



NO. 25

AN INTERNATIONAL
MAGAZINE FROM
ALFA LAVAL

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**Olive oil
excellence**

**Steel giant's
softer side**

**A clever way
past pollution**

Pure water pioneer

Brent Halldorson of Aqua-Pure provides the oil and gas fields in northern Texas with mobile water-recycling services.

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plus the profit **22**



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to winemaking 26

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Natural concerns



editorial

Alfa Laval is gaining increased attention for its solutions for reusing, recovering and improving treatment of water. Being a company devoted to clean technology, we are very pleased with this development and find it encouraging that the conservation of water, together with energy, has become a major concern for our customers.

The scarcity of freshwater is recognized as one of the earth's most imminent challenges, and the ongoing debate about climate change, along with wider environmental concerns, has driven international regulations and local legislation in the water area.

Today the United States and China make the largest water withdrawals for industrial applications; together they account for more than 40 percent of global industrial water use. China is expected to face particular challenges, as it has 20 percent of the world's population but only 7 percent of its water resources.

According to estimates from the United Nations Environment Programme, water scarcity will grow increasingly difficult to handle, especially since many manufacturing facilities have moved to low-income countries that often suffer from water shortages.

But there are also many hopeful signs. The increasing awareness of the water situation is reassuring, and there are existing products and solutions designed to deal with the water challenge. Apart from traditional, mature technologies there are also a rapidly growing number of new, emerging solutions being developed.

Alfa Laval is in the forefront and provides both equipment and systems for water treatment. We have drum thickeners and decanter centrifuges for industrial sludge thickening and dewatering as well various heat exchangers for use in preheating waste streams to improve the efficiency of treatment. We also have high-speed separators, membranes and evaporators to be used in, for example, concentrating waste streams from industrial plants. Besides the municipal and industrial water applications, we provide solutions for freshwater generation from seawater and treatment of wastewater onboard ships, including ballast water, water recycling processes and much more.

In this issue of *here* we focus on water. In the following pages you can read more about water challenges and how they are being solved. You will also find stories about Alfa Laval's involvement in other areas of clean technology. We consider energy saving and water recovery solutions to be intrinsic to most of what we do.

Clean technology permeates our offering, but it's only when it is put to use that we can help the environment and contribute to the effort we must all make to protect our natural resources.

ALEX SYED

VICE PRESIDENT, ALFA LAVAL CORPORATE DEVELOPMENT

Every sixth person in the world today lacks access to safe drinking water, and the situation is expected to deteriorate. Population, pollution and climate put the squeeze on potable supplies, making water a priority on political and corporate agendas.

TEXT: CAROLINA JOHANSSON ILLUSTRATION: CHRISTER JANSSON

Join the water watch

OF ALL THE FRESHWATER on the planet, less than 1 percent is available to mankind. The rest is tied up in glaciers and polar ice or in groundwater so far below surface that it is not possible to extract. "The problem is that the water is not at the right place at the right time," says Håkan Tropp, project director at the UNDP Water Governance Facility at the Stockholm International Water Institute.

In the freshwater that is used worldwide, roughly 70 percent goes for agriculture. Industry uses 20 percent and households use the remaining 10 percent. Meanwhile, highly industrialized nations tend to use more water per capita than developing nations.

The United Nations estimates that every sixth person in the world (or some 1.1 billion people) faces inadequate access to safe drinking water. By 2025, according to UN projections, water shortages will affect 2.3 billion people in about 50 of the world's 200 nations.

Population and economic growth across Asia and the rest of the developing world is a major factor driving freshwater scarcity. The earth's human population is predicted to rise from 6 billion to about 9 billion by 2050, the UN reports. Feeding them will mean more irrigation for

crops. Meanwhile, global warming could disrupt water flow patterns, further reducing the availability of drinking water.

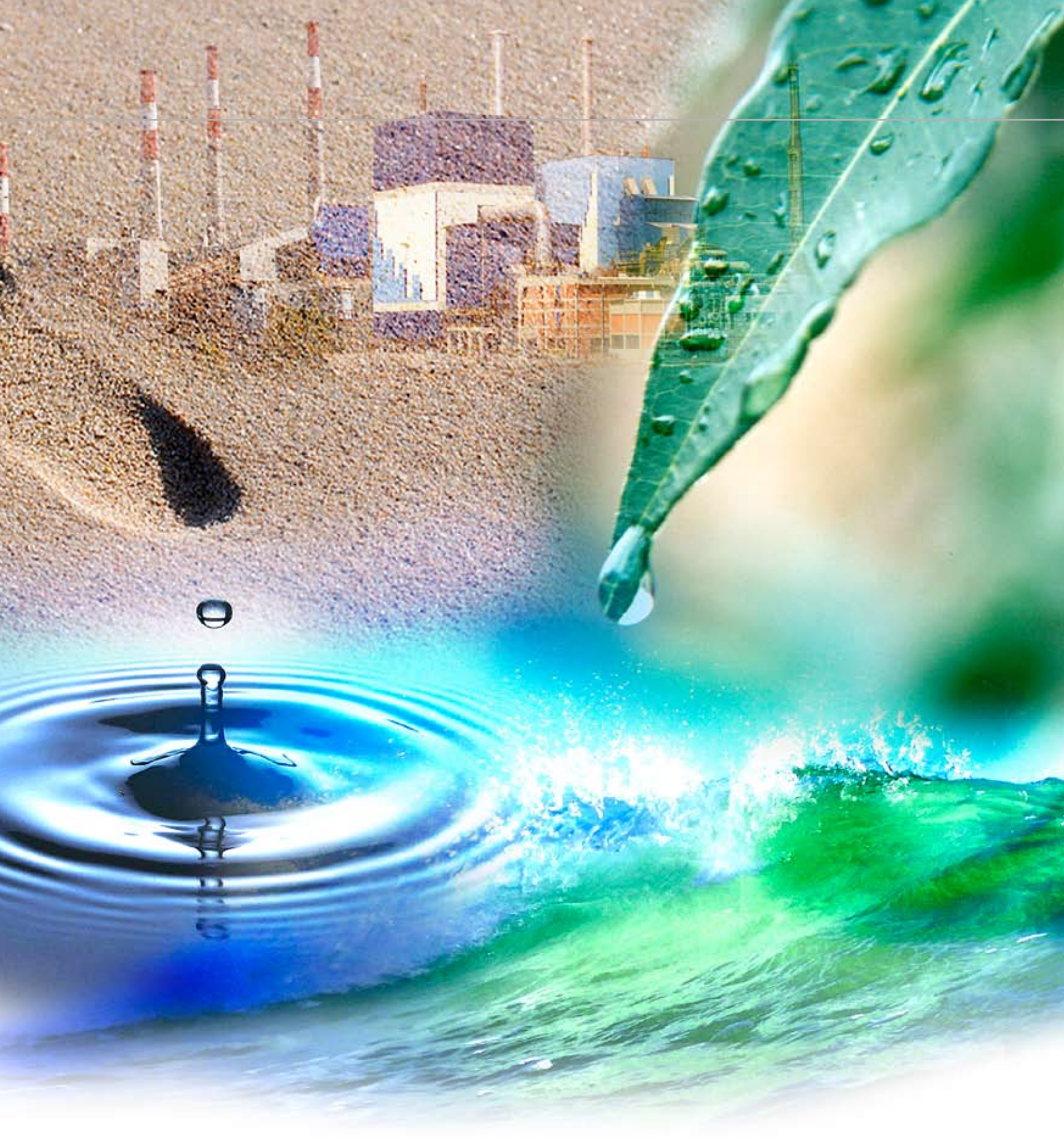
"We are in a situation where we need to protect our water sources in order to secure clean freshwater in the future," says Arjen Hoekstra, professor in Multidisciplinary Water Management at the University of Twente in the Netherlands and author of several books on water policy. "The pace of change is slow. There has been an attitude change in recent years, and water is becoming an issue on the political arena and in industry. Still, there is a lot of room for improvement."

BUT THE ISSUE IS complex, and one main obstacle is money. Says Tropp: "To a large extent, the water crisis is an agricultural crisis. In agriculture, more efficient irrigation systems could do a tremendous amount, and the technology is there. The question is, who is going to pay for it?"

Another problem, he notes, is that in most instances



Håkan Tropp,
project director,
UNDP.



the price on water is too low and is often subsidized by states. This means that there has been little economic incentive, even on the part of industry, to save on water. However, reducing water usage through efficiency measures and reuse will become increasingly important as supplies decrease.

“All industries produce wastewater,” says Ivar Madsen, business unit manager, Energy and Environment at Alfa Laval. “Some use municipal water treatment facilities to clean it, while others use their own wastewater treatment plants. One trend we are seeing is that wastewater is beginning to be viewed as a resource, particularly in

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►► www.alfalaval.com/here/waterscarcity

How much water does it take?

1 cup of coffee – 140 litres of water

1 litre of milk – 1,000 litres

1 kilogram of wheat – 1,300 litres

1 kilogram of rice – 2,300 litres

1 kilogram of beef – 16,000 litres

SOURCE: *Globalization of Water*, Hoekstra and Chapagain, 2008, Blackwell Publishing

>>> dry nations of the Middle East and around the Mediterranean.”

Water treatment technology can be used to clean wastewater so that it can be used for irrigation or cleaning purposes. In fact, water treatment technology is now so advanced that wastewater can be cleaned and reused as potable water. In Singapore, as much as 10 percent of the tap water stems from reused water. Another way to tackle freshwater scarcity is through desalination – turning seawater into freshwater. This is an expensive option but one that is feasible in coastal areas.



Arjen Hoekstra, professor in Multidisciplinary Water Management.

BOTH HOEKSTRA AND TROPP see water as the next corporate green trend. Environmental thinking has already made its way into the boardrooms, and corporate social responsibility is becoming an important tool for companies when it comes to attracting consumers as well as investors.

To talk about water use, Hoekstra has coined the term “water footprint,” a concept that can be applied to nations, corporations or products.

“Companies have an operational water footprint, which basically is the water used in production,” says Hoekstra. “But the business water footprint looks at the whole process

and traces the water used through the supply chain. Take cola as an example. There is the water used by the company needed to make the beverage. But manufacturing cola also requires sugar, which is a highly water-intensive product, and there is a bottle [which also requires water to produce], so in the end, the product uses much more water than one might anticipate.”

Corporate water footprinting is a relatively new tool, but pilot studies are under way, primarily in the food and beverage industry. This autumn, Borealis, a maker of plastics solutions, and Uponor, a supplier of plumbing and heating systems, announced plans for a joint initiative to pilot the concept of water footprinting to the plastics industry.

Corporate water footprinting offers a way to measure water use and also provides an easy way for consumers to grasp the water involved in the manufacture of a product. It takes, for example, 16,000 litres of water to produce one kilogram of beef, or 10 times more than the water needed to produce a kilogram of rice.

“Companies today are dealing with climate issues and energy issues,” says Hoekstra. “Water issues are likely to become the next big thing.” ■

► Key technologies for water recycling

An imminent challenge

– Alfa Laval’s solutions tackle the water scarcity

Alfa Laval has been at the forefront when it comes to developing solutions and processes for treating water and maximizing water reuse.

Its key technologies are in such areas as cleaning of wastewater and reduction of sludge volumes, recycling of effluents, desalination of seawater and cleaning of ballast and bilge water onboard ships. Ivar Madsen, manager for the Membrane Bioreactor unit, Energy and Environment at Alfa Laval, says a big trend now is water reuse.

“In the food industry, which is one of our major customer segments and one with extremely high demands on pure water and technology,

there are moves to reuse water,” he says. “It may not go back into production, but it can be used for, for example, cleaning purposes.”

