

*Alstom and Arabian
Bemco Joint Venture... p09*

*Visit of H.E. Egyptian
Ambassador to PP10... p03*

*Launching of Qassim
Power Plant Ext II & III... p07*

Heat Recovery Steam Generator (HRSG)



“Our only passage to sustain and increase our competitive edge is to refocus on driving for accountability and applying lessons learned.”

Henry M. Sarkissian
Chief Executive Officer
Arabian Bemco

We live in a rapidly changing environment. The rules of business conduct are changing as well. What was “good and acceptable” is no longer good enough. Just focusing on customers is no longer sufficient; we need to win with the customer. Driving for results has been changed to delivering results. Our customers’ expectations are becoming increasingly demanding. Now, customers require greater differentiation in what is being offered to them. New competitors are entering our markets and are pressing hard to gain the “lion’s share” of the business growth opportunity in Saudi Arabia. Our only passage to sustain and increase our competitive edge is to refocus on driving accountability and applying lessons learned. Surpassing past business results requires us to take calculated risks. The secret to success has been, and will always be, becoming innovative, productive, and efficient. Let’s explore these three terms.

Why are we placing more emphasis on innovation? Our future growth and profitability are dependent on innovation. Being Innovative requires that we keep thinking and developing new methods for meeting our objectives. We are required to think in & “outside of the box” and constantly question the validity of our “old habits.” Such habits which may have served Bemco well in the past but may not do so in the future; I am sure you all will agree..... Collaboration within the organization, sense of ownership (caring), transparency, and technical competency are the basic elements for innovation. With these elements, organizational synergy can emerge and flourish. Innovators will be rewarded. I encourage all of you to march ahead.

Being effective requires us to fully understand what our customers want and need, not only now, but we should also be able to anticipate their future wants and needs. We should position ourselves such that we are the preferred choice for fulfilling market requirements. We may even play a role in shaping market requirements which happens only when we have the innovative edge in the market.

Being efficient is basically driving for effectiveness and innovativeness while using a minimum amount of resources (manpower, time, materials, etc.). Over the years, we have grown to accept a certain amount of waste in our processes as being a part of doing business. We stopped questioning it and tolerated its existence. We even do not recognize that this waste is growing in volume and spreading as we grow. Efficiency requires us to seek such waste, no matter how small it might be, contain it, and creatively minimize it or eliminate it completely.

As we reduce waste, not only will we be able to compete better with our pricing, but also our ability to control our processes will improve. As we have more control of our business, we will improve our ability to steer our organization with a greater level of agility in terms of being able to quickly respond to changing market conditions. This is a winning survival strategy which will ensure our long lasting existence as a viable choice for our customers.

BEMCO is in the process of launching a new initiative on Continuous Improvement (CI) and KPI will be the measurement across the board. One of the main objectives of this initiative is to help us identify and deal with inefficiency within our organization. As narrated above, a culture of continuous improvement is necessary to enhance Manpower Utilization, Factory Loading and Productivity in order to free up capacity that will provide the organization a stable foundation to pursue innovation, effectiveness, efficiency, and therefore, GROWTH. Stay tuned for more information about this initiative.

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Riyadh PP10 Combined Cycle Project – 4,512 MW A special historic day where H.E. Egyptian Ambassador and his delegations visited the plant project. *p04*

03 Projects Under Execution

H.E. Egyptian Ambassador to KSA visits PP10 in Riyadh

07 Successful Project Implementation

The Launch of Qassim Power Plant Project Extension II & III

09 Alstom JV with Bemco

Alstom - Arabian Bemco HRSG Factory Joint Venture

13 Learning and Development

Commitment to our Employees

15 Affiliate Company Review

Unicorp International Contracting Company

17 Quality

Product and Process Quality

21 Technology Review

IT Infrastructure

23 Engineering

Bemco International Engineering Management

25 Industrial and Oil & Gas Business Unit

Smart Plant 3D (SP3D) Overall View



Alstom - Arabian Bemco Joint Venture Two prestigious companies to establish a world-class HRSG manufacturing facility for the Kingdom. *p09*



I.T. Infrastructure A fully equipped datacenter that has the capacity to serve not only Bemco’s head office but its satellite offices and affiliates. *p21*



Qassim Power Plant Ext. II & III Where many distinguished guests attended the launching of both projects. *p07*



Product and Process Quality A tremendous benefit for the companies in terms of profitability and motivational factor for the employees. *p17*

H.E. Egyptian Ambassador to KSA visits PP10 in Riyadh



PP10, Blocks A1 and A2



His Excellency Mr. Afifi Abdul Wahab, Egyptian Ambassador to KSA

24th September, 2013 is considered as a special historic day for BEMCO Co. where His Excellency Mr. Afifi Abdul Wahab, Egyptian Ambassador to Saudi Arabia, and his kind accompanying delegation, Mr. Ahmed Zaki, head of commercial and economic office in Riyadh, and Mr. Ihab Suleiman, the first secretary of Bilateral affairs – political and economic section – have visited the Power Generation Plant No. 10 (PP10) in Riyadh.

H.E. Egyptian Ambassador and his accompanying delegation have been

received with a standing ovation by BEMCO's representatives Eng. Bassem Haddad, Central Region Executive Director, Eng. Abed Shakour, Sr. Project Site Manager, Mr. Khalid Haddad, HR/Admin Director and Eng. William Guirgis, Business Development Manager.

At the beginning of the visit, Mr. William Guirgis offered word of welcome and appreciation to His Excellency the Ambassador and his kind delegation. After that, H.E. the Egyptian Ambassador started his speech by saying:

“The KSA-Egypt relationship continues to be strong and vibrant and this is rooted in our long-standing historical, cultural, religious and commercial ties between the two countries. Over the years, KSA has continued its record of huge investment into Egypt which put KSA on the top of investors list and this is evidenced if we make comparison with other countries that invest in Egypt.

We highly appreciate the role played by the Kingdom with Egypt over the course of history, and in particular the



Eng. William Guirgis offers a word of welcome and appreciation to His Excellency the Egyptian Ambassador and his kind accompanying delegation.



L-R, Mr. Ahmed Zaki, Eng. Bassem Haddad, Eng. Abed Shakour, His Excellency Egyptian Ambassador Mr. Afifi Abdul Wahab, Eng. William Guirgis, Mr. Khalid Haddad and Mr. Ihab Suleiman

brotherly characterized role since the start of the Egyptian revolution in January 2011 and through all its stages, including the stage of the revolution of June 30, 2013. To date, the Kingdom's support for Egypt at all levels did not stop for a moment and because of that the Egyptian people will not forget this honorable position.

Now, we notice that there are many Saudi companies investing in various fields in Egypt and implementing vital varied projects, but unfortunately we do not see BEMCO among these compa-

nies. Really, we cannot hide our admiration and highly appreciation with huge technical and management capabilities of BEMCO that make it to stand in the first rows of the list of reputable famous world Power Plants Companies. BEMCO represents a pride for all Arabs, and we strongly encourage you to enter the Egyptian Energy Market, because it is huge market that needs badly such BEMCO capabilities. From our side, we are fully prepared to facilitate any required arrangements that would help you to enter the Egyptian Energy market. H.E. finished his speech by



L-R, Eng. Bassem Haddad, His Excellency Egyptian Ambassador Mr. Afifi Abdul Wahab, Eng. William Guirgis, Eng. Abed Shakour and Mr. Ihab Suleiman

wishing all success and great fortune for BEMCO and all its employees.



