Fantech

TECH-TALK

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Q1 wind challenge taken head on

THE world's tallest residential tower reaches so high that on a clear night it will be seen from as far away as Brisbane to the north and Byron Bay to the south.

But being so tall, Q1 Tower on the Gold Coast has presented some intriguing challenges in the construction.

"The most interesting technical aspect for the installation of the mechanical services systems was to deal with the wind effect," said Jim Godwin, Sales Manager of Air Design, who supplied a range of Fantech products.

Height of the Q1 Tower caused wind factor challenges.

"The systems that control the fans need to negate the effect of the wind blowing against the external exhaust grilles at varying speeds and from varying directions."

The challenge was taken up by mechanical services contractor, Siganto & Stacey, experienced in high-rise development.

Project Manager Doug Smith said the building is virtually fully encased in a glass skin.

However, mechanical services plants at levels 39-41 and levels 75-76, which discharge air, have outlet points exposed to the elements.

With the three units on the lower level operating at 20,000 litres per second and the ones on the upper level discharging air at an even greater rate, the trick was to maintain the right pressure.

"The solution was to monitor the air flow in all instances, and use variable speed drives or dampers to cope with the changes and negate the effect," Doug said.

"As the wind varies in speed, or shifts to a different angle, the system is designed to automatically cater for any change."

A range of Fantech centrifugal and axial fans were provided for general ventilation as well as toilet and lobby exhaust. The two-level car park, which takes up the space of a residential block, also needed exhaust fans capable of discharging air at 25,000 litres per second.

Doug said that because of the sheer size of the project, there were initially some concerns about moving personnel and materials up and down the project.

"But overall, we are very happy with the way it went," he said.

Doug said commissioning had begun, with completion of the project scheduled for August 31.

Q1 TOWER - IT'S BIG

IT'S tall, it's sensational, and Q1 Tower, developed and built by the Sunland Group on Hamilton Avenue, Surfers Paradise, is setting all sorts of records.

At a structural height of 323 metres, or 1058 feet, Q1 Tower will:

- With 80 levels, be the tallest residential tower in the world, shading Melbourne's Eureka Tower.
- Be topped by the world's longest building spire, 97m and oval-shaped.
- Be serviced by the fastest elevators in Australia, travelling at 9 metres a second.
- Become the tallest self-supported structure in Australia, surpassing the 274m Mt Isa chimney stack.
- Eclipse world famous structures such as New York's 319m Chrysler Building and the 321m Eiffel Tower in Paris.
- Become the 16th building on the Gold Coast to hold the "tallest title" since the first high-rise in 1957.

The tower features a 10-storey glass-walled atrium, between levels 60 and 69, which will be illuminated every night of the year.

Wealthy Japanese restaurateur Akeo Kakemoto paid $8.9m for the 100-squares, five-bedroom luxury apartment on Level 74, the highest residential penthouse, complete with home theatre and a balcony pool with uninterrupted views of the ocean.

The six storeys above level 74 contain building plant and maintenance rooms.

EC motors in Coles ground-breaking supermarket

COLES MYER is taking the lead in the development of sustainable energy supermarkets with the opening of its first outlet in April.

The store, in Gisborne, Victoria, features a range of design, materials and construction elements to make it environmentally sound, energy-efficient, reduce greenhouse gases and have minimal impact on its surrounds.

Its best practice refrigeration and HVAC design features include:

- Low air displacement.
- High efficiency refrigeration cabinets.
- The use of non-synthetic natural refrigerant.
- Secondary refrigerant re-circulation.

colesmyer.com

- A roof-top mechanical-electrical centre.
- High efficiency supply and exhaust fan motors.
- A close-couple high efficiency air conditioning condensing pack.

It also includes installation of fans featuring energy-efficient Electronically Commutated motors.

Fantech's Major Contracts & Project Co-ordinator Peter Cotterell said EC motor-powered Gamma and PowerLine fans are being installed in the exhaust hoods for the bakery, chicken cooking and doughnut making areas.

