the chimney and a continuous emissions monitoring system.

In compliance with EN 12953-6, it also allows a 24/7 operation without continuous supervision with complete safety, historical data recording, alerts and notifications via SMS, LAN port for remote control and supervision and maintenance service via Internet or GPRS modem are also among its functionalities.

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**Incidence of energy bill on EBITDA in some Italian industrial sectors (Energy Efficiency Report 2012, Politecnico of Milan)**

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Energy efficiency: important for the economy and sustainability

In the context of energy efficiency, the focus becomes on reducing consumption and improving the efficiency of energy use. Renewable sources, such as natural gas, and imports are mainly covered by non-renewable sources. Several companies are saving, and the legislative constraints must be kept in mind.

The thesis of the study is that the efficiency impact of their process had to be taken in serious consideration, due to the location of the factory into a very populated quarter of Biella. One of the main items under constant scrutiny from the local health authorities were the gas emissions from various sources: the boiler fumes, the PVC plasticizers, any chemical vapour generated during the plastics processing activity.

To find out the most convenient solution, Ing. Fiallo, the Factory Manager of Chiorino, consulted the BONO specialists in Peschiera Borromeo, near Milano, Italy. Their efficiency-improvement proposal was quite radical, but they promised full cooperation and a fast change-over during the Christmas - New Year holidays of 2011. Their technical and economical proposal was accepted by the Company Board, and the remake started.

The package proposed by BONO included:
- One economiser to be mounted on the fumes circuit, to recover a substantial amount of heat used to warm up water that becomes steam in the evaporator connected to both oil boilers.
- A revised circuit for the hot oil, that now does not lose temperature when one of the boilers is not in function.
- Inverter controls on all the rotating parts (pumps and fans) to guarantee reduced energy consumption during their use and avoid overheating and alarms from the safety valves.
- A revised circuit for the fumes, to reduce NOx emissions as required by the current regional legislation.
- A complete recovery of the flue gases (mostly PVC plasticizers and BMP) generated in their processes, that are conveyed to a post-combustor to fully exploit their latent heat and avoid noxious emissions in the atmosphere.
- A complete new electronic control, based on BONO OPTISPARK system, to manage in closed loop the whole thermal station.

The installation of the new equipment and the modification of the circuits took place during the vacation week between Christmas and New Year, with a second refining step programmed at the end of February. A tight cooperation between the technical staffs of Chiorino and BONO allowed for a flawless transition, avoiding any loss of production. The heart of the system never failed, allowing Chiorino to maintain their standard working schedule: the 270 employees of the main factory worked around the clock from Monday 6:00 am to Saturday noon time since the very first day after the completion of the scheduled stops.

The results have been completely satisfactory for Chiorino
- Thermal efficiency raised from 89-90% up to 94%, with a substantial 4% saving in fuel's cost.
- Inverter controls on all rotating parts (pumps and fans) allowed to save 28,000 € per year on the electricity bill.
- Management of the thermal station has been improved and simplified, thanks to the OPTISPARK electronics.

The thermal oil temperature, measured on the return line, drives automatically the operation of the second boiler, which starts only on demand and is kept idle during summer. Only this method provided a 10% saving in fuel's cost.

Chiorino's Factory Manager, Marino Fiallo, checking the thermal plant efficiency on the control panel of their BONO oil heater.

Chiorino occupies the same production site, not far from the centre of the town, since 1906, when the founder, Lorenzo Chiorino, started making leather belts for the rising textile and wool-processing industry that made this Piedmont town famous in the world.

All the fundamental production phases still occur here, while confectioning, customisation of orders and packing are executed in a new larger factory in the southern suburbs of the town. All this technological evolution required a thorough redesign of the processing halls, and the environmental impact of their process had to be taken in serious consideration, due to the location of the factory into a very populated quarter of Biella. One of the main items under constant scrutiny from the local health authorities were the gas emissions from various sources: the boiler fumes, the PVC plasticizers, any chemical vapour generated during the plastics processing activity.

The decision was not simple. The BONO equipment was still in good shape, although the oil distribution circuit suffered from an inefficient flow of liquid that wasted part of the heat when one of the two boilers was not in use, as in summer. On the other end installing a new thermal plant and circuit would have meant an unceaseable step in production, hard to justify economically and very much annoying for their 33 locations spread around the world: more than 40% of their business is done with custom-made conveyors and belts, impossible to stock in advance as it is normally done for the rest of their products.

“The pay back of the investment has already been reached, after 10 months” proudly says Ing. Fiallo “and we must acknowledge the full cooperation of BONO specialists to achieve this satisfactory result. Week-end or night-time, they always replied to our calls with immediate actions and a problem-solving attitude!”

Next steps, since the search of “total quality" is a must expressed in Chiorino’s mission, will be a further improvement in the flue gas recovery and a sophistication of the pumping units that assure the oil recirculation throughout the whole factory, adapting their speed to the actual pressure drop of the fluid, to optimise their noise and electric consumption.

The success story of Chiorino SpA demonstrates that significant efficiency improvements can be obtained for existing thermal plants, with reasonable economic investment and minimum disturbance to the production cycle: the BONO division in charge of these projects (efficiency@bono.it) will gladly investigate and propose the best solution for your case!
Growing: an international challenge

Tripling in four years the percentage of abroad sales maintaining the current domestic market share. This is the goal – ambitious but achievable – for Leonardo Volpato, responsible for the “Internationalisation Project” by BONO Energia, the Cannon Group’s company that deals with steam and water technologies. We interview him to deepen the strategic aspects of this initiative.

