

# CHEMICAL ENGINEERING

## AUGUST 2010

# IN AUSTRALIA

## NEWS

Produced by Engineers Media, Engineers Australia's publishing company, for the IChemE in Australia and the Chemical College of Engineers Australia. The statements made or opinions expressed in this newsletter do not necessarily reflect the views of Engineers Australia or the Institution of Chemical Engineers in Australia.

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### First liquefied gas from Queensland

Britain-based gas company BG has been approved to undertake Queensland's first liquefied natural gas (LNG) project. The project will entail the construction of a processing plant and the installation of a 340km gas transmission pipeline, which will connect the coal seam gas fields in Darling Downs to the proposed gas processing plant on central Queensland's Curtis Island, located off the coast of Gladstone.

The project, dubbed Queensland Curtis liquefied natural gas (QCLNG), will be overseen by the Queensland Gas Company (QGC), a BG subsidiary. It is estimated by Deutsche Bank to cost \$20 billion and employ more than 8000 people during construction. With confirmed customers in China, Japan, Singapore and Chile, QCLNG is predicted by the state government to earn more than \$6 billion/a in exports.

While the QCLNG is estimated by its supporters to increase Queensland's gross

state product by \$32 billion in its first decade, it has also generated concerns for both the state government and the residents of Gladstone. Fears of inflated rental prices have prompted the state government to demand that BG provide affordable housing for QCLNG employees in Gladstone and the gas mining area of Darling Downs.

Coal seam gas is largely methane-based and is often referred to as coal bed methane. It is extracted from coal through pressure reduction in the coal seams, which removes the seam water and allows the gas to escape. Once the gas has been extracted from the Darling Downs coal seam gas mines, it will be transported to the gas liquefaction plant on Curtis Island, where it will be cooled into a liquid to facilitate its storage and transportation.

Construction of the QCLNG project is expected to commence later this year, and BG hopes the facility will be operational by 2014.

### Two gold contracts

Engineering services and project management group Ausenco, based in Brisbane, recently won two contracts for gold processing plants – one in Thailand and one in New South Wales.

The Thailand contract is for the \$110 million processing plant upgrade of Kingsgate Consolidated's Chatree North Gold Project. It involves the construction of a new plant and upgrade of existing infrastructure to more than double the mine's combined throughput capacity to 5Mt/a of mine ore.

Ausenco CEO Zimi Meka said the contract built on the company's long association with Kingsgate, which commenced with the construction of the original Chatree Gold Project in 2001.

Ausenco's Minerals & Metals team will manage the EPCM assignment for Chatree North, with specialist procurement expertise being delivered from the company's global procurement hub in Thailand. Work on the project is expected to commence immediately and is due for completion in the latter half of 2011. The Chatree Mine is Thailand's largest gold mining operation.

The \$32 million NSW contract is for engineering design services for the processing plant upgrade included within Newcrest's \$1.9 billion Cadia East Project near Orange. The project will be Australia's largest underground mine and is due to be completed by 2013.



The proposed QCLNG plant and ship transfer on Curtis Island off the coast of Gladstone.

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# CHEMICAL ENGINEERING AUGUST 2010 IN AUSTRALIA

## NEWS

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### Process control laboratory opened

A new process control laboratory was officially opened last month at Sydney University. The result of cooperation between the School of Chemical and Biomolecular Engineering and Schneider Electric, it will provide students with experiential learning and training in process engineering, dynamics and control.

Lab work will cover instrumentation, process control and operations as well as the wider issues of optimisation and energy management, operability, quality, reliability, safety and viability of processes.

