Borouge marks World Water Day in Abu Dhabi with seminar and exhibition

Wehocoat field joint coating system passes field trials in Finland

A view on the pipe and fittings business in India by Krishen Khanna

Borouge at ChinaPlas 2011 the largest plastics event in Asia
Borouge’s preferred material for gravity sewers and drainage tackles some of the key challenges to establish PP as the pipe of choice in the non-pressure sewage and drainage sectors? In this issue, Youssef Taha of Borouge discusses why not the plastic pressure pipe market - why not in the non pressure sewage market? We have seen this change in the markets here in the UAE where concrete or asbestos cement – we have seen this change in the markets here in the UAE where concrete or asbestos cement – we have seen this change in the markets here in the UAE where concrete or asbestos cement – we have seen this change in the global market for sewerage pipes will experience a growth rate of 6% per annum and this increase in demand offers great opportunities for the plastic pipe industry.

It is estimated that the global market for sewerage pipes will experience a growth rate of 6% per annum and this increase in demand offers great opportunities for the plastic pipe industry.

Sanitation is also in a critical state for despite the increase in investment over the past decade over 2.6 billion people still do not have access to acceptable sanitation facilities. By 2015, it is estimated that the global market for sewerage pipes will be $53 billion which is 28% higher than the 2010 usage. We need to make sure that the preferred pipe is plastic rather than concrete or asbestos cement – we have seen this change in the pressure pipe market - why not in the non pressure sewage and drainage sectors? In this issue, Youssef Taha of Borouge tackles some of the key challenges to establish PP as the preferred material for gravity sewers and drainage.

The beginning of May saw the official inauguration of the “Water for the World” project in Pakistan which provided new water supplies to four villages in the remote Neelum Valley following the devastating floods of last July. The project, which was headed by the HEED organisation, used PE100 pipes to bring water from natural springs high in the mountains to the local villagers living in the valleys below.

There are also a number of articles about the exciting developments in the Indian plastics pipe industry including a fascinating historical perspective by an old friend Krishen Khanna of Kimplas Pipe systems in Nashik. Clearly the industry is growing fast in India with many new factories springing up to produce pipes and fittings for gas and water distribution and for agricultural irrigation. The number of industrial application areas for plastic systems is also expanding, with BorECO PP materials being used to produce sheets for the fabrication of liners for tanks and vessels, and large diameter BorSafe PE100 pipe being used for the transportation of water to small hydroelectric generating plants in the mountains of Himachal Pradesh. The latter project by Jain Irrigation won the prestigious prize from the Plastic Pipes Institute in the USA as their “Project of the Year 2010”.

I hope that you will find the wide range of articles in this issue both educational and interesting and will continue to enjoy reading BorPipe over the next five years.

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Contents

3 ChinaPlas 2011 lives up to its reputation as the largest plastics event in Asia
4 Borouge Innovation Awards 2011
5 WSUP making a real difference to people’s lives
6 The new Wehocoat field joint coating system is put through some tough tests in Finland
8 New three-layer Top Coat rigorously tested in Kuwait
 Utility pipework design discussions with Sweco China
9 Water losses cost Malaysia over half a billion USD each year
10 GPPA holds a successful Spring Conference in Abu Dhabi
11 Middle East Plastic Pipes 2011 in Dubai
12 Borouge marks World Water Day 2011 with a major event in Abu Dhabi
13 The Steel Pipeline Centre holds its 3rd Meeting
14 Borouge PP-R excels in high speed extrusion trials in China
15 Sangir Plastics benefits from using BorECO grades for sheet production
16 Discussing old times and an exciting future for the Indian plastic pipes industry
18 Inauguration of the Water for the World project in Pakistan
19 Pioneering PP gravity pipes in the Middle East & Asia
21 Jain Irrigation win award for the Marhi hydroelectric project
22 American Environmental Scientist named the 2011 Stockholm Water Prize Laureate
23 Borouge customer wins awards for innovation
24 “Tried and trusted” BorSafe PE100 for new gas distribution system at Yas Island
25 China’s thirst for plastic pipes continues to grow!
26 Borouge invites UK expert to discuss the use of PE pipes with Chinese Design Institutes
28 Major seminar on polyolefin sewage and drainage pipes in Saudi Arabia
29 PE100+ Association launch very popular technical book in Chinese
30 Plastic Pipes XVI to be in Barcelona, Spain in September 2012
31 Borouge gains SIRIM Certification for PE materials
32 Calendar of Pipe Events
ChinaPlas 2011 lives up to its reputation as the largest plastics event in Asia

The 25th ChinaPlas Exhibition in Guangzhou during May showcased over 2,400 exhibitors and attracted more than 100,000 visitors thus fully living up to its reputation as the largest plastics event in Asia. Compared to last year’s event the number of exhibitors increased by some 13.8% which reflects the continuous and strong interest and demand for plastics in China and other Asian markets.

The Borous stand attracted a great many visitors during the four day exhibition and the large diameter pipe samples in particular generated a lot of interest. The centre of attention was the 3,000mm diameter spiral wound PP-HM pipe section produced by Union Pipes of Abu Dhabi using BorECO BA212E material, which is the largest pipe of its type produced in the Middle East and Asia. Also attracting considerable interest was a 800mm diameter twin walled pipe sample which is the largest PP-HM corrugated pipe produced in China by Shanghai Era, a leading producer of underground sewerage pipe systems.

PE100 pipe systems also figured strongly on the Borous stand with examples of pipes produced from the new high stress crack resistant BorSafe HE3490-LS-H on show. These materials are exceptionally tough and are ideal for “No Dig” installation procedures. They are therefore well positioned to play an important role in China’s expanding gas distribution programme over the next few years. A range of large diameter PE100 pipe fittings using BorSafe HE3490-IM material produced by Cangzhou Mingzhu were also a major attraction to visitors.

One corner of the stand housed a small ‘Water for the World” exhibition which featured drawings from children of 2-16 years old and a photographic exhibition by Chinese university students.
The objective was for them to use their paintbrushes and cameras to reflect the “value of water” and the importance of conserving this precious resource for future generations.

The importance of improved water management was also presented by Borouge North Asia Regional Sales Manager Hang Biao at the Borouge Press Conference. As he explained plastic pipe systems could make a major contribution by reducing water leakage and pollution, and China is well positioned to take full advantage of the new developments in plastic pipe systems.

The benefits of these new materials were also underlined by Hu Wei, Vice President Pipe for Borouge in an interview with Plastics Technology, a leading Chinese plastics magazine, when he stated: “Borouge is a world leader in providing innovative and high quality polyolefin pipe materials. If we were to convert the total material produced by Borouge last year into a 90mm SDR11 pipe, it would be more than long enough to transport water from the Earth to the Moon. We remain fully committed to the pipe business and to continuously developing new innovative solutions to meet our customers’ needs.”

Borouge Innovation Awards 2011

Borouge takes innovation extremely seriously and each year a competition takes place to identify the best innovations and the best ideas over the previous year. For 2010, there were a total of 76 nominations for awards from which the Innovation Award committee selected the top six for final voting and award presentation.

In March in Abu Dhabi, the award ceremony took place and several members of the pipe team received awards. The photograph shows Prashant Nikhade and Chanchal Dasgupta receiving their award for their work with Sangir Plastics on the introduction of the higher melt flow PE100 BorSafe HE3490-IM for sheet production in India. This project led to improvements in sheet quality and productivity and was featured in BorPipe 19. Also gaining awards at the ceremony were the Middle East team lead by Mohana Murali who worked with Union Pipes in Abu Dhabi on the development of the large diameter spiral wound submarine pipeline, and the irrigation team in India lead by Prashant Nikhade for developing the new irrigation grade for producing in-line drip irrigation systems.
Eleven year old Briena is a student at FPLM Primary School, located in one of Maputo’s poorest neighbourhoods. Following a detailed survey and assessment, the Water and Sanitation for the Urban Poor (WSUP) supported Tchemulane project selected her school as a demonstration programme to improve the existing sanitation facilities and establish sustainable operation and management services. In her story she explains the impact this programme has had on her life.

“The toilets at school have always been bad. There was an awful smell, they were always very dirty and we didn’t have a reliable water supply. Many students urinated and defecated outside. I have been a student at this school for 7 years but, until now, I had never used the facilities. When I needed the toilet, I would leave school and go to a friend’s house. I didn’t use the school toilets because I was afraid of getting sick.

Sometimes I would have to wait a long time before going to the toilet, but I preferred to suffer than go to the school toilets. We didn’t have a regular water supply at school. We just had one tap which was used by all the students and the cleaning staff. We had to wait in a queue and fight to get water to drink. The water supply was unreliable and sometimes it was cut so the students attending the afternoon shift would have to go without water.