Cannon News: could you introduce yourself? What is your role within the Cannon Group and your previous work experience? Leonardo Volpato: After a Master of Science in Mechanical Engineering at “Politecnico” of Milan I got an MBA at “Bocconi” Commercial University. I first worked as Project Manager in the automation and automotive sectors. Then I joined the Cannon Group, where I initially dealt with turnkey projects in the polyurethane transformation sector. Since 2011 I have been working at BONO Energia.

C.N.: How did your experience at BONO Energia start? L.V.: I started with the “Energy Efficiency Project”: a series of after-sales proposals aimed to increase the efficiency of already operating boilers: this service allows our customers to significantly reduce fuel consumption and emissions, saving money and increasing the safety of the installation. We work on the quality of the combustion, on the heat recovery and on the rational use of electricity. We also install automatic control and management systems that optimize the operations of the individual boiler or of the whole boiler room. Our offer is completed with the proposal of preventive maintenance plans, also via remote control. We have already gained important clients in all the relevant sectors and the work is now well underway.

C.N.: You have been developing the “Internationalization Project” for one year. What is your current position in the market and what are you aiming for? L.V.: BONO Energia began to build thermal plants in 1948. Our wide offer is the strength that sets us apart from the competitors: we can satisfy a steam production from 0,3 to 200 t/h and a thermal capacity from 0,2 to 80 MW.

All our products are conceived according to our customers’ requirements, with a “tailor made” approach: we not only realize but also provide our clients with steam and heat for their production process: they are companies operating, for example, in the food & beverage, pulp & paper and chemical & pharmaceutical sectors; we also serve EPC contractors and end users from the oil & gas and power generation fields. We manage these different targets with two dedicated divisions: the “Industrial Division” and the “Engineering Division”.

Globalization had a very noticeable impact over the world of energy and steam. The Italian market, where BONO Energia is leader, is now mature: at the moment we mainly work on energy efficiency interventions on already operating boilers and on spare parts activities. The activity of the Industrial Division, although following an expansion trend, is still characterized by large peaks of activity and periods of calm. To grow and to stabilize the business we are looking abroad, where we see good opportunities. Our goal is to triple the export share of our products within the next 4-5 years, maintaining the leadership in the Italian market. It is difficult, but we can do it.

C.N.: What is your plan to achieve this goal? L.V.: We point to niche markets, where technical capacity and customization represent the key factors for a client, a client that is willing to pay more for a reliable and efficient product. Thus we are competitive also in countries far from home, where manpower is cheaper and there are strong protectionist policies. A recent example of our approach is the supply of a fire tube steam boiler, characterized by the condensation technology, to a major player in the brewing industry: with this generator we gained an efficiency rate of more than 99%.

Another technology very appreciated abroad, thanks to the perfect temperature control for applications in the pharmaceutical, chemical, petrochemical and district heating sectors, is represented by thermal oil heaters, realized in two different solutions: coil design and multitubular.

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C.N.: Products so advanced in terms of technology require a commercial and post-sales service. What is your organisation providing, at this respect? L.V.: A highly qualified local service and sales people capable of interact with customers have always been two strengths of the Cannon Group. We want to adapt to the boilers market the successful model we have been adopting in the plastic sector. We are considering a series of options to be applied depending on the country in which we operate. Each market has its own rules and offers different opportunities for the portfolio of products offered by BONO Energia. ARTES Ingegneria and BONO Sistemi.

We are identifying the best route, considering all the variables: language, mentality, laws, barriers to entry and purchase logics, competitors and expectations. What is common to all countries is the methodology: analysis, definition of a specific marketing mix, promotion and stabilization.

C.N.: Which countries have you chosen to start this project? L.V.: We have started with Russia, where we have been operating for two years at “Cannon Eurasia” Office with personnel dedicated to the promotion of BONO products. Parallel to the industrial development, the attention towards energy efficiency and advanced technological solutions is growing in this country: this factor explains how BONO is increasingly able to assert here its core competencies.

We also have already been operating in Brazil: in “Cannon do Brasil” office our staff is analysing the markets we address to and has already established contacts with the main interlocutors. This country is promising: even if the local supply is well protected by high duties, we can propose a competitive price offering, at the same time, quality products and higher efficiency.

We are also devoting to the French market, where sensitivity to environmental issues is high, our brand is appreciated and we already have very good references regarding large and complex steam generators. Here, as in the French-speaking countries of Maghreb, we are taking advantage of the synergy with ARTES, also offering complete systems for process water and waste water treatments.

In Asia, where our “Cannon Far East” Department coordinate some local offices from Singapore, we already have a full time staff to follow our technologies. Also in this region we are working on niche markets. Although local competitors are strong, both economically and qualitatively, in each country we are able to satisfy the specific needs of our customers: this allow us to enter this market and spread our brand.

In Africa we finally have many references regarding industrial applications, thanks to years of widespread work by our sales people and local agents. Here we intend to strengthen our presence in traditional fuels and to introduce solutions dedicated to alternative fuels, like biomass.

