



Ion Foundation supported the Bethel Educational Social Service Organisation (BESSO) Children's Home, at Hosur, Tamil Nadu with the construction of toilets. This organisation runs a rehabilitation centre for 110 orphans, semi-orphans, abandoned street children and destitute children, providing them with education, hygiene and healthcare.



At the Govt. Zilla Parishad High School, Lakdaram, Andhra Pradesh we helped spread the message of environment care among 500 children, by sponsoring the planting of 80 neem trees in the school compound and a gardener-cum-cleaner.



The Prakruti Badi (Nature School) at CK Pali Village of The Timbaktu Collective, Andhra Pradesh, runs a day school learning centre standards 1 - 10, for 100 needy children from marginalised backgrounds of CK Pali, Ramagiri and Roddam (total 140 villages).

The Ion Foundation provides support with educational material, skill training, sports, capacity building of teachers, celebration of festivals and health care.



The Ion Foundation provided a computer to the The Mathond Gaothanwadi School, Sawantwadi, Sindhudurg, Tal. Vengurla, near Goa which runs a village school (primary education) for 104 underprivileged children.

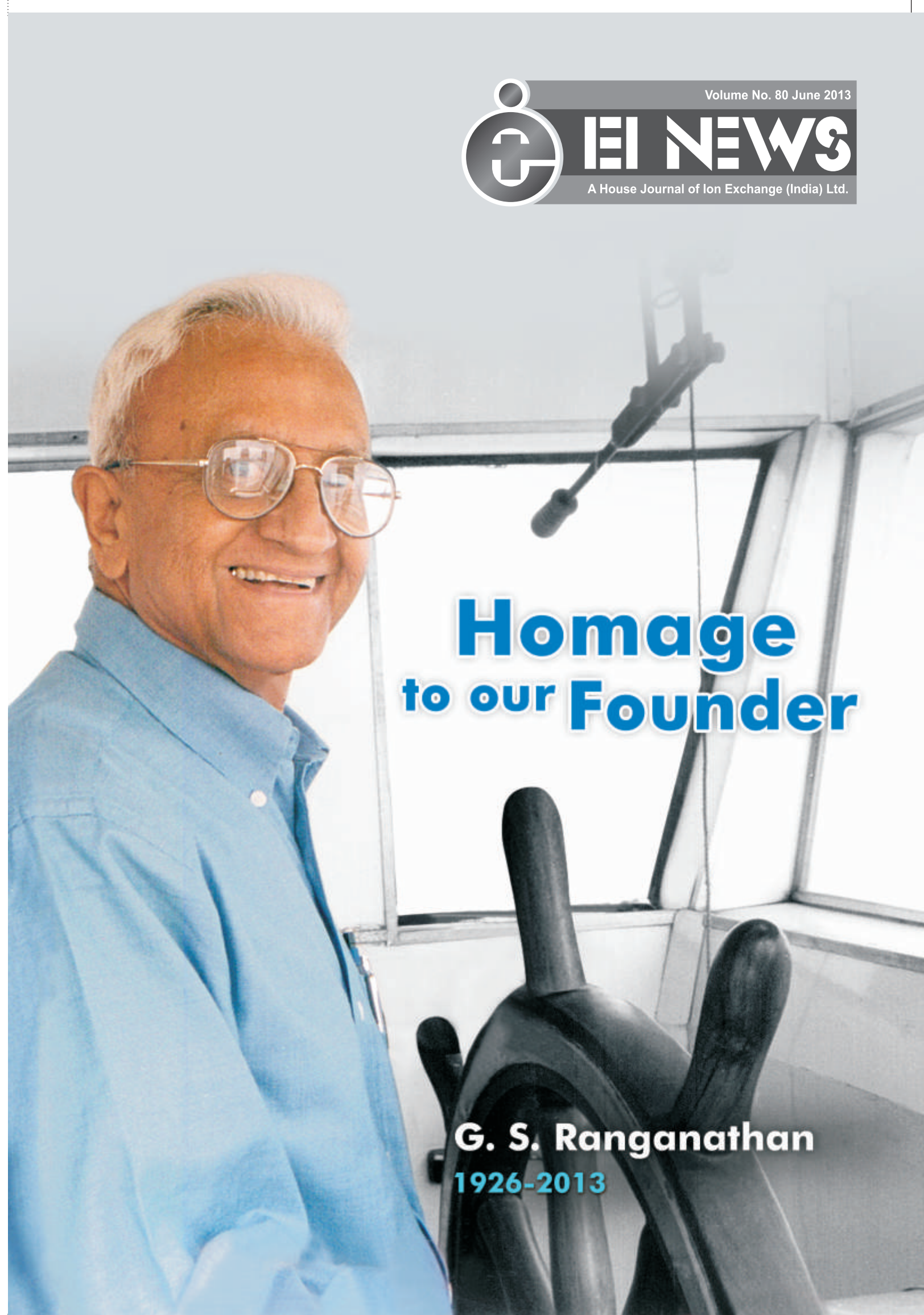


Support to the Bethesda Life Centre (Orphanage), Goa with classroom infrastructure and uniforms for 118 children.

**ION EXCHANGE**  
*Refreshing the Planet*

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# Homage to our Founder

**G. S. Ranganathan**  
 1926-2013

## A MAN FOR ALL SEASONS



**G. S. RANGANATHAN**  
14.02.1926 – 18.03.2013

Ion Exchange deeply mourns the passing of its Founder and Chairman Emeritus, G. S. Ranganathan. With pioneering and entrepreneurial spirit, he took the helm and from small beginnings, created the Ion Exchange edifice and steered it into becoming a global player with a vision "To be the leader in our business which is so vital for people's lives and the environment". His farsightedness, leadership and unique ability of building relationships enabled him to create a sustainable business enterprise on the pillars of innovation, quality, integrity and responsible citizenship.

### Going back in time

In the 1930s J. Stone, a Kolkata based British Company, was Permutit's agent in India. Their main business was from the Indian railways and textile mills. In 1952, because of dwindling sales, Permutit planned to shut shop in India but was persuaded by J. Stone to give it a last chance. Thus, in 1953, a young Ranganathan joined J. Stone, with a staff of two commissioning engineers and a stenotypist. Business picked up, "with luck, perseverance, the dedicated work of staff and the help of mentors, friends and well wishers"... and the rest is history.



L to R: 1954 - Ranganathan with Mr. B. R. Rao, Sales Director - J. Stone, Mrs. Ranganathan, Dr. R. R. Hattiangadi (who became the first Chairman of Ion Exchange) and Mrs. B. R. Rao

### And so it all began

Permutit accepted Ranganathan's recommendation to form a subsidiary company and, in 1964, Ion Exchange (India) Limited was registered with 60 per cent equity by Permutit, 40 per cent Indian. In 1984 when Permutit divested their holding, he advocated and set up employee welfare trusts - a pioneering concept for India - and Ion Exchange became a wholly Indian company.

### Laying a strong foundation

From the start Ranganathan was convinced that innovation, quality, training and systems were fundamental to a strong company. He particularly believed that the strongest asset a company has is its people, that customers were a company's raison d'être and that service was a key differentiating factor. This is evident from his continuous advocacy of these values that he sought, successfully, to inculcate into the company.

## Extending our CSR Outreach



Providing educational assistance to 35 children at the Udhavum Ullangal Illam, Adambakkam, Chennai - a free home for orphans and the helpless aged.



As part of employee engagement, members of Ion Exchange Services voluntarily contribute books, clothes and toys to SOCARE (Society's Care for Indigent), Bengaluru, which provides food, shelter, healthcare and education to children of convicts.