Things are different now. We are no longer afraid to use the toilets because they are kept clean and they don’t smell bad. They are cleaned by staff at least once in the morning period. I have no problem asking the teacher if I can go to the toilet and I don’t have to leave lessons to go to my friend’s house. We have a proper place to wash our hands after using the toilet. We also have two more taps with regular water supply so we don’t have to fight to get water any more.

We are very happy with the improvement of our sanitation facilities and water supply. With these improvements, I hope that we will avoid the transmission of diseases such as diarrhoea and cholera and improve the health of all the students at the school. I think my education will improve as a result of the new facilities. I no longer have to wait for a long time without going to the toilet or miss out on teaching time to go to the toilet at my friend’s house. Now, when I come to school, I feel relaxed and concentrate better in lessons. When I need to go to the toilet, I ask the teacher, I go, and I am able to wash my hands afterwards.”

Water and Sanitation for the Urban Poor (WSUP) is a partnership between the private sector, civil society and academia focussed on addressing the increasing global problem of inadequate access to water and sanitation for the urban poor and the attainment of the Millennium Development Goal targets, particularly those relating to water and sanitation. Borouge and Borealis became members of WSUP in 2007 as part of their “Water for the World” initiative.
The new Wehocoat field joint coating system is put through some tough tests in Finland

An essential part of the cost of any oil or gas transmission line is the protective coating but at 5-6% of the total project cost this is far less than the costs of shutting the line down for repairs and leakage maintenance. Therefore the quality of the polyethylene (PE) protective coating on the steel pipe is of paramount interest. Whilst normally the quality of the factory applied coating to the pipe is high and covered by very stringent international and project related specifications, the coating of the field-joints is not usually made to the same high standard as matching solutions are not available. Therefore, field joint coatings are by far the “weakest link” in the chain.

Having been the major suppliers of 3-layer PE and 3-layer PP coating systems over the past 25 years Borealis and Borouge were very sensitive to this need of the Industry. Being innovative, value creating solution providers, they have worked with the Finish plastics machinery manufacturer KWH to develop the materials and the equipment to provide a reliable field joint coating system. Since 2006, Borealis were developing new PE and PP based field joint coating materials under the leadership of Leif Leiden, Senior Development engineer for Oil & Gas at Borealis.

As Leif Leiden explains: “Our idea was to use molten plastics for field joint coating but we soon realised that there was no suitable equipment available for applying this material. We therefore contacted KWH Pipe, one of the leading plastics processing equipment producers, who were very enthusiastic about our idea, so we started to jointly develop the Wehocoat system.”

The partnership worked well, utilising Borealis’ high level of knowledge of plastics to develop specific materials for this application, and KWH Pipe using its strong skills in mechanical engineering and automation know-how to develop the application robot. “The task was extremely demanding,” says Leif, “but finally we succeeded in resolving all the challenges that arose. A major step was achieved when we worked out how the heating of steel pipe could be done online by induction at the same rate as the machine moved forward. Another significant breakthrough was to realise how the robot, which was circling the pipe, could squeeze the molten plastic upwards.”

The basic idea is that the welded joint area is blasted clean, induction heated and then powder epoxy is applied followed by a layer of molten plastic using the specially designed robot. The robot carries out all stages of the work completely automatically. “The coating in this technique is a reactive top coat material developed by Borealis, which acts as both an adhesive as well as a top coat layer,” explains Leif. The complete Wehocoat package includes a specially designed, four-wheel drive truck which carries a crane suitable for moving the light automated robot onto the pipe. The specially developed polymer Borcoat™ME3000FC in pellet form is fed into an extruder on the truck which plasticises it and refills the robot’s material-buffer cylinder whilst moving from one joint to the next.

Following earlier smaller field trials the Wehocoat field joint system has been given a very good work out on the Mäntsälä-Siuntio pipeline in southern Finland between September 2010 and April 2011, during which
The Gasum gas pipeline site at Nummela, southern Finland in the beginning of February where there is half a metre of snow and the temperature can drop to twenty degrees below zero.

time there was half a metre of snow on the ground and temperatures down to -20°C. The 90km, 20 inch (508mm outer diameter) gas transmission pipeline between Mäntsälä and Siuntio is owned and operated by Gasum Oy who are extending and developing their natural gas network in Finland. The Wehocoat Field Joint system was used to coat over 1000 joints on the project including sections which were subsequently installed using horizontal directional drilling.

The Field Unit Foreman, Yuri Teterev, from the Russian company Stroy Transgaz, was extremely satisfied with the field joint coating system: “The coatings made by the machine are extremely hard wearing and as durable as the pipe coating applied in the factory. The quality of the surface of the joint is better than any other joint coating technology and the machine is relatively easy to use. On average, it does three joints an hour and worked without any problem even in freezing conditions. The only thing that slows it down is how to get near the pipe when it is buried in snow.” He was also very clear that the system was a major step forward compared to any other technology adding: “Wehocoat made field joints are particularly suitable for horizontal drilling when crossing under rivers, roads and other similar installations.”

KWH Pipe Technology’s Head of Engineering, Kari Karjalainen, also confirmed that the mechanical peel strength at the joints was similar to that of factory coated pipes, saying: “The protection performance and adherence are many orders of magnitude better than traditional shrink sleeve joints and there are also several positive aspects if compared to the glass fibre reinforced shrink sleeves that were normally used on sections installed by horizontal drilling. What is also important is that the main work stages in Wehocoat technology are automated and the robot produces a consistent, good quality coating. Other technologies require more manual work, especially hand applied shrink sleeves and cold applied tapes, so there is more chance of human error.”

The Wehocoat- Borcoat system is categorised under Field Joint Coating standard ISO 21809-3 codes 5B (Polypropylene Tapes / Sheets hot applied over an Epoxy layer) and 5E (Polyethylene Tapes / Sheets hot applied over an Epoxy layer). However, it also meets most of the requirements of mainline coating standard ISO 21809-1, which has been verified by 3rd party laboratory testing.

Director of KWH Pipe Technology’s Vaasa Business Unit, Kari Punnonen, believes that there are lots of market opportunities for the new technology: “There are millions of joints made every year which would be suitable for Wehocoat technology. Of course there is some investment needed in the equipment, but making the joints using Wehocoat can even work out cheaper than with other technologies. The greatest savings of course comes from the fact that the technology produces good quality and a uniform coating to the pipeline, which means it is not necessary to start to repair the pipeline afterwards because of joint problems.”

Norbert Jansen, Application Marketing Manager for Oil & Gas at Borealis agrees with Kari Punnonen, saying: “All the big players in the oil and gas industry showed their interest in this new technology and many companies have already participated in our field demonstrations to witness the Wehocoat solution on site and we will organise more field visits in the near future. Although the oil and gas industry usually takes its time to adopt new technologies, when they recognise the potential to improve operations and efficiency they are more than willing to take advantage of it. Initially we will concentrate on the PE onshore field joints and there are a number of global projects coming up where this new technology will provide real benefits for coating the field joints!”

This new innovation will bring a greater “peace of mind” to the pipeline owners and operators by providing end-to-end corrosion protection with a very high level of reliability.
New three-layer Top Coat rigorously tested in Kuwait

The new Borouge PE top coat Borcoat HE3450-H was tested rigorously by the engineers from the coating company Kuwait Pipe industries Oil Services (KPIOS) and passed with flying colours.

KPIOS is the major manufacturer of steel pipes and vessels in Kuwait and a specialist in steel pipe coating. More recently, they have expanded their activities into oil services including the installation of pipelines and therefore they were also interested to learn more about the new Wehocoat field jointing system. This new field joint coating system meets virtually all the requirements of factory applied 3LPE coating, thereby completing a very reliable “end-to-end” solution and eliminating the “weak links” which were the field joint coatings. Therefore prior to the trials, steel pipe coating experts Chanchal Dasgupta and Khalfan Al Muhairi from Borouge, together with Kari Punnonen of KWH, presented the details of these new systems to their technical personnel together with some officials from the Kuwait Oil Company.

The coating trials were carried out on 30 inch diameter steel pipes which were initially being coated with the well established Borcoat HE3450 three layer PE system. Following the changeover to the new Borcoat HE3450-H top coat, the pipe coating rate could be increased by about 30% at the same screw speed whilst still maintaining the minimum thickness of coating at the weld. The peel strength of the coating on the weld was around 300 N/m and in the body of the pipe was above 500 N/cm – both well above the specification requirement.

In addition, the new Borcoat HE3450-H top coat has a higher indentation hardness and higher Vicat melting temperature, making it more robust at the higher ambient temperatures in the Middle East, a benefit that the engineers from the Kuwait Oil Company were quick to appreciate.