Quality Award Certificate for PP10 as Project of the Year 2012

Furthermore, Engineer Bassem Haddad began to explained a very attractive brief about all stages of PP10, starting with Simple-Cycle Phase, which has been handed over and being in opera-

tion with high efficiency, then he touched on the current phase, which is called the Combined Cycle Phase. Also, he spoke about the philosophy of BEMCO about mega project management, quality, safety, and how to implement the stages of the project according to execution time plan with precision and without any delay.

Then, Eng. Abed Shakour began to explain very attractive sheets of illustrations which represent the phases of PP10 from the beginning and to date. The first photo on the illustrations was for the land of the project when it was just a desert, and then followed by pictures that had indicated how happened the development of the project month after month until the date of the visit. After that, BEMCO's representatives accompanied H.E. Egyptian Ambassador and his delegation to a tour to the following areas:

1-The power blocks consisting of the following related to combined cycle

- 10 Steam Turbines
- 10 Generators 130 MW each
- 10 Air Cooled Condensers (Total weight of steel structure only 9,620

Tons).

- 40 Heat Recovery Steam Generators (Total weight of steel structure only 11,240 Tons) complete with 200 modules, HP and LP drums, 60 meter high exhaust stacks, pumps, pipe, spring supports etc...
- 10 no. Pipe Racks Steel Structure total weight of steel structure only 4,585 Tons)
- Huge quantity of pipes for steam, water, compressed air, firefighting etc...
- 10 no. Generator Step Up Transformers 220 MVA each
- 86 Auxiliary Step Down Transformers with different capacities
- Huge no. of Switchgear, Motor Control Centers, LV panels, Control panels etc...
- Huge Quantity of 380 KV, 13.80 KV, 4.16KV, LV cables and control cables.
- Huge Quantity of Instrument and Control devices
- Cable Steel Rack for 380 KV cables (total weight of the steel structure only is)
- 20 Electrical building consisting of steel structure and concrete buildings
- Compressed air system building



Eng. Abed Shakour explains different illustrations showing the systems and stages of the project

2. Water Island for the combined cycle consisting of the following:

- 14 carbon steel and stainless steel water tanks for different type of water
- Water treatment plant to produce water, service water etc...
- U/G Water tanks
- Huge quantity of pipes, cables, Switchgear, Motor Control Center, electrical panels etc...

3. Fuel Area related to Simple Cycle consisting of:

- 20 Unloading bays to unload crude oil and diesel from the tankers
- Unloading pump stations for Crude Oil and Diesel
- Unloading control and power building
- 2 no. Untreated Crude Oil tanks each of 60,000 m³ total capacity
- 6 no. Treated Crude oil tanks each of

300,000 m³ total capacity

- 4 no. Diesel tanks of 58 m³ capacity
- Crude oil and Diesel Forwarding Pumps
- Fuel treatment plant to treat the crude oil.
- U/G oily water system complete with lifting stations, oily water Separator and sludge tank
- Huge quantity of Crude Oil, Diesel, Compressed air and drain pipes
- 2 no. Deluge and Foam Firefighting pump houses and huge firefighting network.

At the end of the site tour, H.E. Egyptian Ambassador said "I'm proud to see Arabian company such as BEMCO which is considered as icon among Arabian companies".

This remarkable achievement, done by BEMCO, will give a big hope that Arab Nation can promote and achieve prosperity for their people. "Once again, I urge you to enter immediately the Egyptian market, and may God help you."



Quality Award Trophy for PP10 as Project of the Year 2012

The Launch of Qassim Power Plant Project Extension II & III



Qassim Power Plant Extension III

At the inaugural ceremony, which was held on Wednesday, November 6, 2013, His Royal Highness Prince Faisal bin Bandar bin Abdul Aziz, Governor of Qassim region, and HE Engr. Abdullah Al-Hussayen, the Minister of Water and Electricity, have launched the "Reinforcement of Qassim Power Plant Projects Extension II & III", where Eng. Ali Bin Saleh Al-Barrak, CEO of SEC along with many distinguished persons were also present.

These two strategic projects have been successfully executed by Arabian Bemco Contracting Co. (BEMCO) on Lump-sum Turnkey basis on a record time and connected to SEC's grid for the Qassim region, which represent a great value to serve the region's population.

On this occasion, H.E. the Deputy Minister of Water and Electricity, Dr. Saleh Bin Hussein Al Awaji said "Today, we are very pleased in the Qassim Region due to the launch of Electric Power Projects, and we thank God for supporting SEC to succeed in the implementation of its plans and programs to enhance the electricity system in Qassim".

Engr. Ali Bin Saleh Al-Barrak, has expressed the importance of

this achievement, which represents an important step to tackle the major challenges to meet the future requirements where the annual rate of increase in demand of electricity is about 9%.

The scope of work of Second Extension of Qassim PP included engineering, procurement, installation, testing & commissioning and start-up of four (4) new Gas Turbines (85 MW each) and all associated auxiliaries such as two (2) winding Generator Transformers, DC, UPS System, MV Switchgear, 4.16 KV Switchgear, MV&LV Cables, 132 KV Cable System including Protection and Control, Compressed Air Systems, SCADA Interface & Remote Alarm Indication, Fire Alarm & Fire Fighting System, HVAC System, 20,000 m³ Crude Oil Storage Tank and other works.

The scope of work of Qassim Power Plant Extension III included engineering, procurement, installation, testing & commissioning and start-up of eight (8) new GE 7 EA Gas Turbines Units, 60 MW each, along with related auxiliaries such as 4 MW black start diesel generator unit, Compressed Air System, Fire Alarm & Fire Fighting System, RO Water Treatment Plant, Raw Water Station, Crude Oil Treatment



Some of the distinguished guests

Plant with capacity of 400 m³/hr., HVAC System, Piping System, 6x220 MVA GSU Transformers, 4x30 MVA UAT Transformers, MV Black Start Switchgear, and remaining works of the plant.

Challenges:

Arabian Bemco successfully connected to SEC's grid ahead of



Boiler for Crude Oil Treatment Plant

schedule four units on May 2012, two units in June & the last two units in July 2012. One of the main challenges in executing the project was on top of project tight schedule, the laborious process for engineering, design and approvals. As a result, the project execution schedule became very stiff/rigid and left no room for errors. For instance, the 132 KV substation cable route designs were approved (IFC was issued) however, several revisions for the route of the cable were requested by the client and took three months before final version was approved. Furthermore, there were no as built drawings for the existing situation at the substation, which caused a deferment in the construction schedule.

Moreover, extreme weather conditions throughout the year became an obstacle against the construction schedule / progress, and taking into consideration the safety aspects,



His Royal Highness Prince Faisal bin Bandar bin Abdul Aziz

where in some cases work has to come to complete stop due to the harsh rain/sand storms.

Working in an existing SEC's facilities where security is paramount requires extraordinary procedures and guidelines. Material, equipment and manpower were not allowed to enter until & unless all proper documentation and permits



Compressed Air System

are in order, and approved under the very strict rules and regulations.

With all the above challenges, tremendous efforts have been expended to erect, test and commission these 8 units, not forgetting that fire-fighting / fire protection systems were essential and a must to be operational prior to any firing / synchronization.

It is quite appropriate to highlight at this juncture that BEMCO has achieved over 7 millions safe man-hours satisfying Saudi Electricity Company by meeting quality expectation, and delivering power as the units operate at base load (60 MW/ unit) with a record of safety and reliability.

Accordingly, PACs for these units were successfully achieved.

