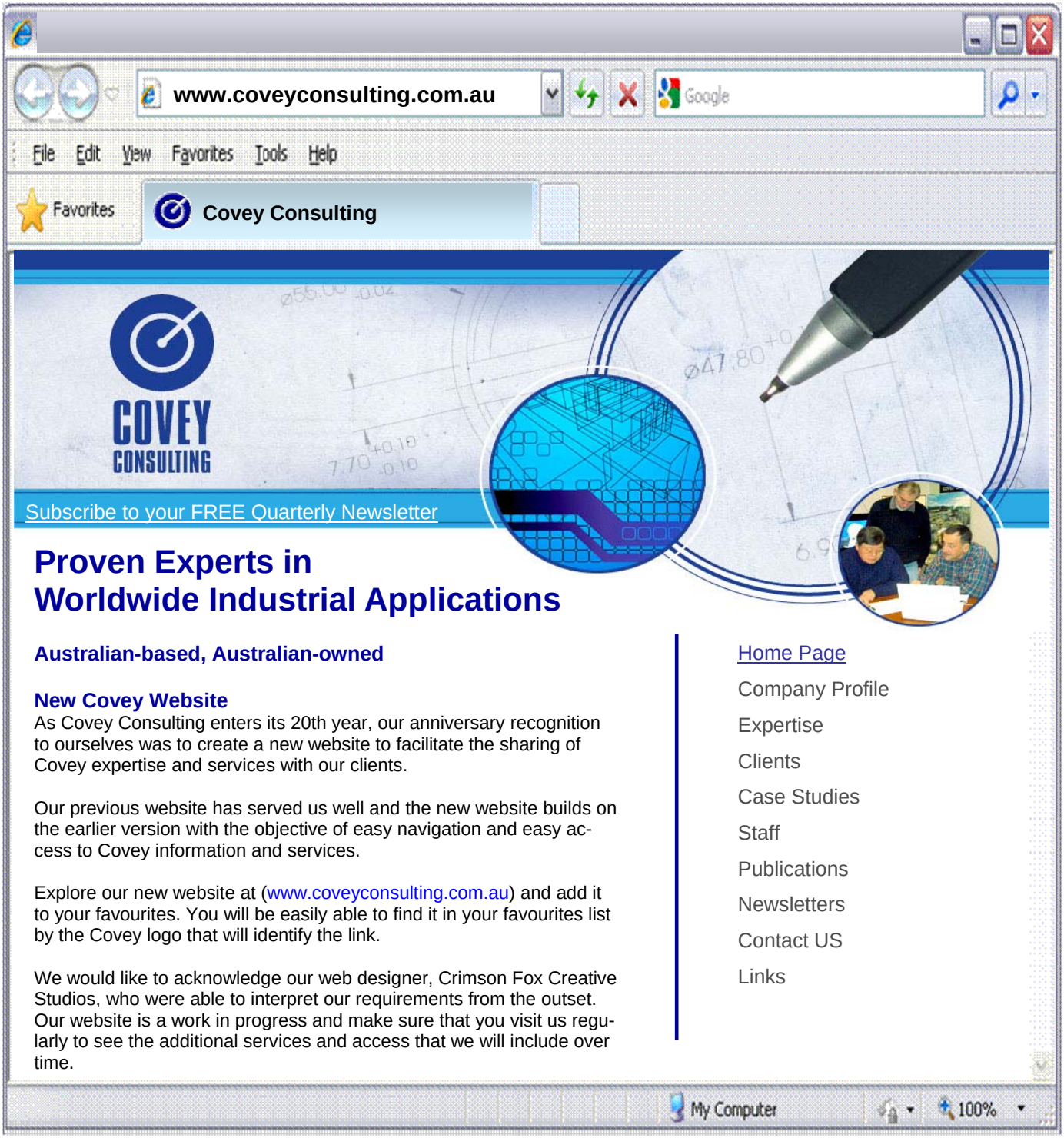
Covey Consulting News

Serving the industry for 20 years: 1989-2009

September 2009

Covey Consulting Website Update:



Instrumentation and Control, then and now, 1966 to 2009

Alan Harvey

Joining CC in 2007 after some decades at RMIT , it was clear that Instrumentation ie control systems seemed to have changed markedly from my early Instrumentation career in the 60's. After graduating from RMIT in 1965, My first position was with APM head office designing a speed and draw measurement system. After a year at the Southgate HO, I moved to my new work-place at APM Fairfield. I became very familiar with air operated transducers, controllers and in particular pneumatic ally operated control valves. Foxboro, Taylor Instruments and Fisher control valves were the main suppliers to APM at that time. The instrument air compressor and dryer for the mill were of great concern and were worshipped daily with checks of air quality and many other operating parameters. With almost every control system pneumatically operated, this was clearly a very reasonable approach. The operating range was 3-15 psi which somewhat later morphed into 20-100 kPA when we moved into the metric age. Higher pressures were used for the positioners for larger valves. Fairfield 6 was, I believe the first APM mill to use electronic controllers by Foxboro. Foxboro originally used 10-50 mA for control signals but later fell in line with the 4-20 mA standard used by everyone else.