The Ion Foundation extends support to Society to Heal, Aid, Restore, Educate (SHARE) Raigad District for their pre-school (Anganwadi) and primary schools (pre-school activity at Raigad District which undertakes literacy, nutrition and hygiene programmes for) 380 children below six years of age. We co-sponsor training of 14 *shiksha mitras* (friends of education) who are trained to conduct sessions in story telling, drawing, craft etc. and 10 Anganwadi workers; provision of books and educational aids, preparation of a documentation manual for project replication.

We support the Indian Council for Mental Health (ICMH) at Navi Mumbai which runs a skills and ability school for 13 mentally challenged children.

We continue to support the 357 students of the Primary School, Chitkul, in Medak Dist., Andhra Pradesh.

The Ion Foundation provides support for a special educator to the Kalrav School, Bharuch, Gujarat which benefits 78 special children.



Water treatment system for process application supplied to GSK Sonapat. The scheme comprises multigrade filtration, softening, reverse osmosis, mixed bed demineralisation, micron filtration and ultra violet. The food grade water quality produced is used in making the health care energy supplement Horlicks.



## Ion Exchange – IRCTC Rail Neer Partnership

The three Rail Neer packaged water bottling plants supplied by Ion Exchange to the Indian Railway Catering & Tourism Corporation (IRCTC) stand testament to the strong partnership forged by state-of-the-art technology and superior service delivered to complete customer satisfaction...and we have now been awarded the fourth bottling plant for IRCTC at Ambernath, near Mumbai.

### At Nangloi, near Delhi

Commissioned in 2002-03 with capacity of 66,000 bottles/day, plant capacity was enhanced by us in 2007-08 to 1,0,2000 bottles/day. Looking at the increase in demand of bottled water, IRCTC has decided to further enhance capacity with installation of one new bottle

blowing machine and increase in the capacity of the water treatment plant; both contracts were awarded to Ion Exchange. With this, capacity will be 1,32,000 bottles/day.

IRCTC also decided to bottle 500 ml bottles at their Nangloi plant

for short distance trains such as the Shatabadi. This contract was also awarded against competitive bidding.

### Danapur, Patna

This plant was commissioned in 2003-04 with capacity of 66000 bottles/day and the capacity was augmented by us in 2007-08 to 1,02,000 bottles/day. Capacity is being further increased to 1,20,000 bottles/day by increasing the capacity of the water treatment plant and adding an auto shrink wrapping system. Here too, Ion Exchange has been awarded the contract.

### At Palur, near Chennai

In 2011 Ion Exchange commissioned one of the largest packaged water bottling plants for IRCTC at Palur. Fully automated from bottle blowing to bottle coding, with a capacity of 1,80,000 bottles/day, the plant was completed by us in just seven months.

"From the beginning I have seen the importance of R&D. Constantly seek better methods of working, improving existing products and develop new ones."

"From the start we had systems introduced by Permutit. And as a company grows, as ours has, systems become even more vital for proper functioning."

"Success depends on how well we manage our storehouse of technology. The company's best trainers are its managers from all disciplines – we must train the trainers so that a culture of training is imbued in all employees. Technical training can be a saleable concept – even an exportable service."

"We must give our customer the best value for money. He is the reason for our existence."

"Exports will compel us to raise our quality to international standards."

Ranganathan had a strong sense of history too. "But for history, which is a record of events, human beings would have made little progress. Technological development too depends on record keeping. There is no need to re-invent the wheel."



### Expanding horizons

Ranganathan quickly built up an impressive countrywide infrastructure of factories, sales offices, dealers and service network, the largest in the Indian water treatment industry. Our ambassador in India and abroad, constantly networking and forging contacts, he soon expanded the company's technology base too, through R&D, joint ventures, licensing and representative agreements making Ion Exchange one of the few companies worldwide with the entire spectrum of technologies, products and services. "Total water management, the synergistic use of all our technologies will enable us to provide total solutions". Under Ranganathan's visionary leadership, the company attained its pre-eminent position in water and environment in India and globally, offering total and integrated water & environmental solutions for all sectors – industry, communities & homes, urban and rural.

### Charting new avenues

Constantly scanning the environment, quick to spot trends and to seize opportunities, very early Ranganathan took Ion Exchange into new market avenues such as membranes and desalination, water conservation and recycle, rural water treatment, services, exports and point-of-use drinking water

purification. As he said "Over the years I have always sensed the need to diversify. Changes in the external environment open a wide vista of opportunities for Ion Exchange".

Thus, way back in the early 80s, sensing the impending water scarcity that would assail the world much later, Ranganathan was already pointing the way, advocating recycle to conserve water.

In 1987 he set up a joint venture for manufacture of reverse osmosis membranes – the first project of its kind outside USA & Japan. He believed that safe drinking water should not be the prerogative of the elite, but should be available to all...the motivation for developing the first, economical point-of-use Zero B tap attachment. Ranganathan had the foresight to build up a countrywide service network more than two decades ago, in 1990, emphasising the need to have an efficient after sales service network to provide prompt service to customers.



Demonstrating our first Zero B purifier, in 1987



### Espousing the environment

Ranganathan was greatly influenced by Goldsmith's *Blueprint for Survival*, Toffler's *Future Shock* and Rachel Carson's *Silent Spring*, among others. Long before they became buzz words, Ranganathan was



passionately promoting environmental protection and sustainable development through his talks at various fora and his monographs. Convinced that "what is ecologically

wrong is not economically sustainable for long," he advocated the development, through agro-forestry, of our country's wasted assets - wasteland and wasted people. Although his hope of starting an agro-forestry project on degraded land leased from Government did not materialise, it did not get him down and he continued to maintain that "poverty and environmental degradation can be solved only by revegetating our wastelands...generating employment for millions, creating wealth from waste, improving the environment".

### The gift of sharing

Social responsibility found equal attention in Ranganathan's agenda. "It is important that we transport our vision into the communities we live in". A strong believer that business can be extended to serve the community and, in doing so, to increase its market, he maintained that the corporate sector can and must play a leading role in bringing about a better quality of life by environmentally and commercially sustainable means. He also believed that the business community had a responsibility towards rural India. "Rural India needs practical, intermediate technology...the corporate sector has a very great obligation to rural India...in fulfilling this, it will increase its own business and the country's wealth".

Ranganathan was deeply impressed by Baba Amte and his projects which he visited many times over the years and he encouraged his managers to do so too. "There is much that our managers can learn from Baba Amte's projects. He has given hope to the hopeless and even made managers out of them. Amte's projects should be used as models for rural development. He has shown us the gift of sharing."

### Trusting and entrusting

"I believe that the future of our company will depend on the excellence of the people who work for it." Always respectful of employees, deeply concerned about their welfare and development, Ranganathan was convinced that people are an organisation's greatest asset. He was quick to recognise and seek out potential, to empower people with freedom to excel, always looking to build up people and careers. Indeed he had a unique ability to inspire lasting loyalty.

He passionately exhorted team work and synergy "Organisational objectives must be achieved through teamwork where every team member contributes. Conflict clearing and resolution are important."

Communicator par excellence he emphasised, at every opportunity, the importance of communication - both for marketing as well as internal communication to keep people in the loop and get them on board, through constant interaction, exchange of ideas and sharing of feedback.

### An open mind, a large heart

Ranganathan successfully created within Ion Exchange a climate of trust, open communication, transparency and intellectual integrity. He had an amazing tolerance for dissent - a rare trait indeed, and never allowed difference of opinion to affect relationships. He was also quick and big enough to admit a mistake, and to acknowledge another's perspective as the right one.