Alstom – Arabian Bemco HRSG Factory Joint Venture



Alstom President and Executive Board of Bemco sign the JV agreement

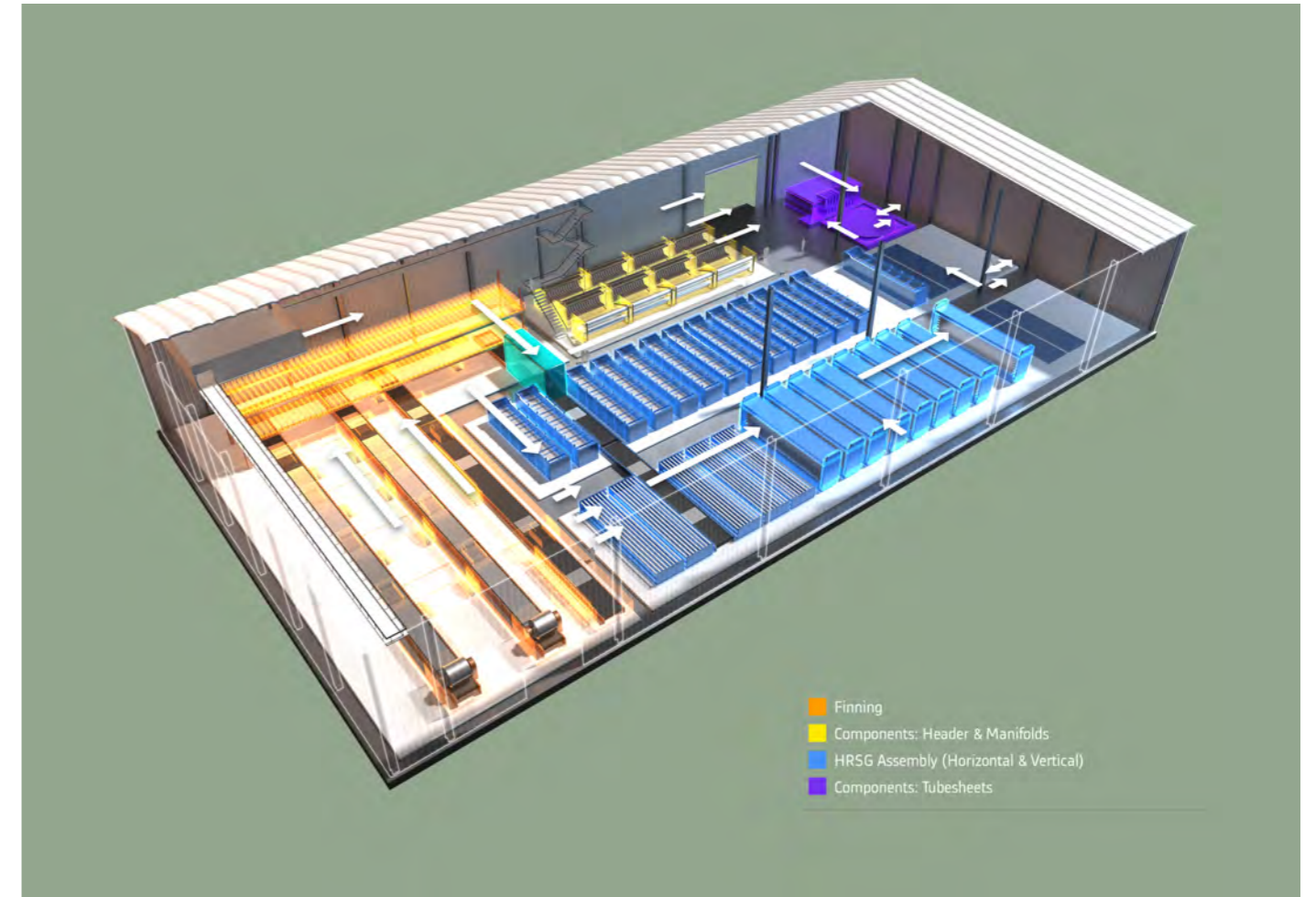
December 02, 2013 - Alstom and Arabian Bemco Contracting Co. Ltd signed an agreement to create a joint venture (JV) company, Alstom Arabia Power Factory Co. Ltd, which will establish a world-class manufacturing facility in Saudi Arabia for power generation components, primarily Heat Recovery Steam Generators (HRSGs) which are used in combined cycle and cogeneration applications to increase thermal cycle efficiency and minimize fuel consumption. In the second phase, the JV will expand the scope of the factory to other power generation equipment.

The initial investment will be worth over 200 million Saudi Riyals. This operation reflects Alstom's on-going commitment to localisation within the Kingdom of Saudi Arabia (KSA) and offers strong market opportunities across the Middle East. The factory, to be located in King Abdullah Economic City, North of Jeddah will train and employ a large number of Saudi nationals. In addition King Abdullah Economic City will be a key attractor for technical talent within the Kingdom,

with top-level educational institutions, a wide range of business and leisure opportunities, and international standards of municipal infrastructure. The production will start gradually from early 2015.

Key components in Gas or Heavy Fuel Oil fired combined cycle power plants, HRSGs improve efficiency and reduce fuel use compared with simple cycle stations. In a region worth around a quarter of the global HRSG market - and where economic and environmental considerations encourage power suppliers to convert existing facilities into or build new combined cycle plants - this offers the venture ample market opportunities.

Engineered to the latest specifications, the factory will have a global footprint above 30,000 sqm. and will utilise innovative new safety-oriented process developed especially for this project that will further minimise shop floor risks. Further design elements will facilitate continuous development and



Factory View

productivity enhancements – emphasising how this is a major, prestigious project for Bemco, Alstom, and for the Kingdom.

With more than 750 installed HRSGs globally, Alstom is a world leader in the engineering and supply of HRSGs for all gas turbine types, whilst Arabian Bemco is an experienced turnkey contractor and local manufacturer within Saudi Arabia. The two companies have already successfully worked

together, including on the Riyadh PP12 steam-tail project bid, which was secured last year.

The Joint Venture will be a limited liability company incorporated under the laws of KSA with a registered office in KAEC. Both Alstom and Arabian Bemco will take a 50% stake. Following technology transfer, the JV will be the exclusive licensee of Alstom's HRSG technology in Saudi Arabia. It will afford Alstom and Bemco a strong local base across the Middle Eastern region. In addition to Saudi market, this facility will also cover key territories such as Iraq, Bahrain, Kuwait, Qatar, Oman, United Arab Emirates, Yemen, Jordan, Syria, Lebanon and Egypt.

Demand for gas-fired power plants is on the rise in the Middle East and Saudi Arabia is also moving towards gas-fired power generation. The joint company would be well equipped to cater to this demand by combining product expertise and technology excellence from Alstom and local presence and logistics offered by Arabian Bemco. "Having successfully executed some of SECs most prestigious power projects in Saudi Arabia including the worlds largest combined cycle power plant, Arabian Bemco is one of the leading Engineering, Procurement and Construction (EPC)



High Management of Bemco, Alstom and Saudi Electricity Company (SEC)

contractors in the region. We are rapidly expanding presence in the Middle East and the JV will equip both partners to serve an increasingly important power generation market with technologically advanced and highly efficient equipment," said Henry M.Sarkissian, Chief Executive Officer, Arabian Bemco.

Philippe Cochet, President of Alstom Thermal Power underlined that "The creation of this joint company is another step towards increasing Alstom's localisation in Saudi Arabia. Working with reputable local partners such as Arabian Bemco is key to our growth strategy in the Middle East. This announcement follows other initiatives that Alstom has undertaken recently such as launching a services workshop and a training programme with SEC to further create employment and develop young talent in this country."