In this field BONO Sistemi could represent a choice for heavy duty industrial heating processes. The thermal fluid heater series OIL-MATIC type OMV is capable of interact with customers have always been two strengths of the Cannon Group. We want to adapt to the boilers market the successful model we have been adopting in the plastic sector. We are considering a series of options to be applied depending on the country in which we operate. Each market has its own rules and offers different opportunities for the portfolio of products offered by BONO Energia. ARTES Ingegneria and BONO Sistemi.

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C.N.: Which countries have you chosen to start this project? L.V.: We have started with Russia, where we have been operating for two years at “Cannon Eurasia” Office with personnel dedicated to the promotion of BONO products. Parallel to the industrial development, the attention towards energy efficiency and advanced technological solutions is growing in this country: this factor explains how BONO is increasingly able to assert here its core competencies.

We also have already been operating in Brazil: in “Cannon do Brasil” office our staff is analysing the markets we address to and has already established contacts with the main interlocutors. This country is promising: even if the local supply is well protected by high duties, we can propose a competitive price offering, at the same time, quality products and higher efficiency.

We are also devoting to the French market, where sensitivity to environmental issues is high, our brand is appreciated and we already have very good references regarding large and complex steam generators. Here, as in the French-speaking countries of Maghreb, we are taking advantage of the synergy with ARTES, also offering complete systems for process water and waste water treatments.

In Asia, where our “Cannon Far East” Department coordinate some local offices from Singapore, we already have a full time staff to follow our technologies. Also in this region we are working on niche markets. Although local competitors are strong, both economically and qualitatively, in each country we are able to satisfy the specific needs of our customers: this allow us to enter this market and spread our brand.

In Africa we finally have many references regarding industrial applications, thanks to years of widespread work by our sales people and local agents. Here we intend to strengthen our presence in traditional fuels and to introduce solutions dedicated to alternative fuels, like biomass.

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Growing: an international challenge

characterized by the condensation technology, to a major extent there are strong protectionist policies. A recent example is the activity of the Industrial Division, although we are already operating boilers and on spare parts activities. We manage these different targets with two dedicated teams from the oil & gas and power generation fields. We do not realize standard products. Our clients use all our products are conceived according to our rational use of electricity. We also install automatic stokers! these two boilers have been in continuous operation since 1961 still produces all the steam required by an industrial laundry in Tuscany. Kept in perfect working conditions by the local BONO Service staff, it just passed successfully the periodical exam and hydraulic test.

BONO Energia has been for many years one of the world leaders in the production of hot oil heaters, which are offered with a wide range of heat power capacity (from 0.2 up to 40 MW) and two main designs: multi-coil type and multi-tubular design. They are widely appreciated for their long lasting service life, their safety under severe working conditions and their high thermal efficiency rates.

The thermal fluid heater series OIL-MATIC type OMV (Fig. 1) is suitable for heating many types of thermal fluids, both mineral and synthetic. Available in a wide range of sizes, the series is dedicated for small and medium capacity outputs, from 0.2 up to 6 MW, and moderate fluid operating temperature, up to 350°C (662 °F). Thanks to its easy design, these series of units have found a large and successful application in different heating processes.

These hot oil coil-type heaters are on the market since several decades and, considering that their design is very simple to imitate, they may look similar to others from a preliminary consideration by the user. However, it is only from a closer technical evaluation that differences emerge and few competitive considerations become the reason of success. Innovation is applied through extensive experience against imitation. OMV boilers, thanks to their well proven design and performances, are the result of competence gained through the 2,000 references achieved and represent a competitive and cost-effective choice for heavy duty industrial heating processes.

In the OMV heater the fluid flows in a turbulent condition, which is enough to ensure a flat temperature profile and a reduced difference between film and bulk temperatures along the entire circuit. The fluid film, in the partially turbulent condition (Fig. 3), has a temperature of 30-35°C (86°F) higher than the bulk one and this situation leads to a fast flow degradation.

Although only a part of the whole fluid volume is present in the film layer, if the fluid temperature exceeds the maximum recommended value (as very often happens in the inner coil, called the radiant section), the whole volume of fluid is quickly involved in a larger degradation rate; this generally doubles with an increase of temperature of 10°C (50°F). The film temperature is not the only one to be controlled in this process: also the bulk temperature must be under strict control. A cracking event occurs in a coil heater when the fluid velocity decreases; and consequently the turbulence decreases and the fluid remains in prolonged contact with the heated surfaces. Even though the bulk temperature may not change so evidently, the film temperature can rise very quickly leading to cracking.

The OMV Coil Heater design is characterized by a turbulent condition, where the difference of temperature between the film and the bulk is reduced, therefore guaranteeing the best operating condition and avoiding cracking and degradation. In order to minimize the degradation rates when using mineral oils above 316°C (600°F), users should take extra care with a proper heater selection in terms of combustion chamber dimension choice. A larger volume of the combustion chamber allows for more room around the burner, which minimizes the radiant energy reaching the coil surface. The same concept applies to the space between the coils.

The radiant section is the area of the tubing that actually faces the flame; depending on geometry and design, up to 60% of the total heat is transferred in the radiant section. The resulting localized heat flow can be three times higher than the average of the entire heater, with film temperatures exceeding the average fluid temperature by 83°C (150°F) or even more. In some heaters, the maximum recommended film temperature of a fluid can be exceeded even if the average temperature is largely within limits. OIL-MATIC OMV employs a new coil design which, if combined with the fluid’s turbulent flow, guarantees excellent heat transfer conditions and the best fluid temperature profile, in accordance with the recommendation of all the fluid suppliers.

