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Ecolibrium

Cape crusader

A coastal project aims to be a change agent.





When you don't know, take it back to first principles

I now work in all building services disciplines and apply the same first principles philosophy. If in doubt, ask.

Eco: Do you have a checklist you always follow at the start of a project? Do you still work on projects, and if not, do you miss this type of work?

PC: I dislike checklists immensely and consider them unprofessional. My thoughts are not shared by a lot of people, I guess. I don't even like shopping lists.

I don't do projects like I once did, but I get involved in determining project directions and solutions for others to design and document. I don't miss the detailed stuff and certainly don't miss the need to coordinate with CAD. And for the first time in 45 years I don't have a timesheet.

Eco: Are you open to new ideas, or are the old ways the best ways? Do you like to collaborate?

PC: Absolutely! I've embraced new technology all the way down the line with the emergence of digital technology for control, magnetic bearing compressors, and even the adiabatic air-cooled condenser. You only have to compare chillers from when I started to what we get now. They used to be the great energy consumer, but fans and pumps have taken over.

As for collaboration, I was in Canada looking at a compressor factory and had been using adiabatic condensers on a project. I suggested to both manufacturers that they should collaborate and build an adiabatic air-cooled chiller. However, there are many places where the old ways remain viable – and sometimes they're the only solution.

Eco: What are your favourite projects you have worked on and why?

PC: In the mid 80s I worked on the redevelopment of Hayman Island in the Whitsundays with no budget and seemingly a bottomless pocket, which was interesting. I didn't design the plant but was involved in the delivery process and had to react

FIRST PRINCIPLES MAN

A love of engineering and an approach based firmly on logic and understanding has helped Phillip Carruthers, F.AIRAH, build a career in HVAC&R that now spans around 50 years. He shares his insights, some stories about memorable projects, and his plans for the future.

Ecolibrium: When did you first decide you wanted to be an engineer, and how did you get to where you are today?

Phil Carruthers: I always wanted to be an engineer! My first idea was to go for automotive stuff designing cars, but I started with earthmoving equipment such as rippers.

We actually developed a ripper for a Caterpillar D9 that cut a swathe six feet deep and six inches wide to simultaneously lay a telephone cable for Telecom. It was magnificent to see working.

I moved on from there to air conditioning in 1969. I knew nothing, of course, but learnt from some very knowledgeable people. The biggest thing I learnt was to listen to everyone, then make up my own mind.

Eco: How would you characterise your approach to work? What are the fundamentals to your philosophy and process?

PC: When you don't know, take it back to first principles. In my contracting days my partner and I established a business line manufacturing very robust air conditioning units for extreme ambient conditions like coke ovens and blast furnaces.

There were no selection tables available, and even normal refrigerants couldn't handle the pressures.

We selected CFC114 and had to size condenser and evaporator coils. So we went back to first principles and sized the coils, TX valve, and so on, then had them checked by coil manufacturers. They worked.

to requests such as: “We need to control humidity so the dacron wall lining doesn’t deform, and we are going have a log fire.” All in the tropics! I could write a book about it.

In my later career working out of the Sydney office I was involved with determining the future of the chillers in the Opera House, and that was a good feeling.

Eco: Whom do you admire and why? Do you have a mentor? Do you gain any satisfaction from mentoring others?

PC: I could be trite and say Willis Carrier and James Harrison, but the man who impacted my life more than anyone was my business partner in the 70s and 80s, Ken McKenzie. He was the most practical and knowledge man I knew.

Moving into consulting, I took a lot of knowledge from my then-boss Russell Brothers, but admired David Norman, the quintessential engineer.

I try to mentor whenever I can. It’s a problem we have in this industry – when someone leaves their knowledge is usually lost. In my previous career I ran cross-discipline training sessions to give engineers from other disciplines an insight to mechanical services, etc.

Eco: Are there interesting, funny or quirky stories you could share with us about your work and what you do?

PC: In the 70s, when my firm won the refrigeration maintenance of a club in Newcastle, they called us after a month questioning why we hadn’t been there to top up the refrigerant. Seems the previous guy had them convinced that refrigerant was consumed. He wasn’t lying! When we looked at the plant there were so many leaks that he did have to top it up regularly.

One of my common questions is “why did you do that?” I said it quite often in London when I found things like three large chillers served by one condenser pump, one chilled

water pump on the leaving side of the chillers, and no valves or speed control. It’s very common in the UK and works well for heating but not for cooling.

One of those moments arrived when I was asked to comment upon an air conditioning system for a detonator factory. The process was that detonators arrived in 1kg boxes and the process workers had to fit the bit that made it go bang and seal it. So each workstation had 1kg of high explosives on it. If the humidity was high, moisture would affect the detonator and it probably wouldn’t go off. If it was low there was a distinct risk of static electricity setting it off at the desk.

The engineers’ solution was to use packaged units with three row coils and start a second unit if the humidity was high. Of course, with twice the amount of air and cooling happening the humidity went up. On the same site the engineer had installed a process cooler (high sensible load machine) into an underground storeroom where the only load was a 100W lamp. He used the unit because it had humidity control usually used in a computer room.

“Why did you do that?”

Eco: What advice do you have for emerging engineers who wish to follow in your path?

PC: Very simple: listen to everyone, consider what you hear, then make up your own mind using first principles. The computer is not always right!

Eco: What’s the most important lesson you’ve learned throughout your working life?

PC: Everyone knows something – some more than others! I’ve learnt from everyone around me and I’m still doing it. Learn the first principles of your industry, such as how refrigeration actually works, and discover that Willis Carrier did work out how air reacts to heat energy. If you know how to use a psychrometric chart and understand

refrigeration you can solve most problems in air conditioning using logic.

Eco: What’s next for you, and what are your goals for the future?

PC: I’ve tried retirement and failed! I enjoy what I do with the top end of the property industry in Australia and New Zealand, so my goal is to keep working.

Eco: What does AIRAH membership mean to you?

PC: I was thrilled when I joined AIRAH in 1972 and it was an honour to be national president in 2003. I’ve taken a lot from AIRAH membership and I like to think I’ve put back. Anyone who works in this industry should be an AIRAH member and contribute to it.

Eco: Describe yourself. What are your defining characteristics?

PC: I don’t abide fools very well (“Why did you do that?”) but I’m mellowing. I like being able to educate people in our industry and hope I can keep doing it.

Eco: If I wasn’t an engineer, I’d be a ...

PC: An engineer! Can’t really think of what else I’d do.

Eco: Do you have hobbies or diversions?

PC: Very few. I enjoy theatre, opera, ballet, and driving fast cars.

Eco: My most valued possession is ...

PC: My health. I hope it hangs in there.

Eco: Tell us something about yourself others might not know.

PC: I’m an open book. Most people think I’m a wine snob, but I’m not really!

Eco: In five years I’d like to be ...

PC: Still working or living in the south of France. ■