After a few years at APM, I moved to BP Australia at their Crib Point refinery. This refinery, built in the early 60's processed middle east crude oil until Australian crude replaced it in the 70's. At BP, Taylor Instruments reigned supreme. All controllers were electronic and only the valves were pneumatically operated. The Crib Point BP refinery near Hastings in Victoria, had a deep water port from which oil tankers discharged their cargo which was then pumped to the refinery, about a km away. Leaving BP and Australia, after two months touring Europe, I did the right thing and rejoined BP on a refinery construction project in Grangemouth, Scotland. The project was to build a 100,000 tons/pa oil refinery which was considered quite large at the time. There was also a Xylene plant and a very secret oil to protein conversion plant for animal food under construction. Winter was challenging up there. We went to work in the dark and came home in the dark, daylight reluctantly appearing between 10 and 4. On the other hand the summer days were very long, reading a newspaper around midnight by daylight was quite possible.

Returning to the present, it was clear many digital protocols and digital bus types have emerged over the last few decades. Hart communication protocol, Profibus and others have emerged, some associated with particular manufacturers, E.g. Siemens, others maintained by standards groups. However the 4-20 mA standard has survived and is a standard input in many control system hardware systems, eg variable speed drives. New companies are now on the scene, In the 60's , Taylor, Fischer + Porter and Foxboro were the major players. Now, Invensys, Krone and ABB are the major control and instrumentation companies.
However, some of the original instrument companies are still in business. For example, Foxboro is now a part of Invensys, thus validating Confuscius's saying, "Everything Changes but remains the same. "

Final Operators, Control Valves versus Variable Speed Drives.

Of particular interest was the change in final operator technology. In the 60's, control valves were almost a standard method of control. The fact that they worked essentially on an energy wastage principle, required an air supply and were quite a considerable fraction of the control loop cost was hardly considered. Currently, semiconductor based variable speed drives (vsd) have to a considerable extent displaced the control valve. These operate on the electrical supply frequency to the pump and vary the pump speed to control fluid flow, thus conserving energy. Instrument air supplies are not required and ongoing energy efficiencies are an important factor in design considerations. Even for processes using control valves, electric motor/leadscrew systems are commonly used by some valve companies. These are relatively slow compared with pneumatically operated valves. Typically, an electric actuator may take 30 seconds to close a valve whereas a pneumatic valve can typically close in approximately 3 seconds.

Controllers.

Separate analog controllers have now disappeared entirely inside digital programmable logic controllers, (PLC) which is really a microprocessor based

system similar to a PC. Cards for input and output signals take in electrical signals from measurement transducers, convert them to digital form which are then passed to the microprocessor. The control algorithm executed by the controller generates control correction signals which are then transmitted to the final operator via an output card.
The output card converts the output signals back to analog form which are then sent to the final controller, a variable speed drive or control valve. Different outputs such as pulse width modulated signals can be supplied for certain equipment. Again new players have appeared on the scene, including Allan Bradley, Rockwell, National Instruments and Siemens. PID control is still the dominant control algorithm but more sophisticated algorithms using feed forward control or model predictive control can be implemented more easily on PLC's.

Measurement Transducers.
Pressure, flow and temperature are probably still the backbone of process industry control systems. However many new methods are now used to obtain these measurements. Many new flow measurement systems have appeared on the market. Mass flow systems using the Coreolis effect are available and even flows of mixed phases, liquids and solids can be gauged. New techniques are being used for transducer ranging. For example pressure and differential pressure cells can be re-ranged using software rather than direct re-calibration.

A new type of pressure transmitter is now on the market which uses semiconductor techniques. These units have range limitations but for certain applications, work very well and are extremely cost effective, at around a quarter of the price of older diaphragm based force or motion balance systems.