Utility pipework design discussions with Sweco China

The Sweco Group is a well known Swedish owned, global project engineering company, who have been working in China since 2001. Their projects have varied in scope, but the focus has consistently been on the development of residential areas and cities. One of their largest projects involves the planning of the Caofeidian eco-city some 250km southeast of Beijing. Here, the goal is to build a climate neutral, attractive city for 1-1.5 million people including a Sustainability Centre which will house an exhibition of sustainable development ideas for city design and...
According to the Malaysian Association of Water and Energy Research, Malaysia lost 1.8 billion cubic metres of water from its network in 2009 valued at around $500 million USD. The head of the Kuala Lumpur and Putrajaya water company explained that this was primarily due to the state of water mains which were in need of a major renovation programme. In his part of the network nearly 25% of pipes were over 40 years old and the cast iron was heavily corroded and losing around 35% of the water transported but budgetary restrictions meant all he could do was patch repair the bursts as they arose.

Ideal circumstances for local pipe producer Timplas Industries to organise a seminar presenting the benefits of polyethylene water systems in Kota Kinabalu, Sabah on March 2011, which was aimed at local water engineers and the state water companies. Supported by Andy Wedgner of Borouge a strong case was made for the use of PE100 pipes instead of the traditional DI and PVC pipes and also for the use of high stress crack resistant PE100 to reline some of these mains to reduce the level of leakage whilst minimising disruption. A similar programme in London by Thames Water reduced the leakage rate by 30% in just over five years and the use of “No Dig” technology reduced the overall project costs by around one third.

The seminar was opened by Assistant Minister of Infrastructure Development, Datuk Japlin Hj Akim and also included presentations by Mitco – Petronas, Kossan Rubber Industries, Megapadu Electrofusion Fittings and SIRIM QAS International, the Malaysian national standards development agency.

Borouge had previously met with Sweco China and they had been very interested in the use of plastic pipes. Therefore while Mike Shepherd was in Beijing, Cindy Wang of Borouge took the opportunity to arrange a meeting with them so that they could benefit from Mike’s knowledge of the European water industry where plastic systems are used extensively. The meeting was held in early March in the Borouge office in Beijing with Dr. Liu and Miss Kong of Sweco.

After introductions Mike described how PE pipes are used in Europe for gas and water distribution. He described in detail the UK national scheme for the colour coding and positioning of underground utilities which has been introduced by the National Joint Utilities Group (NJUG). This agreement provides guidance for all pipe and cable network operators that use the public footpath. For example, for water networks it recommends that they are laid 750mm below the surface for service pipes up to 63mm in diameter and at a depth of 900mm for mains. This affords protection from freezing while the greater depths for the mains are fixed by the wish to avoid accidental damage from other excavations, and also to accommodate the greater height of large diameter sluice valves.

There was also considerable discussion of the design factors that are used to calculate the pressure ratings for PE pipes and the pressure reduction factors used at higher temperature operation. Reference was made to Appendix A of ISO 4427 which uses a minimum curve to define the reduction factors although it also states that if the material’s pressure characteristics are available these can be used to calculate the pressure ratings at different conditions.

The session was extremely lively and interesting with a good open discussion of the differences in pipeline design and operating practices between the UK and China.
Jean-Pierre Audenarde, Mike Shepherd and Andy Wedgner - three of the speakers at the conference

The Gulf Plastics Pipe academy (GPPA) Spring Conference took place at Le Royal Meridien Hotel in Abu Dhabi in April. The audience of around forty delegates listened to expert speakers from around the world present on a range of topics under the twin themes of ‘Achieving Sustainable Quality’ and ‘Thermoplastics in the Oil and Gas Industry’.

The importance of quality of plastic pipe products and installed systems were addressed by a number of the speakers. Dr Ruprecht Schattner of Exova, the globally recognized authority on the standardisation and certification of plastic systems, introduced the subject by presenting an overview of the different types of quality certification schemes that exist. He is currently assisting the GPPA in structuring and implementing their own Quality Mark scheme at a pilot scale level within the UAE. In a later presentation Andy Wedgner of Borouge showed how the quality systems of the different members of the pipe value chain are strongly linked and described in some detail the different elements within the quality plan for a pipe and fitting producer and provided a number of practical tips to help in setting up a sustainable system.

Mike Shepherd, who until recently was a senior engineer with Thames Water in the UK, presented a very practical approach to quality in PE pipe design and installation. In particular he drew the delegate’s attention to the axial forces that are generated in a water main due to internal pressure, temperature variations and valve operation. In a welded PE system these loads would normally be absorbed in the strain in the pipe walls but there was a need for careful consideration when the PE pipe was connected to an existing iron main. Since the old iron joints have no end load resistance it was necessary to anchor the joints with special fittings and gaskets and he showed a number of solutions that he had used within Thames Water.

In the afternoon Khalfan Al Muhairi of Borouge presented an overview of the potential application of polyolefin pipes within the Oil and Gas industry including a unique case study where PE100 pipes had been used as “stand-alone” piping for crude oil transportation in Oman. These pipes have been carrying a mixture of crude oil and brackish water for almost 15 years without any maintenance requirement over the entire period and recent tests confirm that the pipes still have many years of service left in them.

Other presentations covered the use of PE pipes for the gathering of coal seam gas in Australia, PP-R pipe systems for hot and cold water and composite pipes for higher pressure offshore oil and gas gathering ensuring that the delegates had a full and comprehensive overview of the opportunities for plastic pipes in the region.
Middle East Plastic Pipes 2011 in Dubai

In mid May, around 80 delegates attended the AMI Middle East Plastic Pipes 2011 Conference at the JW Marriott Hotel in Dubai. Over the two days, a number of interesting papers were presented illustrating the growing interest in plastic systems in the region.

AMI’s John Nash presented a review of the plastic pipe industry in the GCC region and his expectations for the future. AMI estimate that the plastic pipe market is some 650-700Kton of which approximately 150Kton is for PE and PP pipe systems. He also believes that the market is growing at a faster rate than the GDP, at around 7-8% per annum. The highest potential for growth is in Saudi Arabia as the government are determined to accelerate their expenditure on water and sanitation systems. This is certainly needed because for example, in Jeddah, a city of 2.6 million people there is a chronic shortage of water and only 20% of the population are connected to the main sewer system. Water losses around the region are also up to 50% which increases an already critical situation - so there is a major opportunity to renovate the existing network using relining technologies.

Rob Lawrence of the GPPA spoke about some of his concerns regarding design engineers in the Gulf region who tended to overdesign pipeline systems by overestimating the operating pressure and/or temperature. Although using higher design pressures and temperatures in metal pipes has no effect on the cost of metallic systems, this is not the case with plastic pipe systems, where it can lead to major cost increases to an extent that makes plastic systems uncompetitive.

Similarly, using pipeline structural analysis techniques developed for rigid pipes can increase the cost of plastic materials and their installation - often unnecessarily. He recognised that there was no comprehensive design code for plastic pipe systems but there were many design tools which the GPPA were bringing to the attention of local engineers.

There were a number of papers covering alternative plastic sewage and drainage pipe systems, including a presentation by Youssef Taha of Borouge who discussed some of the challenges of introducing new PP systems to the region as well as some of the early successes that had been achieved. This paper is presented separately by Youssef in this issue of BorPipe.

From outside the Middle East, Jain Irrigation described the water situation in India where many communities suffer from an intermittent water supply. Funded by the World Bank they had undertaken a number of 24x7 water projects in four major cities in the Indian State of Karnataka. These projects actually led to an overall reduction in water consumption by 40-50% and a significant increase in the revenue of the water company, whilst customers were able to enjoy a continuous supply of clean water – in other words a winning situation for everyone.

Also from outside the region Paul Hutchings of Reinert-Ritz of Germany described some of the large diameter PE and PP fittings that they had manufactured for pipeline systems all over the world. These also included fittings for a number of large diameter industrial schemes in the Middle East region.
Since 1993 the 22nd March each year has been designated “World Water Day” by the United Nations when many events are organised to focus attention on the increasing stress on the world’s diminishing water resources. Borouge chose this day to arrange a seminar and water exhibition at the Sheikh Khalifa Energy Complex in Abu Dhabi for its own staff and for guests from other companies within the ADNOC Group.

The exhibition area contained stands featuring the “Water for the World” projects together with some stands of their partner companies and the “Troubled Waters” photographic exhibition. In addition a number of end-products were displayed which were produced by Borouge customers from polyolefin materials that contribute significantly to efficient water management, such as geotextiles, agricultural films, micro irrigation systems and polyolefin pipes for water and wastewater transportation. In addition to internal staff the event was attended by H.E. Dr. Rashid Ahmed Bin Fahad, the UAE Minister of Environment and Water, H.E. Rashed Saud Al Shamsi, Chairman of Borouge’s Marketing Company, as well as representatives from ADNOC, Borouge, Borealis and Borealis, at the opening of Borouge’s Water for the World exhibition.

