

The Fascination of Industrial Engineering

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A “Rose by any other name” springs to mind as soon as we use the collective term Engineer to rally round the flag. Engineering feats abound in history though the earliest are recalled in architectural masterpieces that remind us of past civilisations of which we often only have the vaguest of ideas. The term itself, of course, comes from “Engines of War” in times of the Roman Empire where large blocks of stone were hurled at fortifications as a more direct method than “sapping” the strength by undermining them by digging away at the base.

Using a favourite definition of engineering as “The Art of Skilful Approximation”, engineers were always in the forefront of solving practical problems. Elitism nearly always pervades any profession so one could claim the loss of leadership of any particular branch of engineering is heralded when the incumbents try to expel any newcomers by many and varied means. It is to the credit of our discipline that we have never gone down that path and the writer is happy to recall two personal meetings with one of the founding personalities, Lillian Gilbreth. To our great credit we have always led in welcoming women to join our ranks. Our discipline gained some fame and/or notoriety by a couple of popular cinema films. “Cheaper by the dozen” in America and “I’m alright, Jack” in Britain over half a century ago. However, we always had a review of the language of management, money, in our equations whether the task was pursuing scheduling, sequencing, logistics, asset management, etc., or just plain time and motion.

Returning to the theme of our name, it is essentially twentieth century, and we are now in the twentyfirst, so maybe we look for a change?. The War Engineers led to the Civil Engineers. When the British version of the latter decided that George Stephenson could not join them, the engineers in the railway sheds at the base of the Lickey Bank, where it needed a second steam engine to climb the embankment leading up to Birmingham, formed the Institution of Mechanical Engineers with G.S. as its Foundation President.

Some decades previously, Napoleon had already decided how useful these specialists were and set up the French Public Service system via one of the more elitist examples in the whole of educational history. The top level went to the Taxation department but the Ponts et Chasseurs (yes, bridges and roads) came way ahead of medics, architects, lawyers and the like. Perhaps a funny name by today’s standards but French engineers are still up there in atomic energy and aerospace.

Not named as such, but Industrial Engineering was developed first in America where, as in other countries, it blossomed into such groups as Operations Research. The British perhaps beat them in that particular aspect with Operational Research during WW2, but the earlier establishment of the Institution of Production Engineers was nearest

to our bailiwick. This later amalgamated with the Institution of Electrical Engineers that today is the UK’s Institution of Engineering and Technology. One of the unmentioned aims was to open up their ranks to the engineers who may not have gone to universities before joining the workforce but who satisfied the requirement of gaining academic qualifications and solving practical problems.

The first University Department in England and maybe Europe, but the author made no check up in Estonia, was that of Engineering Production at Birmingham. The words were reversed because of common associations with “suds and swarf” (a.k.a., metal cutting) implied by the other way round. The writer joined the Department to run a “Research Productivity Unit” to investigate what had happened to the industrial heartland of Britain contained by the West Midlands Area. The 1956 Survey of Industrial Production had been established on a decadal basis to complement the Survey of Population that had been established half a century earlier; and results showed a decline of some 3%! Several masters’ theses and at least four doctoral ones later, we came up with the solution. It was an Australian who put his finger on the button – the ‘decline’ was a relative position occasioned by the post-war boom in electronics and white goods that had centred on the south east of England. The West Midlands had merely ‘trodden water’, only later handing over metal fabrication such as building motor bikes and cars to Japan.

Perhaps the main naming phenomenon that came out of that was to gain the idea of Productivity as the target, with improvement as the constant challenge. The writer was presented, concurrently, with a different challenge: to design the first tertiary university course in the world in Quality and Reliability Engineering. With the aid of technical directors of firms such as Rolls Royce Engines and Lucas Aerospace this was done between 1962 and 1964. When it came to running this post graduate, post experience course we canvassed internationally but found nobody with both the academic and industrial credentials necessary – other than the person running the Productivity Unit who was keen to get back to Industry anyway. Some sixteen years later it led to the Caulfield Institute of Technology and heading up the new degree of Industrial Engineering, so no regrets are in evidence. In between it had led to many other venues and avenues that included setting up the first masters’ course of Industrial Engineering in Brazil at Rio de Janeiro – but we won’t go there.

Coincident with the current celebration, it was in 1958 that the Institution of Production Engineers decided to write a history of mass production. This stemmed from the then Hazelton Memorial Library Committee which also spawned the International Journal of Production Research, still running today as one of the leading journals in our area.