Moreover, higher flow velocity in the coils enables to control the fluid itself with simpler control devices, which are not recommended on heaters with lower flow circulation speeds, for the same thermal degradation prevention reasons.

OIL-MATIC OMV works properly also with lower values of velocity circulation, which in other constructions may be critical and rapidly cause degradation, especially using mineral diathermic fluid.

BONO ENERGIA guarantees for these successful thermal machines:

- longer service life of the heater and thermal fluid;
- high level of safety under maximum thermal fluid temperature conditions;
- high thermal efficiency rate.

More than 50 years of service!

Working since more than half a century, a BONO SteamMatic boiler built in 1961 still produces the steam required by an industrial laundry in Tuscany. Kept in perfect working conditions by the local BONO Service Centre, it just passed successfully the periodical exam and hydraulic test.

The Grassi Industrial Laundry in Atepascio, near Lucca, serves since many decades about 120 Tuscanian restaurants and hotels, providing the complete washing and ironing service for any type of natural or synthetic piece of tissue used in the hotel business. Run by the sisters Sandra and Silvia Grassi, the company employs numerous workers and a modern equipment to guarantee fast service and perfect sterilisation of the washed pieces. Among their equipment, two BONO SteamMatic 300 boilers stand out in the power room: their plate numbers speak for themselves! One says “1961 and the other 1979. Purchased second-hand by the father of the Grassi sisters (which are both certified stokers!) these two boilers have been in continuous operation here since the early 1980’s. The very seasonal activity of their clients implies a higher workload during summer, but in average these two machines work 8-10 hours per day, regularly alternating their firing shifts. Three tons of steam at 12 bar feed the whole laundry process: a large rotating washing machine, three pre-dryers, the mangles used to press the sheets, the final

![Products](image-url)

The Grassi sisters (Sandra, left, and Silvia) own the Grassi Industrial Laundry in Atepascio, near Lucca, Italy. The workshop activity is restless, the clean laundry must be delivered, perfectly pressed and packed. “With a regular service these machines still work flawlessly, guaranteeing on efficiency close to 90%!” says Moreno Donatini, who runs the BONO Service Centre in Prato. “Periodical maintenance of the burners and of the hydraulic circuit allows this customer to operate safely and with a limited running cost. This boiler dates from 1961 – its code number is 5/6% – and it just passed successfully the periodical visit required by law with an hydraulic test: actually it hasn’t yet planned for retirement!” And, continues Moreno: “This is not the only boiler of this age that we service in this area: most of the paper mills located in the water-rich valleys nearby use BONO boilers dating 40 or more years, all in perfect shape. These mills have been producing quality paper for centuries, also for banknotes, checks and playing cards. Our clients are very demanding on both product quality and service. We can’t let them down, for any reason!”

Sandra Grassi and Moreno Donatini, Manager of Prato’s BONO Service Centre, in the power room.
Hectic days at ATP (Australian Tartaric Products) near Mildura, Victoria, Australia: the new biomass-fuelled thermal plant supplied by BONO is quickly taking shape. Start-up is foreseen in July, 2013: burning spent wet marc, it will produce saturated steam used to distil Ethanol and produce Tartaric Acid from the same grape’s by-products supplied by the local wineries. ATP is part of the Randi Group (www.randi-group.com), which has a number of similar operations both in Italy and America.

Founded in 1991 by Giovanni Randi, an Italian producer of Tartaric Acid and its salts, Australian Tartaric Products (www.australiantartaric.com.au) quickly grew to establish itself as Australia’s largest manufacturer and supplier of Tartaric Acid. At its plant in Colignan, near Mildura in Victoria state, ATP also manufactures food grade Ethanol, producing and selling natural products only. ATP is part of the Randi Group (www.randi-group.com), which has a number of similar operations both in Italy and America.

Located near the desert, not far from splendid harbours of Genoa. When it arrived on site in Australia, the company had to find a solution had to be found. The system supplied by BONO Sistemi includes:

- A network of conveyors to transport the wet biomass.
- An automatic batch dosing system to feed the marcs to the combustion grid.
- A double-stage preheater, to increase the combustion air temperature up to 220°C.
- Two radiant chambers (post-combustion and inversion) for the flue gas.
- A two-drum evaporator to heat up water and produce saturated steam at 184°C.
- Three dedicated economisers, to reduce flue gas temperature and maximise heat recovery.
- A deaerator, to remove gas from recycled hot water and fresh water refills.
- Flue gas treatment cyclone and baghouse filter, to avoid emissions of dust and fumes.
- A centralised ash recovery system, collecting them from several points of the thermal plant.
- A 25-meter high chimney for the spent fumes.
- A complete electronic control for the whole combustion process.
- Design and engineering of steam and water piping network for the whole factory.

Completely designed and built in Italy, the complex was shipped in October 2012 (in forty 40-feet containers and four huge pre-built elements) from the harbour of Genoa. When it arrived on site in Australia, a 10-specialists staff flew in for the assembly work.

The installation started on January 14, 2013. Now, two months later, a key technical part of the project is completed for more than 70%, and it will be followed by the installation of refractory elements around the combustion chamber and thermal insulation material around all the heated parts. The plant takes a 30 by 20 meter area, with a max height of 25 m.