And he was ever ready to give credit to others - to Owen Martin and B. R. Rao who helped influence Permutit to set up the Ion Exchange subsidiary and "but for whose perseverance our company would not have come into existence", to Soli Cambatta who helped him get orders from the textile mills in the early days, and to his deputies like Dara Vasunia, "a pillar of strength" and Ganpati Rao, "the two who more than anyone else contributed greatly to Ion Exchange's growth in its formative years".

## Oil's Well with Ion Exchange

India's largest edible oil producer (Dalda brand) - Bunge India Limited, Gandhidham, Gujarat chose Ion Exchange to award the contract for complete water & waste water management.



The order is for supply, erection and supervision of commissioning of:

- ▶ Raw water treatment, 22 x 135 m<sup>3</sup>/h comprising lamella clarifier and 460 m<sup>3</sup>/d demineralisation system comprising multigrade & activated carbon filters, softener, ultra filtration, reverse osmosis and INDION Swift demineralisation.
- ▶ Effluent treatment plant, 300 m<sup>3</sup>/d - oil skimmer, diffused air flotation and extended aeration system followed by secondary clarification.
- ▶ Recycle plant, 500 m<sup>3</sup>/d, comprising lamella clarifier, multigrade filter, ultra filtration and reverse osmosis.
- ▶ Sludge management - filter press.

This will be the first total water and zero liquid discharge project in India's vegetable oil industry for comprehensive water & waste management system.



Gelatin concentration ultra filtration unit at Sterling Gelatin.

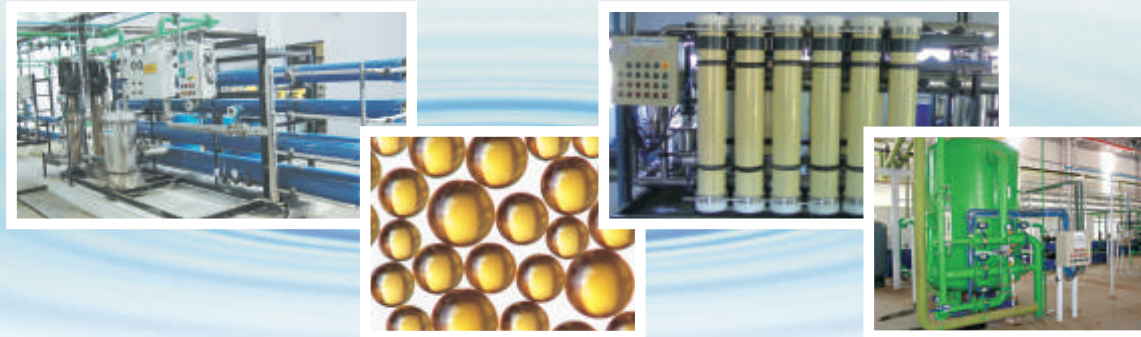


Treatment system at Pearl Drinks, Noida, comprising multigrade and activated carbon filtration (dechlorination), reverse osmosis and activated carbon filtration (for pesticide removal), micron filtration and ultra violet. The water produced is used to make carbonated beverages of Pepsi and complies with all the requisite beverage standards.



## One-stop Menu for the F&B Sector

A complete, customised bouquet of solutions for the food & beverage sector has made Ion Exchange the partner of choice for almost every prestigious F&B brand. On our menu are advanced solutions for all process applications, water management, chemical treatment and service requirements. Moreover, a dedicated team from our F&B vertical works closely and exclusively with each of our customers in this industry to understand their needs and provide integrated, innovative solutions to meet them.



### Process Applications

Filtration, separation and purification play an essential role in food & beverage processing. We use micro/ultra/nano filtration and reverse osmosis and special ion exchange processes in purification and separation systems for all types of process applications including –

- ▶ Cheese production
- ▶ Whey processing, concentration, demineralisation
- ▶ Gelatin deashing, decolourisation, deodourisation, concentration
- ▶ Liquid glucose/dextrose/sorbitol deashing, decolourisation, deodorisation
- ▶ Juice debittering, clarification, concentration
- ▶ Bottle wash recycle in beverage production and breweries with caustic recovery

### Water Management

- ▶ Water treatment systems with material of construction to requirement
- ▶ Waste water treatment – aerobic and anaerobic based, and recycle

- ▶ Cooling & boiler water treatment programmes compliant with food industry requirements
- ▶ Ion exchange resins – WQA Gold Seal approved for specific applications
- ▶ RO antiscalants – NSF certified, activated carbon and other performance chemicals

### Packaged Drinking Water & Natural Mineral Water Plants

We undertake projects on turnkey basis, complete with water treatment, blow moulding and filling machines, labeling and packaging machinery. A full fledged laboratory with facilities for mineral and bacteriological analysis of water and regular quality and operational audits ensures compliance with BIS/international specifications.

### 24/7 Service Support

- ▶ Water management consultancy
- ▶ Application lab & pilot studies for new applications
- ▶ O&M and BOO/T for water systems, utilities and membrane/ion exchange systems for F&B processing
- ▶ Service contracts

### Multi-faceted, varied interests

Central to an understanding of Ranganathan was the diversity of his interests. He often spoke about the deep influence of his parents and of his wife Ahalya – the interest in history, literature and philosophy he inherited from his father and of the love of arts, travel and nature from his mother, and of the strong support and partnership of his wife.

Ranganathan was an avid reader, prolific writer, a spirited and ardent environmentalist, a talented photographer, an animal lover and a seasoned traveller. He had an inborn graciousness, a keen sense of humour and ready wit, and was a fine conversationalist – traits which helped him build a huge network of friends within the business and technological community. His inquiring mind and sound intellect was highly respected within the scientific community too.

*Truly a very special person, a man for all seasons, Ranganathan will be greatly missed and remembered with love, affection and respect by all who knew him, especially the many who benefitted so much from his able experience and mentorship. His vision and leadership will continue to inspire Ion Exchange and he will live on in the enterprise he founded, the people he mentored, the values he inculcated and the ideas he propagated.*



Adapted from the theme song of Sidney Poitier's beautiful film of the same name, this song was sung as a tribute to Ranganathan at his felicitation function on the occasion of his retirement from the Executive Chairmanship of Ion Exchange in January 2003. It also captures the heaviness of heart, profound appreciation and deep regard that swept over the Ion Exchange family at Ranganathan's passing away.

Those early days, of starting shop  
and learning ropes have gone.  
But in our minds, we know their memories  
still live on and on.  
So how do we thank someone,  
who has taken us from local to global?  
It isn't easy, but we'll try...

If you wanted the sky,  
We would write across the sky in letters  
that would soar a thousand feet high,  
To Sir, with Love

Those many years, have hurried by, yes they did fly away  
Why is it, Sir, that years sped by and  
brought us to this day  
You gave us such a great vision,  
that is our mission,  
in the world outside,

What is there for you that we can buy?

If you wanted the world  
We would surround it with a wall and we'd scrawl,  
In letters that would rise ten feet tall,  
To Sir, With Love

The time has come, a whole era now comes to an end  
And as you leave,  
We know that we will miss our founder-friend  
Someone who taught us right from wrong,  
and each for all, that's a lot to learn,  
Someone who steered us through the years

If you asked for the moon  
We would reach up on high and bring it to you  
and write with ribbons ten feet tall,  
To Sir, With Love  
...To Sir, With Love.

The torch you lit – we shall keep burning bright  
The values you planted – we shall cherish and keep alive  
The flag you unfurled will always fly high  
The reputation you built – we will protect and enhance  
Your vision will be our mission... This is our pledge, our commitment.