"The object is to save as much energy as they can," said Peter. "As an example, when the store closes, the fans automatically switch off after the staff go."

EC fans, in operation overseas for some years, are being introduced in Australia for the first time. Fantech completed airflow testing of our newly developed Gamma, GL Gamma and PowerLine ranges featuring EC motors last year.

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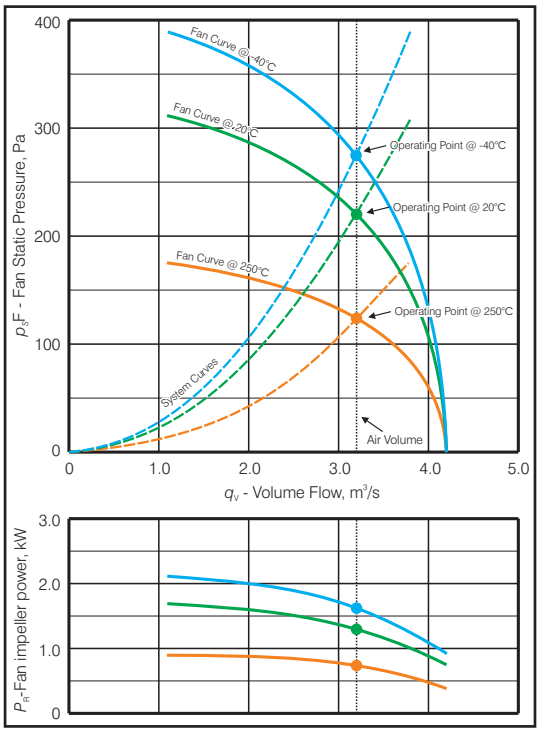
Technically speaking

When the heat's on, the pressure's off

Fan operation at standard and non-standard temperature.

THE FIRST FAN LAW states that fan volume Q varies proportionally to N (speed) and D^3 (diameter) and is independent of changes in air or gas density.
This article seeks to explain why, despite the fan pressure development and mass flow being dependent on air density, the fan volume flow remains constant regardless of changes in the air temperature or barometric pressure. Both these factors do change the air density, as we will demonstrate.



ρ (Rho - air density) varies as $\frac{B_2 \times T_1}{B_1 \times T_2}$

Where B is the barometric pressure, usually expressed in mbar, and T is the air temperature in K or absolute temperature (K = °C + 273).
To demonstrate the effect of temperature change, we have plotted the air-pressure performance for a 630mm diameter fan with a speed of 24r/s, 10 blades set at pitch angle 25°, at standard air being temperature 20°C and barometric pressure 1013mbar. The air density is 1.2 kg/m³. The operating point is 3.2m³/s @ 220Pa. (See Figure above.)

THE SECOND LAW
The second Fan Law states that fan pressure P varies proportionally to N^2, D^2 and ρ (where ρ is air density).
For this example, we will assume the barometric pressure to be constant and can therefore be ignored.

ρ (Rho - air density) varies as $\frac{T_1}{T_2}$

therefore $\rho 2 = \rho 1 \times \frac{T_1}{T_2}$

at $-40^{\circ}C$; $\rho = 1.2 \times \frac{273 + 20}{273 - 40} = 1.51 kg/m^3$

at $250^{\circ}C$; $\rho = 1.2 \times \frac{273 + 20}{273 + 250} = 0.67 kg/m^3$

These changes have a significant effect on the fan pressure development and this is clearly shown on the fan curves plotted on the Figure above.
From the second Fan Law if N and D remain constant, the pressure developed by the fan at –40°C will be:

$220Pa \times \frac{1.51}{1.2} = 277\ Pa$

and at 250°C will be:

$220Pa \times \frac{0.67}{1.2} = 123\ Pa$

If the "system pressure drop" was unaffected by air density, the fan would deliver more air when the air density exceeded that at standard air (ie. –40°C) and less air when the air density was less than that at standard air (ie. 250°C).
However, the system pressure drop (ΔP) is also dependent on the air density:

ΔP varies as ρ(Rho), $\Delta P_2 = \Delta P_1 \times \frac{\rho 2}{\rho 1}$

It therefore follows that ΔP at –40°C = 277Pa, and at 250°C, 123Pa - same calculation as fan pressure development above.
Since the fan pressure development and the system pressure drop vary in exactly the same proportions, the result is that the air volume remains constant regardless of variations in air density caused by gas mix, barometric pressure or air temperature.