At the opening of the seminar, the CEO of Borouge’s Production Company, Abdulaziz Alhajri, highlighted the growing importance of water conservation and the need for the world to harness all its capabilities to preserve water resources. He also stated that in the UAE, two major research projects into groundwater are currently being supported through the “Water for the World” initiative, in conjunction with the Emirates Foundation, to address this challenge in the local environment, and Borouge is also examining its Water Footprint to raise awareness and improve water usage efficiency at its operations in Ruwais, Abu Dhabi.
Omar Akay, Regional Managing Director of the specialist water and wastewater consulting company CH2M Hill then provided an overview of the water situation around the world and some of the work that was going on to try and address some of the problems. He highlighted the work that CH2M Hill had done to develop the Water Tool for the World Business Council for Sustainable Development and a new initiative called Water Match to promote the reuse of municipal effluent for industrial applications.

The Borouge and Borealis “Water for the World” initiative was then presented by Khalfan Al Muhairi who also described a number of the projects that had been undertaken by the companies and its partners during the last three years. Mubashir Niaz, the President of one of the “Water for the World” partner companies, HEED Association, then described the recent project to provide water supply systems to the villagers in the mountains of Northern Pakistan to replace those that had been destroyed in the floods of July 2010. The construction of these systems needed to be completed very quickly before the heavy snows of winter made conditions impossible and he praised the efforts of the villagers and the HEED volunteers who did the majority of the construction work and Borouge for sponsoring the project and organising the supply of pipes through its local agent and customer.

The graphic “Troubled Waters” exhibition displayed a number of photographic images by Belgian photographer Dieter Telemans. These photographs highlight the precious value of water by showing the impact of desertification and drought in the Horn of Africa, floods in Bangladesh, health, sanitation and urbanisation in India, China, Aral Sea, Ethiopia and Chad, as well as water management in Spain and Australia.

In the following two days, the exhibition area was opened to Borouge staff and to the children from the Glenelg School who, as part of the future generation of UAE leaders, also learnt about the value and importance of water conservation for the future of us all.

The Steel Pipeline Centre holds its 3rd Meeting

The Steel Pipeline Centre (SPC) met in May for the 3rd time at the ADCO Head Quarters in Abu Dhabi. Formed by representatives of the GCC Oil and Gas pipeline industry, operators, suppliers and other interested parties the Centre provides a useful forum where all the value chain members can meet to share their knowledge and experience on steel pipeline coating systems and work together to develop joint procedures based on best practice. By promoting the use of specified coating systems, high quality application and installation, commissioning and testing practices they will reduce the risk of any pipeline failure in the GCC region.

Over 60 delegates attended this seminar at which eight speakers from various parts of the industry described some of the latest developments in their specialist area. One of the speakers was Chanchal Dasgupta from Borouge who presented the latest information on the Wehocoat PE field joint coating system which is being developed jointly by Borealis and KWH. The system, which is described in detail in another article in this issue, has now been thoroughly field tested under severe conditions in Finland, and passed all the requirements of the contractor and system owner. This system will significantly reduce the risk of pipeline failure from corrosion at the field joint which in the past was the “weak link” in an otherwise extremely reliable pipe coating system.

At the end of the seminar, it was agreed by all that the Steel Pipeline Centre should continue to meet regularly twice per year in order to share information and update everyone on the progress on the many new developments. A number of subjects were then identified for discussion at the next meeting which will take place towards the end of the year.
During the ChinaPlas exhibition in Guangzhou, Battenfeld-Cincinnati organised a demonstration of their latest extrusion lines together with a technical seminar at a nearby pipe factory. During the two days, over 350 visitors attended the event representing pipe producers, designers and end users from Asia and many other parts of the world.

The Battenfeld-Cincinnati Leanex63 high speed extrusion line produced 20mm diameter pipe from Borouge PP-R RA130E material. The extrusion line was able to operate at line speeds of 25 metres per minute (270Kg/hr) compared to the norm of 20 metres per minute which demonstrates the excellent processability of the Borouge material. Independent testing also demonstrates that pipes produced from this grade show an overall improvement in stiffness and pressure performance compared to other PP-R materials on the market.

During the seminar, PP Product Manager Cristian Hedesiu provided considerable background information on the Borouge 2 and Borouge 3 expansion programmes in Ruwais and the performance of the material which makes it an excellent choice for hot and cold water applications in the Middle East and Asia. In addition, the exceptional chemical resistance of PP-R also makes the pipes ideal for chemical transportation in industrial plants.
Sangir Plastics benefits from using BorECHO grades for sheet production

Sangir Plastics at Pardi, Gujarat in western India is ideally located to produce a wide range of polyolefin pipes and fittings for industry as it is a major centre for the Chemical Industry. PE and particularly PP pipe systems are ideal for transporting aggressive industrial chemicals which would severely corrode most other piping systems in a very short time.

In addition to manufacturing pipes and fittings, Sangir Plastics under their brand name PlastNova also manufacture a range of plain and reinforced plastic sheets for the fabrication of large tanks and vessels and for the lining of concrete or steel tanks. These sheets, which are usually 5 to 30 mm in thickness, are cut to size and then welded using a small hot air welding machine and welding wires extruded from the same grade to form the appropriate shapes. Some sheets are backed with glass fibre cloth to provide additional stiffness or mechanical strength.

Sangir Plastics have also developed some innovative formulations using Borouge PP grades to develop flexible PP sheets with glass fibre backing for the lining application.

In recent trials using BorECHO BA415 and BorECHO BA212E to manufacture natural, gray and white coloured sheets and glass fibre backed sheets, they found considerable improvement in the extrusion output rate, reduced wastage and the possibility to extrude thicker sheets compared to their standard PP materials. In terms of end product properties they observed an improvement in the mechanical properties, surface finish and stiffness of the sheets. Under high temperature applications the performance of the sheets has also been reported to be excellent.

Two of the Directors of Sangir Plastics Sushil Mandhana and Anand Mandhana acknowledged that there was an overall techno-commercial saving of 5 to 7% by using Borouge BorECHO grades compared to conventional higher melt flow PP grades. These benefits have encouraged Sangir Plastics to change over to BorECHO BA415E and BorECHO BA212E.
The Borouge Marketing Team recently visited the Kimplas Piping Systems Ltd. Electro fusion fitting factory in Nashik in India and met up with the owner Krishen Khanna and his son Anirudh who are the men behind the company. Meeting one of the pioneers of the Indian plastic pipe industry the editor could not resist asking him a few questions about the development of his business and how he sees the future for polyethylene pipe systems in India.

I know you have been in the plastics pipes industry in India since the early days, can you tell us a little about how you got started?

Yes, I have actually been involved in the manufacture of PE pipes in India since 1974 and have seen the business develop since that time. It was in 1971 when I was working as a Chemical Engineer for a UK consultancy company that I first had the ambition to start my own operation. I was approached by Polyolefins Industry Ltd. (PIL), Thane – Hoechst partner to granulate HDPE from powder. I jumped at this opportunity and designed and built my own extruder and granulator as none were available in India at that time and got started.

Over the years there must have been many changes in HDPE pipe industry. Can you tell us about some of the major differences with today?

The PE pipe industry in India started with GM5010 black compounded material produced by PIL in India. This was a PE63 grade which became very popular for water distribution, industrial applications as well as gas distribution. Unfortunately as all the material had to be imported it was always in short supply which really inhibited growth in the early days.

By the 1990’s local manufacturers had started producing PE materials and other imported grades were also available which improved the availability and supported more growth. This also enabled the Indian pipe industry to successfully migrate from PE63 to PE80 and now PE100 and in spite of several hiccups due to pipe manufacturers using poor quality or recycled materials, the industry is now well positioned for some dramatic growth.

You talk of dramatic growth – do you really expect to see a rapidly growing demand for your PE products in water and gas infrastructure?

Yes, I expect that the growth is going to be dramatic. For example there are already five major cities in India that have gas distribution systems and with the availability of gas from the Godavari Basin and other discoveries, another 17 cities have started work on developing their systems and the Government target is for gas to reach 220 cities in the next 10 years. In addition I expect massive investments to be made in the water networks to eliminate the water lost by leakages in the old iron water distribution systems by replacing them with PE pipes.

I know you are also appreciably involved in promoting the irrigation systems sector – how do you see this sector
In 1986 I first invested in producing micro irrigation systems and was one of the two pioneering companies to do so. Subsequently I founded the Irrigation Association of India and have remained deeply involved in building up this industry to its current size with an estimated annual turnover of nearly $800 million and growing at the rate of 25% - 30% per year.