Alfa Laval offers several solutions to tackle water scarcity and water reuse. Producing water by desalination is a very energy-intensive method. Alfa Laval’s waste-heat-driven plate-based distillation evaporators use waste heat at, for example, power stations to produce drinking water.

In addition, the company offers a combination of high-speed separators, decanters, membranes and plate evaporators that reuse water before it “becomes” wastewater,

“In the food industry there are moves to reuse water. It may not go back into production, but it can be used for, for example, cleaning purposes.”

thereby reducing overall water consumption.

Further downstream in the wastewater process, membranes in bioreactors provide an opportunity to reuse wastewater for irrigation and cleaning. Wastewater sludge volume is reduced with decanters and drum



Ivar Madsen, manager MBR unit, Alfa Laval.

thickeners, thus reducing transport and disposal costs. Madsen says that a future challenge lies in optimizing the solutions to obtain even more energy-efficient processes.

“That is one of the biggest challenges right now,” he says. “And we are constantly working to improve our technology to accomplish this.” ■

Aqua-Pure's recycling system
NOMAD 2000 uses Alfa Laval's
AlfaVap technology to clean
wastewater from gas wells
in northern Texas.



Clean water visionary

New use of old technology keeps clean water flowing to gas wells in the Barnett Shale in Texas and recycles up to 80 percent of “flowback” wastewater for future use – protecting a valuable natural resource while maximizing gas production.

>>>

TEXT: **JIM DALE** PHOTO: **ED LALLO**



More than 80 percent of Devon's early flowback water is recycled by Aqua-Pure's system.

THE GOOD NEWS? A 13,000-square-kilometre region of North Central Texas lies atop the Barnett Shale – the largest single shale gas play currently under development in North America. Estimates say the area contains 700 to 1,000 billion cubic metres of natural gas, enough to feed US domestic natural gas needs for the next dozen years or more.

Since the first exploratory well was drilled in the Barnett more than 25 years ago, a number of exploration and production companies have developed technologies, including horizontal drilling, to economically extract gas from the highly dense shale formation. Producers are currently drawing in the range of 71 million cubic metres per day through 8,000 producing wells.

THE NOT-SO-GOOD NEWS? The key to making the Barnett Shale economically viable is hydraulic “fracturing” (or “fracking”), a process that involves forcing high volumes of freshwater into gas wells under enormous pressure to create fissures in the shale. These fissures allow the trapped gas to flow into the well bore and to the surface, some 2.5 kilometres upward to the Texas prairie, an area with limited water and periodic droughts.

Each well drilled in the Barnett Shale requires between 4 and 19 million litres of water for fracking. The water supply comes largely from regional reservoirs, municipal water supplies and wells drilled into the Trinity River and Woodbine aquifers that lie between the Barnett and the surface.

After fracking, the residual wastewater – usually containing high levels of salt, polymers, friction reducers and



Devon's Jay Ewing and Aqua-Pure's Brent Halldorson review the results from cleaning water using the NOMAD 2000.

“Once we discovered Alfa Laval’s AlfaVap technology, we’ve never looked back.”

BRENT HALLDORSON, chief operating officer, Fountain Quail/Aqua-Pure

surfactants – has traditionally been pumped down disposal wells drilled far beneath the Barnett layer, never to be seen (or used) again. This scenario involved thousands of individual truck trips over the region’s dusty rural roads to haul water from gas wells to disposal sites.

THE REALLY GREAT NEWS? Devon Energy, which accounts for roughly 30 percent of all Barnett wells, has teamed up with Canada-based Aqua-Pure Ventures to develop a purpose-built recycling system that reclaims 80 percent or more of the initial “flowback” water used in the overall fracking process. Aqua-Pure Ventures, through its Texas-based operating company, Fountain Quail Water Management, has decades of experience in industrial and municipal wastewater treatment innovation.

This “flowback” water – which is ejected from the well due to the initial pressure – typically makes up about 20 to 30 percent of the total water used in the process. The remaining water is extracted along with the natural gas over the lifetime of the well. The ability to recycle four-fifths of the



Julia Holden of Fountain Quail works the control panel of the NOMAD 2000.



flowback water means that Devon is able to reduce its total water needs by 16 to 24 percent – a significant savings, both in water costs and environmental impact.

“Technology for cleaning water through MVR [mechanical vapour recompression] evaporation goes back a hundred years or more,” says Aqua-Pure’s Brent Halldorson, chief operating officer and driver of the Fountain Quail team in Texas. “You boil the wastewater and get pure distilled water as an output, leaving a small concentrated salt solution behind. In this case, that means all the subsurface contaminants and residual materials used in the fracking process.”

Aqua-Pure found a way to develop the old idea of MVR evaporation into something that could efficiently and economically handle the large volumes of water used in the gasfields.

THE INITIAL PROTOTYPE was designed for cleaning the water associated with landfill leachate. “It seemed a logical next step to take our technology a bit further to process wastewater associated with oil and gas production,” says Halldorson. “By making our systems mobile we could take MVR evaporator technology into a new arena – highly variable oilfield wastewater.”

The solution was the NOMAD 2000 Mobile Evaporator – a three-stage portable platform that could move from field to field and use Aqua-Pure’s improved MVR technology to

process a well’s wastewater on the spot. Basic MVR technology, which recovers the heat lost in the evaporation/condensation process and reuses it to fuel additional evaporation, could provide considerable efficiencies. But a compact, two-phase heat exchanger was needed that could keep up with the messy, high-volume process of converting nearly 2.3 million litres of wastewater per day into highly pure distillate.

The challenge that Aqua-Pure faced was that most conventional standard heat exchangers available were not designed for two-phase service and fouled too often, requiring countless hours of physical dismantling and cleaning. “They simply weren’t up to the rigours of the gas production world,” says Halldorson.

Enter Alfa Laval. “I saw the things we did with our AlfaVap evaporator and couldn’t stop thinking of all the other possible uses,” recalls Tomas Kovacs, marketing manager and technologist at Alfa-Laval. “And the AlfaVap is the very heart of what the NOMAD does.” When Kovacs introduced to Aqua-Pure the range of solutions that

► Facts

AQUA-PURE VENTURES

- Based in Calgary, Canada
- Operates in Texas under Fountain Quail Water Management
- About 80 employees in the Texas region
- Primary business is wastewater treatment
- Main product is the NOMAD 2000 Mobile Evaporator
- Key differentiator: Patented mechanical vapour recompression technology enables the NOMAD to boil highly variable oilfield wastewater, recover the steam and create distilled water. The system uses wide-gap two-phase plate technology instead of more traditional shell-and-tube evaporation, achieving extremely high efficiency in the production of recycled wastewater.

>>>

“Over the long run we’ll save money by reusing our own water and not having to truck water all over North Texas.”

JAY EWING, completion construction manager, Devon Energy



►► www.alfalaval.com/here/water/aquapure

>>> could be developed using new designs and materials for the NOMAD process, it was an ideal match from the very beginning.

WORKING WITH ALFA LAVAL, Aqua-Pure was able to incorporate the AlfaVap into the NOMAD design, using titanium that is immune to the highly caustic briny conditions of gasfield recycling.

“Not only is it highly efficient,” Halldorson says, “but it also needs very little other than routine maintenance and the occasional scale removal. Once you get it fired up, using local gas directly from the site to power a start-up boiler, it’s basically an exercise in balancing energy.”

For Devon, whose production plans included 600 wells

for 2008 and exploration of an additional 7,500 sites for 2009 and beyond, using the NOMAD is a great long-term investment. The NOMAD solution costs from 50 to 75 percent more than just pumping wastewater back down into the ground, says Jay Ewing, Devon’s point person on the project. “But,” he says, “we believe the economics will work out over the long run, because we’ll save money by reusing our own water and not having to truck water all over North Texas. Water is a finite resource here. More important, this is absolutely the right thing to do, both to provide ourselves with the water we need for fracking and also to minimize our impact on the environment.”

THE FIRST NOMAD UNIT went into full operation in 2005. Now there are nine complete NOMAD systems in operation, each consisting of three 40-foot modules. Aqua-Pure, Devon and Alfa Laval have worked closely to fine-tune these systems to deliver maximum performance. “We’ve learned a few things as we’ve gone along,” says Ewing.

While water recycling in the Barnett Shale gives Aqua-Pure plenty of room for future expansion, the company is also looking to apply its NOMAD technology as other fields open. One example is the Marcellus Shale, which runs from upstate New York hundreds of miles south through the Appalachians. The Marcellus, many geologists predict, could be the largest single shale field in North America, but it is also among the most environmentally sensitive.

“We’ll be ready to go with as many NOMADs as we need when the time comes to go there,” says Halldorson. “We’re looking at almost unlimited opportunity over the coming decades. Once we discovered Alfa Laval’s AlfaVap technology and saw what it could do for our patented process technology, we’ve never looked back.”

And that’s good news for everyone. ■

► Alfa Laval’s AlfaVap heat exchanger

It’s all in the details

Alfa Laval’s AlfaVap technology has unique features that make it particularly well suited for use in gas and oil fields. The design of the plate pattern, for example, creates high turbulence and dramatically increases heat transfer while at the same time reducing fouling and scaling.

AlfaVap solutions are typically far more compact than conventional “falling film” systems, which work by pumping contaminated water to the top of a vertical shell-and-tube heat exchanger

and having the liquid boil in a thin film as gravity pulls it down through a series of internal tubes. Their compactness ensures a reduction in installation and operation costs. And designed-in expandability makes adding plates

“Alfa Laval’s AlfaVap gave us the robust, powerful, efficient and easy-to-service heat exchanger technology we needed.”

to extend capacity easy and cost-effective.

“We knew we had a process that would meet the economics of the gasfields and help create a sustainable water cycle to allow fracking in shale,” says Aqua-Pure’s Brent Halldorson. “Our success hinged on having a serviceable evaporator exchanger that could handle the rigours of oilfield wastewater. Alfa Laval’s AlfaVap gave us the robust, powerful, efficient and easy-to-service heat exchanger technology we needed,



Alfa Laval’s AlfaVap has the right features for the job.

and we’ve had a great working partnership ever since.” ■



► Lectures

LISTEN TO ALFA LAVAL AT ACHEMA 2009

Monday, 11 May

10:30 Plate evaporator reduces energy consumption in caustic evaporation plants
Tomas Kovacs

11:30 Energy and water consumption savings for copper smelting
Ergin Kulenovic

12:00 Separators and decanters: how to optimize service intervals
Mats Jateus

14:00 The power of synergies: optimization and integration of membrane processes
Frank Lipnizki

Tuesday, 12 May

10:30 Multi-step chemical processes in a modular reactor
Barry Johnson (Authors: B Johnson, D Unge)

Wednesday, 13 May

12:30 Utilization of and application development with nickel-base alloys in plate heat exchangers
D Klint, K Nilsson
(Author: C Wolfe, Organized by ThyssenKrupp VDM GmbH, Werdohl/D)

Thursday 14 May

14:30 Save water for injection in multiple-use stainless steel biotechnology facilities
Kent Milton

16:00 Pharma condensers – cleaning validation
Patrik Arvidson

For more detailed information about the lectures and other Alfa Laval activities at the event, please visit www.alfalaval.com.

Meet Alfa Laval in Hall 4.0, stand H2-J8.

Alfa Laval at ACHEMA 2009:

Dimensions of performance

Presenting its latest innovations, solutions and services for the chemical industry and other process industries, Alfa Laval will participate in ACHEMA 2009 under the theme "Dimensions of performance."

"The ACHEMA event has become somewhat of a tradition with Alfa Laval," says Hans Dahlén, manager, Process Industries at Alfa Laval. "It is a good venue for the company to meet customers, listen to their needs and have fruitful dialogues. As usual we are taking the opportunity to introduce new innovations and show the latest news from our complete offer towards chemical engineering, environmental protection and biotechnology."