# INDION® Resins On Expansion Move

Put together a sustained focus on customer needs, product development, application know how, technical support and world class quality – and you have the perfect recipe that makes our INDION brand of resins the preferred choice across sectors. Now, adding to the wide range of resins for water and waste water treatment as well as non-water, speciality applications, are several more – the result of continuous innovation and R&D.

## Oleophilic Resin to treat Oily Effluent

This recently launched product is unique to the Indian market. Oil contamination in effluent from refineries and petrochemical industries is a major concern. Our oleophilic resin effectively complements existing oil removal technology, enhancing the efficiency of oil removal equipment. It helps coalesce the oil in a specially designed oil coalescer unit, reducing oil concentration by 80 – 90 per cent from around 100 ppm at the inlet.

## Removal of phenol from hydrochloric acid and nitroresol from waste water in the agro-chemical industry

The ion exchange process can be effectively applied to reduce phenol in hydrochloric acid to < 50 ppm. The hydrochloric acid can then be sold as commercial grade, instead of disposing it.

Another application is removal of nitroresol, a benzene compound generated during production, which contributes to COD levels in the effluent and is also non-biodegradable. Its removal, using ion exchange, considerably reduces the COD load on the effluent treatment plant, bringing treatment costs down. It also enables subsequent recovery and reuse of the chemicals from the effluent, which are raw materials for the process.

## Deashing of Sweeteners & Starch

Confectionery manufacturers require sweeteners of extremely high purity levels. Sweetener products like liquid glucose, dextrose and sorbitol are manufactured from various starch sources such as potato, maize, wheat, rice, tapioca, etc. which contain impurities such as ash and colouring bodies. These impurities affect the finished product quality and hence need to be removed, to achieve the purity levels required by the end manufacturers.

Our INDION resin is highly effective in deashing of starch as well as colour removal, enhancing product quality and consequently fetching the manufacturers much better prices. Commanding a lion's share of the market, our ion exchange process for production of high quality sweeteners is used extensively by almost every prestigious brand in this sector including Nestle, Cadbury, Perfetti, Maize Products, Gulshan Polyol, Ambuja Exports and Riddhi Siddhi Gluco Biols.

## On Display

Mr. Ajay Popat (centre), our Executive Vice President, was a jury member on the prestigious FICCI Water Awards at Delhi. A citation for his invaluable help in screening proposals and selecting the winners was presented to him by Ms. Sheila Dikshit, Chief Minister of Delhi and by Mr. Montek Ahluwalia, Deputy Chairman, Planning Commission. Mr. Popat was also presented with a grove of twenty trees located at the periphery of Kumbhalgarh Sanctuary, Udaipur, Rajasthan.



Ion Exchange participated in a number of exhibitions in India and overseas, showcasing our complete range of solutions for water and environment management.



PMEC, Mumbai



Water Africa Building & Construction, Nigeria



Vibrant Gujarat Trade Show, Ahmedabad



Water India, New Delhi



Chemtech, Mumbai

While industry pays heavily for water, the domestic sector remains heavily subsidised. Water recycle can easily be, and, in fact is being gradually extended to large residential colonies and educational institutions, hotels and hospitals, recreation resorts etc. Management of sewage generated from residential, commercial and institutional complexes is important from both sanitation and water conservation aspects. Sewage is a consistently available alternate source of water for specific uses; that it is available at point-of-use makes a strong case for decentralised treatment and reuse.

In India as elsewhere in the world, industries have started using treated sewage for process use. Industrial effluent must be kept totally out of sewage which should be treated and reused. Domestic sewage can then be treated and, after destruction of pathogens, used for irrigation returning nutrients to the land. Recycling of sewage would keep the seas clean so be used for recreation which would greatly boost the tourism industry and generate employment.

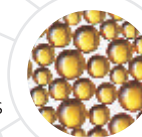
Properly treated sewage is visually indistinguishable from drinking water. Indeed, future generations worldwide may have no option but to drink treated sewage water. The process has already started in Singapore with NEWater

which is reclaimed water blended with fresh water, produced by the country's public utilities.

**Desalination of sea water:** Another alternative water supply source is desalination of sea water including mobile desalination plants in times of monsoon failures, drought, and other natural calamities. A determined effort to bring down energy, material and membrane costs, if successful, will re-spur the desalination market.

**Storm water harvesting:** Besides rain water harvesting, another supply source could be storm water harvesting from roads and paved areas in urban and industrial areas and its reuse.

Though it may be difficult to implement and will require low cost, low energy water treatment systems, it would yield multiple benefits. Apart from increasing water availability, it would help recharge ground water levels and quality, control flooding, augment life of roads and reduce their maintenance and repair cost.



## Fluoride Removal from Potable and Waste Water

Excessive fluoride concentration in ground water has been reported in more than twenty developed and

based preparations.

Well established in the north eastern regions of India, our resin for iron removal is now proving to have substantial export potential given its ease of use and high performance. The iron specific resin is an insoluble media which oxidises dissolved ferrous iron ( $Fe^{2+}$ ) to insoluble ferric iron ( $Fe^{3+}$ ). The insoluble iron thus formed gets trapped in the resin bed. No chemical regeneration is required as simple water backwash removes trapped iron from the resin bed.

## Nitrate Removal from Potable Water

Nitrate ( $NO_3$ ), a naturally occurring form of nitrogen (N), is essential for plant growth and often added to soil to improve its productivity. Water moving down through the soil after rainfall or irrigation carries dissolved nitrate into ground water, and thus nitrate enters water supplies. Drinking water containing high levels of nitrate is harmful as nitrate ions form complexes with the blood and, in the long term, can cause oxygen depletion affecting human and animal life.

Our INDION resin is being used extensively in northern India, to remove nitrate from potable water and is also being exported to US and Europe.

## Treating Arsenic Contamination of Ground Water

Drinking water containing arsenic may cause several types of cancer, diabetes mellitus, diseases of the circulatory and respiratory systems, kidney and liver. Elevated mortality rates were observed for all diseases of the circulatory system and some research concludes that



developing countries including India where nineteen states face acute fluorosis problems.

Our recently launched INDION chelating type ion exchange resin contains specific functional groups which have selective affinity for fluoride ions to effectively remove fluoride from water. It has taken off well in rural areas as it can treat potable water having up to 20 ppm fluoride content, reducing it to the WHO specified limit of <1.5 ppm.

## Iron Removal from Ground Water

Concentration of iron in rural ground water supplies is a common problem, with levels ranging from up to 50 mg/l, while the WHO recommended limit is < 0.3 mg/l. Iron-bearing ground water is often noticeably orange in colour, causing discolouration of laundry and imparting an unpleasant taste to drinking water, tea and other water

## On the Rural Front New INDION Fluoride Removal Handpump Attachments

Our new fluoride removal handpump attachments in FRP using the newly developed INDION RS-F resin (fluoride removal resin) have been installed at three locations.

A demonstration plant at Gangiwara village in Chhindwara District of Madhya Pradesh was installed under the supervision of the Superintendent Engineer & the Executive Engineer PHED Chhindwara. It caters to the drinking water requirements of around 80 people living in and around the village. The inlet water has a fluoride content of 3.5 ppm which is reduced to 0.3 ppm in the treated water.

Another unit was installed by Ambuja Foundation of the Ambuja Cement Group, which undertakes CSR activities at Balada village, Jaitaran Tehsil, Pali District in Rajasthan. Around 1250 villagers are using the treated water from this unit which has a flow rate of 11 litres per minute.

The third unit has been installed in collaboration with Water Aid and its partner Vasudha Vikas Sansthan of Dhar at Hasanpur in Kalapani District in Dhar. The unit was successfully field tested in the presence of the Executive Engineer as well as Water Aid and Vasundha Vikas Sansthan.