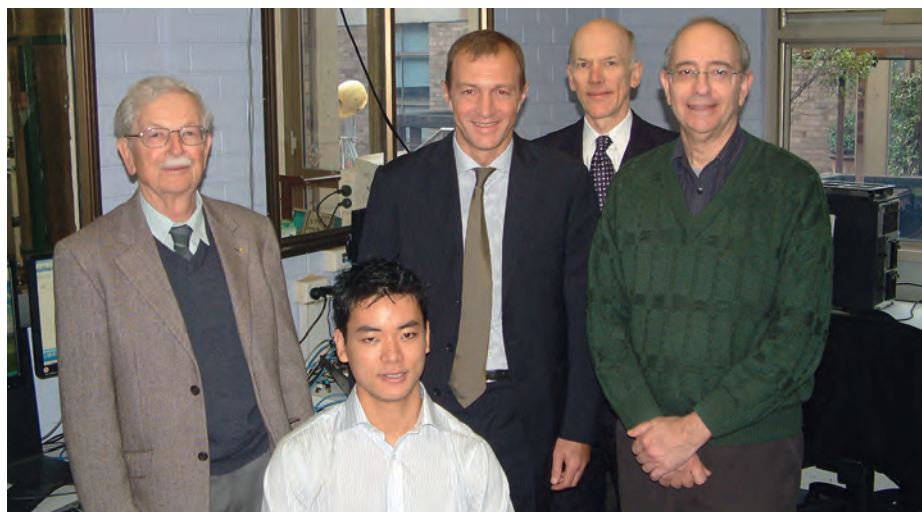
The lab will also address the needs of process control professionals already in the workforce through professional development courses to be run by the Chemical and Biomolecular Engineering Foundation of the university, in collaboration with Schneider Electric.

It was officially opened by Emeritus Professor Rolf Prince and Lionel Finidori, Schneider Electric's managing director for the Pacific zone. The laboratory brings together over \$1.5 million in dedicated process and didactic training equipment complete with instrumentation and process controls.

The company not only provided the equipment, but also the knowhow through its technical experts who supervised the installation and testing of the process control system.

Several other programs are already in place under the partnership between

Schneider Electric and the university, including industry aligned short courses in process control, energy and safety, mentoring programs with students and graduate development projects aligned with the Major Industrial Project Placement Scholarship Scheme.



*At the opening of the new laboratory were (l-r) Emeritus Professor Rolf Prince, chemical engineering and commerce final year student Harry Chan, Schneider Electric's Lionel Finidori, Dr Don Hector representing the university's Chemical and Biomolecular Engineering Foundation, and Professor Tony Vassallo, Delta Electricity chair in sustainable energy development at the School of Chemical and Biomolecular Engineering.*

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### Plenary Speakers include:

- Professor Andrew Hopkins
- Professor Jinghai Li
- Dr David Mills
- Professor Hans Müller-Steinhagen
- Dr Ziggy Switkowski
- Mr Andrew Stock

**The Chemeca 2010 Committee is also excited to announce a new scientific session, The Nanoparticle Safety Session, featuring some of Australia's most prominent and influential scientists:**

- Dr Amanda Barnard
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- Dr Roger Drew
- Professor Chunying Chen
- Dr Megan Osmond
- Associate Professor Darren Martin

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# 2010 chemeca

### Keynote Speakers

**Six top rated journals will publish key special issues in top-rated journals associated with Chemeca 2010 that span the conference topics:**

- Chemical Engineering Research and Design (IChemE)
- Biochemical Engineering Journal (Elsevier)
- Experimental Thermal and Fluid Sciences (Elsevier)
- Energy & Fuels (American Chemical Society)
- Biomicrofluidics (American Institute of Physics)
- Powder Technology (Elsevier)
- Advanced Power Technology (The Society of Powder Technology Japan; Elsevier)
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Prizes will be awarded for the best paper, poster and presentation.



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# CHEMICAL ENGINEERING AUGUST 2010 IN AUSTRALIA

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## NEWS

### Authority on risk management dies

Sir Frederick Warner, a leading authority on chemical risk management and nuclear safety in Britain, died last month. He was 100.

Warner led the first international team into the ruins of the Chernobyl nuclear plant after the meltdown in 1986. He assembled a group of experts, all aged over 65. The idea was that, because of their age they would have less to lose in the event of a massive dose of radiation.