The process industries are under pressure. Besides legislative matters, they have to deal with decisions concerning issues such as energy efficiency, reduction of CO₂ emissions and the conserving of resources. For example, by

investing in heat recovery a company would not only improve its bottom line, but also reduce waste, decrease emissions and cut the cost of operations.

In order to meet new demands, Alfa Laval has developed a complete range of compact

yet temperature- and pressure-resistant heat exchangers, such as the gasket-free Alfa Laval Compabloc 120.

Other recent innovations include ultrapure pumps for pharma use, a continuous plate reactor for the production of fine and specialty chemicals and pharmaceuticals as well a module-based separator that can reduce energy consumption by up to 30 percent, depending on application and media (see pages 12–13).

In addition to an extensive portfolio of solutions to meet future demands Alfa Laval has also developed an online energy savings calculation tool. With its help, customers can determine their own potential fuel savings and reduction in CO₂ emissions. The calculation tool can be found on www.alfalaval.com/energy.

Take the opportunity to learn more about Alfa Laval's latest developments at ACHEMA 2009. ■

► Facts

ACHEMA 2009 in short

- Is the 29th international exhibition-congress on chemical engineering, environmental protection and biotechnology
- Takes place in Frankfurt, 11-15 May 2009
- Will draw about 4,000 exhibitors from 50 countries and 180,000 participants from 100 countries.

ALFA LAVAL PRESENTS:

Groundbreaking separator range

– large separators for applications in a number of industries.



Multiple choices – multiple savings



Erika Lindqvist,
project manager.



Johan Bergström,
platform manager.

LIKE A GIANT LEGO construction, the new range of Alfa Laval separators is compiled from a number of building blocks. Designed to meet a wide variety of applications within the dairy, protein, life science, chemistry, brewery, vegetable oil, beverage and biodiesel industries, the new range will replace the company's largest self-cleaning industrial separators.

The new modular design brings numerous benefits to users. "For one, the modular design will make it possible to deliver an application-specific product with a shorter delivery time," says project manager Erika Lindqvist.

It will also become easier for users to upgrade and rebuild equipment, instead of investing in an entirely new separator. Only one block needs to be replaced in order to create a completely new product. This is valuable for companies within, for example, the biodiesel industry – a fairly new industry with changing needs. Now there is also the possibility of rebuilding equipment instead of buying new machines.

The modular design also opens the door to faster technology development, as the set interface between blocks

makes it possible to develop one or a few of the building blocks to create new products with new functions. Improved serviceability is another benefit.

The technical features of the different blocks were determined after comprehensive feasibility studies. "We asked our customers to specify their separation demands," says Johan Bergström, platform manager, Food & Industrial applications, Alfa Laval. "Then we coupled the demands with the blocks to develop enough variations to meet all the different needs."

WHILE ALL BLOCKS show improvements from previous separators, one module – the drive unit – comes in a completely new design. Called eDrive, the unit brings additional reductions in maintenance costs as well as energy savings (see sidebar).

Alfa Laval is also first to make hermetic inlets standard on all separators in this range. These inlets, which are successfully used within the dairy, pharmaceutical and vegetable oil industries, will ensure the users substantial energy savings. For example, by changing from an open to a



By using eDrive, Alfa Laval's new drive unit, companies get a robust system while reducing energy costs.

Customer's voice

“ We needed to increase the production capacity at our biodiesel plant in Brunsbüttel, Germany. It was recommended that we use the Alfa Laval BD 120C separator for the final biodiesel clarification process.

We are very satisfied with the investment, since the BD 120C will not only allow us to increase capacity but also to improve product quality and reduce the need for maintenance compared with our existing machines, saving us both time and money.”

Hans-Jürgen Peters

Plant manager, 3B Biofuels GmbH & Co KG



► The Alfa Laval eDrive

Cost-saving innovation

With eDrive, its new direct-driven separator drive unit, Alfa Laval gives users the opportunity to reduce their operating costs.



Peter Thorwid,
concept manager.

The new unit both reduces energy consumption and improves the robustness of the system. “This is our first large direct-driven separator drive unit,” says Peter Thorwid, concept manager at Alfa Laval and one of the engineers behind the eDrive concept. “Now we have a motor technology that ensures a compact and robust installation. The simplified design makes the machine easier to run and maintain.”

eDrive is a concept patented by Alfa Laval that combines the latest mechanical and electronic features. Its embedded control system ensures optimal energy efficiency, cooling and lubrication, which

translates into less downtime and greater cost-savings for the user. “By working with both mechanics and electronics we can build smarter and better solutions,” says Thorwid. “Thanks to the built-in electronics, the customer can improve the productivity during the life cycle of the equipment simply by upgrading the embedded program.”

In constructing eDrive, Thorwid and colleague Roland Isaksson have teamed up with leading motor-technology developers. “Now we have

“Now we have a motor technology that ensures a compact and robust installation.”

found a technology that we can use for a long time, which is also used by leading companies in other industries,” says Thorwid.

“Energy-efficient and effective products that are easy to adopt for different purposes are the kind of products one needs,” he says. “They are the future.” ■

hermetic inlet, a brewery can lower its energy consumption for the separator by up to 30 percent.

The bottom-fed hermetic inlet also ensures a gentle acceleration of the process liquid up to full bowl speed, which minimizes splitting of shear-sensitive protein particles and/or drop splitting in liquid/liquid applications, thereby maximizing separation performance.

MANY INDUSTRIES COULD benefit from choosing a hermetic outlet as well, which would ensure a completely air-free separation process, eliminating foaming and oxidation of the process liquid. “This could be very beneficial for juice, beer and wine producers, for example,” says Lindqvist.

To date about 15 different combination separators have been launched for applications in the brewery, vegetable oil, beverage and biodiesel industries. By the end of 2009 about 40 products will be available, and by the end of 2010, when the entire range has been launched, nearly 100 different products will be on offer. ■

Read more at:
www.alfalaval.com/here/present/newseparatorrange



Lamberto Baccioni, manager at Alfa Laval (left), and Lapo Baldini, vice president of the Confederazione Italiana Agricoltori, have teamed up to produce the best olive oil possible.



Mixing technology and tradition

In a competitive olive oil market top quality is a sure way to success. The Mondeggi farm in Italy uses advanced milling technology to ensure first-class Tuscan olive oil at the same time that it preserves the historical features of the landscape. Sharing its knowledge with others is a vital part of the farm's strategy.

TEXT: MASSIMO CONDOLO PHOTO: MAURIZIO CAMAGNA

>>>



Laura Lenzi,
director,
Mondeggi
Lappeggi.



LOCATED IN THE HILLS around Florence, Italy, the Mondeggi olive oil farm is just 15 kilometres from Piazza della Signoria and Ponte Vecchio, but the urban landscape of the big city seems light years away. The historical villa that is at the centre of the Mondeggi farm was built in 1538 and is surrounded by olive groves – some 12,000 plants extending over 60 hectares. Vineyards cover an additional 34 hectares.

It's a land well worth preserving.

"At Mondeggi we grow olives, and we produce and sell olive oil, but above all we conserve the typical characteristics of the Florence hills," says Pietro Roselli, councillor for agriculture at the Provincial Administration of Florence, the agency that has owned the farm since 1964. "Preserving the land's typical characteristics goes beyond just preserving native species. We also want to maintain and preserve the features of an historic Tuscan farm, with its villa, farm buildings, oil mill and traditional products."

The Florence province also favours development, experiments and education. For this purpose, the Mondeggi owners decided to set up a mill of their own, instead of using an external mill to crush their olives. When relying on the big external oil mills, Mondeggi, like most farmers in Italy, was forced to book its milling days

months in advance, without knowing how much the olive production would weigh and, more importantly, whether the olives would be properly ripened on that day. Seldom do these circumstances allow farmers to achieve top-quality products.

WHEN MONDEGGI HEARD about the Alfa Laval mill equipment in 2007, the owners jumped at the opportunity. "We got in touch with Alfa Laval," says Roselli, "and they told us they could supply the mill as well as the service and training. So we started a partnership to produce top-quality olive oil and to teach farmers from our province to do the same."

The Mondeggi mill, equipped with Alfa Laval's fully automated module, opened in November 2007, and now the farm can produce its own extra virgin Tuscan olive oil.

The new mill also allows Azienda Agricola Mondeggi Lappeggi, together with Alfa Laval, to strengthen its focus on innovation and training. The Mondeggi mill is used as a pilot demonstration plant for other farmers, who seldom have their own mills. It shows them how top-quality olive oil can be produced at sustainable prices, thanks to a shorter production chain using an in-house oil mill. Mondeggi also provides refresher courses and practical master courses for people in the olive oil industry and training for non-EU citizens working at Italian farms.

"Within a few years, having an olive mill will be indispensable for farms that want to improve their production

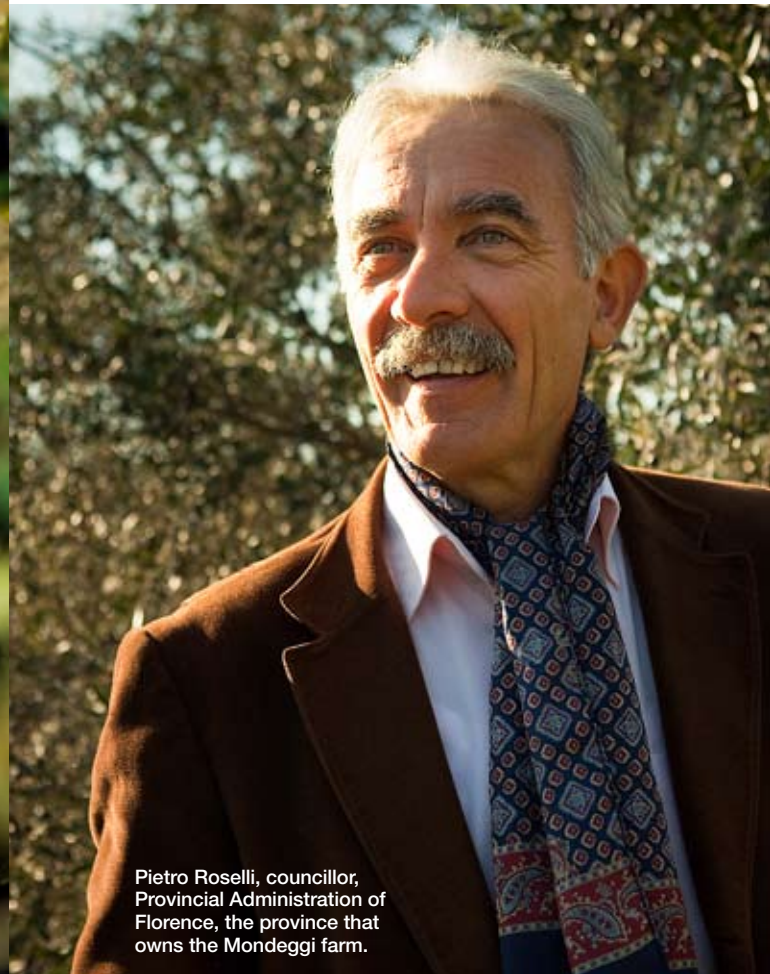
► Facts

MONDEGGI IN SHORT

- Founded in 1964. Donated by the Ascoli family to the Provincial Administration of Florence
- Managed by Azienda Agricola Mondeggi Lappeggi, a limited company owned by Provincial Administration of Florence (99 percent) and Florence Chamber of Commerce (1 percent)
- Located in Bagno a Ripoli, an Italian province in Tuscany that includes Florence
- Employs four people, plus seasonal workers for grape and olive harvesting
- Produces Tuscan extra virgin oil, a blend of Frantoio, Leccino, Moraiolo and Pendolino olive cultivars
- Sold under the brand Azienda Agricola Mondeggi Lappeggi
- Only sold directly at the farm.