## Pharma Resin Facility is US FDA Compliant

Our US FDA compliant pharma resin lab and manufacturing facility have been successfully commissioned at Ankleshwar, Gujarat; this facility has also received WHO-GMP (good manufacturing practices)



certification. The processing, packaging, labelling and control operations in the production of all our pharmaceutical grade resins are carried out at this plant. The appropriate Drug Master Files have been filed with the US Food & Drug Administration and we will shortly be

going in for certification. US FDA compliance, on the back of ISO 9001 and 14001 certification, will greatly facilitate our exports of pharma resins to USA, Europe and Japan.



even at lower concentrations, arsenic contamination is a major cause of death. So it is vital to reduce arsenic content in drinking water to <10 ppb.

Our INDION arsenic specific media selectively removes arsenic from ground water without affecting the characteristics of influent water.

## WQA Gold Seal certification for F&B applications



Our continual emphasis on public health and safety set in motion the process for obtaining the US Water Quality Associations (WQA) Gold Seal Certification for several of our resins used in drinking water and food & beverage applications.

- ▶ INDION 225 Na F – high purity food grade resin used in the treatment of foodstuffs, beverages, potable water and water used in the processing of food.
- ▶ INDION NSSR (Type I) resin for selective removal of nitrates from water.
- ▶ INDION 830 S (Type I) strong base anion resin for removal of organics from drinking water, and of colour bodies from sugar syrup and other process streams.

WQA's Gold Seal is one of the most recognised certification marks, not only in the USA but internationally, as an identifier of product quality. The oldest third party testing and certification program in the drinking water treatment industry, it offers certification of all products and chemicals that come into contact with drinking water.

It's important to protect the integrity of these sources by ensuring that waste water generated in rural areas is treated as well, ideally by decentralised systems that can operate well under rural environments.

**Sludge Treatment:** There is a slow but steady trend towards high performance, cost effective sludge management solutions particularly in dewatering and drying technology segments. The expansion of the waste water treatment sector, stricter legislation and implementation is posing a massive sludge disposal and management challenge with a potential for energy recovery.

Among the newer technologies receiving attention are thermal oxidation technologies and other upcoming technologies like the use of ultrasonic equipment aimed at the digestion and dewatering process.



## Drinking Water Treatment

Elimination of the use of elemental chlorine, control over the formation of disinfection byproducts, higher levels of contamination in fresh water supplies (inorganic, heavy metal, industrial contamination) and the improved analytical methods that detect previously unnoticed but potentially harmful contaminants, are creating additional demands on the operators of water treatment plants. Technologies to meet these demands include various combinations of filtration and disinfection technologies.

**Membrane filtration:** Low-pressure membrane systems improve microbial removal and filtration performance while reducing or eliminating the need for coagulation, making this a chemical free and cost effective process. Membrane systems are coupled with disinfection systems like iodised resins or UV (for point of use systems) or site generated disinfectants like chlorine dioxide, ozone or oxidants to

ensure complete disinfection during transportation and storage.

**Chemical disinfectants to replace elemental chlorine:** They provide an additional level of security in ensuring that the treated water is not subjected to recontamination when transported in pipelines or during storage. The chemicals which are replacing conventional products like chlorine include ozone, chlorine dioxide and other oxidants. Choice of the correct product depends on full study of the application, source, treatment process, consumption areas etc. Mixed oxidant generators that generate a powerful but safe liquid oxidant have been found to be extremely effective in meeting disinfection needs (including effectively tackling chlorine resistant protozoa like cryptosporidium) and at the same time controlling the formation of disinfection by products.

## Alternate Sources of Water Supply

Water reuse, desalination of sea water or brackish ground water and rain water harvesting are fast emerging alternate sources of water supply.

**Recycle of industrial effluent and sewage** is an effective and economical way of solving water scarcity, by substantially reducing use of fresh water. Organised industry has begun recycling effluent and gaining benefits of lower fresh water usage and saving in water costs. Small scale industries which now contribute most of the pollution, should be helped with further incentives and encouraged to treat their effluents before discharge into



common effluent treatment plants which could treat the water and return it for reuse.



# Emerging Trends & Technology for Water & Waste Water Treatment

An insight into global trends, opportunities and challenges in the water and environment sector and the various technologies and options available to address and leverage them.

## Waste Water Treatment

**Tertiary treatment to reduce water use and waste water generation:** The catalysts for reuse include scarcity of water and regulations limiting generation of waste water having high dissolved salts and BOD. Apart from its need to protect human health, tertiary treatment provides opportunity for industry to limit fresh water use and waste water discharge through recycle of waste water.

Reverse osmosis, ultra filtration, sequencing batch reactors, high rate clarification systems, continuous backwash filters and dissolved air filtration systems are some of the solutions for water recycle in industrial plants. Their

outstanding performance has enabled reduction in water use by as much as 90 per cent.

Final disinfection has to be chosen based on cost effectiveness. Traditional chlorine disinfection is relatively low-cost and effective, but challenges include handling and storage, formation of disinfection by products,

contact time etc. UV technology disinfects by radiating micro-organisms to prevent them from replicating and requires only a short contact time. Other disinfectants include chlorine dioxide, ozone and oxidants all of which can be generated and used on site.

Membrane filtration is increasingly replacing secondary clarification because of the level of secondary treatment currently required. It gives waste water systems the ability to operate with poor settling sludge, smaller footprints,

higher efficiency and ease of operation because no process adjustments or controls are needed as with clarifiers.

Scarcity of energy, the largest and most variable cost in waste water treatment, can be addressed by instrumentation and controls. Programmable logic controllers (PLCs) and SCADA systems can help to conserve energy with variable-frequency drives; also energy-efficient motors.

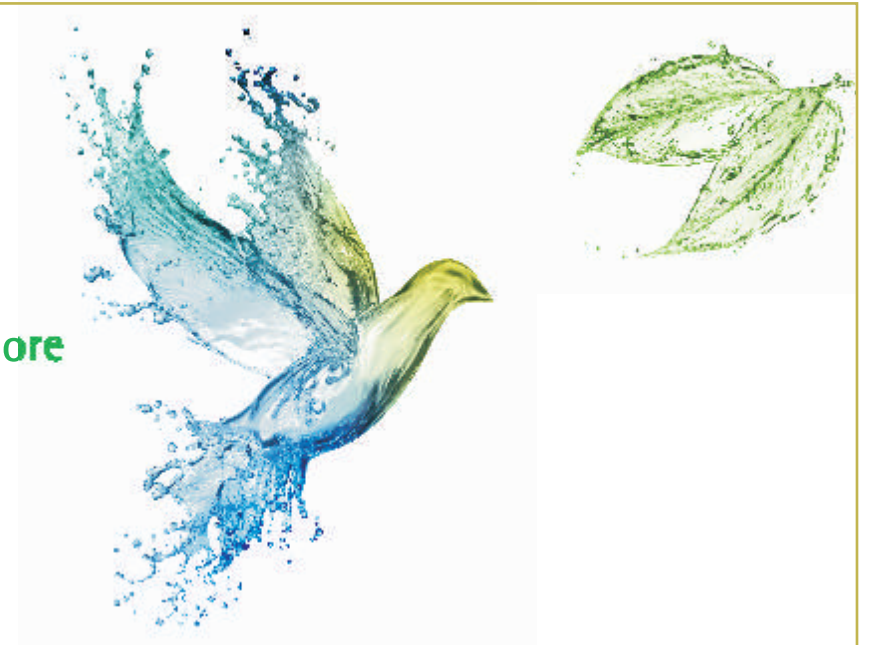
**Decentralised community systems for waste water treatment:** As residential, commercial and even industrial development move into semi-urban and semi-rural areas, there is need for small, decentralised community systems with tertiary treatment to deal with industrial effluent and domestic sewage. Such systems need to be able to handle issues related to low flow rates.