About HRSG

A heat recovery steam generator or HRSG is an energy recovery heat exchanger that recovers heat from a hot gas



HRSG Turbine Internal View

stream. It produces steam that can be used in a process (cogeneration) or used to drive a steam turbine (combined cycle).

HRSGs consist of four major components: the economizer,



Bemco CEO, Mr. Sarkissian shaking hands with Alstom President, Mr. Cochet

evaporator, superheater and water preheater. The different components are put together to meet the operating requirements of the unit.

Modular HRSGs can be categorized by a number of ways such as direction of exhaust gases flow or number of pressure levels. Based on the flow of exhaust gases, HRSGs are categorized into vertical and horizontal types. In horizontal type HRSGs, exhaust gas flows horizontally over vertical tubes whereas in vertical type HRSGs, exhaust gas flow vertically-over horizontal tubes. Based on pressure levels, HRSGs can be categorized into single pressure and multi pressure. Single pressure HRSGs have only one steam drum and steam is generated at single pressure level whereas multi pressure HRSGs employ two (double pressure) or three (triple pressure) steam drums. As such triple pressure HRSGs consist of three sections: an LP (low pressure) section, a reheat/IP (intermediate pressure) section, and an HP (high pressure) section. Each section has a steam drum and an evaporator section where water is converted to steam. This steam then passes through superheaters to raise the temperature beyond the one at the saturation point.

Some HRSGs include supplemental, or duct firing. These additional burners provide additional energy to the HRSG,



Bemco CEO, Mr. Sarkissian shaking hands with Alstom President, Mr. Cochet

which produces more steam and hence increases the output of the steam turbine. Generally, duct firing provides electrical output at lower capital cost. It is therefore often utilized for peaking operations.

HRSGs can also have diverter valves to regulate the inlet flow into the HRSG. This allows the gas turbine to continue to operate when there is no steam demand or if the HRSG needs to be taken offline.



Some of the distinguished guests

Emissions controls may also be located in the HRSG. Some may contain a Selective Catalytic Reduction system to reduce nitrogen oxides (a large contributor to the formation of smog



Bemco's CEO thanks SEC's high management for their strong support to success of this arrangement

and acid rain) and/or a catalyst to remove carbon monoxide. The inclusion of an SCR dramatically affects the layout of the HRSG. NOx catalyst performs best in temperatures between 650 °F (340 °C) and 750 °F (400 °C). This usually means that the evaporator section of the HRSG will have to be split and the SCR placed in between the two sections. Some low temperature NOx catalysts have recently come to market that allows for the SCR to be placed between the Evaporator and Economizer sections (350 °F - 500 °F (175 °C - 260 °C)).

About Alstom

Alstom is a global leader in the world of power generation, power transmission and rail infrastructure and sets the benchmark for innovative and environmentally friendly technologies. Alstom builds the fastest train and the highest capacity automated metro in the world, provides turnkey integrated power plant solutions and associated services for a wide variety of energy sources, including hydro, nuclear, gas, coal and wind, and it offers a wide range of solutions for power transmission, with a focus on smart grids. The Group employs 93,000 people in around 100 countries. It had sales of over €20 billion and booked close to €24 billion in orders in 2012/13.

About Bemco

Arabian Bemco Contracting Co. Ltd. (BEMCO) is one of the top leading Power & Industrial EPC Turnkey Contractor in the kingdom of Saudi Arabia with over 24,000 MW installed power generation capacity in power plants. With in-house engineering capability Bemco's competence enables it to design, procure, construct, fabricate, erect, commission,



Exchange of souvenirs

operate and maintain power plants with different technologies that are in line with the growing demand of the Kingdom. BEMCO has undertaken some of the largest and most challenging turnkey projects in Saudi Arabia and the Region, where Bemco has successfully completed Power Plant #9 (PP9), the worlds largest Grass Root Power Plant with 60 Turbines as well as the worlds largest Combined Cycle Power Plant , PP10 with 40 Gas Turbines + 10 Steam Turbines & 40 HRSGs in Riyadh, Saudi Arabia on EPC basis. Other capabilities include construction of Water Treatment Plants, Fuel Storage Facilities, Fire Fighting Systems, Compressed Air Systems, Cooling Water Systems (CCWS & OCWS), Auxiliary Steam Boiler Systems, Turbine Inlet Air Cooling Systems, Crude Oil Pipelines, and large refrigeration & district cooling plants and civil works. Bemco is continuously expanding its existing industrial base to satisfy the local demand.

Commitment to our Employees

By : Mr. Magdy Mekky, Corporate Vice President, Business Development



Mr. Magdy Mekky

Through decades of dedication, quality, hard work and commitment to our customers and to our employees, "BEMCO" became a Flagship Brand in the EPC Sector of the Kingdom; success has given us the edge to surpass our competition.

Meanwhile, our strategies provide our road map for partnering and competing with global companies, our strategy has not changed. But we'll execute them differently and do it with a critical focus on four areas that cut across all of our

business in the Middle East:

- Operational Excellence
- Partnership with Global Companies
- Safety, Quality and Continuous Improvement
- Attract & Retain Talents

Today, I share with you, how we work in making "BEMCO - The Employer of Choice".

For the last few years, company manpower has increased tremendously and the focus in trainings was derailed. As such, we are going to introduce a special 8 level training program for all the groups to enable us to improve efficiency, retain people and grow sustainably. The first 5 levels of this training program will be introduced 'in-house' and will be championed by the Managing Directors of each of the Business Units and other support groups such as Finance, HR and Project Control. Upon successful completion of these 5 levels, additional 3 training programs will be conducted externally.

"Attracting and Retaining Talents" will be one of the key success factors of making Bemco - "The Employer of Choice". In the next few years, we aim at sustaining and strengthening

our position through investing in learning and development of our most precious assets - our "People". Many new initiatives are being developed and launched to help us position our organization for success. The three most relevant initiatives are:

➤ **Young Leaders Program (YLP):** This program is aimed at our promising new employees and will provide structured avenues for their development into effective future leaders of the organization. The benefits of the YLP span at multi levels. It enhances employees' self-awareness, performance, motivation, clarity of purpose, and optimal utilization of skills. It also develops employees' effective leadership skills in managing teams to harness synergy. Ultimately, these benefits will be manifested at the organization level in terms of creating a culture of innovation, cooperation, and overall improved



management structure. This program is ready and we are gathering candidates; the program will be conducted in March 2014.

➤ **Bemco Leadership Development Program (BLDP)** which is aimed at middle to higher management employees within the organization. BLDP will help bridge the gap between our current performance level and that which we desire. It will be instrumental to business sustainability and growth. Expected date to start this program is May 2014.

➤ **Bemco Executive Leadership Program:** This program targets executive management and aims at enhancing the strategic depth of management along with people motivation and engagement.

In recent weeks, we identified a few opportunities for developing our employees' skill set to better serve our customers and strategic positioning in the market. Some of these opportunities are:

➤ **Project Management (PMP)** to help our employees develop their project management skills and ensure optimal

In the next few years, we aim at sustaining and strengthening our position through investing in learning and development of our most precious assets - our People.

performance in terms of profitability and delivery. This training is customized to fit our specific business requirements and the training will be conducted in March 2014 in 4 batches.

➤ **ITIL Training** had successfully conducted and completed for 20 IT professionals to introduce them to the latest international standards for Information technology (ITIL). This particular training will improve the efficiency of our IT staff and allows for improved internal customer satisfaction.

➤ **Quality** to ensure that we are meeting our customers' expectations for quality service and products. This is a prerequisite for continuing and growing business as such we are planning to provide training in quality for 50 employees.