On the basis of this idea Volunteers for Ionising Radiation was later formed and incorporated into the emergency provisions of the Order of St John.

Warner studied chemistry at the University College of London and then completed

a postgraduate diploma in chemical engineering. During the war he was asked by the British government to build a plant for the manufacture of nitric acid. Although he had little knowledge of how to construct a chemical plant, his success in building it at half the cost of Imperial Chemical Industries helped raise the status of chemical engineering.

In 1956 he cofounded Cremer and Warner consulting chemical engineers. Over the following decades he served as an adviser to government in various roles.

He was elected to the Royal Society in 1976, later winning the Leverhulme Medal and Buchanan Medal.

Source: Telegraph, London

### Pratt Prize to process engineer

Prathab Gopiraj, a first year associate process engineer at PSN's Melbourne office, recently received the prestigious 2010 IChemE Pratt Prize for the best final year chemical



engineering design project among 300 Victorian university students. Gopiraj's final year design project topic was "Whey processing: producing edible lactose and WPC35 from acid whey".

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# CHEMICAL ENGINEERING

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### New desalination research centre

The National Centre of Excellence in Desalination (NCED) was launched last month at Murdoch University's Rockingham campus in Perth with the turning of the first sod.

The university was awarded \$20 million by the federal government to host the centre, and the WA government added an extra \$3 million. Murdoch University is the administering organisation responsible for developing a research program, engaging partners and managing intellectual property frameworks.

The centre is to provide research and development of desalination technologies and solutions.

The hub of NCED will be a desalination

pilot-scale testing and research facility, which will allow researchers to test new and improved desalination technologies and processes, and enable industry to validate commercial products, integrate currently available technology and assess potential technology options.

CH2M Hill is the lead design consultant for the facility. The company's Australia and New Zealand regional water business group manager David Middleton said: "The desalination innovations developed at NCED will have world-wide application as improvements are made in the efficiencies and carbon footprints of future desalination facilities."

The facility is expected to be operating by September 2011, in time for the International Desalination Association World Congress in Perth.

The 12 projects the NCED Board has approved for the first round of funding were also announced at the launch ceremony.

Professor David Doepel, Murdoch's deputy vice-chancellor research (acting), said the funding recommendations span all five research theme areas: pretreatment; reverse osmosis desalting; novel desalting; concentrate management; and social, economic and environmental issues. Approved projects are equally divided between fundamental and applied research.



### Training in 2010

#### Fundamentals of process safety

6–10 September, Melbourne

#### Introductory HAZOP

8–9 November, Melbourne

#### HAZOP study for team leaders and team members

3–5 November, Perth

#### Chemical engineering for non-chemical engineers

15–17 November, Brisbane

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[www.icheme.org/shortcourses](http://www.icheme.org/shortcourses)

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### It pays to be a chemical engineer

by Matt Stalker

Earlier this year IChemE surveyed its Australia based members for the second time to measure the health of the nation's chemical engineering salaries.

The survey was part of a wider consultation with IChemE members across the countries that home the highest concentration of members – UK and Ireland; Australia; Malaysia; USA; Singapore; South Africa; Canada; India; and New Zealand.

Almost 450 Australia based members participated in the survey and the headline results are broadly positive. The median salary across all participants is \$117,500/a compared to \$110,000/a two years ago – a 7% increase.

Graduate salaries have also remained strong, increasing by 6% in two years from \$56,500/a to \$60,000/a.

The \$4000/a difference between male graduate salaries and those of female graduates remains a cause for concern. A similar pattern emerged in the 2008 survey and

while small sample sizes mean that these findings must be handled with caution, it's something worth monitoring in future surveys.

There was good news for chartered chemical engineers in the survey once again. Chartered chemical engineers between the ages of 40 and 49 typically earn, on average, around \$55,000/a more than their non-chartered counterparts.

[www.getchartered.com](http://www.getchartered.com) contains all of the information you need to know about working towards chartered status.