Low-flow treatment technologies include fixed-film packaged treatment units and membrane filtration. The major benefit is that higher quality effluent can be discharged to ground water for indirect reuse or for reuse in low end applications like horticulture, vehicle washing etc. As the size of these systems is small, they are generally easy to operate and are inexpensive. They can also be used at military camps, large construction sites, disaster relief operations, seasonal festivals and camps.

Also, development is occurring in rural locations which lack sewage infrastructure. In these areas the drinking water source is usually ground water, small lakes and streams. Rural areas is treated as well, ideally by decentralised systems that can operate well under rural environments.



We live, breathe and celebrate nature. Now, with an even more refreshing new look!



**ION EXCHANGE**  
THE POWER BEHIND WATER (INDIA) LTD  
Total Environment Solutions

is now

**ION EXCHANGE**  
*Refreshing the Planet*

The rapid pace of modernisation is taking its toll on the health of our planet. Its once pure natural resources are being polluted at an alarming rate leaving behind an unhealthy ecosystem for ourselves and future generations. The need of the hour is sustainable development.

For 50 years now, we at Ion Exchange have been healing the planet with sustainable environmental solutions for water, waste, air and soil. In the coming years, as efforts to nurse the planet back to health intensify, we are poised to partner the world, industry and our customers to be the change-makers for a better world and a better quality of life.

In sync with the change we strive to bring about, we have also changed our logo and incorporated a new positioning line *Refreshing the Planet*, a move that accentuates our commitment to assume an even greater responsibility to the cause of ecology and everything we stand for. The new Ion Exchange logo, with its hues of green and blue, celebrates the greenery and water around us, and more strongly reiterates our constant commitment and effort to make the earth a better place to live in. The grey underline symbolises the strong foundation and base that our organisation has.

# Engineering Contracts

## Bullish on Ion Exchange

India Bulls Realtech Ltd., demonstrated their confidence in Ion Exchange with an order for design, engineering, civil construction, erection and commissioning of a 117 MLD tertiary treatment plant, with five-year comprehensive operation & maintenance. This is one of the largest tertiary treatment plant orders in the Indian industrial sector.



DynaDisc and DynaSand oxy filter under construction, at power plant site

The plant comprises DynaDisc and DynaSand oxy filter with contact chlorination system and sludge management. The treated water from the plant will be source water to India

Bull's upcoming 5 x 270 MW power plant in Sinnar, near Nasik, Maharashtra.

Hot on the heels of this order was another from India Bulls Power Ltd. for design, engineering, civil construction, erection and commissioning of a 2 x 45 KLD comprehensive sewage treatment plant and sludge treatment along with sewerage network for their Nasik and Amravati power plants. The sewerage system comprises 7.5 kms sewerage line, with lifting station.

## Good Chemistry

Ion Exchange won a repeat order for total water and effluent treatment/recycle with zero liquid discharge, from Reliance Industries Limited for their 1300 TPD polyfibre project at Silvassa in Gujarat.

Salient technology features include our Swift demineralisation system, high loaded moving bed bio-reactor (MBBR) and the use of glass enameled bolted tanks for all overhead water retaining structures, for the first time in India. The project comprises:

- ▶ Potable water treatment (ultra violet system)
- ▶ Water treatment (demineralisation)
- ▶ Sidestream filtration with auto valveless gravity filters
- ▶ Effluent treatment with MBBR and lamella clarifier
- ▶ Effluent recycle (multigrade and activated carbon filters, ultra filtration and existing reverse osmosis system)
- ▶ Zero liquid discharge - multiple effect evaporator
- ▶ Sludge management with belt filter press

This is our second zero liquid discharge project in the downstream petrochemical segment in India. The order confirms Reliance Industries' confidence in our capabilities following the successful execution and performance of the 48 MLD zero liquid discharge effluent treatment plant, demineralisation and sidestream filtration units in 2009 at the Jamnagar Refinery.

# Relentless Commitment Awarded Yet Again

## Water Digest Awards 2012-13

Ion Exchange was once again the proud recipient of the Water Digest Awards in three prestigious categories:

- ▶ Best Water Company - for the sixth consecutive year
- ▶ Best R&D and Technological Breakthrough - Zero B ecoRO
- ▶ Best Water Treatment - Water Treatment Chemicals



# Spreading the Word



- ▶ **Platinum** – A luxurious service package for water treatment and waste water treatment plants which includes services i.e. HSE audit, technical audit by experts from IESD, training for staff and operators etc. In case of any unscheduled visit, we also commit to availability of engineers at site within 24 hrs of intimation.
- ▶ **Gold** – A mid range service package for water and waste water treatment plants that suits plant equipments. It is cost effective and helps increase plant efficiency.
- ▶ **Bronze** – The basic service package offered by IESD for services commonly required, like scheduled & unscheduled visits, supervision/overhauling and water analysis, etc.

This wide bouquet of services differentiates IESD from other service providers, enhancing the quality of its service offerings and creating value for customers.

With 10 branch offices across India, 75 territorial offices, IESD already serves over 14,000 customers across diverse industries & institutions, irrespective of the make or type of water & waste water treatment equipment. ISO 9001:2008 certified, and having a NABL accredited & KSPCB empanelled laboratory for analysis of water, food & media, IESD has also extended its service operations to neighbouring countries like Nepal and Bangladesh and is poised to spread its wings to other Asian countries.



Order received from Gujarat Mineral Development Corporation Ltd., Panandhro, Kutch, Gujarat, for revamping of their existing sea water reverse osmosis (SWRO) plant and operation & maintenance. The project is being implemented on BOT basis.

We continued our communication initiatives to promote environmental sensitivity using posters, e-contests, e-cards, screen savers and eco-games, to promote the green message.



Environmental games that prodded the grey matter into thinking green created quite a stir. Word game *Ek Ka Anek*, pictiary *Guess Karo*, a *Kaun Banega Eco Pati* quiz and the *Garbage Se Gold Tak* best out of waste competition saw intensive participation in the cause of the environment.

## Innovative Value Adding Services

**Ion Exchange Services Division (IESD) launched several services that have been much appreciated by its customers.**



### Remote Monitoring of Water Treatment Plants

Announcing the launch of the remote monitoring of water treatment plants, at the company's 'Loyal Customer Meet' at Bengaluru, Mr. Dinesh Sadasivan, Senior Vice President said "This will help us offer value added service to our customers and it will overcome problems related to availability of qualified engineers at remote sites and possible human related errors in monitoring. Continuous remote monitoring also drastically reduces possibility of plant shutdown".

The company had earlier launched various new service packages such as automation of reverse osmosis plants and Swift demineralisation units, cooling tower blow down automation, energy saver automation for effluent treatment plants and sewage treatment plants, oxygen detector for sewage treatment plants.

### Containerised Water Treatment Plants on Rent

Containerised water treatment plants on rental basis for supply of treated water was another first-of-its kind service in India to be offered by IESD to industries and institutions across diverse sectors such as pharmaceuticals, breweries, food & beverages, hotels, hospitals and software technology parks.