Displays.
In the 60's elaborate graphics panels mimicked the process plant at considerable cost. Currently, flat panel displays can show process diagrams, graphics, recorded outputs and trends in variables. Changes in the process may be accommodated by re-programming the display programs.
The flexibility of what may be displayed and the options of selecting and displaying variables are clear advantages of flat panel displays driven by a program resident in a PLC. Also being indefinitely reprogrammable, the ability to adapt to process changes is a considerable advantage over physical graphic panels. Multiple flat panel displays may be used if necessary to display for example a mimic diagram for the process plant on one display and time displays of process variables on the other.

Summary.
Control systems now have more flexibility and a wider scope than ever before. The computer and power electronic systems have played a major part in this change. Programmable controllers, electronic variable speed drive systems and semiconductor based transducers are an important part of modern control systems. On the opposite side, higher skill levels, particularly software skills are required to make some changes, eg to reprogram a graphics display. This is changing with some suppliers, developing drag and drop programming for their products. Some measurement options are very new, eg mass flow systems and Doppler radar based.

$e^{i\pi} + 1 = 0$

This is an equation I came across rather late in life which was proved by the Swiss mathematician Leonhardt Euler in 1729. I can't get my mind around it, but apparently you can prove it using Taylor expansions and the i terms cancel out somehow. It has been voted "the most beautiful equation in mathematics" as it ties together e, π, -1 and 0.

It can evoke rather mixed responses as follows:

"The most remarkable formula in mathematics". Richard Feynmann - Nobel Laureate in physics in 1965 for his work on quantum electrodynamics*. Also an expert lock picker, bongo player, and all round good guy.

*For those of you (like me) who are not familiar with this topic, quantum electrodynamics is best defined as "something that makes your head hurt just to think about it".

A feeling of awe: $e^{i\pi} + 1 = 0$?!!?? Therefore God exists! From a sometime mathematics student who went over to the dark side (IT).

And lastly, the Australian yobbo "If it's equal to nought, what's the use of it??"

Reg Harvey

You heard it here first!

On 12th and 13th August the story appeared in every major news site that Neanderthals shared with modern humans a distaste for brussel sprouts
(see e.g. http://www.france24.com/en/20090812-neanderthals-wouldnt-have-eaten-sprouts-either).

The story said that researchers at the University of Barcelona under Prof Carlos Lalueza had discovered that Neanderthals and some (presumably the most intelligent) humans have the gene fragment TAS2R38 (not to be confused with TASR39) which makes the person dislike the bitter taste of phenylthiocarbamide (PTB)– the substance that gives brussel sprouts their revolting, bitter taste. The dislike of PTB is fundamental to the survival of the individual, as many vegetables that taste bitter are poisonous (including brussel sprouts!?). Therefore, losing this sense (both meanings of the word) should not be a survival trait.

What a pity that this work came so late. If only they had read COVEY CONSULTING NEWS of December 2008, they would have seen a learned article on the revolting nature of brussel sprouts. There they would have learned the nefarious (and indeed counter-evolutionary) process by which some people were selectively bred without the rational and potentially life saving hatred of brussel sprouts.

Once again, Covey Consulting was first!

COVEY CONSULTING ENTERS AGREEMENT WITH BIOINDUSTRY PARTNERS

Covey Consulting is pleased to announce that it has recently entered into an agreement with BioIndustry Partners Pty Ltd (BIP) to offer a range of services across the biofuels, bio products and biomass processing industries.

BIP was established two years ago by Dr Graeme Bullock, Prof Margaret Britz and Dr Les Edye to provide services including:

- strategic planning for research, development and deployment,
- technical auditing,
- business planning,
- R&D project management and facilitation,
- advisory services for grant scheme applicants expert witness services.

BioIndustry Partners also advises on business sustainability, emissions reduction strategies and life cycle assessment outcomes.

These skills will be coupled with Covey Consulting's expertise in business planning, project management, process design, chemical analysis and biomass processing to offer an Australian based 'one-stop' service for most types of bioindustry projects.

More details in the next issue of Covey Consulting News.

In the meantime contact Covey to see how we can help you.

The editorial committee invites contributions to the Covey Consulting Newsletter, on topics of current/future interest, from interested parties. Submissions/enquiries can be made by email on: enquiries@coveyconsulting.com.au

A Guide to Low Cost Sourcing – and have all your Christmases come at once!

Low Cost Sourcing is the current buzzword in purchasing circles. And no, it does not mean all previous purchasing has been high cost – although there are views along those lines in some corporate circles from time to time.

What it does refer to is the apparent bargain prices for supplies and materials purchased from overseas (read non EU/North America) vs. locally manufactured or those imported by brand name agencies.

This is not an unfamiliar story of course; fifty years ago "Made in Japan" had a certain reputation for unknown brands, unknown quality but a good price.