Thanks to having its own mill, Mondeggi can make sure the olives are pressed at the optimum point of ripeness and as soon as possible after harvesting, ensuring best-quality results.



Pietro Roselli, councillor, Provincial Administration of Florence, the province that owns the Mondeggi farm.

“We started a partnership with Alfa Laval to produce top-quality olive oil and to teach farmers from our province to do the same.”

PIETRO ROSELLI, councillor for agriculture at the Provincial Administration of Florence

quality,” says Lapo Baldini, a member of the board of directors and vice president of Azienda Agricola Mondeggi Lappeggi. “The olive oil market is growing all around the world, and quality will be essential for gaining new market shares in the future.”

OLIVE OIL SUPPLIES 3 percent of the world’s demand for edible oil, and some 3 million tonnes are sold each year. The majority is intensively farmed, standard-quality oil, for which the market pays about three euros per litre. Operators who want higher profits have to turn to top-quality and authenticated trademark products. “As with wines,” says Baldini, “consumers will learn to recognize the different varieties and to match the right oil with the right food. At the moment, neither consumers nor restaurant owners are ready for this change, but it will happen soon. But not even the producers are ready, which is why we at Mondeggi are thinking about the future.”

The future involves pressing olives to obtain oil with specific characteristics. This means the production of

single-cultivar oils or blends with strict percentages of cultivars. And above all, it means pressing olives only at the optimum point of ripeness – as soon as possible after harvesting, ideally within a few hours. “Otherwise we risk pressing unripe or overripe olives or leaving too much time between harvesting and pressing,” explains Laura Lenzi, director at the Azienda Agricola Mondeggi Lappeggi. “In the latter case, we risk yeasting the olives, which changes the final flavour of the oil.”

The Alfa Laval module also allows for flexibility. By choosing the crushing system or temperature of malaxation, for example, the process can be customized. “As early as the crushing stage, the mill operator can make an important choice,” says Lamberto Baccioni, manager of Alfa Laval’s Olive Oil Business Unit. “A delicate oil can be obtained by using the stoner, whereas a spicy oil can be produced by using the disc crusher, which can also crush the kernel.”

Thanks to the eight sensors placed along the pipes, the pressing temperature can be controlled. This is extremely important for the flavour of the oil as well as for the control

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Annamaria Vignini,
board of directors
of Mondeggi
Lappeggi.

►► www.alfalaval.com/here/oliveoil/mondeggi

>>> necessary to produce the finest-quality olive oils, which can only bear the cold-pressed label if the olives are pressed at no more than 27 °C. Temperature control is also important

► Facts

Olive oil standards

- **Extra-virgin olive oil** and **virgin olive oil** comes from cold (no more than 27 °C) pressing the olives and may not contain refined oil, i.e., oil that has been through a heat and chemical process to remove, for example, bad smells and tastes. To be called "extra," the olive oil must be free of defects in laboratory and taste tests and contain no more than 0.8 percent acidity. Virgin olive oil may have an acidity of up to 2 percent.
- **Olive oil** is a blend of virgin oil and refined oil, of no more than 1.5 percent acidity. It commonly lacks a strong flavour, because refined oil is completely flavourless.

for compensating for the weather conditions. Olives picked on a sunny day are considerably warmer than those harvested on a cloudy day.

"This year [2008] we are producing a high-quality oil, even though the olives are slightly overripe," says Gianluca Benvenuti, the Mondeggi crusher who controls production. "We started the plant last year [2007] and harvested 10,000 kilograms of olives, which was a poor crop. This year we hope to harvest between 40,000 and 50,000 kilograms."

Today there are just over 100 oil plants in the world with the same level of advanced technology as the Mondeggi plant; half of these plants are semiautomatic and half are fully

automated. The fully automated plants, such as the one in Mondeggi, have a touch-screen control panel and a production-flow tracing system. They operate for several hundred hours per year but are designed to work for thousands of hours. "They are very reliable and maintain a good value after use," says Benvenuti. "The reliability of the remote assistance service also helps us prevent downtime during peak periods."

THE MONDEGGI FARM is part of a network of centres of excellence set up by the Tuscany Regional Administration, says Annamaria Vignini, a member of the board of directors of Azienda Agricola Mondeggi Lappeggi. "Our training courses cover a range of activities, from planting and growing olive trees to pruning, crushing, composing blends and product zoning," she says. "This work is informative as well as innovative. Our research results are given to farms throughout the area. Our work has the full support of the Florence Chamber of Commerce, which sets up training courses for professional olive oil tasters and evaluators. Plus its analysis laboratory assesses our products."

Mondeggi also cooperates with regional agencies such as Arsia (the Regional Agency for Development and Innovation in Agriculture), which finances the company's projects via Artea (the Regional Agency for Agricultural Grants). In addition, the farm works with universities in Tuscany (in particular Florence University) and elsewhere in Italy and throughout the world. "Foreign universities show great interest in our research about improving quality/costs ratio in olive oil production," says Vignini.

All in all, she adds, "the result of our work will be a more well-developed oil culture, and future customers will be more aware of differences between brands and quality." ■

► The Alfa Laval MM353-X3 module

Automated perfection

– Every step counts when olives are turned into oil

The Alfa Laval MM353-X3 module installed at the Mondeggi farm is completely automatic. The olives pass from the hopper at the beginning of the line to an exhaust fan that removes the inevitable leaves, twigs and sticks. From there they are washed with water recycled from the washing machine itself, after which a screw conveyor takes them to the crusher. This section permits the use of either a disc crusher or a stoner. With the stoner, kernels are separated off and used as fuel to heat the plant's processing water or sold externally.

The olive paste exiting the crusher is pumped into jacketed malaxers, in which the paste is agitated to release the oil from the fruit particles using heat from an air

cavity entirely surrounding the machines.

The next step is the decanter, where oil, water and husk (olive residue) are separated. The decanter can be set to work with a three- or two-step cycle. It can process just the olive paste, or processing water can be added to the paste. Water influences the characteristics of the oil and increases the production capacity. The oil is then treated in a centrifugal separator where the remaining water is separated off to finalize the olive oil. "Using a

"If a two-step cycle is used, the water savings is up to 90 percent."

three-step ARA decanting cycle, an Alfa Laval exclusive solution, we save 66 percent of processing water compared to a traditional oil mill," says Laura Lenzi, director at the Azienda Agricola Mondeggi Lappeggi. "If a two-step cycle is used, the water savings is up to 90 percent."

At Mondeggi, both vegetal water and husk are collected and used as agricultural fertilizer.

Alfa Laval technicians continuously monitor the plant to ensure that it always operates correctly and maintains product excellence. Alfa Laval also uses the Mondeggi plant to show its customers how top-quality oil is produced and to provide expert training for staff from farms that have bought similar machinery. ■



Olives pass through the Alfa Laval crusher at the Mondeggi mill.



Emissions cut in half

For the first time, the Alfa Laval Packinox heat exchangers will be used in an integrated gasification combined cycle (IGCC) plant, to clean synthetic fuel gas made from coal before combustion. The installation is at a US power plant, and the cleaned gas will be used in a gas turbine for power generation.

In combustion of fossil fuels sulphur dioxide (SO₂) is produced. When it reaches the atmosphere it reacts with water and eventually becomes acid rain. In an IGCC process the sulphur is removed before combustion, thereby minimizing the environmental problem. In fact, compared with the latest conventional "clean coal" technology, the IGCC process has significantly less impact on the environment, with a 50 percent reduction in SO₂ emissions.

The US Packinox order is worth SEK 95 million. ■

Powerful orders



Alfa Laval continues to supply equipment to power plants all over the world.

In 2009, for example, Alfa Laval will deliver crude oil treatment equipment to the Rabigh power plant in Saudi Arabia. The order is worth SEK 70 million and includes separators and plate heat exchangers for cleaning crude oil and oily water.

In 2010, a power plant in the booming Chinese power market will install Alfa Laval plate heat exchangers. The plate heat exchangers will use seawater in the cooling process at the plant.

The order value is SEK 50 million. ■

Yoga guru starts healthy business

Yoga guru Baba Ramdev has become a national icon in India. His televised endeavour to take 1 billion people on a health trip through yoga and healthy food habits is beamed into millions of Indian homes each morning. His promise of a stress-free, disease-free life through yoga practice and Ayurveda (a system of traditional Indian medicine) has given him a following that matches those of the country's Bollywood and cricket superstars.

Through his Divya Yoga Mandir Trust, Ramdev has established a centre for Ayurveda and yoga that includes facilities for treatment, research and a teaching university. Online, the trust sells herbal products, books, DVDs and more to an international client base.

Now Ramdev is expanding his horizons and entering the business of consumer products. In May 2009, the Divya Yoga Mandir Trust will open the world's largest juice and puree production plant. Located in Haridwar, outside New Delhi, it's set to produce 200 tonnes of healthy, high-antioxidant

fruit and vegetable juices and purees daily.

Alfa Laval has supplied and installed the complete multi-fruit and vegetable processing line for the plant. It is the biggest multi-processing line supplied by Alfa Laval so far, designed to handle hourly loads of 20 tonnes of aloe vera, amla (Indian gooseberry), bottle gourd, bitter gourd and carrot, 10 tonnes of apple and mango and four cubic metres of baby wheatgrass. Aloe vera will be produced all year round, while the other raw materials will vary with season.

"Processing as much as 20 tonnes of aloe vera per hour has never been done before," says Amy Geng, regional sales manager for Beverage & Viscous Food at Alfa Laval in Asia and Oceania who helped design the plant. "The largest production has previously been in Thailand, where they process about four to five tonnes per hour. Our new processing line in India will handle four times as much."

The juices and purees will be sold under the "Patanjali" brand. ■

Protecting the trees of Peru

About 40,000 hectares of rainforest in Peru are about to be certified by the Forest Stewardship Council (FSC), thanks to a financial contribution from Alfa Laval. FSC is a non-profit organization that certifies forests and guarantees that they are handled with social, economic and ecological responsibility.

The forest in question is located near Iquitos, in the Amazon, and its owner, Fecomazan, a family-owned forest enterprise, will now be able to finance the certification process and apply new working principles to its forest management.

Timber marked with the FSC trademark is guaranteed to have been selectively cut; old trees are cut down to give the young ones more space to grow, thereby leaving a healthy and well-kept forest for future generations.

The cooperation between Alfa Laval and FSC was initiated in connection with Alfa Laval's 125th anniversary in 2008, with the aim of protecting forests in Borneo and the Amazon. With help from Alfa Laval, individual forest owners will be able to FSC certify their forests.

Alfa Laval is currently in the process of selecting the next forest project, in Borneo. ■



The race for competence

Massive retirement is one of the greatest challenges ahead for industrial companies worldwide. It's critical that they act now, despite the ongoing financial crisis, to retain the invaluable knowledge of the ageing workforce.

TEXT: CAROLINA JOHANSSON ILLUSTRATION: ROBERT HILMERSSON

IN A TIME WHEN skyrocketing unemployment rates make the headlines, not many feel the urge to plan for future labour shortages. Nevertheless, managing and retaining knowledge could become one of the big challenges facing companies in the near future. Companies that address this challenge early on and are flexible will gain a real advantage.

"We are already seeing signs of labour shortages in countries like Japan, for example," says Bo Edvardsson, professor at the Service Research Centre at Karlstad University in Sweden. "In Europe, there is no labour shortage per se, but some companies are having problems attracting the right competence. Even those that are laying off people may have difficulties recruiting in other areas of the business."