These plants consist of reverse osmosis and demineralisation

units; the treated water can be used for drinking as well as for industrial and institutional requirement of water for boilers, cooling towers, and certain other processes and applications. The functioning of the critical parameters of the unit would be remotely monitored on a 24 x 7 basis by IESD's technical team from the corporate office in Bengaluru, through the use of an SIM based data acquisition system, to ensure availability of quality water continuously. Mr. Sadasivan said that the significant advantage for customers of this service would be availability of treated water with no capital investment, thereby enabling them to focus on their core competency without the hassle of maintenance of the plants. Also, since the plants would be operated & maintained by competent IESD engineers, on-site and through remote monitoring, they could be rest assured about the quality and quantity of water. "This service" added Mr. Sadasivan, "is also intended to enable customers to meet their water requirements during breakdown of their existing water treatment units, changes in currently available water



quality, occasional requirements of higher quantity of water, temporary requirement of fully functional water treatment units during industry/institution site completion stages, water requirement for exhibitions/events, standby water treatment unit during existing plant maintenance, and any other such temporary requirements".

### Sterling Service Packages

IESD customers now have the option to select the services best suited to them from a wide range of platinum, gold and bronze packages as recommended by our dedicated and professional service engineers. The list of services is drawn up after a detailed study of each plant by our technical team and best options recommended to the client.



Ion Exchange was the recipient of a prestigious project for the joint venture of Tata Steel with Nippon Steel, the world's second-largest steelmaker which will produce and sell high-tensile auto-grade steel in India. The JV is setting up a continuous annealing and processing line (CAPL) at Jamshedpur, with a capacity of 600,000 tons per year, and hopes to wean away international automakers such as Honda, General Motors and Hyundai Motors from importing their requirements of special steel for making automobiles and instead purchasing this from the JV.

Ion Exchange Waterleau was awarded this contract from L&T Minerals and Metal SBU for a four stream effluent treatment plant (alkaline waste treatment, oily waste treatment and utility waste treatment) with a tertiary recycling system and sludge treatment for the Tata CAPL project, Jamshedpur. The scope covers design, engineering, supply, construction (excluding civil) and supervision of erection & commissioning.

L&T Minerals and Metal SBU also awarded Ion Exchange the contract for the complete chain of 40 m<sup>3</sup>/h demineralisation plant as capacity enhancement for the existing 3 x 45 m<sup>3</sup>/h demineralisation plant supplied by us, as process water for the pickling line and tandem cold mill (PLTCM) at Tata Steel Cold Rolling Mill, Jamshedpur. The scope of work is design, engineering, supply, construction (excluding civil) and supervision of erection & commissioning.

The plant is designed so that it can be accommodated in the building housing the existing plant. All three streams will be connected to the new regeneration system which is part of the contract. The project includes multigrade and activated

carbon filters, demineralisation and DM water storage tank, complete electrical work and automation.

Our long association with the steel major JSW continued with the addition of two more contracts from JSW Steel at Bellary, Karnataka for the supply of water treatment equipment for their expansion plans. Both projects will involve significant recovery of energy from heat as well as a significant reduction in CO<sub>2</sub> emissions.

- ▶ The first project is for supply of water treatment equipment for the waste heat recovery boilers for the sinter plant. The high temperature waste gas from a cooler is recovered to circulate in a boiler to produce steam. The quality of the water requirement for the high pressure boilers is stringent to ensure that the projected benefits are obtained.
- ▶ The second project is for coke dry quenching, in which the red-hot coke is cooled by gas circulating in an enclosed system, thereby preventing the release of airborne coke dust. The thermal energy of the red-hot coke which is lost in the conventional system, is collected and reused as steam in the CDQ system.

Our specialised water treatment equipment will provide water of the required quality and quantity for both the projects.

Both these projects use less fossil fuel and results in lower CO<sub>2</sub> emissions, thereby contributing to reduction of global warming. Ion Exchange is indeed proud to be associated with both these projects which will offer significant benefits to JSW as well as to the environment.



# Commissioned

## For NTPC Tamil Nadu Energy Company

The 19.8 MLD (3 x 275 m<sup>3</sup>/h) sea water reverse osmosis (SWRO) desalination plant, the largest SWRO plant for a power project in India, was commissioned at Vallur, Chennai, for the 3 x 500 MW thermal plant of NTPC Tamil Nadu Energy Company, a joint venture of National Thermal Power Corporation and Tamil Nadu Electricity Board.



Pretreatment



Reverse Osmosis



Demineralisation

# Launched

## Presenting

Zero B ecoRO uses an eight-stage purification process; using revolutionary high recovery RO (HRR) technology that reduces water wastage by 80 per cent and equipped with advanced electronic system sanitiser (ESS) technology, this international breakthrough comes after extensive research.

- ▶ 8-stage purification process removes all impurities
- ▶ Water saving up to 80 per cent
- ▶ HRR technology improves water recovery phenomenally.
- ▶ ESS technology cleans the purifier automatically, 24/7; it sanitises all internal components online, preventing germ build-up in the water tank
- ▶ E-Health – an electronic device protects the water against recontamination while in storage and even when you carry it around. This health guard keeps tank water fresh for one week
- ▶ Automatic power flush enhances membrane life
- ▶ Performs well even with extremely high recovery rate

Zero B customer care number is now 022-6618 1234.



# Delivering Ceramics with Style

Now on offer to the ceramics industry are our process chemicals that significantly improve product quality – binders for stronger tri-dimensional structure and increased mechanical strength, efficient dispersants for high performance ceramics and organic deflocculants to reduce or eliminate thixotropy.

## INDION® Dispersants

- ▶ Reduce bulk viscosity and maintain stability of high solid slurries
- ▶ Excellent ability to disperse insoluble inorganic salts and soil particles
- ▶ Better performance viz. higher slurry density at low viscosity, saves fuel cost during spray drying
- ▶ Cost saving due to low dosage
- ▶ High temperature stability
- ▶ Non-toxic

## INDBOND Binders

- ▶ Low dosage
- ▶ Excellent ability to disperse insoluble inorganic salts and soil articles
- ▶ Minimal or no adverse effect on rheological properties of slip
- ▶ Maintain bulk viscosity and stability of high solid slurries
- ▶ High efficiency for binding calcium ions
- ▶ High temperature stability
- ▶ Non-toxic
- ▶ Cost-effective



## Alternate Sources of Make-up Water

In addition to carefully controlling blow down, other water efficiency opportunities arise from using alternate sources of make-up water. Water from other equipment within a facility can sometimes be recycled and reused for cooling tower make-up with little or no pretreatment, including the following:

- ▶ Water used in a once through cooling system.
- ▶ Pretreated effluent from other processes, provided that any chemicals used are compatible with the cooling tower system.
- ▶ High-quality municipal waste water effluent or recycled water (where available).

## Operation and Maintenance

A cooling tower water treatment specialist can help to maximise the cycles of concentration and maintain water efficiency in operations and maintenance. Therefore you need to select your water treatment vendor with care. Many vendors do not really regard water efficiency as high priority and some may be reluctant to improve water



efficiency because it means the facility will purchase fewer chemicals. In some cases, saving on chemicals can outweigh the savings on water costs.

## Retrofit Options

Several retrofit options may help maintain water efficiency across facilities and your water treatment specialist must advise you on these. For example,

- ▶ Side stream filtration can turn a troublesome system into a more trouble-free one. Installation of cooling tower side stream filters cleans the water, enabling the



system to operate more efficiently with less water and chemicals. Side stream filtration improves cycles and recovery of backwash water from these filters and is particularly helpful if the system is subject to dusty atmospheric conditions.