Direct origins of mass production went back further than Oldsmobile and Ford, which in any case were based on the Chicago stockyards, to Christopher Polhem or Polhammer in Stiersund, Sweden early in the eighteenth century. Unfortunately his production of a range of kitchen utensils was based upon wooden machinery and, over on the other side of the North Sea, a revolution was going on with the use of coal and iron.

Historically the manufacture of ships' blocks during the Napoleonic Wars is well documented and occurred near the site of the Woolwich Arsenal, near London. Various other examples went on in the nineteenth century, often in America and associated with clocks and firearms that included the Colt revolver, the demand for which was boosted by the Crimean War.

Obviously nobody could go back to interview the participants of such industrial examples but there was a possibility to consider the development of the small electric motor, as in the heart of the vacuum cleaner, for instance. Living almost next door to the Hoover factory in Perivale¹, the author was charged to investigate.

Technical changes to the production methods had occurred in an evolutionary manner on a frequent basis, and usually at the inspiration of the foremen and charge hands on the shop floor. Regrettably most of these innovators had retired and any records had disappeared. After about fifteen months of determined effort the whole idea was shelved.

The next step was a reflection dating back to Christmas 1945 when people were queuing up outside a shop in Piccadilly to purchase the new invention of "The pen that can write under water" made by the aircraft firm Miles-Martin². At about five pounds ten shillings this was a lot of money in those days, but it sold in a purchasing frenzy³. In October 1945, a similar instrument based on the Eversharp/Eberhard patent, the owners of which had failed to register in the USA, had gone on sale in New York as the Reynold's Rocket at the price of US\$12.50 (about US\$160 today) and they sold over US\$100,000 worth on the first day at Gimbel's department store.

By the time that the above deliberations to review a history of the ballpoint pen had taken place⁴, the French Baron Bich had entered the market and pencils were disappearing from public servants' desks at an alarming rate, which incidentally involved disastrous effects on the "lead" pencil and fountain pen⁵ industries. So an effort to review the history of the manufacture of this ubiquitous device was started, again by the writer.

Several alternatives to the derivations of the quill pen used in monasteries started to emerge in the late nineteenth century. Felt tips, later to be revived and still going today, made an early appearance but it was attempts to incorporate a rolling ball that held most promise.

In the 1930's Hungarian Laszlo Biro started the quest, and we still honour his name, as he and his brother Georg took out their original patent in 1938⁶ and again in 1943 after they had emigrated to Argentina in 1940. Because it did not leak at higher altitudes, the RAF later bought the licensing rights of the capillary action pen to use in fighter aircraft during WW2.

Of some interest to engineers, there were two major problems the solutions to which became closely guarded trade secrets similar to the formulae for the Coca-Cola and Schweppes recipes. They were so secret that neither was patented. These were the constitution of the oil-based ink and the mechanism for peening the end of the supporting tube around the ball bearing. M. le Baron Bich's organisation solved the latter and the constitution of the ink was slowly developed by several firms. Notable research also went into ancillary aspects such as the production of the small 1mm ball bearing, later to go down much further, by firms led by Hoffman's of Chelmsford.

For the reason that competing firms struggled with the solution of the two major problems, the ballpoint pen had a somewhat chequered commercial history before becoming the world-wide cheap solution to writing that it is today. Pens were often difficult to start making a line and difficult to stop leaking onto garments. Irregular lines with imperfect balls and general "overselling" of its capability made most consumers become disillusioned with the invention. But it stayed the course and is now universally accepted.

Parker pens re-invented the product with their "Jotter" in 1954. This had large capacity ink refills, various ball sizes and, above all, quality and reliability that justified its high price. BIC[®] also solved the reliability with a much simpler design and its "Crystal" has stolen the world market by now selling tens of millions per day.

The story of the ball-point pen may have been recorded elsewhere but hopefully this gives one account of pursuing an aspect of our discipline's history. May there be many more!

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1 Now a listed building and a head office for Tesco Co. Ltd.

2 The vital ink-holding chamber had four turns of a copper tube.

3 The Waterman Exception Ballpoint Pen has a RRP of £155.00 today.

4 In 1964/5

5 The American firms of Parker, Sheaffer and Waterman (owned by BIC[®]) survive making up-market fountain pens and ballpoints. Though the fourth firm that dominated fountain pens until the Biro appeared, Wahl-Eversharp, amalgamated its pen division into Parker's in 1957 but was liquidated in the 1960's.

6 The principle of the ballpoint pen was patented by John L Loud in 1888 to mark leather but was never commercially exploited.

Looking Forward: A Possible Future for IIE in Australia 2008-2058

Dr. Damian Kennedy, IIE Federal President

BACKGROUND TO THE IIE

The Role of the IIE

The hallmark of any organisation is the leadership it shows within the society it operates.