THE THIRD LAW

The third Fan Law relates to fan power, or kW. In this instance, kW varies proportionally to N^3 , D^5 and ρ.
If N and D are constant, then the kW varies with the air density:
At 20°C the fan absorbed power is 1.32 kW
At –40°C the absorbed power will be

$1.32 \times \frac{1.51}{1.2} = 1.66$ kW

At 250°C the absorbed power will be

$1.32 \times \frac{0.67}{1.2} = 0.74$ kW

With an absorbed power of 1.32 kW it would be normal to fit a 1.5 kW motor. If the motor is in the air stream - as would be normal for an axial fan - there would be no need to increase the motor size for the low temperature, as, even though the corrected absorbed power exceeds the motor rating, the improved cooling from the very cold air will comfortably compensate for the excess kW. Conversely, it would be unwise to contemplate reducing the motor size for the 250°C temperature.
Unfortunately, some fan engineering books recommend that system pressure drops be corrected for air density. Fantech strongly disagrees. System pressure drops should be calculated at standard air density, as corrections can lead to confusion when the fan performance is specified.
In terms of barometric pressure, if a fan is to be applied in an atmosphere greater than normal – for example, below sea level, in an underground mine or in a pressure chamber - where the air density will be higher, then the fan supplier must be informed so that they can make allowance for the increased kW.

(Continued from page 1)

EC motors at Coles

With integrated electronics to regulate the fan speed, EC motors not only provide outstanding efficiencies but similarly impressive control of fan performance.
At Gisborne, EC motors are also incorporated in refrigeration cabinet fans, refrigeration condenser fans and other small ventilation duties.
"It's all about reducing energy costs," said Don Griffiths, Coles Supermarkets Refrigeration & Building Services Design Engineer. "The reduction in greenhouse gases associated with the building fit-out and operation is in line with Coles Supermarket's key corporate goals.
"These stores will have a much lower environmental 'footprint' per square metre than any of our existing new stores."
Refrigeration initiatives were developed by Mr Griffiths in association with project partners Frigrite Refrigeration, Bitzer Australia and Danfoss Controls, while mechanical services initiatives have been developed by Robertson Consulting in association with the HVAC installation contractor Sharp & Pendry, and equipment suppliers Fantech, Ziehl Ebm and Rayson Industries.
The Gisborne store was due to open in late April, while a similar Coles supermarket in Winmalee, NSW, is scheduled for a July launch.
Overseas, US retailer Wal-Mart found sales significantly higher in stores lit by natural light, while Sainsbury's giant Millennium Store in Greenwich, UK, utilises north facing windows stretching 500 metres.

Congratulations to ground-breaking contractor on 130th

A dinner in August and the publication of two books are just part of the 130th celebrations of one of Australia's most successful mechanical services contractors.

Congratulations go to James L. Williams Pty Ltd, whose portfolio of projects is a blue-chip rundown of Australian construction.

Founder J. L. Williams.

Managing Director Allen Williams said that its ground-breaking projects includes the first fully-air conditioned building in Melbourne, the Footscray District Hospital, in 1953, now known as Western Hospital, and ICI House, the first multi-story building in Melbourne.

"And the Royal Adelaide Children's Hospital, completed in 1964, was the largest mechanical services contract of the time," said Allen.

Its latter day work can be seen in NSW buildings such as 400 George Street, No. 1 Martin Place (Westin Hotel), King Street Wharf and the recently completed Police Headquarters in Parramatta. Recent Victorian constructions include Yarra's Edge, QV3 and Council House 2, and in Queensland, the beautiful blue and bronze glass AMP building (Comalco House), Saville Southbank and 33 Charlotte Street.