➤ **Safety** to ensure that our employees are healthy as they perform their duties. This will contribute to employee morale, productivity, and employee retention. We plan to provide safety trainings for around 200 employees in 2014.

Developing and training employees is not limited to formal training. Knowledge can be transferred across the organization through on the job training (OJT) or through coaching and mentoring.

As we go forward, it is essential to capitalize on our existing strengths and further develop and close the "gap". We need to build a culture where every one of our employees feels that he is a "leader" and is able to correlate his own function and performance within the organization to its overall capacity and performance.

We target **25,000 to 30,000** hours training in the year 2014. Let us work together and help one another to achieve this milestone for Bemco and its affiliates.

Unicorp International Contracting Company



Mr. Joe Sarkis, Managing Director

Mr. Joe Sarkis is a civil engineer born in Lebanon in 1949. His professional career started in 1972. In 1977 he joined Almabani General Contractors, and in 1992 he became Director of Lebanon branch where he was involved in several Reconstruction projects. His job with Almabani was briefly interrupted by a call to government service when he had the privilege of serving as the Minister of Tourism of Lebanon from July 2005 to July 2008.

In February 2010, Unicorp Board of Directors appointed Mr. Sarkis as Managing Director of the Company.

Unicorp International Contracting Company has seven years of activity in Saudi Arabia in the field of construction of infrastructure works, industrial plants, residential and commercial buildings.

It has a backlog of SR 1.8 Billion, and is capable to handle wide and complex projects with its competent management, large number of qualified personnel and construction equipment.

Unicorp capitalize on its own experience and available resources, and also on the partner companies' qualifications and reputation (Arabian Bemco & Almabani). It employs at present 2,500 persons among them 80 engineers and 140 supervisors, and operates from its Jeddah head office located within the Bemco Group headquarters.

Vision

Unicorp International Contracting vision is to become a world class EPC Turnkey Contractor with focus on infrastructure, residential, commercial and industrial projects.

Mission

➤ Ensure Company growth and increase market share in the field of its specialization.

➤ Develop good business relationship with clients, strategic partners and banks.

➤ Search for business opportunities, expand to most regions in Saudi Arabia through diversification of projects.



Human Resources Department



Technical Department

➤ Maintain a perfect image of the company and preserve ISO and OHSAS achievements in quality, environmental and safety.

➤ Apply knowledge, skills, tools, IT programs and techniques in order to (i) standardize the process of engineering and construction methods, (ii) measure and control performance, (iii) create a spirit of continuous improvement.

➤ Meet commitments and increase profitability.

Unicorp holds ISO and OHSAS certificates for Quality, Safety and Environment Management Systems. It is registered as civil contractor at Aramco, Marafiq and Maaden, and is completing its registration at Saudi Electricity Company and National Water Company.

The on-going projects are:

SANG Housing Project

In partnership with Arabian Bemco, the project consists in the engineering, procurement and construction of a residential neighbourhood which includes 1,250 individual triplex villas, fences, infrastructure utilities, roads, irrigation, electrical and



General View of SANG Housing

mechanical networks. The neighbourhood land area is 1,300,000 m² and the built-up area of villas is 390,000 m². Partial handing over will start soon and works will be completed by end of December 2014. The nature and quantity of major activities are reinforced concrete 400,000 m³, masonry 420,000 m², plastering 450,000 m², doors & windows 54,000 no., floor & wall tiles 660,000 m², internal & external paint 1,800,000 m², sanitary fixtures 27,000 no., A/C units 23,000 no., power outlets 78,000 no., STP 5,000 m³ capacity, underground water tank 80 m³ capacity, irrigation tank 5,000 m³ capacity, water tower 600 m³ capacity, asphalt roads 390,000 m².

KAIA Airport

Load Center C, First & Business Car Park, and other Facilities at

new KAIA Airport in Jeddah. Scope of work includes the construction of several technical buildings and related facilities. Works will be completed by May 2014. The major



Generator Building & Central Switch Hall

activity is reinforced concrete 120,000 m³.

Riyadh CC Power Plant No. 12

Unicorp's scope consists in the procurement and construction of civil works in Power Blocks and Buildings. Works will be completed by end of October 2014.

The nature and quantity of major activities are excavation 425,000 m³, backfill 300,000 m³, reinforced concrete 100,000 m³, precast concrete 5,000 m³.



General View of Riyadh PP No. 12

Searching and looking for new business opportunities is Unicorp's continuous goal. Management's responsibility is to integrate sustainability in the thinking and programs. In addition to its on-going projects scheduled to be completed in the current year, new projects are expected to be awarded in the near future.

Year 2014 is destined to be a turning point in the development and progress of Unicorp.

Product and Process Quality

By : Dr. Francisco Rosique , Managing Director, GEDAC ELECTRIC.



Dr. Francisco Rosique, holds a Six Sigma Green Belt, Black Belt and Champion from GE General Electric (1998-2002)

What is Product and Process Quality?

Historically the term Quality has evolved from design and manufacturing according to the standards and specifications without any deviation, to the concept of eliminating errors in the Products, such as Components, Solutions and Services, and in Processes, such as Finance, Manufacturing, Project Management, etc...

A very important aspect is the quantitative and qualitative way of measure Quality. Sometimes Companies put a lot of emphasis in doing things right in the Factories, without errors, but if the Sales force do not keep a good commercial approach and the created customer perception is poor quality in commercial transactions. You can manufacture the best product in the World that the Customer perception will be poor quality as a whole.

Quality Systems

The main purpose of a quality system is to ensure that the design specifications of a product or process are transferred into the product and process itself in a consistent and cost-effective manner, another definition is to ensure that a company consistently meets customer requirements in a competitive way.

The Quality Systems exist to address the main important aspects of quality control and assurance, through statistical techniques to the management of complete quality systems within organizations. BS, EN dates from 1979, ISO 9000 from 1987, and a wide literature covers from production, to installation and final inspection and test.

The Six Sigma process has been published in the International Organization for Standardisation under

the ISO 13035 in 2011.

Quality Improvement Methodologies

The main quality improvement methodologies combine the statistical techniques with the tools for process improvement, and quality systems. These are: TQM Total Quality Management (1980), Six Sigma (1986), and EFQM European Foundation for Quality Management (1989).

Total Quality Management through a high employee involvement was already calling for zero defect campaigns, and employees are urged to do a job right first time, but Six Sigma emphasized more in specific projects to eliminate errors in a continuous improvement environment, and EFQM is mainly helping companies to achieve excellence measuring current processes, identifying gaps and provide solutions.

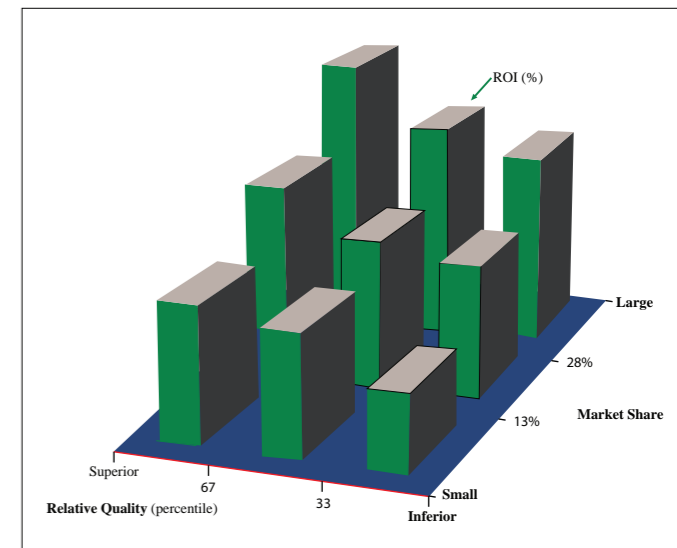


Figure 1. Relative Quality, Market Share and Return On Investment - PIMS (1980)

Six Sigma Methodology

Bill Smith a senior engineer in Motorola introduced the methodology in 1986 and Jack Welch from GE adopted in 1995 as a new system to maximize business success. It is generally accepted that the main benefit of Six Sigma is a systematic way to drive out defects getting savings out of it and decrease variability in the outcome.