So, how well has the IIE lived up to this standard in its first 50 years of existence? The answer is none too obvious...Yes, the IIE still exists today, but how well has it served its purpose? How well has the IIE helped Australian society meet the challenges it faces? Like any good organisation, the IIE can only really justify its existence if it helps the society in which it operates to meet the challenges that society faces and to most effectively and efficiently aid that society to excel in the attainment of those goals that society wishes to achieve.

The IIE does have a proud history of achievement in Australia. As mentioned in Lex Clark's article "An Early History...", one of the founding fathers of the Australian Methods Engineer Association (forerunner to the IIE), Mr. Chris Heyde showed exactly such leadership – not only in convening the AMEA's foundation meeting and giving the AMEA its first constitution, but also later to develop and present to the world a new and innovative approach to the setting of time standards – MODAPTS. The 'Heyde Prize' is still awarded in Japan today in recognition of this Australian IE pioneer!

The willingness of the early IIE to engage with the world is also evident. AMEA engaged the famous Dr. Lillian Gilbreth in publishing a world-exclusive feature article in its very first edition of the forerunner to this journal, *The Methods Engineer*. The early IIE was certainly not backward in coming forward! It showed real pioneering leadership.

In 1958, the AMEA had achieved its objectives and the organisation then emulated what was "happening overseas". This, to me, shows 'followship' and not leadership! The 'broader' overseas-inspired "Industrial Engineering" was to be adopted as the local mast head and subsequently the older "methods study and work measurement" groups were consumed within the new 'IE' and, as reported by Clark, were labelled 'para professionals' within their own organisational ranks! Perhaps it was time for this to happen but arguably not so, as it was not until the early 1960s that the MODAPTS system was launched. However, as MODAPTS was not the American-backed MTM preferred method of synthesising time standards, MODAPTS almost became lost.

There is a powerful lesson to be learned here and I will return to this later.

Membership of the IIE

Membership of any organisation reflects what the organisation means to its members.

The membership of the IIE grew with the modern industrialisation of manufacturing during the Menzies' Government period of the 1960s and peaked in the early 1970s. Membership is reported by Clark to have peaked at 1,365 members in 1974. Following the Whitlam Government decision to reduce tariffs 20%, steady decline in IIE membership reflected steady decline thereafter in Australian manufacturing as a percentage contribution to overall economic growth. With few exceptions, this trend has continued to this very day.

The low point in membership numbers of an independent IIE was 784 recorded in 1993 (Clark). Joining Engineering Australia (EA) (nee: The Institution of Engineers Australia), the IIE effectively surrendered control to the policies and practices of EA. This, again in my view was an act of "followship", with disastrous results for the IIE. Membership plummeted to all time lows.

It was not until the leadership of the IIE under the Federal Presidency of Mr. Derek Andrews in 2001 that the IIE regained its needed independence. Whilst still retaining its IES (Industrial Engineering Society) status as a technical society within the EA, the IIE adopted its own constitution and self management of its affairs – both organisational and, more importantly, financial. Membership numbers, however, were stagnant with little net gain between new members joining and established members leaving the IIE.

Membership in the IIE has modestly increased under the current IIE leadership since 2005. Today, overall membership has increased approximately to 370 members. This resurgent growth has primarily been driven by new student memberships through the Monash University Industrial Engineering and Engineering Management undergraduate and post graduate programs. Any lessons to be learned? Plenty!

And, none so more important as to maintain strategic relationships but never at the point of surrendering one's own independence.

Governance of the IIE

The IIE, as with any organisation, cannot be immune to applying the fundamental principles of industrial engineering to its own structure, organisation and management – In fact, in the application of the fundamental principles of industrial engineering, the IIE itself must be a leader.

All Australian state and territory members are represented by their local President / Secretary / Treasurer group and all IIE Directors are nominated and elected from the overall IIE membership. All Federal roles are also decided by nomination and election.

Travel and accommodation costs are minimised by bi-monthly telephone-conferencing and only at AGM time is a fly-in, meet, fly-out, same-day event organised on a yearly basis.

All formal positions within IIE are filled by volunteers. No one person is paid for services rendered. Cost recovery of expenses incurred in undertaking official and Board-sanctioned IIE duties are, understandably, recoverable but even these are carefully scrutinised and capped on an average yearly basis. All financial outgoings are via double-signature (Secretary, Treasurer) IIE cheques. Full transparency of all IIE financial transactions is via posting of all ASIC-compliant and independently-audited financial reports onto the membership-section of the IIE Web site (iie.com.au).