Federico Volpe, the Project Manager of BONO Sistemi who has led the installation team, says: “We have built a splendid relationship with the staff of ATP and with numerous local: they were supporting us with invaluable help since the very beginning of our activity here. We have even spent our free time with them, visiting the beautiful natural parks of the region, organizing barbecues and boat tours during the week end. They appreciate our hard-working style, and we enjoy their hospitality, the wines and the special fruits of this area. It will be a pity to quit them at the end of the installation!”

Commissioning is scheduled for mid-June. A particular key item of this plant is the first reclaimer manufacturing facility to be located outside of China and the first in Latin America. All volume of reefer manufacturing capacity has been so far located in China, where MCI operates a plant in in Qingdao. Scheduled to open in the beginning of 2014, the new plant will have an annual capacity of 40,000 x 40 ft cube reefer as well as a number of Star Cool reefer machines. It will also be able to build 600 high units to cater for the banana trade.

The plant – that will operate in San Antonio, the largest Chilean port in terms of freight handled and the busiest port in the western coast of South America, 110 km west of Santiago – is expected to create 1500 jobs and in around the town. The city of San Antonio is ideally located in the largest reefer exporting region in Chile and also in close proximity to the other container busiest terminal, Valparaiso Port. Total investment in the project is put at US$170M. According to MCI, the new factory will help correct a reefer trade imbalance that disfavours exporters of fresh produce, fish and meat from western South America. “The new factory will produce MCI’s high-quality reefer in a part of the world where exporters have problems gaining access to reefer.” said MCI CEO Peter Nyman in a company statement released to the press. The core of the plant will be the Polyurethane (PUR) injection plant, where all the foam-insulated components of the box reefer – side walls, roof, floor, front, doors and covers – will be manufactured at a rate of one complete box assembled every 9 minutes. For this large contract MCI launched a bidding process to define the type of equipment. Cannon, that in the 1990’s had supplied a similar plant to Maersk in Tinglev, Denmark, was finalised to provide also this entirely new foaming complex. The PUR foaming equipment will cover an area of approximate 4,300 sqm.

The ten Cannon high-pressure, high-output dosing units will feed, for the foam injection, twenty-five mixing heads (FPL and J1-type) mounted on nine large polymerisation presses, designed according to the bi- and tri-foaming method. They will be manufactured with a high-quality PUR spraying system, for the large and small steel sheet/PUR/steel sheet sandwich panels. The presses will be manufactured with high-quality PUR/urethane injection systems to allow a high volume output and the quality of the foamed panels.

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**Customised water treatment: solving problems all over the World!**

ARTES Ingegneria develops the water treatment solutions of the Cannon Group. Michele Galdi is in charge of the Industrial Division of ARTES: his current mission is to increase the export rate of a range of products and technologies widely established in Italy since many decades. We interview him to understand the strategic and practical aspects of his project.

**Cannon News: How did you get into the water treatment field, and specially at ARTES?**

Michele Galdi: I’m 54 years old, I graduated in Industrial Engineering Technologies, Mechanical applications. I have been always involved in water treatment technologies starting my career in the fields of pulp and paper, food preserves and canning. My third job has been with ARTES Ingegneria, that I left twenty years ago to gain new experiences; in particular I worked for many years as commercial director of Siemens Water Technology for Central and Southern Italy. In 2011 the CEO of ARTES, Pasquale Punzo, offered me the responsibility of the new Industrial Division and that’s how I got back in the Cannon Group. I work in the Salerno headquarter, where I live with my family and where - in the little free time I have left – I teach tango!

**CN: Which products and technologies are produced by the Industrial Division of ARTES Ingegneria?**

MG: We are “problem solvers” able to satisfy the specific needs of every customer. It is therefore a standard product, but every order is handled to create a customised solution. Our technologies and products are those that ARTES have been developing for more than 35 years: water softeners, demineralisation machines, deaerators for central heating systems, filtration systems, water purifiers, water purification systems for waste water with both biological and chemical/physical solutions for the reuse of water from sewage treatment plants.

For every application we propose the most appropriate technology: ion exchange resins, membranes for reverse osmosis and ultra filtration, activated mud plants, and several others.

**CN: How do you describe your market positioning strategy from the geographic point of view?**

MG: ARTES Ingegneria is one of the most important players of the industrial water treatment field and, in specific applications, also in those for civil use. We are the largest player in this field in Southern-Central Italy.

Twenty years ago we used to sell everything only in Italy, but today’s situation has drastically changed. Part of our domestic market disappeared, and we look now at countries that haven’t just developed a new industrial context but an environmental awareness linked to the quality of the released wastewater.

The Engineering Division has brought abroad their proprietary solutions for large plants, especially addressed to the Oil & Gas field; making the revenue of ARTES more than 25 millions of Euros, with a rate of export close to 90%.

My goal is much the same: to export at the same rate – with the highest possible margins – the so-called “standard” line of products made by the Industrial Division.

**CN: From where have you decided to start, and how?**

MG: We started innovating our technology offer, making agreements with a few suppliers of complementary technologies to ours: I quote an example of an agreement with the German company Microdyn Nadir, a firm that produces special membranes for MBR technology (membrane bioreactors); or even the agreement with EXXRO for the “over disc” application of reverse osmosis membranes, the treatment of landfill leachate, highly present in highly urbanised areas.