Jack Welch in GE got an Operating Margin before the implementation of Six Sigma at 13.6% in 1995, and after Six Sigma 16.7% in 1998. This was approx. US\$600 million. Jack Bossidy in Allied Signal from 12 to 14% in 1999 attributed to Six Sigma Savings. This is between 2 to 3pp premium in the Operating Margin to Sales ratio due to Six Sigma actions.

The PIMS Profit Impact Market Research survey was demonstrating that the Companies with higher customer perception in quality are able to sell their products with a higher Return on Investment, and it concludes that higher quality provides +8pp ROI premium when comparing companies with an average Market Share at 20%, and provides +11pp ROI premium when comparing companies with large Market Share (See Figure 1).

The two major components of Six Sigma are: Business Process

Figure 2. DMAIC. Six Sigma Process Improvement Stages

Define	a. Identify the Project-Customer's CTQs b. Develop a team charter c. Define and build a high level Process Map
Measure	a. Select CTQ Characteristics b. Define Performance standards c. Collect Data & Validate Measurement Tools
Analyze	a. Establish Process Capabilities b. Define Performance Objectives c. Identify variation sources
Improve	a. Screen Potential Causes of Variation b. Discover Variables relationships c. Establish Operating tolerances and Pilot solutions
Control	a. Validate Measurement System b. Determine Process Capability c. Implement Process Control System and Project Closure

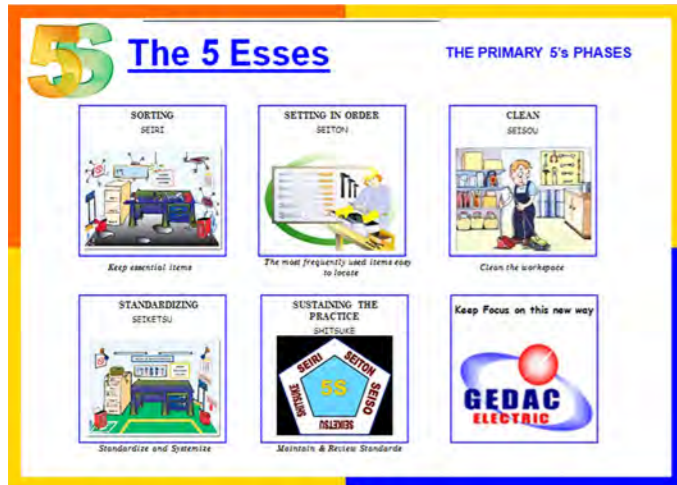


Figure 3. Hiroyuki Hirano's Five Esses critical to quality

Management and Process Improvement Methodology. The first is the strategic approach and the second relates to the improvement of current processes and the creation of new ones.

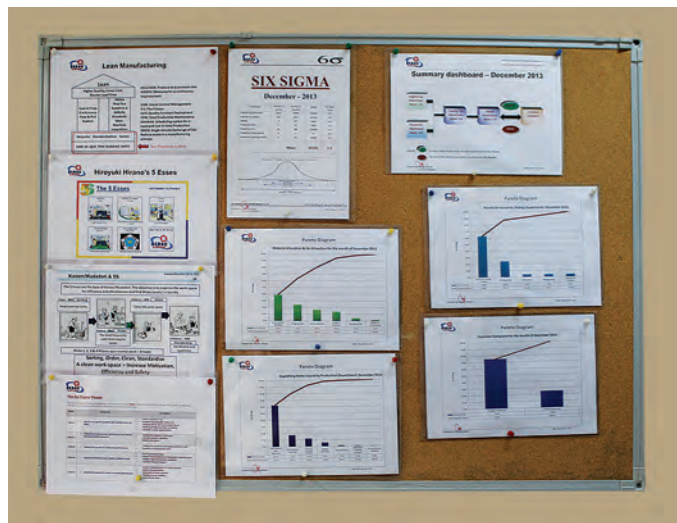


Figure 4. Main Monthly Quality Dashboard in the GEDAC Factory

The implementation of Six Sigma requires to identify the issues and areas of the business with a real need to improve, set up priority projects to fix the problems and for each identified project is required to follow the following stages: define the problem, measure the key variables critical-to-quality, analyze, layout an action plan with assigned owners and timing to improve the key identified issues and control de sustainability of the solutions. These five stages are called DMAIC project methodology. (See Figure 2)

The number of defects in a process perfectly correlates to the Six Sigma level in a numerical scale from 0 to 6. A high level of defects in a process drives the six sigma level to the lower amounts (poor process quality), and a low level of defects to the top of the scale (high process quality), but near to 6 is very difficult to achieve in practice. It represents 3.4 defects per million opportunities.

GEDAC approach to Quality.

To get stability, accuracy and low variability in the outcome of the Product manufactured and the Business Processes, it is very important to combine different techniques to maximize Quality in all aspects.

We fully embrace the following techniques:

- Six Sigma
- Hiroyuki Hirano's Five Esses (Figure 3)
- Lean Manufacturing and
- Kanban starting this year 2014

Our Quality Assurance Controller summarize every month the defects encountered in the Quality Control, Customers Complaints and Departments. This data is processed and published in the Dashboards at the entrance and in the different Departments of the Factory (See Figure 4 and 5).

Employees in the Factory see the Management involvement and the interest to perform with the contribution of all Employees. Working in a clean environment, and everything in order is driving out defects. These are very important motivational factors, and increase productivity without additional cost.

Summary

Product and Process Quality has a tremendous benefit for the companies in terms of profitability and motivational factor for the Employees. It is very important to make all changes critical to quality sustainable in long term. It is not a single project or short term action. Leaders committed to drive these changes as a systematic process for improvement are



Figure 5. Quality Dashboards in every Department in Manufacturing

key with the objective to eliminate errors, get profitability and motivate employees. It requires Management personal involvement, striving for things done right at first, sense of urgency and productivity.

Electro-Mechanical Works Awarded to INMA

Arabian Bemco Contracting through its affiliate company INMA Contracting was awarded the contract for the Electro-Mechanical works of the new Kingdom Tower project located in Jeddah, Saudi Arabia. This project upon completion will be the tallest building in the world standing at 1003 meters high. The project, which is estimated at 4.7 Billion Saudi Riyal, would be 173 meters taller than Dubai's Burj Khalifa.

The skyscraper is intended to be the centerpiece of the Jeddah Economic City development beside the Red Sea and will consist of 220 floors, 168 of which would be habitable. Piles of this building are expected to be 100 meters deep and an estimated half a million cubic meters of concrete and 70,000 tons of steel will be used.

The tower is designed to accommodate a Hotel, Residential & Serviced Apartments, Offices, Podium, Sky Lobbies and Rooftop Spire. INMA will execute the complete electromechanical works for the project to include but not limited to HVAC System, Water Treatment, Storage Tanks, Fire-Fighting

System, and Electrical Utilities Services. The skyscraper will be part of the Multi Billion Jeddah Economic City Project. Nevertheless, the Jeddah Kingdom Tower will remain the tallest building in the world once completed placing Dubai's Burj Khalifa (830 meters) in second place and Tokyo Sky Tree (634 meters) in third place.