Having said all that, the most important aspect of good governance is a continuing sharing of goodwill among those elected to serve the IIE. This, I am happy to say, has always been my personal experience and to my fellow IIE members, I say, thank you. Of course, one is bound to meet a few “characters” along the way as Bob Watson so reminds us in his “IIE Memoirs” previously referred to.

Any lessons here? Yes. There is no substitute for good governance. This can be guaranteed if decision-making is well informed by a well respected and adhered-to constitution, of which the IIE can be proud. The IIE has an efficient and well structured *modus operandi*. Of course, having some jovial moments along the way helps the good-governance process!

IIE Activities

The true strength of any organisation lies with the active members themselves.

Bill Murrell’s “Memories of an Industrial Engineer” covers a myriad of experiences – active in industry (practitioner, consultant), academe and the IIE. However, Bill Murrell may be the exception. That is, can we expect all IIE members to have a bend towards such a fulfilling engagement with such a wide variety of endeavours? Evidence (and theory) suggest not. If all members of the IIE were to be “Bill Murrells”, the IIE would be world-renowned! There would be nothing the IIE could not do including solving all the world’s problems!

Being active in a highly visible way, however, is not the goal of all IIE members. It must be recognised that the IIE

meets the needs of some of its members simply by “being the IIE”. Membership to the IIE provides the legal legitimacy some seek in recognition of formal IE qualifications, particularly those who have graduated in IE overseas and now wish to work and practice as IEs in Australia, and to call Australia ‘home’. Such members happily pay their yearly subscription and that’s it. And, as far as the member’s view of the IIE is concerned, “job well done”.

Without being too academic, however, the lifecycle of the more typical IIE member often reflects the classic life cycle of any product/service or process!

Phase 1: graduate (in) IE, Phase 2: early IE career, Phase 3: mature IE, Phase 4: “retirement”.

The need of the IIE member often reflects where they are at any point in their IE life-cycle. The new graduate needs ‘opportunities to gain practical experience’ (jobs), the early-career IE needs ‘opportunities to grow’ (gain further professional knowledge and career-advancement opportunities). The mature IE wants “help” (to acquire and manage new IE graduates to handle his/her ever-increasing levels of responsibility) and the Phase 4 IE often seeks opportunities to “give back” (mentor young people by passing on invaluable knowledge gained through a lifetime of learning from their own many experiences).

Thus, the IIE has a range of needs to fulfil. And, in general, I believe that the IIE is about serving the needs of its members first and foremost. However, having said that, such needs may not be divorced from broader societal and/or global needs that may also be paramount in the minds of members. After all, there’s no point in being a product/process improvement guru if there is no industry-based or whatever-based opportunity to practice and hone those skills! Lesson: The IIE’s major resource, in fulfilling the various needs of its members, is the membership itself! What the IIE needs to do, of course, is to provide the opportunities for this pseudo-self help to happen and for other forms of assistance to be in place.

IIE also has corporate members and Lex Clark’s expose on IE within the armed services is a timely reminder. Major organisations within Australia are also often major employers. For example, Westfields (Coles) employs over 200,000 people Australia-wide. Also, Australia’s most important organisations (in terms of wealth-creation) – the ASX200 companies – are major players in the ‘need-to-improve’ technical and financial productivity game. Their needs are also timely (urgent) but not necessarily in a life cycle sense. On my February 2008 swing trip around Australia, the then ASX200 companies saw their predominant need to “better spend money” through M & A (Mergers and Acquisitions) activities and to “better integrate their knowledge bases” for better sustainability of their various competitive advantages. Today (only 9 months later) the then ASX200 companies are rapidly becoming the ASX140 companies with the likes of ABC Learning, Babcock & Brown, etc. making spectacular fast exits from the top 200 companies list! Today, the urgent need is a complete 180 degree turnaround to NOT spend money, NOT to be

merged or acquired, and to ensure some form of longer term economic/financial survival! Lesson: Major corporations in Australia need, more than ever, the knowledge and skills embedded within the IIE and that the IIE needs to be flexible and responsive to rapid changes in corporate members' local/national/global competitive environments.

The Inclusiveness/Exclusiveness of IIE

The hallmark of a professional organisation is not only its knowledge base but how well it uses this for the betterment of society.

Perhaps, through following the doctrines of Adam Smith (Blakemore), and in particular the division of labour as the major causal driver of higher productivity among nations, professional bodies tend to pride themselves too on the generation and exclusive holding of their own hard-won bodies of knowledge and skill sets. I suspect too that the IIE is no exception to this and that it has also tended to exhibit such behaviour (Clark on 'IE within Defence' but outside of direct IIE engagement). However, to its credit, the IIE has engaged widely with both sexes (Jenney).