Competition for labour can take many forms. China, for example, has built a strong domestic automotive industry by actively recruiting engineers from Western companies. This may leave Western companies drained, but many experts expect that competition for knowledge will stiffen in coming decades as the baby boomers (people born during the post-World War II baby boom, 1946–1964) move into retirement.

In the US, projections by the Census Bureau indicate that one-fifth of the workforce will be over age 55 by 2015. In the EU, Eurostat projections forecast that every third member of the union will be age 65 and over by 2050. This demographic shift puts huge pressure on governments and policymakers but will also directly affect industry.

"Few companies are taking serious steps today to address the threat of critical knowledge loss due to an ageing workforce," says David DeLong, researcher at the Massachusetts Institute of Technology AgeLab. "Leaders should be taking

action now if they want to minimize the serious impacts on performance they will experience in the years ahead."

While all industrial sectors are likely to be affected, those hardest hit will be industries where employees have long tenure and where experiential knowledge remains valuable over time. Electrical utilities, manufacturing, aerospace and defence contractors, health care, oil and gas, and government are the sectors that will be hurt the most by the knowledge drain. "Many employees in these sectors have spent their entire careers with the same organization," says DeLong. "They have accumulated tremendous know-how about complex systems, products and processes that will just disappear when they retire."

Thomas Möller, Parts & Service segment marketing manager at Alfa Laval, says manufacturers are already starting to feel the lack of knowledge. "There are studies showing that up to 80 percent of unplanned stops are self-inflicted," he says. "Manufacturers have problems with high staff turnover and more and more complex products, making it harder to build and keep the knowledge about a process. Competition for the best staff has started to increase already."

ANOTHER ASPECT of the knowledge crunch, says Edvardsson, is the transformation in the Western economies of traditional manufacturing industries from product-oriented to service-oriented businesses. Manufacturing companies today are not just selling a product, they are increasingly relying on service facility management and maintenance for revenue. This shift places higher demands on labour flexibility, says Edvardsson. "Many more employees will have customer contact, for example, which requires new



Bo Edvardsson,
professor,
Service Research
Centre.



David DeLong,
researcher,
Massachusetts
Institute of
Technology.



►► www.alfalaval.com/here/service/competence

competence,” he says. “The companies that succeed in securing this competence will be very successful in the future.”

To prepare for the coming knowledge crunch, companies and organizations should actively seek ways to secure the knowledge they have, either by documenting it or by allowing older workers to transfer it to younger ones. In the United States, says DeLong, some companies have appointed special “chief knowledge officers” with the

task of presenting a strategy for avoiding a crunch.

At the same time, developments within technology and IT are changing the way manufacturing is done. It takes fewer people to operate a manufacturing plant today, at least in the industrialized world, than it did 20 years ago.

“This means companies will be even more dependent on their staff in the future,” says Möller. “The importance of competence development, basically doing things smarter and better, will increase.” ■

► Alfa Laval's training and automated solutions

Technical assistance to rely on

When qualified service and maintenance staff comes in short supply, assistance from companies such as Alfa Laval gains importance for the industry.

“We have increased our service and maintenance staff significantly,” says Thomas Möller, Parts & Service segment marketing manager at Alfa Laval. “We have also opened more local and regional service centres around the world to make it easier for companies to get efficient service.”

The demand for education is also rising, which is why Alfa Laval has increased its number of customer

education events. “We teach operators and maintenance staff how the equipment works, how to perform the maintenance at the right time – and also how to secure the full capacity of the equipment and production processes,” says Möller.

Alfa Laval is also at the forefront when it comes to developing new automated technologies that simplify and optimize processes and thereby further reduce companies’ reliance on certain personnel. “Automation is one way to ensure oneself against loss of staff and also a way to improve productivity,” says Peter Blomberg, automation manager,

“We teach operators and maintenance staff how the equipment works and how to secure the full capacity of the equipment and production processes.”

Core Automation Team, at Alfa Laval.

Alfa Laval has different automated techniques that are used across the company’s products and industrial sectors. One example is the Alfa Laval Cosmos condition monitoring technique, which signals when ball bearings on separators or decanters



Thomas Möller, Alfa Laval.

are wearing out and need to be replaced “We also do what we call ‘predictive maintenance,’ where we download data from a customers’ machine on a regular basis and analyze it,” says Blomberg. “That way we can recommend when service is needed or when parts are starting to wear out, to avoid unnecessary downtime.” ■

ECO SOLUTION WINS THE DAY



A successful team. Alfa Laval's Moses Modibela (left) with AEL's Alan Pikor (middle) and Dave Hill (right) from Ardeer Engineering.



Ammonium nitrate in AEL's large storage hall; the company produces 280,000 tonnes per year.



The polluted white steam rising from the stacks at AEL's ammonium nitrate plant outside of Johannesburg was causing problems with the community and, potentially, the authorities. A quick solution was needed. What the company got not only solved the problem but also resulted in substantial savings.

TEXT & PHOTO: **TOBY SELANDER**

BACK IN 1896, at the start of South African gold rush, Paul Kruger, the country's legendary president, looked at the gold mining industry and realized that what South Africa needed was its own dynamite factory. Recognizing the dangers of such an industry, he ordered a horseman to find a suitable location, a day's ride from the Johannesburg city centre. Today the memory of Kruger's dynamite factory is still alive in the African Explosives Limited (AEL) plant situated in Modderfontein, east of the Johannesburg city centre.

But the problem is that site, while perhaps still a day's ride from the centre, is not as far away from the city's inhabitants as it used to be. Residential houses have been creeping closer and closer to the AEL plant. And the plant has grown. In the 1990s the Modderfontein factory was recognized as the largest producer of explosives in the world, with a production of 6 million detonators a week.

Ultimately the proximity of the plant to the community began to cause problems. And core among these problems was the white steam from the plant's stacks. Relatively large quantities of ammonia – and more than the government-

allowed 30 tonnes a month – were being discharged with the steam, polluting the air and contributing to over-fertilization.

"The steam from the stacks quickly gets diluted with air, so in fact when it reached the people in the community it didn't exceed limits set by the government on what a human can be exposed to," says Alan Pikor, Technical Services manager at AEL. "But, with the environmental aspects in mind, we had to act."

He and Dave Hill, a project engineer from Ardeer Engineering, realized that an active authority could easily have closed the plant. And the chain reaction would have been very serious, not only for AEL but for the entire country. AEL produces 280,000 tonnes of ammonium nitrate a year, which is

► Facts

ABOUT AFRICAN EXPLOSIVES LTD

- Produces and sells explosives in different forms and also provides "total blasting solutions" to the mining industry, supplying products, services and blasting expertise
- Number of employees: 2,500
- Turnover: 2,699 million rand (203 million euros) in 2007
- Is owned by AECI, listed on the Johannesburg Stock Exchange. The Tiso Group, a black empowerment company, in 2004 acquired 25.1 percent of the shares in AECI.

>>>

New use for existing products

The solution used at AEL is actually built of well-known products used in a totally new application. For Alfa Laval it was just a matter of modifying the existing plate evaporator AlfaVap and plate condenser AlfaCond and using them in a smart new way. Although the AlfaVap had never before been used for absorbing and neutralizing ammonia, it proved to work very well for this application.

The AlfaVap was originally constructed to concentrate sugar juice, but over the years more applications have been added, such as concentrating fruit juices, sweeteners, stillage and sodium hydroxide.

"The entire operation costs us nothing, apart from electricity supplied to some vacuum and other pumps."

Together, AEL technical services manager Alan Pikor, Ardeer project engineer Dave Hill and project manager Dave Russell worked on the solution. This is how it works:

Each hour, 17 tonnes of polluted steam containing 300 kilograms of ammonia (NH₃) is channelled into the AlfaVap. In the inlet of the AlfaVap the steam is first mixed with a weak nitric acid solution (HNO₃). Flowing down the hot channel of the AlfaVap the steam condenses and the ammonia is absorbed in the condensate, where it gets neutralized by the nitric acid.

The chemical reaction results

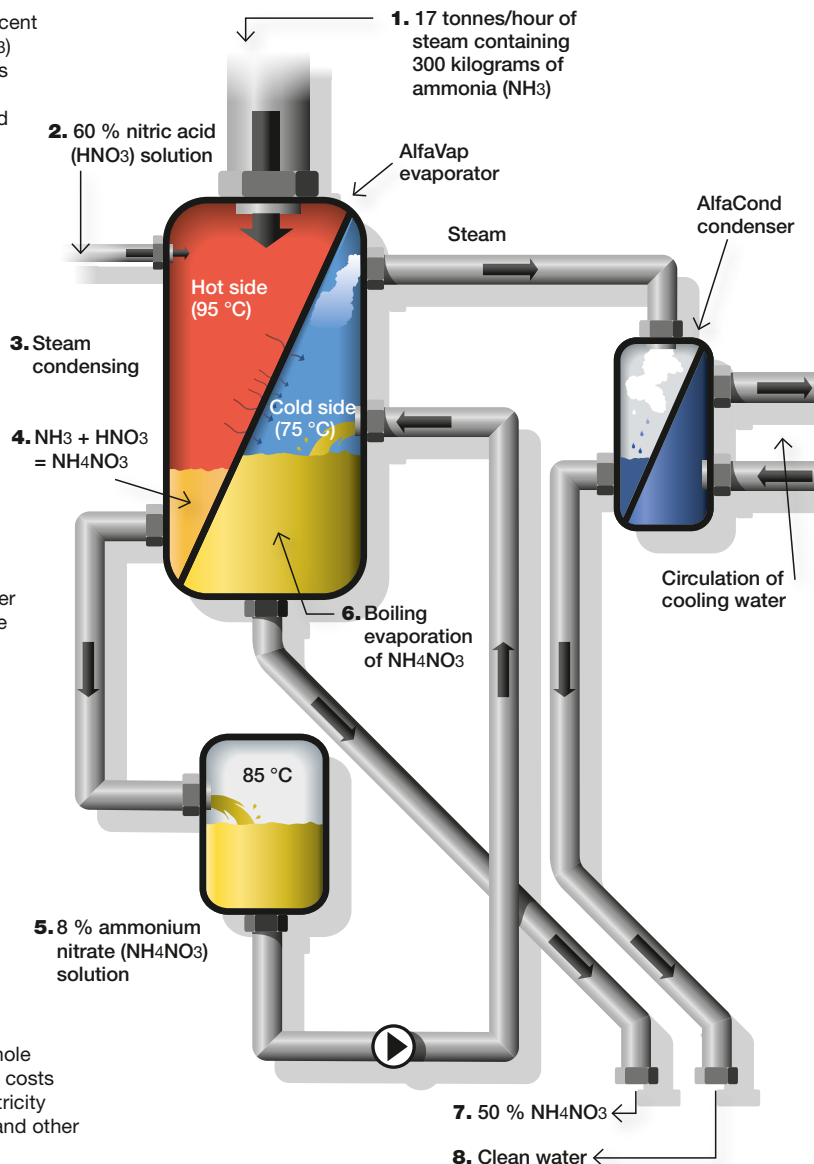
in the formation of an 8 percent ammonium nitrate (NH₄NO₃) solution. This solution drops down in a tank below the AlfaVap and is then pumped to the "cold" side of the AlfaVap. On this side the 8 percent solution is boiled down to a concentration of 50 percent, using the energy released from the condensing steam on the "hot" side.

Exiting from the AlfaVap is a solution of 50 percent ammonium nitrate plus 75 °C water vapour.

The water vapour is sucked into the AlfaCond, where it is condensed and cooled down to 40 °C. The clean water produced is later used as cooling water in the plant.