The triangular footprint and sloped exterior of Kingdom Tower is designed to reduce wind loads; its high surface area also makes it ideal for residential units. The overall design of the tower, which will be located near both the Red Sea and the mouth of the Obhur Creek (Sharm Ob'hur) where it widens as it meets the Red Sea, as well as having frontage on a man-made waterway and harbor that will be built around it, is intended to look like a desert plant shooting upwards as a symbol of Saudi Arabia's growth and future, as well as to add prominence to Jeddah's status as the gateway into the holy city of Mecca.

Two of the main owner of the project are also a major shareholders in Arabian Bemco Contracting Co.



"The World Tallest Building, The Kingdom Tower"

I.T Infrastructure

By : Mohammad Al-Hejin, I.T. and Security Director



Power Zone Overview



Mr. Mohammad Al-Hejin

With Bemco's shift to the new office premises came the golden opportunity to build from scratch a state of the art, fully equipped, datacenter. A Datacenter that has the capacity to serve not only Bemco's head office but its satellite

offices and affiliates with the ever growing and life-essential information technology, communication, and electronic security needs. We did not let this opportunity go to waste and planned, designed and put together a Datacenter to support the future growth and sustainability of our organization.

Our efforts began with the first exposure to the building plans of the new location during 2011. As soon as we received the first draft of the office layout, our plans went into action to procure and install all necessary components. We first searched and successfully identified the right partners that could do the job on a world class level.

In 2012, plans were immediately put forth and the best scenarios studied, followed by the actual plan execution with daily close supervision. Part of the Datacenter creation was the delicate task of shifting our existing servers, both new and old, to their new home with minimum downtime. We were able to tackle this task without any significant disruption in IT services to our clients. By the beginning of 2013 we had achieved a fully operational Datacenter.

What is the anatomy of a successful modern Datacenter?

First of all, an abundant supply of stable electrical power at the heart of it, surrounded by cool, clean and secure

housing for all the hardware that is to be housed within the Datacenter's walls. So we installed an Uninterrupted Power Supply (UPS) with high specifications and reserve capacity to bridge any power deficiency of the server farm. This is supported by a large power generator located in the basement to power the large AC units during any power outage and at the same time charge the UPS battery banks. The walls consist of a new type of lightweight insulated and strong concrete block so as to keep the temperature stable inside the room while providing sound and temperature insulation as well as security to the server farm environment. The Datacenter enclosure is also provided with a world standard raised



BEMCO Head Office I.T. Team

floor that is equipped with floor air conditioning and a water leak alarm system. Moreover, the room is equipped with an exemplary firefighting system as well as intrusion, temperature and power fluctuation alert systems.

What are the main components of this Datacenter?

The answer is computing power, data storage, a slew of internal and external networking components and solutions, an organization wide IP telephony system, a complete security camera system as well as STC, Zain and Mobily telephone company equipment for all of Bemco's sites and affiliates. That in addition to encompassing our own proprietary backup solution for site data and state of the art backup for Bemco's needs.

As for total physical security and attendance, we use technologies such as biometric finger print, facial recognition and picture ID smart cards. These are supported by a 100+ security camera surveillance system spread over 5 floors and 2 basements.

The above mentioned self-built state of the art telephone communication

system is IP based, which enables Bemco to call sites at no cost. Furthermore, the smart system deployed by Bemco allows mobile phone calls to be routed automatically to our corporate mobile phone partner network at very low costs.

All of these technologies operate on a wide area network broken up into zones functioning as a multi-tenant data and voice network with various security layers. Other cutting edge applications include our own unified global email system, which recently came online and is catered to by a highly qualified in-house team of open source experts. At the heart of our day to day operations lies an ever growing ERP platform based on Oracle JDE customized to serve every aspect of Bemco's operations.

We never rest as we are constantly striving to increase the level of system intelligent automation and services, while improving performance and security on every level, Bemco's IT and Security workforce is always looking for improvements since growth has no limits.

Bemco International Engineering Management



Dr. George Aboufadel, Managing Director, Bemco International Offshore (BIO)

As one of the largest EPC Contractors in the Power business in KSA and in the region, Arabian Bemco has always put a substantial effort and emphasis on the development and improvement of its in-house engineering capabilities. One of the main reasons for the success of Arabian Bemco is attributed to its strong engineering capabilities developed and enhanced over the past 30 years. Our continued advancement, standardization and re-structuring has given our engineering group the know-how, depth and qualifications it currently possesses.

A major restructuring of the Engineering Group started in 2008 by introducing specialization rather than the previous allocation of project engineers. BIO engineers with their specialized knowledge in systems, processes and equipment for both open and combined cycle power plants have increased substantially and become a landmark achievement.

The specialization and main function of the Engineering Group, which includes a total of eight business units, are highlighted below:

1. Electrical, lead by Engr. Youssef Saliba
2. Instrumentation & Controls, lead by Engr. Hrair Kevorkian
3. Steam & Water Cycle, lead by Engr. Faramarz Bairamijamal
4. Fuel Systems, lead by Engr. Elias Haddad

5. Water Treatment, lead by Engr. Charles Kai & Piping group reporting directly to Engr. Kenderjian

6. Fire Fighting and Fire Alarm, lead by Engr. Imad Karam

7. Building Services and Industrial Gases, lead by Engr. Kabalan Jeitani

8. Civil, lead by Engr. Fadi Bitar and reporting also to the Director of the Civil Group, Engr. Nabil Nakhle. Steel Structure and Tanks are lead by Engr. Garo Arpajian.

Each Business Unit has the complete ownership of all activities within the unit from proposal stage until the final handover to clients. The engineering Business Units are responsible for the complete Basic and Detailed engineering preparation, value engineering, determining the capacities and specifications of all equipment and systems, quantification of all material, setting the construction man-hours and construction equipment requirements, selecting the Suppliers and Manufacturers, finalizing all technical submittals and approvals with the clients, expediting vendors delivery and factory acceptance testing to insure timely release of material fabrication and shipping.

In summary, the following engineering activities are performed for the open and combined cycle power projects:

Mechanical Field:

Plant general arrangement drawings, process flow diagrams, P&IDs, heat and mass balance diagrams, water balance diagrams, system descriptions, system design calculations, equipment requisition packages, vendor document reviews, equipment data sheets, piping calculations and classification, piping isometrics, piping support drawings and arrangements.

Electrical Field:

Single line diagrams, protection and control diagrams, system studies, equipment sizing calculations, equipment requisition packages, vendor document reviews, equipment data sheets, general arrangement drawings for electrical buildings, lighting design drawings, grounding and lightning protection, cable raceway design, low current system designs, cable routing and pull tickets.

I&C Field:

Plant control system configuration diagrams, operation and control philosophy, IO lists, instrument and valve lists and



data sheets, process hook-up diagrams, instrument location drawings, interconnection wiring diagrams, I&C cable schedules, system logic and control loop diagrams, functional description, equipment requisition packages, vendor document reviews.

Civil Field:

Plant Geotechnical requirements and studies, Civil Structural and Architectural Design Criteria, Buildings layouts, Equipment and building foundations, Steel Structural designs, plot plans, storm water and external Drainage, Marine Works and intake, outfall and pump house designs.

In 2013, Bemco higher management decided to appoint Engineer Sarkis Kenderjian as Engineering Manager to enhance the coordination between the different Business Units and standardize its internal processes in order to optimize the flow of information, knowledge and data.