The heart of the micro irrigation system is the drip lateral and I am pleased to see that Borouge is developing a specific grade for manufacturing this important component and I am very happy to co-operate in this development.

We started developing electrofusion fittings in 1996 and since then we have been deeply involved in developing fittings with a focus on gas and water distribution systems. We now have a very extensive range and most recently have added the Flexifit range of tapping saddles. These tapping saddles are welded to the gas or water main and the house connection pipe. Each saddle can accommodate 2 to 4 different main diameters which reduces the inventory and the associated costs for the installer. These fittings have been fully tested and approved and carry the Kitemark licence from the British Standards Institution (BSI) and a product licence from DVGW of Germany.

You have always been very innovative in your product development over the years. Can you tell us something about the latest innovations?

You have achieved a lot in your career in the plastics industry – What are the things that you would like to accomplish in future for developing the market?

I truly believe that in India today we are on the threshold of a plastic revolution. Our institutions have suddenly started believing in plastic products and in particular in plastic pipes. I would like to support this revolution by producing high quality PE fittings to the International Standards as no pipe network can function without the full range of quality fittings. To this end I have invested in a new manufacturing facility which will enable us to meet this increase in demand whilst maintaining the highest levels of quality.

Is there anything else you would like to address to the Indian PE pipe industry?

My answer is simple - the future is in our hands we just have to go and get it!
Inauguration of the Water for the World project in Pakistan

Over 400 villagers gathered in the Neelum Valley in Northern Pakistan to celebrate the construction of the new water systems in four of the local villages. On the stage sat the Minister of Health and other VIP guests contributing to the official inauguration ceremony, including some of the members of the Village Water Committees who had contributed so much to the construction of the systems and were so important to their future operation.

A number of speakers including the Minister thanked NGO HEED who, working with the support of the local villagers, installed the new water systems to the villages of Mattoo, Kandol, Matteiyan and Daba after the original systems had been destroyed during the momentous flooding in July last year. Their achievement was all the more remarkable because most of the work was completed during the cold winter months.

Mubashir Niaz the President of HEED described the project and praised the contribution of the Village Water Committees who had undertaken much of the backbreaking installation work in such harsh conditions. He also thanked Borouge who had sponsored the work under their “Water for the World” programme and local pipe producer Sun International who had provided the PE100 pipes. He believed that the systems that they had installed were robust and would serve the villagers for many years to come with the minimum of maintenance.

At the inauguration ceremony, Borouge was represented by members of the Arfeen Group who are their official agents in Pakistan. One of Arfeen’s senior Director’s Mr Javaid Firoz said on his return from the ceremony: “We are proud to have played a role in this important project and after our 12 hour journey to and from the site, during which we encountered several landslides, we fully appreciate the logistics problems that HEED and the villagers had to overcome to complete their work and we congratulate them for their success. We hope the project will go a long way in upgrading the standard of living for people in this part of world.”
The key challenges
Many of the challenges ahead relate to changing the “mind set” of the engineers designing new sewerage and waste water systems, who for the whole of their working life have specified rigid pipe materials such as concrete or asbestos cement. We need to clearly demonstrate the benefits of plastic systems and show them that all products are readily available in the local market as are all the necessary knowledge and skills to install the systems to a high standard.

Flexible versus Rigid pipes
A “flexible” plastic pipe looks and behaves very differently to a rigid concrete or asbestos cement pipe in that it is very much lighter in weight and can deform under load. The important thing is to recognise these characteristics as the significant benefits that they are and not causes for concern.

As shown in figure 1 the stresses due to all the applied loads in a rigid pipe build up in the walls of the pipe creating cracks which eventually lead to failure. Internal corrosion due to the build up of acids in the sewer in harsh environments (such as high temperatures and low flow rates) accelerates this process leading to premature failures and environmental pollution.

In plastic pipes the stress in the wall due to the external loads will be greatly reduced as the pipe can deform as shown in figure 2. This small amount of ovalisation transfers the stresses to the side-fill material around the pipe without any significant reduction in the flow capacity of the pipe (ref. 1).

Installing PP systems
PP pipes are lightweight, easy to handle and easy to install meaning that the lifting equipment needed to manoeuvre concrete and asbestos cement pipes is not required reducing both the cost of installation and the noise and general disruption caused to the local community.

Jointing can be carried out using integral push-fit sockets with rubber rings or on plain ended pipes using double sockets or mechanical fittings. Where additional security is required to prevent leakage of hazardous fluids or to eliminate the threat of root intrusion in heavily wooded areas then fusion welding

Despite the increase in investment in sanitation systems over the past decade, over 2.6 billion people (almost 40% of the global population) still do not have access to adequate sanitation facilities. By 2015, it is estimated that the global spending on sewerage pipes will be $53 billion (28% higher than the current demand level). We need to make sure the preferred pipe is plastic rather than concrete or asbestos cement – we have seen this change in the pressure pipe market why not in the non-pressure sewage and drainage sectors?

In this article Youssef Taha of Borouge tackles some of the key challenges to establish PP as the preferred material for gravity sewers and drainage pipes. This article is based upon Youssef’s presentation to the Middle East Plastic Pipes Conference in the JW Marriott Hotel, Dubai on 16-18th May.

Youssef Taha, Borouge Application Marketing Manager for PP pipe systems

Pioneering PP gravity pipes in the Middle East & Asia
BorPipe

I fully expect this same trend to take place in the Middle East and Asia but of course we are starting from a low base and we need to develop some good success stories of our own to convince engineers to move away from the rigid concrete and asbestos cement pipes they have used over the years.

Some of the Success Stories

Despite the challenges outlined above we are starting to build up our portfolio of success stories from the Middle East and Asia based on the BorECO PP materials supplied by Borouge.

Solid wall PP pipes for small diameter domestic sewers:

In Syria Technoplast are producing a range of solid wall PP pipes up to 160mm in diameter for transporting domestic waste from the house to the main sewer.

Mineral filled PP multilayer pipes for internal wastewater systems:

In Iran the Vahid Industrial Group are using BorECO BA415E to produce their multilayer Muri Silent pipes and fittings which are being installed in luxury homes and apartments around Tehran (see fig. 4.). As outlined by their Technical Manager: “We chose BorECO BA415E from Borouge because it provides the optimum balance between the stiffness and impact strength for our Muri Silent Pipe system. The processability of the material is also excellent, which is a very important consideration when you are manufacturing a relatively complex multilayer pipe system.”

PP versus other plastics for non pressure pipes

PVC was the established non pressure plastic pipe material in Europe but this is now changing as the industry recognises the benefits of PP systems. This change is being driven by environmental issues, material toughness, financial considerations and the fact that most of the major pipe producers now supply PP systems for sewage and drainage.

The swing to PP in Europe increased as higher stiffness PP materials such as BorECO BA212E became available because this enabled the cost of the PP pipes to be even lower than that of the equivalent PVC and PE products.

Lifetime of PP systems

The results of a major study of sewers in Germany, Holland and Sweden clearly demonstrated that plastic sewers posed less risk of failure than concrete and clay sewers. The camera survey covered 1,800km of sewers up to 800mm in diameter all of which were less than 30 years old. From the data they estimated that the risk of failure of plastic sewers was only 15% that of the risk of failure in concrete or clay systems (ref. 2).

Also plastic materials and particularly PP, have a very high resistance to the acids that can form in sewers, particularly at higher ambient temperatures, that will corrode concrete and asbestos cement pipes. This means that the wall thickness of PP pipes does not reduce over time and they retain their strength throughout their long operating life. This is not unexpected as in aggressive sewers engineers often use PP or PE sheets to line concrete and asbestos cement pipes to protect them against corrosion.

Good quality PP pipes are also extremely tough and can absorb considerable deformation without cracking. This was clearly demonstrated by the Swedish National Testing and Research Institute who applied a constant deformation to PP pipes over a long period of time (ref. 3). Tests at 15%, 25% and 45% deformation were carried out on both new and artificially aged pipes and the compliance of the pipes was measured for test periods up to 10,000 hours (see fig. 3). In all cases no cracking or crazing occurred in the pipes clearly demonstrating the long term toughness of the material under considerably higher loads than they would ever experience in the ground under normal operating conditions.
**PP for large diameter twin wall drainage pipes**
In New Zealand Waters and Farr made a painless transition to BorECO BA415E for their large diameter twin wall “StormBoss” drainage pipes which have a strong image in the local road drainage market. As their Technical Manager, Leon Tabachnik reported; “The transition from our current material to BorECO BA415E was entirely painless. The extruders quickly settled down to a lower melt pressure, showing that the new grade is indeed much easier to process than alternative materials.”