And studying longer won't necessarily earn you more money. The median salaries of chartered chemical engineers with a bachelor's degree are higher than those with a masters or a doctorate.

Surprisingly, the best paid chemical engineers in Australia can be found in sales and marketing roles with median salaries of \$162,500/a, a hefty increase on the 2008 median of \$125,00/a. Manufacture and production salaries have increased by 7% from \$102,500/a to \$110,000/a while aver-

age R&D pay has grown by just 1% from \$84,000/a to 85,000/a.

Comparisons by industry sector reveal that the best paid sectors are contracting, oil and gas exploration, and production and petrochemicals with \$190,000/a, \$150,000/a and \$138,000/a median salaries respectively.

Bottom of the pay league are chemical engineers in the areas of water, chemical and allied products and process plant and equipment with median salaries of \$83,000/a, \$92,000/a and \$93,500/a respectively.

By states, the survey showed the median salary in Western Australia is \$140,000/a compared to \$85,000/a in South Australia. Queensland (\$113,500/a), Victoria (\$112,000/a) and New South Wales (\$102,000/a) all sit in between.

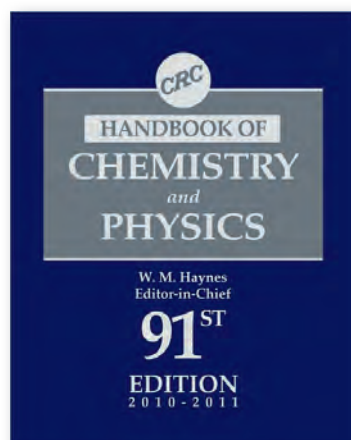
*Matt Stalker is communications manager at IChemE. He can be contacted at [mstalker@icheme.org](mailto:mstalker@icheme.org). The full IChemE 2010 Australian Salary Survey data-set is on sale at \$110 (plus postage) from IChemE's office [sales@icheme.org](mailto:sales@icheme.org) or by calling +61 03 9642 4494.*

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# ICHEME

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## Roadmap discussion on energy

by David Montgomery

An excerpt from granny's recipe for a low carbon energy future might read: "Take two parts solar, one part wind and a generous sprinkling of geothermal, mix well into a base of natural gas and nuclear, then bake at high political heat until ready to be served."

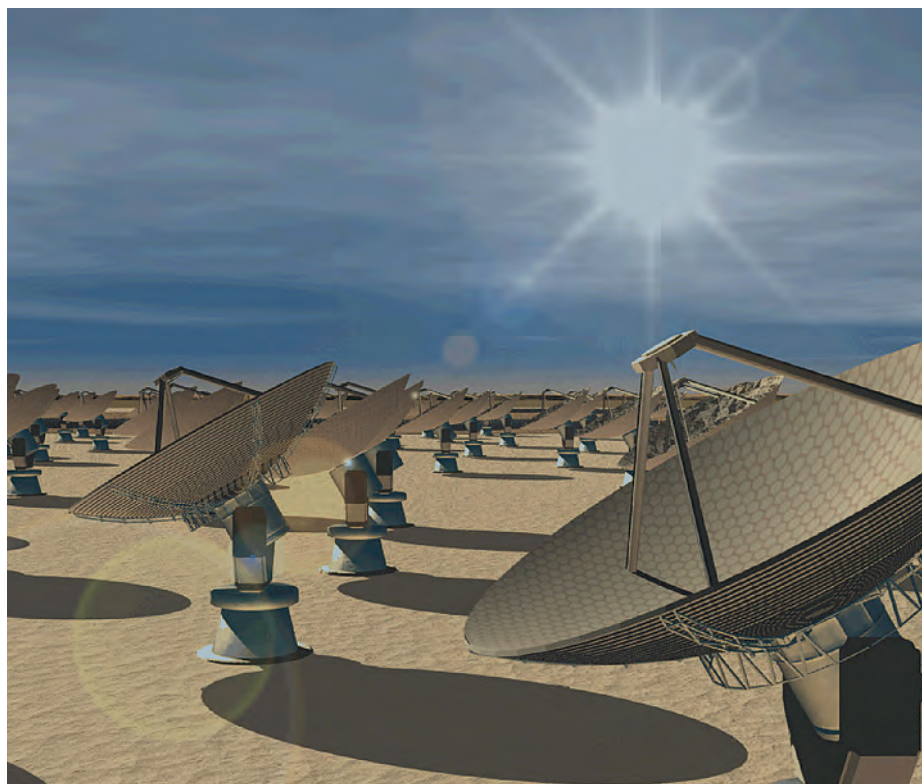
Unfortunately, if there was one thing that became clear throughout the IChemE Energy Roadmap talks at the Novotel Langley in Perth on 10 June, it was that there is no easy answer to the question "What will our energy future look like?"; much less an easy-to-follow recipe or set of directions. Instead, the options were as varied as the panel of presenters, which consisted of Elena Mavrofridis, carbon manager for Woodside; David Whorral, sustainable development manager at Hatch; Hui Tong Chura, above-ground leader at the WA Geothermal Centre of Excellence; and Gordon Keen from ExxonMobil.