Then we reorganised our distribution structure: we started by reinforcing the Italian agents network, now I’m working at the creation of the international network for selected markets, countries with a higher potential interest in our technologies, those where it is only available a local offer, with lower quality and lower profitability. We offer performing and completely dedicated solutions, not available locally.

**CN: Which are the target countries that have been identified for this project?**

MG: The Far East is a geographic area where the environmental problems are taken very seriously, particularly the growing use of water, and our solutions are really well suited in this context. The recent opening in Cannon Singapore representative office of a high-level developer business will be a key factor to the entry in this area.

We also launched the MENA project for the Middle East-Nord Africa which has been developed by our Jordan engineer, who got his degree at Napoli University. Speaking to our clients in their own language is really important – but not yet a common practice in Italian companies. We try to do it.

In January 2013 we participated to the most important local fair of this field, The Arab Water Week in Amman, Jordan. The demand for water purification plants is really high, to treat brackish water even if it’s from drains or directly from the sea; the making and reconstruction of the sewerage network will continue as also will the civil wastewater treatment plants. Half of the population of this countries is not connected to a water purifier: an unacceptable hygienic condition, as well as a major stumbling block to the development of the seaside tourism of the area.

The particular conditions of the Brazilian market, pushed us into the research of a partner, responsible of the local production for the larger and less strategic components of our plants.

In Russia and CSI our intention is to build an agents network, led by one of our experts in Cannon Eurasia. Turkey is really interesting for the domestic market where, thanks to high quality and low cost labor we could be able to create a partnership for local production; it is also a strategic position for the control of several developing countries in the Middle East.

**CN: Where is this project leading your company?**

MG: For the future, the goal is ambitious: I want to overcome the one million Euro that has been achieved in 2012, to reach five millions in 2013.

A tough challenge, but we have the potential to achieve it: in 2012 we have generated a high volume of offers, that are being evaluated and defined during these months. If just one in ten of those comes to success, the budget of sales will be reached!
BIOCLAR, an advanced sludge treatment for wastewater

A large part of civil and industrial installations, especially in developing countries, is located in remote and sealed areas where there is no possibility for connection to a public sewer. In these situations the problem of how to adequately treat civil wastewater has to be tackled. ARTES Ingegneria has developed an activated sludge process called BIOCLAR, an advanced technology — compared to conventional biological processes — that fits perfectly with the harsh environmental conditions of remote Oil&Gas fields, mines, outback construction sites.

Each BIOCLAR module consists of an aeration basin and a settling tank. The key part of the treatment is the aeration chamber in which, thanks to its multistage composition, the oxidation process occurs. While bacteria in the aeration tank decompose the sewage to form a suspended sludge, a settling chamber (clarifier) is placed after the aeration chamber to allow the micro-organisms grown in the aeration chamber to settle by gravity, forming sludge on the bottom of the clarifier. Clarified water is discharged by gravity to a chlorination basin where residual bacteria is eliminating through chlorine dosing. The entire plant is run automatically by a PLC (Programmable Logic Controller) that allows for non-stop consumption and is supplied completely pre-fabricated. In fact the package is pre-assembled on-skids and tested directly in the ARTES workshop.

The modular design is compact and easy to transport and requires minimal erection activities on site allowing for a quick start-up of the plant. With this technology ARTES has affirmed once again its role as the ideal partner in the realisation of Oil & Gas projects with the supply of innovative and efficient solutions to treat any kind of water even in the most extreme conditions.

Advantages of BIOCLAR process

• High efficiency in removing the pollutants
• Compact size, because of high concentration of sludge
• Wide range of working conditions
• No chemicals required for standard operating conditions
• Smell-free operation
• Completely pre-fabricated module
• Easy to be installed at site with a reduced erection activity
• High flexibility because of the modular design
• Reduced maintenance because of the very simple design
• Reduced noise impact, silenced blowers

The quality and innovation reached through the development of Process Water Recovery systems allows ARTES Ingegneria to satisfy the requirements of the paper industry to reduce consumptions.

A 60 m³/h Package Process Water Treatment plant supplied to several paper mills in Italy during the past few years is an example of how the expertise and technical competence acquired and more innovative solutions built around the individual customer’s needs.

The system consists of a “Pre-treatment Plant” for river water, a “Demineralisation Plant” for the boiler water and a “Reverse Osmosis” plant to recover and reuse the process water. The fully-automatic system gives excellent results in terms of quality of the water produced, flexibility and running costs.

Ciro Miele, the Technical Assistance Manager of ARTES Ingegneria, says: “The quality of the components used allows to reduce maintenance costs to a minimum while the low consumption of chemicals and measure volume of sludge produced during the pre-treatment phase, keep running costs down. Further systems are covered by a filtering system that guarantees continuous functioning even in the event of a high concentration of suspended solids (like floods and torrential rain) and by a Reverse Osmosis system that allows performance even with higher salinity. Our competence and on-time delivery has convinced several customers to commission us for revamping and further supplies at other sites”.

Zero-waste waters for the Paper Industry

ARTES Ingegneria has been selected for the participation in the GIP Project – Guangdong/Italy Traineeship – whose goal is to reinforce the economic relations between the Italian partner regions and the Chinese district of Guangdong.