"We also did the installation of air conditioning and mechanical services at Rialto Twin Towers, in 1988, a building of significant world-wide interest, being the then tallest concrete structure in the Southern Hemisphere," Allen said.

It all began with James Lambert Williams starting a career in plumbing in 1875, working for himself in Melbourne.

Allen, a direct descendant of James, said that during the tough economic climate of the 1930s, the emphasis moved away from plumbing towards HVAC.

"From there we have grown to three hundred people in three states, creating supplier demand for thousands of large and small businesses," Allen said.

Launched with an enjoyable luncheon for suppliers and sub-contractors in February, the 130th anniversary will be further recognised with the August gala dinner, one book outlining the company history, family and friendships, and the other re-creating J. L William's diary of his 1902 round the world trip.

Williams staff in the old factory.

Simple question – excellent solution

The question from David Robinson, of Melbourne's Robinson Engineering Consultants, was a simple one. "From the Fantech web-site, how can I send details or dimensions of a fan to another person?"

Our original method was a complex technique of producing a PDF and attaching it to an e-mail.

But now we have come up with a much easier solution. An e-mail feature has been added. Simply click the "envelope" icon at the top of the Product page and an e-mail form will pop up with the link to the page.

Address it to the intended recipient, and send. The person at the other end – perhaps a potential client or a consultant - simply clicks on the link and the technical details appear.

Another example of a good result coming from much-appreciated input from our clients.

Stainless steel proves to be the Key...

Key Manufacturing is well named. The Adelaide based company is one of Australia's leading component manufacturing and metal finishing services.

With more than 50 years experience in the white goods and automotive industries, Key Manufacturing specializes in anodising, powder coating and metal processing – processes that involve a lot of heat and fumes.

Selection of fans and blowers as part of a re-fit of its anodising area therefore required equipment that would withstand corrosion. JPM Mechanical and Fantech provided the solution – stainless steel.

Installed were:

- Five AP-0564 560mm diameter adjustable pitch axial fans, designed for a wide range of uses, including hot, toxic and noxious gases, corrosion fume and explosion risk applications.
- Five C2-056QS Q-Seal attenuators, 1150mm in length, designed for quality installations in often difficult to handle situations.
- One Fan and Blower.18-L SWSI centrifugal Fan, 450 mm diameter.

Casings and components, including the motors for these fans, were made of 316 stainless steel.

"It's a very hot area, and the usual steel casings would be eaten by the fumes, such as that from the acid," said John Selan, Managing Director of JPM Mechanical.

"While they are standard fan selections, using stainless steel makes all the difference. They are resistant to the fumes and ensure long life."

John said that despite the challenges of the installation, "all went smoothly."

The only hard anodising plant in South Australia, Key Industries provides clean bright colours and quality natural or matt finishes. Component sizes range from large architectural extrusions to tiny intricate parts.

PRODUCT NEWS

Larger Ezifit boosts flexibility

The Ezifit Thru Roof range of fans has been extended with the addition of a larger 200mm fan powered version and 150mm and 200mm Relief Vent models.

The range is now suitable for use in small commercial applications as well as kitchens, range hoods, domestic bathrooms and toilets.

The fan units can be speed controlled, with 150mm and 200mm versions in 2 and 4 pole speed options included in the range.

The Relief Vent versions are available with 150mm or 200mm connecting spigots and are ideal for use with duct mounted fans such as the Minitube and Mixvent range. They are suitable for both supply and exhaust air applications.

Ezifit range expanded.

The units are easy to install, in both metal and tile roofing. The aerodynamic cowl is designed for low air resistance and a bird mesh guard is fitted as standard. The surface is galvanised, making it easy to paint.

Optional extras include powder coating in chosen colour and duct and grille kits.

Each model is available in a convenient kit containing simple instructions, fixing screws, support straps and roof flashing.

Systemaire shift benefits all

A multi-purpose conference/training room is a key feature of the brand-new, purpose-built premises for Systemaire, Fantech's WA distributor for 17 years.

The modular room can be configured for a variety of roles, a major one being regular product training sessions for contractors and consultants.