The common message was summed up early on by Dr Matt Hardin, when he said that the solution to the energy debate will be a broad portfolio of energy sources. In his welcome address, he described the urgency of developing serious alternatives to CO<sub>2</sub>-intensive energy, and challenged the audience that in the future we may need to start viewing any carbon thrown away as carbon that could have been used for fuel, considering of course feasible ways to mitigate the resulting CO<sub>2</sub>.

So what of this broad portfolio of energy sources? Mavrofridis highlighted the huge potential LNG has for being a part of the transition to a less carbon intensive energy future, with 4t of CO<sub>2</sub> saved per unit of energy generated when compared to coal.

Whorral outlined the hurdles that face many of the currently available technologies, which include the facts that:

- solar power, without improved storage options, is only available during the day
- wind is intermittent and unreliable in many parts of the world



Artist's impression of one of the Square Kilometre Array installations.

- hydro depends on the combined availability of large quantities of water and a significant height differential to generate electricity
- wave energy is only viable at the coast.

In addition, Whorral described the problem of efficiency losses in current transmission networks, and how these can quickly erode any economic incentives that may be available from some of the more geographically specific technologies, which may not always coincide with areas of highest energy demand.

Keen focused on another key motivation for finding a viable solution when he described the fundamental part played by reliable energy supplies in reducing poverty and improving the quality of living. In his presentation, he illustrated the population

challenge that faces the world over the coming century and called for increased efficiency and expanded supplies as a key part of the answer, while mitigating emissions.

Hui Tong Chura provided an in-depth insight into the latest local applications of geothermal airconditioning, including the UWA campus airconditioning project, as well as the one for the supercomputer system that will drive Australia's Square Kilometre Array Pathfinder demonstration project. In the latter application, this technology has the potential for direct CO<sub>2</sub> mitigation of up to 9000t/a of CO<sub>2</sub>.

*This panel presentation was a part of the IChemE Roadmap series of talks that were held around Australia during June.*

# CHEMICAL ENGINEERING AUGUST 2010 IN AUSTRALIA

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## ICHEME

### New chartered members recognised

The Queensland Joint Chemical Engineering Committee (QLD JCEC) held the Queensland Members dinner on 13 August at the heritage listed United Services Club in the historic Spring Hill precinct of Brisbane.

Over 100 members and guests attended the function and celebrated the achievements of the recently upgraded and elected Members and Fellows of both IChemE and Engineers Australia for 2010.

Guest speaker Russell Scott, IChemE vice-president international and past chair of IChemE in Australia, highlighted the value proposition of being chartered and aspiring to be a Fellow member. He raised the issues of a global community in engineering pointing out that while there may be growing numbers of members of IChemE in Australia, there are well over 100,000 chemical engineers graduating each year within the Asia-Pacific region alone. Queensland JCEC chair Graham Turner thanked Scott for his presentation and expressed his hope that the function will become an annual event.