**PP structured wall pipes for industrial intakes/outfalls**
Large diameter pipes for industrial plants are no longer restricted to PE pressure pipes as Union Pipes are now producing 3 metre diameter structured wall PP pipes for a major project in Abu Dhabi. These pipes will be produced from BorECO BA212E PP-HM material from Borouge using the Bauku spiral winding technology. The high modulus material is ideal in that it produces a high stiffness pipe with the minimum wall thickness and since these pipes will be transporting sea water the corrosion resistant properties of the PP material are an added bonus.

**Concluding remarks**
Clearly, we still have a lot to do to convince engineers of the benefits of using PP pipe systems for sewage and drainage in the Middle East and Asia, but I am satisfied that we have made a good start to that journey. We are building up the number of success stories in the region and once installers and operational engineers have used PP systems they will demand them to be considered in all schemes and they will become the preferred material for non pressure piping systems in exactly the same way as PE has become the preferred pressure pipe system.

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**Jain Irrigation win award for the Marhi hydroelectric project**

At the Plastic Pipe Institute (PPI) annual meeting in May at Hilton Head, South Carolina, USA, Jain Irrigation were presented with an award for their work on the Marhi hydroelectric scheme. This project which involved the installation of a 710mm polyethylene water feeder pipe at a height of nearly 4,000 metres was considered an outstanding achievement and was given the PPI Municipal and Industrial Division 2011, Project Award.

The actual pipeline construction was started in May 2008 when there was still snow on the ground and the temperatures in the early morning and late evening could still drop down to -10°C. Despite the logistics problems in this remote region of India the installation of the 942m length of polyethylene pipeline was completed in only 65 days.

Engineers from the Himachal Pradesh Government Energy Department agreed that the PE100 pipes were much easier to handle and install than the metal or concrete pipes used in previous projects. Even at low temperatures the flexibility of the material enabled the pipes to follow the natural contours of the hillside which much reduced the need for special fabricated fittings.

Overall the project tested the strength and durability of the pipe and of the construction crew to the fullest and provided yet another example of the true value of BorSafe HE3490-LS PE100 piping systems.
American Environmental Scientist named the 2011 Stockholm Water Prize Laureate

Stephen R. Carpenter, Professor of Zoology and Limnology, the study of inland waters, at the University of Wisconsin-Madison, USA, will receive the 2011 Stockholm Water Prize. Professor Carpenter’s groundbreaking research has shown how lake ecosystems are affected by the surrounding landscape and by human activities. His findings have formed the basis for concrete solutions on how to manage lakes.

Professor Carpenter, 59, is recognised as one of the world’s most influential environmental scientists in the field of ecology. By combining theoretical models and large-scale lake experiments he has reframed our understanding of freshwater environments and how lake ecosystems are impacted by humans and the surrounding landscape.

The Stockholm Water Prize Nominating Committee emphasises the importance of Professor Carpenter’s contributions in helping us understand how we affect lakes through nutrient loading, fishing, and introduction of exotic species. “Professor Carpenter has shown outstanding leadership in setting the ecological research agenda, integrating it into a socio-ecological context, and in providing guidance for the management of aquatic resources,” noted the Stockholm Water Prize Nominating Committee.

On receiving the news, Professor Carpenter said: "I am thrilled. Many great people have received the prize over the years, and there are many others whose work is worth rewarding. It is a great honour to be selected. The prize will increase my resolve and sense of obligation to work on emerging issues of freshwater, such as climate change.

Malkapur "24x7" water project wins major award

The Malkapur “24x7” water project recently received the prestigious Prime Minister’s Civil Service Award ahead of 64 other nominated projects from all over India. At the ceremony in Delhi, the project’s Chief Engineer Rajendra Ganeshlal Holani received the award from the Prime Minister on behalf of the team. The project which was carried out in 2008 was an excellent example of how PE100 pipe can be used to supply water to outlying villages in rural India.

The solution was to provide a new fusion welded polyethylene feeder main delivering water 24 hours a day to the 2960 individual households in the village. This project, conceived and financed by Maharashtra Jeevan Pradhikaran (MJP), was undertaken by Kimplas Piping Systems and EPC Industries strongly supported by Borouge. This new system is designed for an eventual village population of 67,000 and water is billed on a volumetric basis and has reduced the unaccounted for water from its initial level of 35% to less than 5%.

Since this was an important reference project within the Maharashtra State
Borouge customer wins awards for innovation

Borouge customer Ecoflo Industries of Nashik, India manufactures a wide range of irrigation systems and provides turnkey projects to some of the poorest countries of the world. In many of these countries the farmers are extremely poor and without electricity or the price of fuel for an electrical generator.

But the team at Ecoflo are extremely innovative and have developed mini sprinkler kits which can be directly connected to their patented Treadle Pump to irrigate a 300 square metre vegetable plot. This low cost and low weight pump means that the farmer can utilise his body weight in a very comfortable walking action to irrigate his crops. In fact during a visit to their factory at Nashik in India, Khalfan Al Muhairi was able to demonstrate the simplicity of the operation by shifting enough water in a few minutes to almost drown the rest of the Borouge Marketing team.

Naren Bhinge Managing Director of Ecoflo said: “Since we developed the pump in 2005 about 8000 units have been installed all over the world. The kits are usually provided free of charge to the farmer by an NGO and often enable the farmer to make that first step out of the poverty trap and after a few years be able to afford an electrical generator.”

The unique Ecoflo Treadle Pump has also won a number of awards including the Plastindia Foundation Plasticon 2005 award for excellence in contribution to agriculture and the prestigious Marico Innovation for India Award in 2009 for business supporting the social sector. As Naren Bhinge stated: “We are very proud of this latter award, which actually led to the President of India visiting a small farm at nearby Igatpuri to see the pump in action. We are also very pleased to work with Borouge and cooperate in their programme to optimise their range of irrigation materials.”

only the highest quality materials and products were used. The pipes and fittings were produced from pre-compounded BorSafe HE3490-LS and BorSafe HE3490-IM materials that meet all the requirements of the latest ISO standards and to minimise the possibility of joint problems all jointing is carried out using electrofusion fittings. Kimplas Piping Systems also supplied the pipes in 100 metre coils, which dramatically reduced the number of joints and speeded up the installation of the system.

Clearly the Indian Government has now recognised the value of this important reference project in their programme to improve the water supply to its rural population. At the time the project was also featured in a CNBC documentary.

H.M. King Carl XVI Gustaf of Sweden, who is the patron of the Prize, will formally present Professor Carpenter with the 2011 Stockholm Water Prize at a Royal Award Ceremony in Stockholm City Hall on August 25 during the 2011 World Water Week in Stockholm. Founders of the Stockholm Water Prize are Swedish and international companies in collaboration with the City of Stockholm. They are: Bacardi, Borealis and Borouge, DuPont, Europeiska Insurance, Fujitsu, Grundfos Management, Hewlett Packard, ITT Water & Wastewater, Kemira, KPMG Sweden, Läckeby Water, P&G, Ragn-Sells, Saab Automobile AB, Scandic, Scandinavian Airlines (SAS), Siemens AG, SJ (Swedish Railways), Snecma/ Safran, Uponor, Water Environment Federation and Ålandsbanken Sverige.
"Tried and trusted" BorSafe PE100 for new gas distribution system at Yas Island

The award winning developments at Yas Island in Abu Dhabi are spectacular and extremely prestigious so when they decided to build a new PE gas distribution system they chose “tried and trusted” BorSafe HE3490-LS PE100 material from Borouge.

Yas Island is the site of a US$36 billion development project which includes the well known Yas Island Racing Circuit, which has hosted the Formula One Abu Dhabi Grand Prix since 2009. It also features attractions such as Ferrari World, and the Yas Hotel and in the future will have a water park, the Yas Mall and Warner Bros. Movie World, a movie theme park. In 2009 the Yas Island development was named the World’s leading tourism project by the World Travel Awards Committee.

Consulting engineers from Penspen International designed the 20km gas network in SDR11 PE100 pipe which ranged in size from 32 to 400mm in diameter and included a 350m long section of 250mm diameter pipeline installed using Horizontal Directional Drilling. The Penspen engineers also supervised the construction work which was carried out by Al Fanar Gas Services. Al Fanar has over 21 years of experience in the gas industry and was also responsible for installing a 6.5km gas network on Reem Island, another development in Abu Dhabi.

All the pipes were produced locally by Union Pipes, Hepworth and Cosmoplast using BorSafe HE3490-LS pre-compounded PE100 material from Borouge which was selected because of its long and successful track record in gas and water utility projects and because it is the only PE material from the region that is listed by the PE100+ Association as meeting their stringent Quality Assurance requirements.
China’s thirst for plastic pipes continues to grow!