The program main executive actor is the Italian/Chinese Foundation and it is also characterized by a partnership with the Italian Foreign Affairs Ministry and with the Emilia Romagna and Campania Regions. The scheduled activities are focused on the formation and traineeship, and they are addressed to Italian and Guangdong private companies’ managers; some formats are also included in the program, whose goal is the consolidation of economical trade relations and experiences. ARTES has fully met all the required selection criteria, including the enterprise goals connected to the mission purposes: the internationalisation trend, the possibility to invest some key resources in China and, finally, the coherence between the enterprise activity with Guangdong’s interested industrial districts.

Specifically, a project – shared with other Salerno-based companies – was presented, titled “Quality and beauty for all citizens”: it starts from the analysis of some environment-related problems of the Gulangyu Island, in South-East China (but it could easily be applied to other parts of the country) and it tackles possible actions regarding urban design, energy efficiency, water, air and ground recovery and regalification.

The interdisciplinary group in charge of this project is also active in the urban consultancy and architecture fields. The whole project is based on a thorough concept, an innovative, global and fully made-in-Italy project. In fact, professionals from ARTES and from other Salerno enterprises have adopted a new expansion philosophy towards the Chinese market: this new strategy is no longer based on single products export, easy to imitate, but on a full package whose integration includes the original Italian know-how. This philosophy is tightly connected with the new Chinese environment, characterized by the emerging market of historical building restoration. Furthermore, the

ARTES, new opportunities in Guangdong, China

The competence and skills of Italian enterprises are widely recognized in this field. The action in the Chinese province of Guangdong started on January 12-24, 2013. ARTES representatives, along with Cannon Far East personnel, presented the “Quality and beauty for all citizens” project and, in particular, the implementation of water and waste water treatment systems: their goal is to minimize the water consumption and the environmental footprint, respecting the original urban structure. This represents a fundamental action for Guangdong’s 105 million citizens living in 177,000 square kilometres. ARTES representatives not only have held formal meetings with the local authorities, focused on the possible actions in their urban context, but have also visited numerous important production sites, with regard to the solutions of common issues in the industrial water treatment. The numerous ARTES references, matured in 35 years of dedicated activity, are highly considered in this region in which water is considered an indispensable resource for all the processes; it is worth noticing that, along with the most traditional sectors (food & beverage, textile and pulp & paper), there are in Guangdong new fast-rising sectors as automotive, electronics and pharmaceuticals.

ARTES worldwide experience, consolidated also in the oil & gas and mining sectors, perfectly fits the presence of extraction and manufacture activities of natural resources as coal, oil shale, metals and semimetals. The start of commercial relations with the province of Guangdong certainly represents a huge opportunity for ARTES Ingegneria. This is one of the most important Chinese productive areas, thanks basically to their openness to the new market trends and to foreign investments: their total 2010 GDP in fact is very close to the Indonesian one (886 billion $).

The local authorities are also aware of the importance of promoting a constant industrial upgrading and a wide reinforcement of the managerial and professional competences of the district. Therefore, in conclusion, Italian enterprises can certainly be considered as credible partners, thanks to their wide experience in a complete range of competences and to their attitude to reach excellent results with limited resources.
Biological Treatment, innovative solutions for the “worst dirt” – protecting the environment

The mission of ARTES Ingegneria: to transform waste liquids in reusable water, contributing to a lower consumption of this precious resource and to a reduction of electricity use. No need to resort to “miracle solutions” – it can be made by developing new technologies and optimising those already consolidated. A recent example worth mentioning is the development of a mono-block biological treatment unit used in the presence of organic pollutants, which integrates the MBR technology (Membrane Bio-Reactor) with a Powdered Activated Carbon (PAC) carrier.

MBR – by combining a biological reaction with membrane filtration – is currently the most advanced technology for biological treatment. This system has a substantially lower footprint than that of a traditional biological plant, which requires the use of large dimension oxidation tanks; it is also very effective in the most contaminated wastewaters, characterised by high values of pollutant parameters: treated water becomes then so pure that it can be used for non-potable reuse and sometimes even classified as drinking water. This system can replace traditional separation phases of activated sludge (sedimentation and filtration that take place inside the tank) with a membrane ultrafiltration step and, thanks to the integrated system developed by ARTES, substantial reductions in energy consumption – up to 40% less compared to traditional systems – can be achieved. The membranes used by ARTES are predominantly produced by MICRODYN NADIR. This German supplier has developed a simple, thus effective, system that, based on mechanical action, removes impurities deposited on surfaces. Its peculiarity: their removal takes place continuously, while the treatment system is in operation. Thanks to this system, the filters can be cleaned, for the needs of the process treating, quite easily. ARTES has integrated the MBR technology with a system in which the activated carbon is trapped in an inert matrix for the adsorption and oxidation of organic compounds; the inert matrix holds the activated carbons promoting the growth of biochemical decomposition of organic substances. Furthermore, the cross linked structure in which the activated carbon is enclosed facilitates the distribution of the organics required for pollutants oxidation and the self-generation of carbon particles.

The new technology, developed by ARTES, was recently presented at the international conference “China EU membrane research and application workshop on water and waste water treatment: process intensification”, held in Wenzhou in November 2012. Research centers, universities and companies, both European and Chinese, have shared their experience jointly developing the current application of membranes in water treatment, outlining the guidelines for future improvements aimed to upgrade its performance, to reduce energy consumption and to allow the full reuse of water; targets perfectly in line with ARTES Ingegneria mission.