During the function all recently upgraded and elected members were individually recognised and presented to their



Engineers Australia and IChemE members at the Joint Chemical Engineering Committee function in Brisbane.

peers. Seven new Fellows were present – Mark Hodgson, Ian Johnston, Rod McPherson, Ian Mulvihill, Graham Turner,

Nicholas Meakin and Paul Lant.

An additional 20 members were awarded with chartered status.

### Forum on energy literacy

IChemE will be conducting a forum on energy literacy on Sunday 26 September in Adelaide at 2pm, before the official Welcome Function for Chemeca 2010.

The IChemE member forum is titled “Energy literacy: How do we take up the challenge?”

Dr Desmond King, president of Chevron Technology Ventures and president of IChemE, said in his presidential address in May: “For billions of people around the world, affordable energy is the lifeblood that delivers nutrition, sanitation, health, education, transportation and every other critical

element of life...energy is more than just a fuel. It is the catalyst that makes modern life possible.”

The recent electoral campaign provided a smorgasbord of examples of misconceptions about energy. What is the role of chemical and process engineers and professional bodies in raising the standards of literacy about energy?

Besides King, other guest speakers will be Noel Williams, chair of the IChemE in Australia Board; Dr Matthew Hardin, technical officer on the IChemE in Australia Board and senior lecturer at the University

of Western Australia; and Dr David Brown, CEO of IChemE.

The forum will explore issues such as:

- What is the role for chemical engineers in raising literacy about energy?
- What are the opportunities to influence the broader public’s energy literacy levels?
- What tools are available to chemical and process engineers to accept invitations to address school groups, alumni, Rotary clubs about energy?

Email [austmembers@icheme.org](mailto:austmembers@icheme.org) to register your interest to attend.

## NEW PRODUCTS

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### Versatile monitor for hazardous gases

ANRI Instruments & Controls has released the GDS404, a 1-4 channel gas alarm from GDS Technologies. The versatile system configuration monitors any combination of oxygen, combustible and toxic gases. The GDS404 comes in a steel housing and can be used in different environments from commercial premises through to heavy industrial and hazardous area applications.

The monitor has a range of sensors including infrared, electrochemical, catalytic combustion, thermal conductivity and MOS sensors. Gases include O<sub>2</sub>, CO, H<sub>2</sub>S, SO<sub>2</sub>, NO, NO<sub>2</sub>, CL<sub>2</sub>, H<sub>2</sub>, HCN, HCl, NH<sub>3</sub>, O<sub>3</sub>, C<sub>2</sub>H<sub>4</sub>O, CO<sub>2</sub> and LELs. Other controllers are available for larger installations.

Alarm features include two alarm stages, with a delay to alarm option, selectable alarm relays, visual LED displays and audible warnings. Digital alarm settings are fully adjustable. IP52 housing is standard, with the option of IP65 housing if required.

Monitoring locations include boiler plant rooms, water treatment works and processing plants.

[www.anri.com.au](http://www.anri.com.au)



The GDS404 gas alarm

### Control valve in new body

Flowserve Corporation has released the Flowserve Multi-Z anti-cavitation control valves in a new cast globe body. With the new cast body design the company expects to be able to provide shorter delivery times for customers with dirty service applications in the oil and gas, chemical, and power industries, as it eliminates cavitation, which helps minimise maintenance costs and improves reliability.

To achieve zero cavitation, the Multi-Z is designed to divide the pressure drop into three to six stages to gradually reduce pressure and minimise velocity spikes. Additionally, in dirty service applications with particles in the process fluid, this staged pressure reduction serves to lessen

erosion, extending the life of the valve, decreasing maintenance and minimizing downtime, the company said.

[www.flowserve.com](http://www.flowserve.com)

### Water-to-water heat exchanger

The new Thermo Scientific Neslab System water-to-water heat exchanger provides a clean, stable, controlled, closed-loop water cooling system that rejects the process heat into an existing in-house facility water supply. This eliminates the problems associated with the direct use of in-house water such as insufficient or fluctuating flow, changing pressure, poor water quality, and temperature instability.