The Engineering Group is also responsible for the coordination with the Proposals Management, Operations Management lead by Engr. Nidal Ghazi and constructability reviews with the Construction Management lead by Engr. Garo Arpajian. This is essential to maintain and enhance the productivity of the workforce on site and improves the utilization of the construction equipment for the timely completion of the Projects within the allocated budget and to the highest Quality and Safety requirements. Also, the Engineering Group has the responsibility to ensure the proper implement-

ation of the OEM requirements needed for successful Start-up and Commissioning where all its activities are lead and coordinated in BIO by Engr. Hrair Kevorkian.

The utilization of smart plant 3D, a state of the art modeling tool for Power Plants and Oil & Gas Projects, has been implemented in Arabian Bemco Projects for the past several years through external resources and engineering firms. Accordingly, BIO Engineering Group started phasing out the internal use of Auto-Cad software and is currently in the final stage of migrating to full in-house capabilities of the Smart Plant 3D. The engineering preparation and detailing is done on a single platform for any given project, where all the trades and equipment modeling entered ensuring proper coordinated drawings and extremely accurate results. The material quantification and issuance of piping isometrics and other detailed engineering drawings are generated with high accuracy and fast issuance.

In addition, Bemco higher management has merged with the Engineering Group of BIO the engineering center of excellence in Jeddah to form an integral part of the overall Arabian Bemco engineering structure. With the continued support and directives of the High Management, Arabian Bemco Engineering Group will continue to perform and excel in the current highly competitive market and to the expectations of our clients needed to maintain our goals of being the most competitive, best performing and highest Quality EPC Contractor.

Smart Plant 3D (SP3D) Overall View

By : Dr. Emad Abbas Kamil, Managing Director, Industrial and Oil & Gas Division



Engineers being trained on SP3D



Dr. Emad Abbas Kamil

Introduction

SP3D – SMART PLANT 3D is a product developed by, Intergraph® who is a leading global provider of engineering and geospatial software that enables customers to visualize complex data.

Businesses and governments in more than 60

countries rely on Intergraph's industry-specific software to organize vast amounts of data and infuse the world with intelligence to make processes and infrastructures better, safer and smarter.

This software empower customers to build and operate more efficient plants create intelligent maps, and protect critical infrastructure and millions of people around the world.

Key Features

- SP3D is a data-centric & rule-driven solution for streamlining engineering design processes. Smart Plant 3D provides all the capabilities needed to design a plant and then keep it as-built throughout its life cycle.
- SP3D is a simple and works on user friendly environment with state-of-the-art graphics and powerful wizards to assist in performing even the most complex tasks quickly and easily.
- SP3D has ability to share designs across disciplines in real time, which saves time and money and produces a best design.
- SP3D lowers the overall project costs through reduced rework, increased design quality and better communication between various engineering disciplines.

Equipment Task

During plant design, SP3D uses the equipment and furnished task to select the equipment objects from the catalog database and position these objects in the model.

Piping Task

The piping task is used to create a fully rendered three-dimensional model of the various pipelines in SP3D model. SP3D



A view of interactive training session on SP3D

uses this task to insert piping components, instruments, split them during design and spool the piping.

Electrical Task

Electrical task is used to organize the electrical objects such as cableways and conduits within the system hierarchy of SP3D model. SP3D model uses the electrical system to control the specifications that can be used within the system such as conduit, cableway and cable tray specifications.

Structure Task

The structure task places and modifies structural objects. SP3D uses this task to place beams, columns, braces, truss elements, cables, equipment foundations, column footings, openings, slabs, walls, and connections in SP3D model. SP3D can create custom section shapes using 2D symbols and places those custom sections in the model.

HVAC Task

The HVAC task creates a three dimensional representation or model of a distributed system so that it creates a fully rendered 3D model of various duct systems.

Drawings and Reports Task

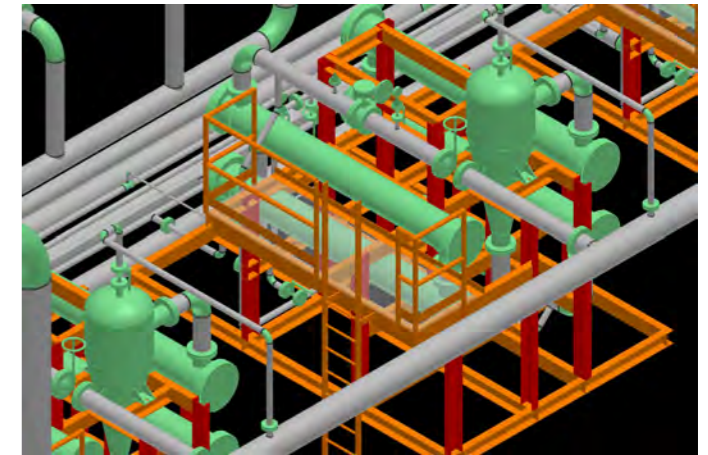
The drawings and reports task creates orthographic drawings, isometric drawings and reports from the model. This task provides an update feature to increase productivity. SP3D has the features of extracting Isometric drawings and material take off (MTO) from the model.

Concurrent Design

Users working directly against the database. Short transaction database architecture means changes immediately available to all users no "save required". Permission controls mapped to windows configurable down to object level.

Global Workshare

- Standard hub and spoke feature of MS SQL Server & Oracle.
- Near real time speed (seconds on global updates).
- Supports any type of work split discipline area, system and etc...



Sample of SP3D model

- New satellites / work locations can be brought on line in hours.
- Satellites can re-use all the specs, standards and templates from host site.

Integration on Common Engineering Platform

SP3D has features of Integration with upstream 2D design products viz. Smart Plant P&ID, Smart Plant Electrical, Smart Plant Instrumentation as well as downstream material management application through Smart Plant Foundation (SPF) which allows streamlining of project data across the discipline.

Interference Checking

- Continuous Model Checking
 - Background process running as a service on a server.
 - Checks all objects that are created or modified.
 - Keeps track of all interferences.
 - Interferences stored in database.
 - Pre and post processing rules fully customizable.
- Interference Management
 - Approve, write remarks
 - Zooming to interference for visual review
 - Dynamic on-line list view
 - Excel report available
- Interactive (local) Interference Checking
 - Optional check
 - Checks only objects that the user is creating or modifying
 - Checks only against objects displayed in the user's workspace

Change Management & Notification

- Relationships cause the impact of design changes to be propagated.
- Electronic 'To-Do' List :
 - Notifies changes to the relevant user(s) based on design ownership/permissions.
- Relationships also exist between plant objects & drawings.
 - Objects "know" which drawings they appear on.
 - When objects change relevant drawings are notified.



- STORAGE TANKS
- PRESSURE VESSELS
- HEAVY STRUCTURAL STEEL
- STACKS
- PIPE
- SILOS AND HOPPERS
- HVAC DUCT



ENGINEERING | MANAGEMENT | QUALITY | SAFETY | DEDICATION

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Work force of more than 1,000 persons composed of qualified engineers, experienced technicians and highly skilled fabricators & certified welders. The Design & Engineering Team is the core of the company and has a technical capability & experience of handling conceptual & detailed design for diversified range of steel products, with excellent quality and perfect finishing.

Development and engineering department is equipped with advanced CAE/CAD in-house and externally prepared software such as; X-STEEL, STAAD III, TANKS, COMPRESS, SAB, VULCAN VS VI.

The Design Engineering & Drafting Team is well conversant with most design, material & manufacturing codes:

- AWS American Welding Society
- AISC American Institute of Steel Construction
- ASME American Society of Mechanical Engineers
- SMACMA Sheet Metal & Air Conditioning Contractors National Association

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