- ▶ Installation of a make-up water or side stream softening/dealkalisation system when hardness or alkalinity is the limiting factor on cycles of concentration; a reverse osmosis system when chlorine and TDS are limiting factors, for higher cycles of concentration.
- ▶ Alternative disinfection options like on-site oxidant generation, chlorine dioxide, ozonation etc. may be considered to reduce water and chemical usage. However it is important to evaluate the life-cycle cost impact of such systems.
- ▶ Automated chemical feed systems on large cooling tower systems will help control blow down/bleed-off by conductivity and add chemicals based on make-up water flow. These systems minimise water and chemical use while optimising control against scale, corrosion and biological growth.

These options are offered on BOOT/BOO basis also.



## Ion Exchange Safic – Joint Venture

Ion Exchange has signed a joint venture agreement with Altix-listed company, Safic, a wholly owned division of Accentuate Limited, South Africa. The new joint venture will market water treatment equipment, chemicals and resins throughout South Africa and the SADC.

Safic, established in 1981, develops world class chemical products for industry and commercial processes and solutions, some of which are water-based. Safic has won numerous awards and accolades for its environmental protection efforts including the Mail and Guardian 'Greening the Future Award', and a chemical safety award two years in a row - the only South African company to have ever achieved this.

Safic will use its vast client network to assist Ion Exchange offer one stop water management - supply and treatment solutions to its customers. It will also offer Ion Exchange administrative, logistical and regulatory support on the ground in South Africa.

Announcing the JV, Ion Exchange India's Chairman & Managing Director, Rajesh Sharma said, "Both our companies are ISO 9001 and 14001 as well as OHSAS 18001 certified, sharing values of good manufacturing practices, quality and service as well as employee health, safety and environmental responsibility. One of the objectives of this partnership is to enter new market segments and have a greater market share for our water

treatment business in this region." He added that the JV aims to secure 5 to 7 per cent of the South African water treatment market over the next three years and estimated the South African market to be roughly valued at R 10 billion.

Fred Platt, CEO of Accentuate Limited said "The JV will be able to leverage Accentuate's infrastructure and chemical distribution ambitions. The types of challenges South Africa and India face in terms of water are also similar, such as rural water quality and a lack of water infrastructure. A lot of solutions developed in India could be a much better fit for South African conditions than those developed in Europe."



## Overseas Contracts

### Asia Pacific Region

We received an order for a 55 m<sup>3</sup>/h softener and a 25 m<sup>3</sup>/h demineraliser plant from Evyap Sabun Sdn. Bhd., Malaysia for their oleochemical plant.

### Saudi Arabia

From Arab Steel, Saudi Arabia of the Al Tuwairqi Steel Group, for total water management which includes a 2400 m<sup>3</sup>/d recycle reverse osmosis plant and a 1200 m<sup>3</sup>/d brackish water reverse osmosis plant, with O&M for all existing water and waste water systems.

From Alupco – Aluminium Products Co. Ltd., for resins, chemicals, reverse osmosis plants and refurbishment of their existing reverse osmosis units.

Al Jazeera Steel & Lion Steel placed orders for reverse osmosis plants and chemicals.

### UAE

Several orders from Abu Dhabi:

- ▶ Order from Emirates Steel Industries LLC for improving the efficiency of ultra filtration and reverse osmosis membranes for their 2000 m<sup>3</sup>/d sea water reverse osmosis (SWRO) plant.
- ▶ A fluidised media reactor, FMR 600, from Discovery Contracting.
- ▶ A 200 m<sup>3</sup>/d two-pass reverse osmosis plant from Al Dana Water.
- ▶ A 60 m<sup>3</sup>/d new generation packaged sewage treatment plant for the Al Jaber Group.

From Microsol, Fujirah, a 20 m<sup>3</sup>/h ultra filtration plant.

In Dubai, for Al Barari Development, a 500 m<sup>3</sup>/d containerised brackish water reverse osmosis plant, and for Red Sea Housing, an order for a 36 m<sup>3</sup>/d sea water reverse osmosis plant.

In Ras Al Khaimah, a 150 m<sup>3</sup>/d membrane bio-reactor for Rak Development Authority, and an order for a 2 x 550 m<sup>3</sup>/d containerised brackish water reverse osmosis plant for JK Cements.

### Africa

Effluent treatment from Roofing and Rolling Mills, Uganda, East Africa, for their cold rolling mill expansion project. A 60 m<sup>3</sup>/h demineralisation plant had been supplied earlier for the same complex.

In Tanzania, East Africa our first order for a new generation packaged sewage treatment plant, 2208 m<sup>3</sup>/d, for Hotel Whitesands Ltd., Dar Es Salaam.

We commissioned a 2 x 3 m<sup>3</sup>/h containerised sea water treatment plant for Alpha Logistics Kenya, Africa, for their gas pipeline project at Songo Songo Island, Tanzania.

Orders from Angelique International Ltd., Sierra Leone, West Africa for the Ministry of Water Resource, Indian High Commission, for high rate solids contact clarifiers and filtration plants of 1.6 MLD, 2 MLD and 3.2 MLD. These have been successfully commissioned and handed over to the client.

An order for 3 x 150 m<sup>3</sup>/d, 100 m<sup>3</sup>/d and 2 x 200 m<sup>3</sup>/d fluidised media reactors for Olam International, Gabon, West Africa.

An order for a 34.5 m<sup>3</sup>/h new generation packaged sewage treatment plant for the Indian High Commission, Nigeria, West Africa.

## Cooling Tower Water Management

Cooling towers consume significant amounts of water and implementing a well designed and superior cooling water treatment programme with specialty formulations will improve the cooling water chemistry and thereby the cycles of concentration in the cooling circuit and significantly reduce make-up water needs.

Ion Exchange offers a wide range of customised water circuit solutions for treatment of cooling water and recycle of blow down waste water. These, along with retrofit options and operation & maintenance, yield substantial savings and improved ROI.



- ▶ Recycle of water gives tremendous cost benefits.
  - As cost of water is projected to increase continuously, recycle of water brings significant savings in fresh water purchase.
  - Better quality water (recycled) for process lowers processing costs.
  - Lower conveyance and disposal costs due to reduced waste water generation.
- ▶ Savings in chemical consumption in make-up water treatment plants as well as cooling water treatment.
- ▶ Lower chemical handling and storage as there will be a significant reduction in usage and handling of chemicals like acid and alkali.

### Recovery of Blow Down

Recovery of cooling tower blow down is the focus for water management in a cooling tower, where recovered water can be reused as cooling tower make-up or alternatively as feed to the water treatment system (demineralisation etc.) or directly to the process. A key parameter used to evaluate cooling tower operation is "cycles of concentration" (COC) calculated as the ratio of the concentration of dissolved solids (or conductivity) in the blow down water compared to the make-up water. Since dissolved solids enter the system in the make-up water and exit the system in the blow down water, the cycles of concentration are also approximately equal to the ratio of volume of make-up to blow down water.

### Increasing Cycles to Decrease Water Use

From a water efficiency standpoint, maximising cycles of concentration using specialty chemical treatment programmes will lead to higher efficiencies and lower blow down quantities (which can then be recovered), reducing make-up water demand. However, this must be done within the constraints of make-up water and cooling tower water chemistry. While increasing COC, it is always important to find an optimum between ROI, increased TDS to waste stream, process performance and operation. Dissolved solids increase as cycles of concentration increase, which can cause scale and corrosion problems unless carefully controlled.

## Citronella Extraction Plant

Ion Exchange Enviro Farms Ltd. commissioned its agro-based project for extraction of essential oil from citronella grass at Neral, Maharashtra. The citronella oil extraction plant has started commercial production and sale of the oil.

Citronella essential oil is a natural deodoriser and purifier and can be used with vinegar to sanitise surfaces. The aroma of citronella oil renders it an insect repellent – its most useful quality. It can be used as a spray, a diffuser or even dabbed on cotton for home use.