The effective performance and the reduced footprint of this solution allows it to be successfully applied to wastewater treatments in civil settlements and in the food, paper and textile industries. In particular for landfills, is another example in which the MBR technology can be successfully employed.

Research & Development

Conventional Activated Sludge Process

Integrated MBR Process

Three Cannon JL 32 mixing heads feature a combined output capacity of more than 1,000 l/min of Polyurethane!

A very generous “wet end”

The foam deposition, in open mould, is done while the movable platens enter in the press. With this pouring system the most critical point is to get a fast movement of the platen, linked with a high-enough components output, so that the press is surely closed before the foam reaches the edge of the mould. The installed Cannon “wet end” allows for a maximum total output of more than 1,000 l/min, given by three dispensers with three large, new Cannon JL32 mixing heads. Allowing for a single output of more than 6 Kg/sec, the JL represents a new concept of high-pressure, self-cleaning mixing head without injection nozzles (JL = JetLess) that provides a better mixing efficiency than the classical “L-shaped” head at this output level. This provides less foam overpacking and, as a welcome consequence, some chemical’s savings. The heads can be used to pour three individual streams of foam or, equipped with perforated pipes, to pour in place over the whole panel width.

At the end of the foam operation the held pipe is automatically dropped inside or outside of the panel.

A good cooperation provides good fruits

This fully-automated, huge panel’s line has been a real challenge for Cannon and Manni, assisted by the Cannon local Sales office. With a good cooperation, especially with the customer, the results have been very positive since the very beginning!
ARTES R&D generates an innovative solution for ballast water treatment in ships

A patented solution is now available at ARTES Ingegneria for the treatment of ship’s ballast waters: a major environmental problem can now be tackled more economically, saving precious time to the ship owners.

Hundreds of ships, worldwide, load and discharge at least 10 billion tons of ballast waters on a yearly basis, to balance their hydrostatic equilibrium and optimise their navigation. Water is stored in wide tanks built into the hull of the ships: loading of ballast water occurs when the ship downloads the stored payload, while discharging is done when the ship is loaded with new goods.

A major environmental problem
This operation is the main cause of a giant mix-up that is endangering the sea life all over the world.

Ballast water transferred from one ecological zone into another introduces invasive species and non-indigenous organisms. A research stated a potential content of up to 7,000 different micro-organisms in a single tank. This cross-contamination has already drastically disrupted organisms. A research stated a potential content of up to another 70% of the global fleet. The major ship-owning countries (Italy, Greece, Liberia and Panama among others) did not ratify this convention in time, and the situation is now pending. Some countries already very much hit by this dramatic change of their marine ecosystems asked for an immediate enforcement of the treaty. The US Coast Guard amended its regulations on ballast water management by establishing a standard for the allowable concentration of living organisms in ballast water discharged from ships in waters of the United States, and also amended its regulations for engineering equipment by establishing an approval process for BWT systems.

Solutions are available, but... Several BWT methods are already available, based on mechanical filtration, ultrasonics, de-oxygenation, chemical treatments, UV irradiation, etc. Most of them handle water both at loading and unloading, requiring a very long operational time. Chemical treatments can bring undesired effects of corrosion of the tanks and circuits, or reaction with hydrocarbons mixed with the water and lose their disinfecting power. But a major problem is timing: these ships are extremely expensive toys running around the clock. They cannot waste precious time sitting idle on a quay, waiting for the completion of operations that are not essential for their mission: moving goods around the globe. Ship-owners often waste more money for the time spent for the management of the ballast water than for the loading and unloading operations of the transported goods. Even with the most powerful pumping and filtering groups, the loading of up to 100,000 m³ of water in a single ship can be an extremely time-taking chore.

A more efficient solution is demanded by this important market. Based in Salerno, one of the major Italian harbours, ARTES Ingegneria has for many years built good relationships with a number of maritime companies: their treatment systems for potabilisation or for disposal of waste water have been installed on numerous commercial or passenger’s vessels. A series of meetings with the local ship owner’s association defined the major targets of a new project, aimed at the definition of a faster and economic BWT solution.

ARTES provides a smart solution
Integrating the experience grown in more than 30 years of activity in the field, ARTES Ingegneria has conceived and patented a package that integrates UV disinfection technology with advanced micro-filtration.

The proposed package filters and treats on line with high-power UV quartz lamps the incoming water destined to the lower ballast reservoirs while loading it. Unlike other solutions, it runs the sterilisation process of the remaining tanks above the floating level, while the ship is travelling, off line. The central computerised control decides the right timing for this operation, so that the sterilisation can be done at the most convenient time of the trip and its disinfecting effect is guaranteed at the moment of the discharge, avoiding any possible resurgence of micro-bacteria growth after a long time of residence in the tank. A series of high-energy UV-emitting lamps, installed in the individual ballast water tanks, provide the requested amount of light necessary to eliminate all the living micro-organisms suspended in ballast water.

Solutions... go in the time

At the desired moment, the release of the disinfected water can be done by gravity, through large gates built in the ship’s sides, rather than transferring it out with energy-hungry, relatively slow conventional pumps.

Advantages
The package provides significant benefits:
• Optimised timing during harbour operations
• Low power consumption for water treatment
• Compact installation and access to lamps
• Easy management, no skilled manpower
• Environmentally-friendly treatment
• Modular design, single central control
• No impact on ballast water tanks or coatings

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