But the dictum of "pay for what you get" remains largely true for any low-cost sourcing. A very cheap product is likely to have a cheap performance, whether it be a one-wash T-shirt or an electronics knock-off. But it may still be fit for purpose. So one of the many challenges for a buying organisation has been to understand that and make the conundrum work for them.

Naturally, the opportunity for low cost manufacture is not restricted to fakes. Many Brand Names in retail markets have used fine quality manufacture in those same low cost countries. Not that these are necessarily sold cheaply in western retail outlets – after all there is a Brand Name (and margin) to protect.

What is interesting is the emergence of low-cost sourcing for manufacturing and process industries. With ever tightening constraints on capital and maintenance budgets, exacerbated by the GFC, organisations are now considering the unmentionable option of buying non-brand name products and materials.

In fact, the brand name suppliers to manufacturing industries are already out there in low-cost manufacture lands. But their model has not really changed. That is because industry in Australia has largely used technology and products designed and manufactured in Europe and North America and relied on the reputations that comes with the established brand names. In some ways this has come at price. The product quality, excellent service and support and access to new products here, all costs money. Historically industry has happily paid all this in the cost of the product.

Naturally, any supplier will do whatever the customer wants as long as they are willing to pay. And as the suppliers say, correctly, buyers should not be concerned about the source of a product as long as it has the same quality and performance. This does not mean suppliers necessarily pass on any savings (see above). But it has been a great relationship – products that work, leaving the local manufacturer to focus on their business.

So far, this is hardly low-cost sourcing as far as the customer is concerned. But now the paradigm is starting to shift. The reality is that countries like China do make products to the best international standards. So why not source directly? Do you need the local support that was thought indispensible? Do you have to purchase on the brand name? If the savings are large enough, then these are all real questions. And seemingly, the answer is savings – numbers up to 40% cheaper than the traditional suppliers are bandied around.

But how can you capture the savings with acceptable risks? Let's start with risk. Production and engineering staff avoid any more risks then they already know, preferring to reduce risk or at least pass it onto another player. Their focus is that of management – reliable production of saleable product. Further to the risks in performance, low cost offshore sourcing can carry additional risks, such as support and service requirements.

A significant element in total risk is perceived risk – in practise quite a rubbery concept, flavoured by personal prejudices, relationships with existing

suppliers, causing more work, and "if it works why change, when the savings are small in the total cost of production". In recent times, the cut backs in maintenance and capital budgets have magically changed these perceptions. Of course the elimination of perceived risk is achieved anyway when senior management simply say it is going to happen. Yet, without buy-in from the actual users of a new or different product the chances of acceptance and realising any purchase savings will be difficult in many ways

So, assuming the usage risks are known and accepted, how about capturing savings from low-cost sourcing? The point of maximum savings is when the product is at the factory gate in China or equivalent low-cost country. Deduct now the total cost of shipping to your site in Australia (including insurance, freight, taxes, fees, duties and currency). And consider the real or potential further costs to the business of:

- Manufacture and shipping times,
- The enforcement of performance guarantees,
- Payment terms (e.g. payment upfront may be required), and
- Long-distance stock, repair, service and spares issues.

Not that these additionals are unique to low-cost countries, or different from sourcing already being done from further back in the supply chain than the easy Free-In-Store. But they can be more complex than traditional supply lines. The temptation to take the lowest possible cost by dealing directly with the source country has its challenges.

With the globalisation of economies and markets it makes sense that businesses purchase what they need at the lowest possible cost to remain globally competitive. Where input products do not have the advantage of local manufacture, a targeted look at low-cost sourcing will allow more competitive manufacture at home.

The low-cost sourcing concept is now well established and practised, which says either that it is a value proposition despite the risks, or that a lot of people are going to come a nasty cropper.

There are several ways of approaching low-cost sourcing, each coming with different levels of cost and a risk. Bearing in mind the two are not always in a simple relationship. Higher cost and higher risk is not the most desirable outcome. Assuming you are still proceeding, here are some purchase options:

- Direct from the offshore manufacturer
- Own purchasing representative in the country of manufacture
- An agent in the country of manufacture
- An agent in the customer country

These alternatives are not mutually exclusive. The best low-cost outcome depends on the sourcing requirement.

Direct purchasing

If you know what you want and where to get it, direct purchasing from the manufacturer may well yield the best price – but not necessarily. There can be different prices based on relationships, as well as domestic and export pricing. A cold call from outside the Middle Kingdom yields just the starting price.