The new Systemaire building, in the rapidly growing suburb of Malaga, consists of 880m^2 of warehouse space and a 320m^2 two storey office block, much more room than their previous Balcatta premises.

"This gives us the opportunity to carry more stock, boost our customer service levels, and regularly brief contractors and consultants on latest products," Tony Fego, Systemaire Managing Director, said.

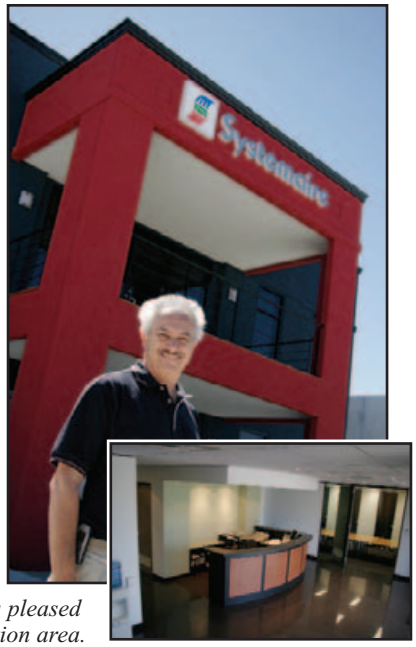
"The entire staff of nine, soon to be increased to eleven, will no doubt enjoy their new 'home away from home', as every effort has been made to house them in a very pleasant working environment," said Tony.

The new premises can be seen from Reid Highway, a main northern suburbs link road giving easy access to the airport and southern industrial suburbs.

One of the highlights is the impressive fitting out of the staff lunch room. Drawing on his heritage, Tony is very pleased with the cappuccino machine.

"Italian, of course," he says with a grin.

● *The new address for Systemaire is:*
63-65 Boulder Road, Malaga, WA, 6090.
Phone (08) 9209 4999.
Fax (08) 9209 4900.



Systemaire's Managing Director Tony Fego is pleased with the new headquarters. Inset: The Reception area.

The new Wellington customer service site for Fantech NZ Inset: Regional Sales Engineer Bruce Gillanders, right, presents a prize to an opening day guest, Tim Rowe of Beca Consultants.

Move boosts customer service in NZ

NEW ZEALAND clients are benefiting from a new and much enlarged Fantech (NZ) Ltd's service outlet in Wellington.

After six years of working from a small, one-room operation, the company has expanded into a warehouse and customer service site in Alicetown, Lower Hutt, about 10km from the city centre of Wellington.

Fantech NZ Manager Colin Moss and Wellington Regional Sales Engineer Bruce Gillanders report that this has given them the opportunity to establish a trade outlet and develop improved customer service for existing and new clients.

"We are selling flexible ducting, grilles, diffusers, louvres, fittings and single-phase fans direct into the market to service everyday needs," said Bruce.

A key point is the introduction of a range of products from Bradflo, specialist manufacturer of air diffusers, grilles, sheet metal fittings and flexible duct, as well as Lorient intumescent fire dampers.

After managing the Lower North Island territory by himself for six years, Bruce has been joined by Enrique Gomez to assist in trade sales and daily running of the warehouse.

They moved in on December 1 last year and officially opened on March 16.

Colin Moss said that selection of the location was strategic.

"A lot of businesses in this area are in the service industry, and our catalogue of over-the-counter products perfectly satisfies their needs," he said.

WOULD YOU LIKE MORE INFORMATION?

Please contact me regarding: ❒ Ezifit fans ❒ Mixvent fans

❒ Please send me a copy of the 2004 Fans by Fantech CD.

❒ Please send me a copy of the 2004 Fans by Fantech Catalogue.

Is there anything else we can help you with?

❒ I would like to be included on the Tech-Talk distribution list.

❒ I would like to be removed from the Tech-Talk distribution list.

Have you relocated? Please help us keep our records up to date by including your new address.

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Company: .....
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Tel: ..... Fax: .....
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Sydney	(02) 8811 0400
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Sydney South	(02) 9153 6005
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