"The good thing is that the 50 percent concentrate can be sold either as fertilizer or to dilute the 93 percent ammonium nitrate solution produced by the ANS plants to 89 percent for safe road transport purposes," says Pikor.

What is unique about the system is that the polluted steam is transformed into ammonium nitrate solution product and clean water, and the energy available in the 95 °C steam powers the whole plant. "The entire operation costs us nothing, apart from electricity supplied to some vacuum and other pumps," says Pikor. ■



>>> approximately 60 percent of all ammonium nitrate used for explosives in South Africa. AEL is also a major supplier for the mining industry in the rest of Africa. If the Modderfontein plant had to shut down, the economic impact on the region would be considerable, resulting in many lost jobs.

The AEL team started to think about how to produce clean steam. Pikor understood that it would be possible to separate the ammonia from the steam, but the volumes would be enormous, as would the costs associated with such a project.

Pikor remembered reading an article in Alfa Laval's *here* magazine about desalination in the Middle East. "I thought 'let's see if it could work for us,'" he says. "I had met Moses Modibela of Alfa Laval and decided to get hold of him."

The rest is history. Modibela called his colleague Tomas

Kovacs, marketing manager for Evaporation & Condensation at Alfa Laval's Process Technology Division, who was boarding a flight in China on his way back to Sweden. During the flight Kovacs made pen-and-paper drawings of possible solutions, and on arrival he scanned and emailed the drawings to Pikor. The Alfa Laval system installed at AEL today is the same as in the original drawings, apart from a few small alterations and some added equipment.

WHEN IN FULL use in April 2009, the solution will decrease AEL's ammonia emissions dramatically. "We believe that once the system is up and running, the amount of polluting ammonia per month will not only be below the authorities' limit of 30 tonnes per month, but the system will let through only, in total, some 10 kilograms of ammonia per year," says Pikor.



The Alfa Laval equipment installed at the AEL plant.



Alan Pikor, Technical Services manager at AEL.

►► www.alfalaval.com/here/cleantech/ael

“We believe that once the system is up and running, it will let through only, in total, some 10 kilograms of ammonia per year.”

ALAN PIKOR, Technical Services manager at AEL

And the solution will pay for itself. The process needs hardly any external energy to work, as it uses the process heat energy in the steam from the stacks. The best part, however, is that the former ammonia pollution can now be converted into ammonium nitrate, thereby saving the purchase of an additional 100 tonnes of ammonia per month.

And finally, with the steam and the emissions from the stacks gone and the concentration of ammonia in the air around the plant far below the 1.5 ppm that a human can smell, the people living nearby will not have to see the emission or smell the ammonia.

IT WAS NOT a difficult task to convince the AEL board to give the go-ahead for the necessary 27 million rand (2 million euros) investment, considering that the solution

solves an environmental problem at the same time that it makes money, and without using any external energy. “We believe we can have the costs paid off in 19 months,” says Pikor.

He and Hill remember when they first tested the new set-up. When the vacuum pump started, the steam began to puff out from the stack, but after 20 minutes the puffing stopped and the stack was clear of all steam, while the plant was operating at 100 percent.

“There were actually people from the neighbourhood who called us and asked what happened when the emissions disappeared,” Pikor recalls. ■

► Facts

AMMONIUM NITRATE

An ammonium nitrate (NH_4NO_3) solution is formed by a chemical reaction between ammonia and nitric acid. It is the most common component in explosives for the mining industry and is often used in a granular form, mixed with an emulsion or fuel oil.

The ammonium nitrate used for explosives is chemically the same as that used as a fertilizer, but its consistency is more porous.



Wine science

The craft of winemaking dates back thousands of years. Now scientists at the French National Institute for Agricultural Research are successfully challenging traditional methods and introducing modern technology.

TEXT: ANNA MCQUEEN PHOTO: ALASTAIR MILLER

OVER THE PAST FEW DECADES, technology has become increasingly important as wineries worldwide look to improve quality and to make production processes more efficient. Gone is the barefoot stomping of grapes, replaced by machines such as crushers, agitators and decanters. In the Languedoc region of southern France, the Pech Rouge Experimental Unit of the National Institute for Agricultural Research (INRA) works to challenge traditional winemaking habits by testing new technology and processes.

While new technology can often improve the winemaking process, there is no once-size-fits-all process or technology. "Wine is unique, and it varies from varietal to varietal,

from *terroir* to *terroir* and from vintage to vintage," explains Jean-Louis Escudier, director of INRA Pech Rouge. "So all we can do is to evaluate what the possibilities are and what can be achieved with any particular tool."

And this is exactly what the Pech Rouge unit is doing. Together with industrial partners it evaluates how new processes can improve winemaking and creates product-development strategies.

One of INRA's patented processes for producing red wine is called Flash Release. It was established about 10 years ago as an alternative to traditional pre-fermentation maceration in which the tannins, colouring agents and flavour compounds are leached from the grape skins and pips into the must. This traditional process can take up to two



Alain Samson, engineer at INRA Pech Rouge.

►► www.alfalaval.com/here/wine/inra

► Facts

INRA IN SHORT

- The Pech Rouge Experimental Unit of the National Institute for Agricultural Research (INRA) is the only state-funded research unit dedicated to research and technology transfer in viticulture and oenology in France.
- The Pech Rouge site is also home to La Cité de la Vigne et du Vin, a cultural education centre open to the public where people can learn all about vines and wine as well as wine-tasting. They can also stock up in the centre's wine boutique.
- INRA is in a unique position in that it is able to carry out highly controlled experiments that can compare differences along the entire life cycle of a wine, from vine to bottle.

weeks. Flash Release involves heating the grapes to 70–95 °C in minutes, then chilling them instantly in a vacuum. This breaks down the fruit's cell walls, improving the release of phenolic compounds by some 50 percent. These elements influence the wine's taste, colour and mouthfeel.

Many wineries already extract through heating, but INRA has found that with Flash Release it's the speed at which the grapes are chilled that gives the exceptional results. Flash Release is being used successfully by many wineries in France and has been exported to other countries, including Australia.

Following Flash Release, the juice can be vinified traditionally on the skins, producing tannic, structured wines with good keeping potential. But lately, INRA has been looking at fermenting the must alone without the skins, thus removing the need to press it. This way there is >>>



Jean-Louis Escudier, director of the INRA Pech-Rouge unit in southern France that aims to bring about a technology conversion in viticulture (the science of vine growing and grape harvesting) and oenology (the science of wine and winemaking).

“Not only could the use of such a system streamline production, but it could also remove the need to use environmentally unfriendly additives.”

JEAN-LOUIS ESCUDIER, *director of INRA Pech Rouge*

>>> no secondary extraction, and the wines are lighter, fruitier and more contemporary.

“The resulting wines were so fruity and mellow, in line with current drinking trends, that we started looking at using a decanter to both extract and clarify the must instead of a traditional press, to see if that brought any further benefits,” says Escudier. To do this INRA teamed up with Alfa Laval, with whom it had successfully cooperated before, to introduce a Foodec decanter into the equation.

For the research, the juice, skins and pips go into an agitator after Flash Release to gently create a homogenous

liquid. This then goes through the decanter to separate the clarified juice from the pips and skins, removing the need for both pressing and clarification.

INITIAL TESTING shows promising results. Using the decanter, it seems possible to produce at least the same quality wine in a much faster and more streamlined way.

Alain Samson, engineer at INRA, says the researchers have been comparing extraction and clarification using the decanter to using traditional processes. “We’re also comparing the results with musts from our own Syrah and Grenache grapes with musts from Merlot and

Cabernet Franc grapes from two large cooperatives in the region,” he adds, “so there are a lot of variables.”

The wines are fermented identically in individual temperature-controlled vats. A battery of tests is then performed to compare results before the wines are tasted by INRA’s tasting panel. “Preliminary sensory evaluation has revealed wines comparable to those produced using existing extraction and clarification methods, which is very good news indeed,” Samson says.

IF THE FINAL RESULTS are as positive as the preliminary findings suggest, the potential advantages to wineries will be significant. “Not only could the use of such a system streamline production, saving the wineries both time and money,” says Samson, “but it could also remove from the process the need to use environmentally unfriendly additives.” These additives include perlite, kieselerde and gelatine, which are commonly used in traditional clarification methods. Removing them from the process also means removing the disposal costs of them after the process.

Further economic gains can be made, as the decanter can also be used for other processes, such as clarifying lees and removing sediments.

“The process is suited to bigger wineries with larger infrastructure budgets,” explains Samson. “Certain handcrafted wines would gain nothing from adopting such a process, but for high-output wineries and cooperatives, this could really streamline things without compromising on quality.” ■

Alfa Laval’s Luc De Vlieger (right) talks to Alain Samson, engineer at INRA Pech Rouge.



► The Alfa Laval Foodec decanters

Value-adding technology

– Best-quality wine at a lower cost

For its ongoing joint research project with Alfa Laval, France’s National Institute for Agricultural Research (INRA) is using a ContiJuice test module that includes a buffer tank, an agitator and an Alfa Laval Foodec decanter to separate and clarify grape juice from the pips and skins instead of traditional pressing and clarification methods.

INRA began looking into the benefits of incorporating a Foodec decanter into its Flash Release process in 2006, and in late 2008 it signed a three-year contract with Alfa Laval to

fully evaluate the potential of the process.

Alfa Laval is very optimistic about the outcome. “If the research continues to show positive results, adding the Foodec decanter could bring significant benefits to wineries, saving them an estimated 20 to 25 percent of their production costs,” says Luc De Vlieger, Wine, Coffee and Tea business manager at Alfa Laval Brussels. “For us it will be valuable to have a third and neutral party testifying to these benefits.”

Alfa Laval has been supplying a range of Foodec decanters to the

“If the research continues to show positive results, adding the decanter could bring significant benefits to wineries.”

wine industry for several years and has installed bases in Germany, France, Spain, Argentina and the United States. The smaller Foodec 200 and 300 models are used mainly for juice recovery in settling tanks and lees thickening in fermentation tanks. The larger Foodec 500 and 700 machines are



INRA is studying how the Alfa Laval Foodec decanter can further improve the winemaking process.

used for grape juice extraction and run 35,000–70,000 hectolitres per season per Foodec decanter. ■



Airport goes green

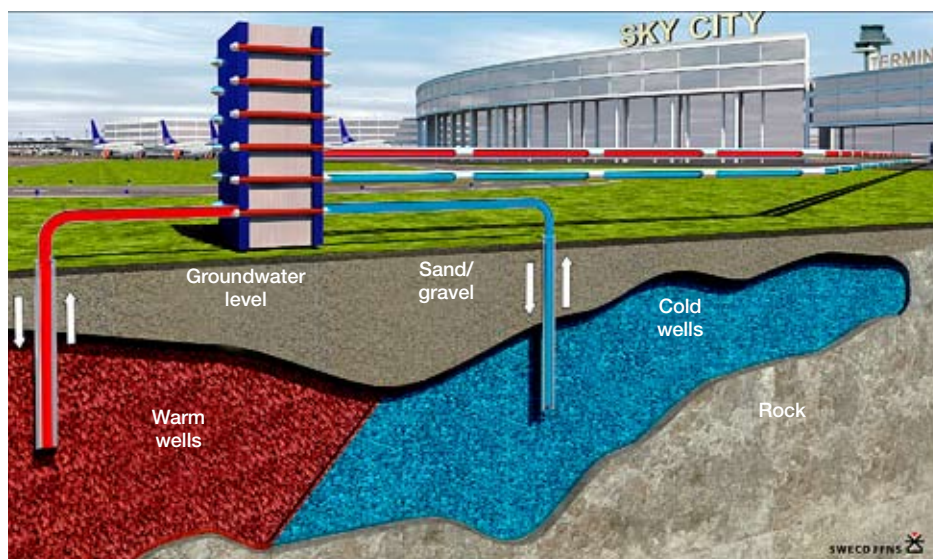
– A newly built aquifer will cut Stockholm Arlanda's CO₂ emissions

To further reduce its CO₂ emissions, Arlanda Airport in Stockholm is building the world's largest storage for energy to provide the airport with heating in the winter and cooling in the summer.