At the China Plastic Pipes Association Annual Conference in Yichang, HuBei Province, the Secretary General, Wang Zhanjie, announced that the market for plastic pipes continued to grow rapidly and in 2010 had reached 8.4 million tons, which certainly makes it the largest market for plastics pipes in the world. The biggest share was still for PVC (55%) although PE was catching up fast with a 30% market share. He also estimated that there were now over 3,000 plastic pipe producers in the country and 20 of these had an installed capacity in excess of 100kton.

Mr Wang Zhanjie also outlined his main objectives for the China Plastic Pipes Association in the coming twelve months which included:

- Enhancing the cooperation with the material suppliers to promote PVC pipe grade materials and pre-compounded PE materials for pipe production.
- Enhancing international exchange including a visit to RAPRA in the UK in June and the Plastic Pipes “Spin Off” Conference with the PPCA in Beijing in November. He also advised members that the Plastic Pipes XVI would take place in September 2012 in Barcelona in Spain.
- He also announced his intention to set up a “Quality Alliance Group” for producers of PE gas pipes to ensure that only good quality pipes made from approved pre-compounded raw materials would be supplied to China’s growing gas industry.

During the course of the conference the 440 delegates heard a number of interesting papers including:

- The growing use of plastics pipes in infrastructure projects in China which was presented by Gao Lixin from the Center of Science & Technology of the Ministry of Housing & Urban-Rural Development (previously known as the Ministry of Construction)
- A review of the development of plastic sewage & drainage pipelines in China was given by Wang Lan, Secretary General of the Drainage Association under the CUWA (China Urban Water Association)
- Cindy Wang of Borouge presented a paper showing some of the exciting new developments in the Middle East Pipe market including the use of large diameter PE and PP pipes in major industrial plants.
- Also an interesting paper on the stress crack resistance testing of PE pipes was presented by Xiong Zhiming from the National Testing Center of BRICI, SINOPEC.
Although polyethylene pipes have been used for low pressure gas distribution in China for some time, in other applications designers still often prefer to specify more traditional materials such as ductile iron, steel and concrete. In discussions with the designers, Borouge customer Chinaust, found that this was mainly because they were not completely familiar with the different design methodologies used in PE pipelines and therefore they felt more comfortable designing with the older materials.

To help overcome this problem Borouge agreed to invite Mike Shepherd, who until recently was a senior engineer with Thames Water in the UK, to visit the main design institutes, in China to develop their understanding of PE pipes and appreciate better the benefits of the using these materials. Therefore, seminars were organised by Borouge and Chinaust with two of the largest design institutes the Beijing General Municipal Engineering Design & Research Institute and the Beijing Institute of Water, in early March. The Beijing General Municipal Engineering Design & Research Institute was established in 1955 and is the leading municipal design institute in China. The 1400 employees are responsible for the design of major infrastructure projects such as roads and bridges, municipal pipelines, landscape planning as well as the preparation of standards and specifications. Recent projects range from the renovation of the well known Tiananmen Square to the design of Terminal 3 at Beijing Capital Airport.

The Beijing Institute of Water was established much later in 1970 under the auspices of the Beijing Hydraulic Bureau and has 270 staff. The Institute’s main focus is on water resource management and hydroelectric engineering projects, including the large scale South to North China water transportation project. Since 2000, the scope of their activities has been extended to include municipal water administration including the use of recycled water. One current project is the design and construction of the 1200mm diameter PE pipeline to convey recycled water from the Jiu Xian Qiao water treatment plant to the local rivers to provide compensation water, which was reported in Borpipe 19.

At the seminars, Mike Shepherd gave a brief introduction setting out the history of PE pipes in Europe followed by some of the advantages of polyethylene over other materials for water pressure pipelines. He then described in detail the installation and jointing requirements and the design of the anchorage required when connecting PE to non welded systems to cope with temperature stresses and the other forces on the pipeline. He also stressed the need for quality in the products and installation including the need to use only PE pipes and fittings that were manufactured from pre-compounded resins to a recognised ISO or European standard or equivalent.
Mike then discussed the cost benefits that could be obtained by taking advantage of the excellent hydraulic smoothness of PE and the fact that PE pipes are manufactured in a variety of wall thicknesses or SDR ratings. As around 70% of the cost of PE pipe is the cost of the material, considerable savings can be made by designing the pipe for the correct hydraulic capacity and pressure class needed for the application. As an example of using the better hydraulic characteristics of PE, he showed that a 630mm SDR 17 (10 bar) PE pipe with an internal diameter of 556mm was more than equivalent to a DN 600 iron pipe with an internal diameter of 610mm. Indeed, if you consider the long term roughness factors for the two materials, the volume flow for the PE pipe would be 5% higher for an allowable head loss of approx 2m per km.

He explained that further savings could be made in installation costs because as the fusion welded PE joints were fully end load bearing there was no need for concrete anchorage blocks except when you connect to an old iron pipeline. This can save considerable costs and disturbance particularly in congested city roadways where it is difficult to find space for anchor blocks. Welding the PE pipes into long pipe “strings” also makes it easier to lower them into a narrow trench or to use one of the many “No Dig” installation methods which can significantly reduce installation costs. Mike illustrated these with examples of narrow trenching and directional drilling for new pipe installations and slip lining and pipe bursting methods for pipe renovation and replacement.

Finally, Mike described the “whole life” costing method used in Europe to determine the most economical pipeline materials for a particular project. This method not only takes into account the costs of the pipe materials and the installation but also the costs of ownership of the pipeline throughout its service life. These costs can include the costs of maintenance cleaning, costs of repairs and compensation when bursts occur, energy costs on pumped systems, etc. These will all vary from country to country because of differing regulatory requirements and relative costs for materials and labour but these variations can all be taken into account in the calculations. He concluded that it was surprising how often the cheapest material to purchase were not the cheapest material to own.

Each session was followed by over an hour of questions from the audience. The questions covered many areas of interest from the type of backfill required for PE pipelines to the methods of carrying out repairs and connections to PE pipelines in the future. In particular, there was a lot of discussion around the issue of the thermal expansion and contraction of PE pipelines during pipelaying and in the design of anchor blocks. Mike gave comprehensive answers to all the questions, quoting references to further guidance where appropriate.

At the conclusion of the Beijing General Municipal Engineering Design & Research Institute seminar, Professor Liu Yusheng thanked Mike Shepherd for his presentations and summed up the session by stating that although it may not be possible to simply copy the European codes of practice in China, the information provided could contribute considerably to the development of the Chinese national standards and installation specifications, leading to the better utilisation of PE pipes in China.
The Al Bilad Company is well established in the non-pressure pipe market in Saudi Arabia, having been one of the largest producers of concrete pipes in the region since the early 1980’s. Having recognised the benefits of plastics for the construction of these large diameter pipes and fittings, they invested in a Krah production line and now supply a wide range of pipes, manholes and fittings up to 3m in diameter from PE80 and PE100 materials. Recently, they asked Borouge to support them in a seminar at the Marriot Hotel in Riyadh to introduce and promote these new products to the Saudi Arabian sewage and waste-water engineers.

At the event in February, over a hundred delegates attended the seminar representing many different organisations including the National Water Company, Ministry of Water and Electricity, local consulting engineers and contractors. The seminar was opened by Mohammed Afanah of the Al Bilad Company, who presented some of the advantages of lightweight large diameter polyolefin non-pressure pipes compared to other materials. He showed for example, that since polyolefin materials are resistant to corrosion they will not be affected by the build up of hydrogen sulphide inside the sewers at the high temperatures in the Middle East, which causes so much damage to concrete and asbestos cement sewage pipes.

Being lightweight the pipes are also easier to handle on site and much quicker to install without the need for heavy lifting equipment.

Ahmed Al Mazrouie then presented Borouge and introduced Andy Wedgner and Jarmo Harjuntausta who discussed some of the technical details concerning the design and installation of polyolefin sewage pipes. Both PE and PP materials were covered and the materials compared in terms of their performance characteristics which clearly favour the higher stiffness PP-B materials within the Borouge BorECO range of materials. The audience were very attentive and became actively engaged in the lively question and answer session that followed the presentations.
The PE100+ Association have had a long standing relationship with the publisher Vulkan Verlag in Germany and between them they have produced three technical books about PE pipe materials which have been widely circulated in Europe. Now for the first time, the latest volume has been translated into Chinese and is available in a range of bookshops in China. This builds upon all the other activities that the PE100+ Association has been doing in China to enhance pipe quality, design and installation technology and will consolidate the “Golden Bridge” of knowledge with the Chinese plastic pipes industry.