But more important than the price at this stage is to know what you are buying. In the manufacturing powerhouse of China, there are always several suppliers who can seemingly meet your needs. This is a risk, without prior knowledge of the company and the product. Requiring payment up front, before delivery is not uncommon. Then you have to organise shipment to Australia. What is a guarantee 8,000 km and train ride away really worth? These may not be actual risks but you need to be aware of the issues.

In the first instance, products that require after-sales service or parts are at greater risk than one-offs. But as always, and particularly in China, it is about relationships, especially when based on repeat business. That is how issues are minimised.

Own representative in-country

This approach is effective for larger companies who are continuously sourcing a range of products and shipping to Australia.

The key is the right team on the ground and including local staff. Best value is from using the local business know-how for sourcing. The in-house team can communicate the specifications, do all the site and quality checks before and during manufacture, and facilitate shipment. This has huge advantages for pricing, reliability of supply and backup. It just comes at a set-up and operational cost,

but can be justified, as demonstrated by many successful examples.

Agent in-country

Again this all comes down to relationships. Who is the agent actually representing – you, manufacturers, others? How responsive will they be? While that may not matter most of the time, in a crunch you need their commitment to you. Potentially this has many of the advantages described above, but without the cost of maintaining your own company specific representation. And while agents clip the ticket on the way past, get it right and it is a cost well worth paying.

Home country Agent

This could be slightly more expensive (greater agent margin), but more secure and arms-length – and still overall a very attractive option. Firstly, the agent may be more accountable under Australian commercial arrangements – for example guarantees or payment terms. Depending upon the agent's business model, and the customer needs, there could be the further security of service and spare parts here. As a minimum, customers expect this agent to source and deliver the products to their sites – that is supply chain responsibility. Then there are the relationship intangibles - agents have a vested interest in keeping local customers happy – they need a good reputation and repeat business.

The home country agent ultimately is back where we started. Providing a more complete supply and service to meet customer requirements – at a price. Not unexpectedly, the established brand agents are moving towards their own low-cost sourcing offerings in reaction to the above models.

The case for nudism

Geoff Covey

A moment of idle reflection led me to realise that there are many benefits in becoming a nudist, and as I thought about it some more I began to wonder why anyone not living in Alaska or similar climes has not become one.

The only conclusion that I could reach was that most people have not recognised the benefits, so I feel it my duty to share them with you.

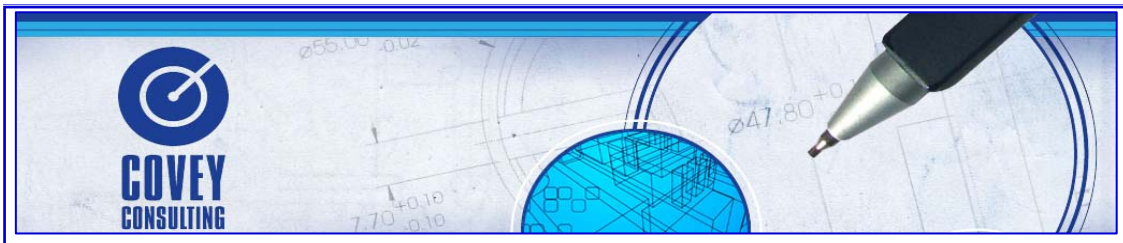
Good things once you are a nudist:

- You do not have to wash clothes, hang them out to dry, fold them, iron them and put them away.
- You free up vast areas of cupboards and chest of drawers that can now be put to more useful purposes such as storing old magazines, presents that you will never use but don't want to throw away (because they were presents) and items that you are not using at the moment but which are sure to come in handy one day.
- You do not have to worry about changing fashions. You are born with one style of skin and it will be as much in fashion when you die as when you were born.
- No one ever buys you socks or bed-jackets for Christmas
- Skin never wears out and you never have to go shopping to replace it.
- Ladies do not have to worry whether their blouse goes with their shoes – skin goes with skin.
- Men do not have to worry whether they can get away with wearing this shirt for just one more week – you always keep wearing the same skin.
- You don't ever wake up in the morning and wonder what to wear – it is decided for you.
- Never need to worry about finding two socks that match when you are in a hurry – you always know where to find the skin on your feet.
- You automatically learn how to keep away from thistles, nettles, thorns and ants.
- No one ever says to you "You cannot go out wearing that!"
- Your teenage children have no way of shocking you with their dress.
- Your younger children will never miss the school bus because they took too long getting dressed.

And I bet you thought that the list was going to be full of comments about eye-candy and lascivious opportunities didn't you?

Certainly not!

When you get to my age the best chance for romance is to display as little skin as possible.



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