The heat exchanger takes advantage of an existing in-house water system for heat removal; it uses less energy and costs less to

operate than traditional compressor-based chillers, the company claimed.

[www.rheologysolutions.com](http://www.rheologysolutions.com)



The heat exchanger rejects process heat into an existing water supply system.

## NEW PRODUCTS

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### Integrated temperature control for heat exchangers

Teralba Industries has developed a temperature control system to integrate with its Mueller Accu-Therm plate heat exchanger, which it manufactures in Australia, under licence from US based Paul Mueller Co.

The incorporated temperature control system provides manufacturers of food, dairy, beverage, chemical and pharmaceutical products with a system for heating, cooling and pasteurising of various types of liquids.

The temperature control system is available in various versions starting with simple digital readout and control valves for service media, variable temperature set points and data output to integrate into a production line, to complete stand-alone pasteurisers.

[www.teralba.com](http://www.teralba.com)



Integrated temperature control system for heat exchangers.

### Coriolis flowmeter

Endress+Hauser's new Promass E is the first Coriolis flowmeter with true 2-wire technology, according to the company. It offers the full output range of 4mA-20mA.

It can be seamlessly integrated into existing plant systems at lower cost due to the reduced cabling and installation time. Based on proven Coriolis sensor technology, the flowmeter offers reliable, simultaneous measurement of mass flow, fluid density and temperature while meeting all the relevant safety standards such as NAMUR and SIL. With its intrinsically safe IEC Ex certified design, the Promass E is suitable for use in hazardous areas.

The user-oriented operator interface makes commissioning and operation faster and more reliable.

Application-specific set-up is possible via the local display, FieldCare or any open FDT/DTM configuration tool. Operator, maintenance and expert menus ensure that users only have access to the configuration parameters they need, improving the simplicity and safety of operation.

Device, event and configuration data is securely stored on the Promass E's patented HistoROM. This enables the transfer of configurations to other similar Promass E devices during commissioning; or the fast exchange of measuring electronics without the need for recalibration.

In addition to liquids such as acids, alkalis and solvents, the new Promass E also measures all gases. The application pressure range extends to 10MPa with a process temperature range of -40°C to 140°C. It can be supplied with line sizes from DN8 to DN50 and has a mass/volume flow accuracies of  $\pm 0.25\%$  and density accuracy of  $\pm 0.0005 \text{ g/cm}^3$ .

[www.au.endress.com](http://www.au.endress.com)



The Promass flowmeter.

### Filter nozzles

Ilmap sand filter nozzles are now available in Australia and New Zealand from Tecpro Australia.

Applications of the Italian-made high-precision sand filter nozzles include the treatment of drinking water, demineralisation, urban and industrial wastewater treatment and desalination plants.

In addition to the standard polypropylene, the range is available in a variety of specialised PP formulations. Glass-filled polypropylene (30% fibre glass) is available for increased strength and temperature resistance, with a permitted maximum operating temperature of 110°C. Mineral-filled polypropylene (40% mineral talc) nozzles are for increased dimensional stability and compression strength under higher temperatures.

PVDF (polyvinylidene fluoride) nozzles

are for optimal mechanical strength, abrasion resistance, thermal stability, purity and chemical resistance. Suitable for contact with drinking water and drinking liquids, this material can be used up to a maximum operating temperature of 135°C.

[www.tecpro.com.au](http://www.tecpro.com.au)

### Self-cleaning water filter

Forsta Filters has released the M-90 automatic water filter. At about 30cm tall, it offers a compact design. Automatic backwash allows the filter to clean itself as needed, thus reducing routine maintenance. The filter uses a single flush valve and less than 8L in the 6s backwash cycle.

The M-90 filter has a stainless steel body, screen, and components, screen mesh available down to 5 microns and flow capacity of up to 400L/min.

[www.forstafilters.com](http://www.forstafilters.com)