Arlanda is using an aquifer, a geological formation that stores groundwater, to create a large underground container that functions much like a thermos. In summer, cold water is being pumped through plate heat exchangers connected to Arlanda's cooling system. The heated return water is then pumped back underground to be used in the winter, melting snow on aircraft parking spaces and preheating ventilation air.

In the past five years alone, Arlanda has invested 200 million kronor (19 million euros) in different environment-related projects and has halved its CO₂ emissions. The new system will decrease the airport's annual CO₂ emissions by thousands of tonnes. It also saves the airport 19 gigawatt hours of energy per year, which corresponds to an annual energy consumption of a 1,000 houses.

Alfa Laval has delivered the plate heat exchangers to the aquifer system – two Alfa Laval TL35B units and an Alfa Laval T20B. The system was designed by Sweco and installed by Malmberg. ■



Beneath Arlanda there is a 3-million-cubic-metre aquifer – a geological formation that stores groundwater. By storing the energy from the hot water in the ground, the system will be the world's largest storage place for energy. Above is a simplified drawing of the system.



Alfa Laval technology prevents legionella bacteria from spreading through warm tap water.

►► www.alfalaval.com/here/legionella

Clever technology defeats disease

Fighting the potentially fatal legionella bacterium is becoming increasingly important as more and more people gain access to heated tap water world-wide. Alfa Laval's AquaProtect system was recently chosen by the European Parliament to prevent any outbreaks of Legionnaires' disease.

TEXT: CARL ANDERSSON GRAPHICS: TOMAS ÖHRLING

NOBODY REALLY KNEW what happened. In July 1976, 34 people died suddenly after staying at a hotel in Philadelphia in the United States. They had all fallen ill with a mysterious form of pneumonia, and they were all members of the American Legion, a US military veterans association.

The disease was dubbed Legionnaires' disease, or in medical parlance, Legionellosis, and in early 1977, when the bacterium that caused it was identified, it was given the name *Legionella pneumophila*. The Philadelphia outbreak was the first known outbreak of the disease. The legionella bacterium was found to be breeding in the cooling tower of the hotel's air conditioning system, which then spread it through the entire building.

Researchers eventually determined that the bacteria are commonly found in nature, wherever there is warm stagnant water. They will grow in water at temperatures

of 20 °C to 50 °C, with the optimal temperature being around 35 °C.

People become infected with the legionella bacteria after inhaling tiny droplets (aerosols) of contaminated water. The bacteria penetrate the lungs and invade the body's white blood cells.

The people who fall ill from the bacteria are typically middle aged or older. People who smoke or have chronic lung disease or an impaired immune system are most susceptible. For people who contract the disease, the mortality rate is high: Between 5 and 40 percent of those affected succumb to the illness.

"THE NUMBER OF LEGIONELLA infections has shown a steady rise, particularly over the past five years, partly due to improved detection and diagnosis," says Tom Makin,

director manager of the Department of Medical Microbiology at the Royal Liverpool University Hospitals in the UK. "It is also believed to be due to increased heat retention in buildings and improved energy conservation measures."

John Dobson, managing director of Legionella Control International in the UK, says the highest rates of infection are normally seen in southern Europe. "This is probably because cold water entering buildings will be subjected to higher ambient temperatures, which can support the growth of legionella bacteria and result in large outbreaks."

Because legionella bacteria are temperature sensitive, they can be killed at 70 °C. This fact is the basis for the Alfa Laval AquaProtect system.

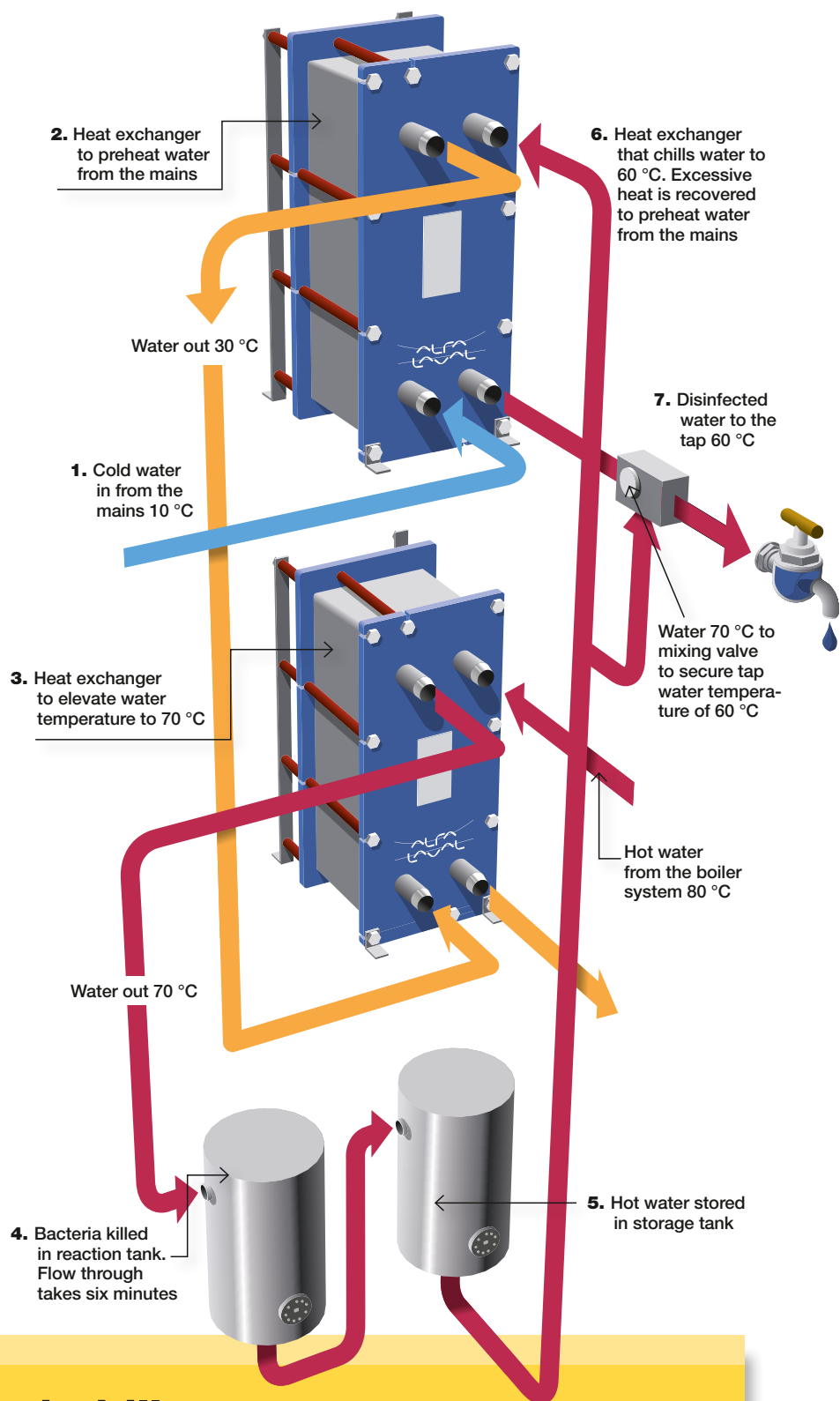
"Our thermal treatment solution for killing the legionella bacteria avoids the need for having chemicals in the tap water, which otherwise could be influencing the composition of the water," explains Thomas Juul, Product Centre manager, Market Unit Comfort, Alfa Laval.

THE EUROPEAN PARLIAMENT in Brussels is one of those that have chosen Alfa Laval's chemical-free solution to keep legionella at bay.

Previously, the parliament had a solution where the temperature in the water storage tanks and the distribution pipes had to be manually increased to about 80 °C to kill the bacteria. This system was unreliable and required lots of energy to run. The parliament initiated a search for a system that better fulfilled its needs. "The best match appeared to be the Alfa Laval AquaProtect system," says Jean-Pierre Pamart, facility manager of the European Parliament.

In 2008, contractor firm CETECAL installed three AquaProtect systems in the parliament building. "We are very satisfied with the systems," says Pamart. "They have shown that they are reliable and that the thermal shock [the thermal treatment of the water] works perfectly."

He underlines two great benefits, "First of all, the automatic thermal shock: We no longer have to do this manually, which saves us a lot of time," he says. "Secondly, we can now save a lot of energy, because there is no longer any waste heat." ■



► The Alfa Laval AquaProtect system

Energy-efficient bacteria killer

The three Alfa Laval AquaProtect systems installed in the European Parliament building are semi-instantaneous water-heating systems, designed for conditions where hot water requirements are not constant.

Cold water entering the hot water system is heated to 70 °C in a heat exchanger. This water then flows through a reaction tank, which is designed so that the water takes six minutes to flow through it – the time it takes to kill the legionella bacterium.

"The heat recovery ensures there is no waste of thermal energy."

From the reaction tank, the water flows to a storage tank. When hot water is drawn off in the system, the 70 °C hot water is taken from the storage tank. On its way to the tap it goes through the initial heat exchanger once more

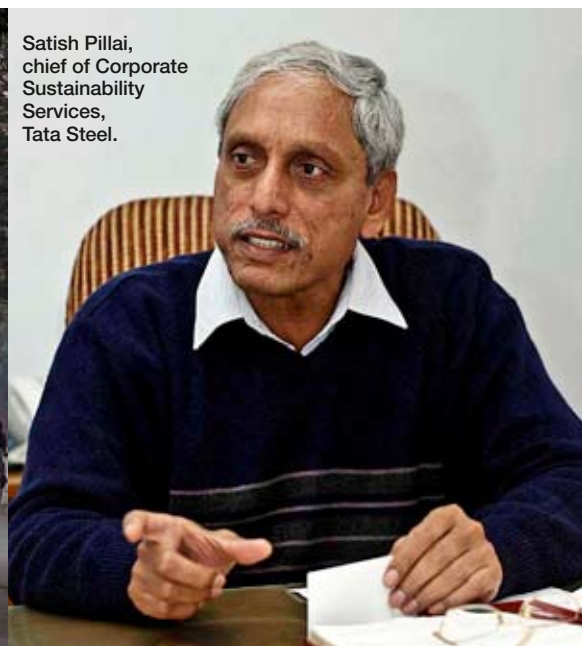
to be chilled to the appropriate system temperature of 60 °C. As extra quality insurance, 70 °C water can be added to the tap water to secure a final temperature of 60 °C, completely free of legionella bacteria.

The AquaProtect system also maximizes heat recovery. When the 70 °C water is chilled to 60 °C during the final step of the process, the excess heat is used to heat the incoming cold water.

"The heat recovery ensures there

is no waste of thermal energy," says Thomas Juul, Product Centre manager, Market Unit Comfort, Alfa Laval.

Compared with other semi-instantaneous systems operating at lower temperatures, the Alfa Laval AquaProtect system requires no extra energy to increase the water temperature to 70 °C or to drive the charging pump. "With our system you get Legionella protection without increasing energy costs," says Juul. ■



Satish Pillai,
chief of Corporate
Sustainability
Services,
Tata Steel.

SOCIAL PIONEERS

With its ideas of social responsibility, India's Tata Steel revolutionized the industry a century ago. Today the company runs its own city and at the same time maintains its place among the top 500 corporations in the world.