This first half of the book is a comprehensive technical background to PE100 pipe materials, the production and testing of pipes and fittings and jointing and installation methods. This latter section provides an illustrated guide to all the popular “No-Dig” techniques so useful in renovating old leaking iron mains to reduce water losses.

The second part of the book is dedicated to interesting and challenging case stories where PE100 pipes have been used to solve practical problems. The book is unique in that the stories are written not just by raw material suppliers and pipe producers but also by engineering consultants and end users. A good example of the latter is the article by Axel Frerichs of the German water company OOWV, who tells of a successful project to install a 10.5km, 710mm diameter SDR17 PE100 water main partly by direct burial and partly by directional drilling where the main passes under a canal.

It is anticipated that this book will greatly assist water and gas engineers in China to better understand the characteristics of PE100 and enable them to get all the benefits that these systems can offer.

The PE100+ book in Chinese can be obtained from the following bookshops and websites:

i) www.sinopec-press.com
ii) Bookstore of Publisher in Beijing, Tel: 010-84289974
iii) XinHua bookstore with many branches throughout China
iv) www.amazon.cn/
v) www.dangdang.com
vi) www.chinapipe.net
It was recently announced that Plastic Pipes XVI, the next International Plastic Pipe Conference will be held in Barcelona on September 24th to 26th 2012. The biennial forum and exhibition attracts more than 500 participants from over 80 countries. Zoran Davidovski, Chairman of the Organizing Committee is convinced that the event in Spain will attract even greater attention than the previous conference in Vancouver. “Every two years, the major end-users, designers, engineers, contractors and suppliers of the plastic pipe world meet to review new solutions, applications and developments shaped by this essential technology. It is a unique exchange of experience and one that also embraces the major trends and issues facing this dynamic international market.”

Environmental impact
Key subjects in the area of new solutions will focus on landmark projects and novel applications. Given the antiquated state of traditional sewer and utility pipe networks in many countries, rehabilitation chiefly through trenchless technology will be of particular interest. Sustainable construction and Life Cycle Assessment will also feature strongly with the very latest scientific evidence that underlines the low environmental impact of plastic pipe systems.

Davidovski explains that the choice of Spain for the world conference venue is quite relevant. “In Spain, the rate of conversion by end-users to our technology has been significant. This trend has been all the more pronounced in the building sector where durability and cost performance are all the more appreciated.” However, compared to other European countries, the rate of penetration of plastic pipes within the Spanish water utility sector is still relatively low. “Opportunities for growth are therefore enormous. This is a country where issues such as sustainability and saving resources, irrigation improvements, cleaning and purification are essential measures to mitigate the extreme effects of climate change.”

New applications
Presentation of papers will encompass major application areas such as gas and water supply, sewer and drainage, domestic hot and cold, soil and waste systems and industrial services. Nevertheless, the versatility of plastics combined with the rate of innovation in the industry, are such that application areas are continuously evolving. New applications will therefore be fully examined such as harvesting and collecting rainwater via filtration and attenuation systems. “Technological developments within our industry can occur at an amazing pace,” says Davidovski. “A picture of the future will be outlined by looking at some exciting new plastic pipe materials. Other developments such as structured wall and multi-layer pipes will be analyzed for their characteristics and important benefits. We shall also provide a practical insight to new product design and testing tools.”

Unique platform
Market issues will centre on the evolution of the plastic pipe industry and the scope and scale of experience worldwide. A review of the demise of traditional pipe materials has also been planned as well as a thorough update on standardisation, norms and Harmonized European Standards (hENs). “The International Plastic Pipe Conference is a unique platform and meeting point for this continuously evolving technology and industry. For eighty years, plastic pipes have transformed the way essential services are delivered. Although mostly out of sight, their efficiency and sustainability will be very much visible at Plastic Pipes XVI.”

Plastic Pipes XVI is organised by the Plastics Pipe Institute, PVC4Pipes, PE100+ Association, TEPPFA and national and regional trade associations. The location for the conference and exhibition will be the Hotel Arts in the attractive harbour district very close to the old centre of Barcelona. Further information for registration, exhibitors, accommodation, sponsorship and the submission of papers (abstracts to be submitted before 15 November, 2011) can be obtained from:

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Website: www.ppxvi.org
Borouge gains SIRIM Certification for PE materials

Borouge has gained SIRIM Certification for its BorSafe HE3490-LS and BorSafe ME3440 materials produced in Ruwais, Abu Dhabi following a rigorous process including a plant audit.

The scheme is operated by SIRIM QAS International which is Malaysia’s leading certification, inspection and testing body. They provide a Product Certification Scheme for many different sectors and give 3rd party assurance on the quality, safety and reliability of products. The certification mark signifies that the product is consistently manufactured in accordance with the specific standard that enhances customer confidence.

After successful application, the applicant is given a license to mark the certified product with the "MS” certification mark which is recognized within a number of countries in Asia. This certification attests that the product meets quality requirements of the Malaysian Standard MS1058: Part 1.2005. (Polyethylene PE piping systems for water supply, Part 1: General). This provides the pipe producer and the system operator with an assurance of performance, safety and reliability as well as demonstrating an effective system for the production processes. The SIRIM certification mark is also recognized by design and consulting engineers in other countries, such as India, as a valuable Quality Assurance endorsement for the raw material used for important projects.

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Calendar of Pipe Events

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
<th>More information</th>
</tr>
</thead>
<tbody>
<tr>
<td>15-17 June</td>
<td>IndoWater, Jakarta, Indonesia</td>
<td><a href="http://www.indowater.com">www.indowater.com</a></td>
</tr>
<tr>
<td>22-26 June</td>
<td>Iran Plast 2011, Tehran, Iran</td>
<td><a href="http://www.iranplastfair.ir">www.iranplastfair.ir</a></td>
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<tr>
<td>4-8 July</td>
<td>Singapore Water Week, Singapore</td>
<td><a href="http://www.siww.com">www.siww.com</a></td>
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<tr>
<td>21-27 August</td>
<td>World Water Week, Stockholm, Sweden</td>
<td><a href="http://www.siwi.org">www.siwi.org</a></td>
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<tr>
<td>24-24 August</td>
<td>No Dig South Africa, Pretoria</td>
<td><a href="http://www.nodigsouthafrica.com">www.nodigsouthafrica.com</a></td>
</tr>
<tr>
<td>6 September</td>
<td>SAPPMA Conference, Midrand, South Africa</td>
<td><a href="http://www.sappma.co.za">www.sappma.co.za</a></td>
</tr>
<tr>
<td>8-9 September</td>
<td>18th India Oil &amp; Gas Review Summit, Mumbai</td>
<td><a href="http://www.biztradeshows.com">www.biztradeshows.com</a></td>
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<tr>
<td>3-5 October</td>
<td>Power &amp; Water Middle East, Abu Dhabi</td>
<td><a href="http://www.adnec.ae">www.adnec.ae</a></td>
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<td>3-6 October</td>
<td>No-Dig Down Under 2011, Brisbane, Australia</td>
<td><a href="http://www.nodigdownunder.com.au">www.nodigdownunder.com.au</a></td>
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<td>10-11 October</td>
<td>Trenchless Middle East, Dubai</td>
<td><a href="http://www.trenchlessmiddleast.com">www.trenchlessmiddleast.com</a></td>
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<tr>
<td>13-15 October</td>
<td>2011 Water-Expo, Beijing</td>
<td><a href="http://www.waterexpo.cn">www.waterexpo.cn</a></td>
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<tr>
<td>22-25 October</td>
<td>APIA Annual Convention, Sydney, Australia</td>
<td><a href="http://www.apia.net.au/events">www.apia.net.au/events</a></td>
</tr>
<tr>
<td>10-12 November</td>
<td>Viet Water, Ho Chi Minh City, Vietnam</td>
<td><a href="http://www.bvents.com">www.bvents.com</a></td>
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<tr>
<td>13 November</td>
<td>Formula 1 Race, Abu Dhabi</td>
<td><a href="http://www.formula1.com">www.formula1.com</a></td>
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<td>20-23 November</td>
<td>2nd Arab Water Forum, Cairo, Egypt</td>
<td><a href="http://www.arabwatercouncil.org">www.arabwatercouncil.org</a></td>
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<tr>
<td>21-24 November</td>
<td>2nd IWA Development Congress &amp; Ex, Kuala Lumpur, Malaysia</td>
<td><a href="http://www.iwa2011KL.org">www.iwa2011KL.org</a></td>
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<tr>
<td>27-29 November</td>
<td>Plastic Pipes Spin-Off Conference, Beijing</td>
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<tr>
<td>04-08 December</td>
<td>20th World Petroleum Congress, Doha</td>
<td><a href="http://www.20wpc.com">http://www.20wpc.com</a></td>
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