TEXT & PHOTO: **SIMON DE TREY-WHITE**

WITH SOME 80,000 employees, Tata Steel is today the world's sixth-largest steel company and the flagship company in India's largest corporation, Tata Group. In 2008 it even entered *Fortune* magazine's prestigious Fortune Global 500 – the list of the top 500 companies in the world. Tata Steel's steel plant at Jamshedpur, in eastern India, produces hot and cold rolled coils and sheets, galvanized sheets, tubes, structurals, wire rods, construction rebar and bearings.

From the start the company has been extraordinarily committed to social responsibility. When it established its steel plant a century ago it also founded Jamshedpur city, purpose-built to house the workers for the plant. The city

has been maintained by Tata Steel ever since. Indeed it's the only city in India without a municipality, since Tata Steel provides power distribution, public health care, planning engineering and construction plus water and wastewater services. Policing is left to the state authorities.

The rare combination of plentiful water, ample local iron, coal and limestone and a railway link was what in 1907 convinced Tata Steel founder Jamsetji Nusserwanji Tata that he'd found the ideal location for his steel plant, amid the forested Dalma hills of eastern India's Jharkhand state. Today, despite its industrial nature, Jamshedpur has retained the natural charms of the site.

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The main entrance gate to the Tata Steel main plant. Visitors are welcomed by a statue of Jamsetji Nusserwanji Tata, the founder of Tata Group and considered one of the greatest industrial visionaries of all time.



TATA STEEL



“Many fundamental rights were first applied by Tata Steel – the eight-hour day, paid leave, parental leave and public consultations.”

SATISH PILLAI, *chief of Corporate Sustainability Services at Tata Steel*

>>> Named in honour of its founder, Jamshedpur was born in the mind of J N Tata long before the first stake was driven in 1908. Tata had planned it down to the last detail years earlier. Rather than simply creating rows of workers' huts, he insisted on including all the comforts and conveniences a city could provide. His instructions read, “Be sure to lay wide streets planted with shady trees, every other of a quick-growing variety. Be sure that there is plenty of space for lawns and gardens; reserve large areas for football, hockey and parks; earmark areas for Hindu temples, Mohammedan mosques and Christian churches.”

Historically the Tatas came from a priestly Parsi family, which may have been formative for Jamsetji and almost certainly strengthened his moral values and sense of duty to community. This is best summed up in his own words: “In a free enterprise, the community is not just another stakeholder but in fact the very purpose of its existence.”

SINCE THE START, the Tata Group had an extraordinary ongoing commitment to corporate social responsibility (CSR), and today it has a Social Accountability SA 8000 accreditation. While such buzzwords are ubiquitous in the business world and, one might suspect, often meaningless, with the Tata Group it's the real deal. “Many fundamental rights that are applicable today as government regulations were first applied by Tata Steel – the eight-hour day, paid

leave, parental leave and public consultations,” says Satish Pillai, chief



Amitava Chandra,
Tata Steel.

of Corporate Sustainability Services at Tata Steel.

What the city looks like today is a testament to Tata's visionary plans and the diligence of his son, Sir Dorabji Tata, who saw them through to completion.

T M Venkatesh, a 34-year-old receptionist at a hotel in Jamshedpur, certainly approves. He and his family have lived in the city for 13 years. “It's a very metropolitan city,” he says. “There are so many different types of people here with different cultures from all over the country.”

When asked to describe Jamshedpur in a few words, Venkatesh replies, “It's a city of joy, actually. People are happy here, due to job security, great medical facilities, education and amenities. You cannot compare it with any other Indian city; it's unique. The water is filtered 18 times, and you can drink straight from the tap! I wouldn't live anywhere else.”

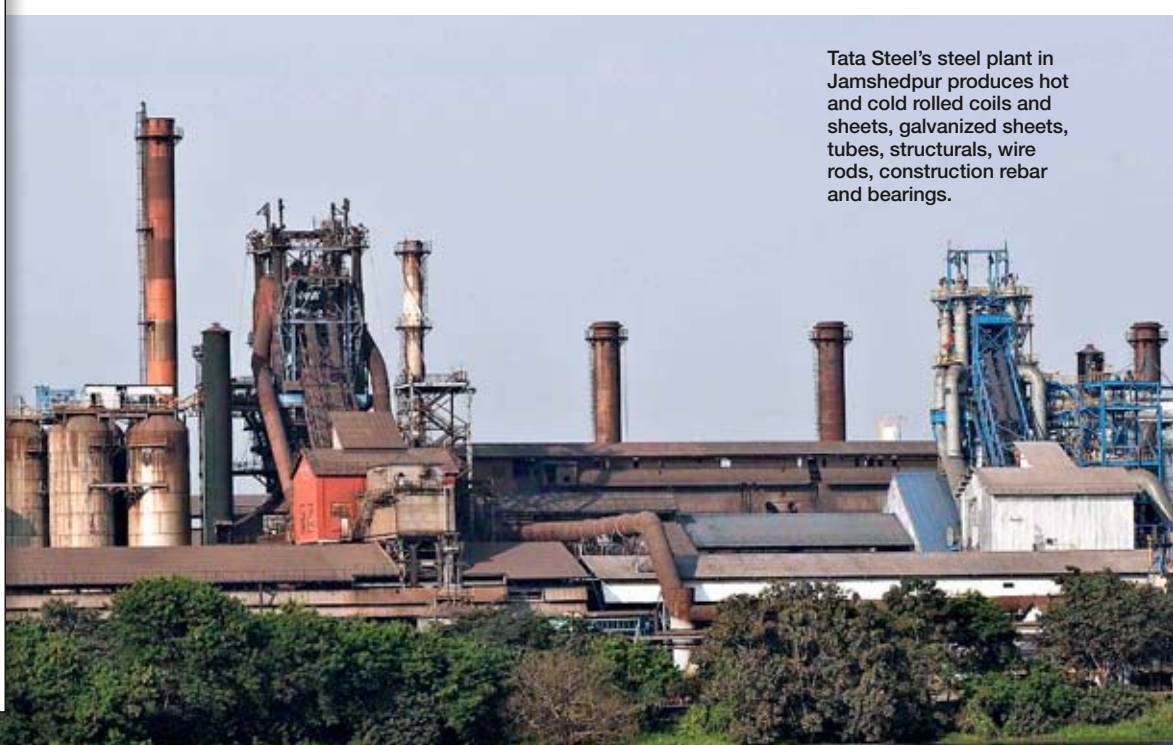
MINIMIZING THE IMPACT of Tata's industry and ensuring that the community as a whole benefits from its presence falls to Pillai. “From the inception – from Jamsetji on through successive generations of Tata Group leaders – the message that the community is an important stakeholder in your business has been sent very clearly,” he says. “You cannot work in an industry in isolation from the people around you.”

► Facts

TATA GROUP AND TATA STEEL

- Tata Steel is the world's sixth-largest steel company.
- Its annual crude steel production capacity is more than 28 million tonnes.
- The production capacity of the Jamshedpur works is 6.8 MTPA (million tonnes per annum), slated to increase to 10 million MTPA by 2010.
- Three greenfield steel projects are proposed for India, creating additional capacity of 23 MTPA, and one for Vietnam.
- Tata Steel has presence in more than 50 European and Asian markets and manufacturing units in 26 countries.
- Tata Group delivers to more than 90 different companies within chemical, engineering, services, energy, materials and consumer products, IT and communication.
- The Group has almost 290,000 employees (2007).

Tata Steel's steel plant in Jamshedpur produces hot and cold rolled coils and sheets, galvanized sheets, tubes, structurals, wire rods, construction rebar and bearings.



Early morning in Jubilee Park, located in the heart of Jamshedpur. The park was a gift by Tata Steel to the city citizens on the completion of the company's 50 years in business.



►► www.alfalaval.com/here/socialresponsibility/tatasteel

In early years so radical were the company's approaches that people were initially unsure how to react. "When we began our outreach initiatives in rural areas in 1979 there was naturally some scepticism," says Pillai. "People thought that it was too good to be true that this company was helping them free of charge, but over the years this has waned."

And no wonder. The monumental social outreach programme covers Jamshedpur and more than 800 villages in and around its manufacturing and raw materials operations, where it delivers income-generation support initiatives, health and medical care, education, sports and relief.

BUT HOW CAN a private company maintain such profitability year after year and still apply itself to such pioneering social commitments? Tata Steel's payoff from the social programme is not strictly economic, says Pillai. But the payoff also lies "in a good reputation as a corporate citizen, credibility, accountability and a social licence to operate," he says. "Tata Steel set the global benchmark for CSR and has continued the policy, irrespective of its profits. It has been sincere and consistent in its approach." Then, on a characteristically modest note, he adds, "I'm not saying we are the best; we have also learned from others who have started their own CSR schemes."

Tata Steel's cooperation with Alfa Laval goes back decades. Alfa Laval supplies the plant in Jamshedpur with heat exchangers, centrifuges and service and has even opened a service office in the city (see sidebar). "Alfa Laval was chosen on the basis of being the best supplier of the specialist equipment we needed," says Amitava Chandra of Tata Steel's Vendor Management Procurement Division. "They also had a presence in India, which was and is very important for service and support. We maintain business relationships only with those vendors who are responsible and have a culture, ethics and social commitment that is compatible with Tata Steel. Alfa Laval is one such vendor." ■

► Alfa Laval in Jamshedpur

Local office a matter of course

Alfa Laval has had an office in Jamshedpur since 1992, handling new sales and service to Tata Steel and other customers in the region.

Where possible, repairs are performed on site at Tata Steel. For

major repairs and conditioning, the equipment is sent for servicing to a dedicated service centre in New Mumbai.

PR Prasad, mechanical maintenance, Tata Steel. "Proactive service is provided to Tata Steel, whereby our service

engineer carries out regular health checks of the equipment and guides Tata Steel in how best to maintain the equipment and what spares to buy," says D K Verma, Alfa Laval sales manager. "Permanent posting of staff on site is not required, but in case of emergency we provide a 24-hour call-out response."

To date Alfa Laval has supplied Tata Steel's Jamshedpur works with nearly 300 heat exchangers (mostly M30s) and approximately 60 centrifuges, which are employed in blast furnaces, slab casters, hot strip and cold rolling mills. "All Alfa

Laval plate heat exchangers and centrifuges were tailor-made to Tata Steel's requirements," says Verma. "The challenge is to understand the process requirement, site requirement and duty details and design the equipment to suit."

The two companies began cooperating before the launch of Alfa Laval's local service office. P R Prasad, chief of mechanical maintenance at Tata Steel, says he worked with Alfa Laval in 1990, when Tata Steel had problems with oil cooling in hydraulic packs used in casters and in one of the steel plants. "Shell-and-tube heat exchangers were being used, which were only cooling the liquid by four to five degrees [Celsius]," says Prasad. "So Mr Verma of Alfa Laval

"Alfa Laval is not a subcontractor but a partner on our journey to excellence."

and I studied the duty conditions, such as oil grade, flow and actual temperatures at the site, and Alfa Laval designed plate heat exchangers accordingly. After installation the temperature was reduced by 10 to 12 degrees, solving the problem. Thus I can say that Alfa Laval is not a subcontractor but a partner on our journey to excellence." ■

Oceans of challenge



Clean water.

Today, more than one billion people lack access to clean water. If we fail to conserve this life-giving resource, the numbers suffering from thirst will increase dramatically.

At Alfa Laval we are deeply involved in this challenge. We convert seawater to freshwater. We cool and heat water. We clean wastewater. Our high performance decanters play a key role on the global stage. Installed in their thousands throughout the world, they clean a volume of wastewater from a population equalling that of the entire USA. And each year we install new decanters with sufficient capacity to match the needs of everyone in Sweden!



www.alfalaval.com