The problem becomes, however, when one organisation sees the business of all other organisations as being its exclusive own! I suspect that the IIE (and IE in general, the world over) has suffered from this dilemma. Lesson: The fact is, of course, that superior performance in technical and financial productivity (the professional goals of industrial engineering) is everybody's business and not the exclusive concern of IEs only!

Today's IIE Environment

There will always exist some 'crisis' and it is up to professional organisations such as the IIE to respond in an effective and efficient manner.

In the articles by John Blakemore, the author paints a fairly grim (but I believe somewhat) accurate picture of the problems facing the world today. However, he also sees opportunities for industrial / manufacturing engineers to contribute to their resolution and eventual solving. In particular, through application of innovative concepts in product design, process design, transfer accounting, working capital investment, etc, the author does prophesy a possible way forward – even if only, at this stage, conceptually. Lesson: The world never stands still and the need to solve the world's productivity problems within a safer environment has never been greater – a challenge not only to productivity specialists (IEs) but to all 6.7 billion of us who inhabit this earth. The time to act in a global effort is now. We simply cannot wait as the problems can only escalate along with the expected world population to some 9 billion people within our next? fifty years.

A POSSIBLE WAY FORWARD FOR THE IIE

Given the gravity of the current world crises, I would like to address this issue before commenting on how the IIE can continue to meet the individual and corporate needs of the IIE membership per se.

In meeting current urgent globalised societal needs, the IIE – particularly through its association with Australia's preeminent engineering body, Engineers Australia, - has an important role to play. This role will best be served, however, if the IIE is a strong independent voice fully engaged in vigorous discourse and debate not only with and within EA but also with other key professional bodies within society.

IIE also needs to similarly engage with other like-minded institutes throughout the world. Our associations with Japan, Europe, etc. need to be further developed beyond current basic memoranda of understanding.

The IIE needs to fully exploit its knowledge base for the betterment of society. New knowledge based on current research into performance theory and knowledge management needs urgent further development. To achieve this, the IIE needs to fully engage with other professional bodies in fields of business management, economics, engineering, etc.

IIE needs to become performance-focused. For too long, IE (worldwide) has employed a rather subjective approach to productivity improvement whereas, the real game is and has always been excellence in organisational performance – both technical and financial productivity performance.

So what might be the way forward?

The IIE already has the tools to achieve all of the above. Through this journal, e-news letters, etc. the IIE is well placed to engage with the rest of the world. To get noticed, however, will require us not being shy in coming forward – just as our early founders so clearly showed in the early days of the IIE's (nee: AMEA) development. Development of our body of knowledge through knowledge networking is a viable strategy. Invitations to all IIE members and other parties / individuals in society to share and further develop our knowledge will help ensure real solutions are found to today's problems. This I see is the major mission for IIE in the months ahead.

Re: IIE meeting the ongoing needs of its membership, I suggest the way forward is for the IIE to more fully engage with both existing and future individual and corporate members. Again, the tools to achieve this are in place together with further contact with key corporate executives within Australia's major employer organisations, both private and government.

In summary, It is only through reaching out and demonstrating a willingness to share will the IIE remain relevant in today's globalised world. I believe we all share a common destiny.

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Economic Turbulence and Climate Change...Opportunities for Manufacturers and Innovators

John Blakemore

Today's global economic turbulence has two fundamental elements, the failure of the current economic orthodoxy as it applies to globalization and the crisis in the making due to climate change. Whilst it appears that these two phenomena are not related at first glance, on further examination we can see that the over-consumption of the western world and the waste of commodities and waste in the financial markets has led to the massive problem the world has with resource depletion and the influence the affluent population has had on accelerating climate change. However, this interaction creates wonderful opportunities for Innovative Manufacturers.

Adam Smith's contribution in the *Wealth of Nations* has been looked at almost in isolation from his original and even more important work, *Moral Sentiments*. It was this lack of understanding that led to the massive short term gains in the British economy whilst Margaret Thatcher was the Prime Minister and the overall world situation in the longer term was further eroded by the same policies in the USA as practiced and supported by Ronald Regan.

A further and very serious illustration of the failure of the current economic orthodoxy is exemplified by the sub prime mortgage crisis in the USA.

In the third quarter of 2007, bank write-downs in the USA were US\$30Bn, four months later it was increased to US\$150Bn. Even this is probably an underestimate since recent predictions are putting the real value at somewhere between US\$400Bn and US\$1000 Bn (i.e. US\$1 Trillion). To cap this GM and Ford are in crisis, conventional business schools have failed to provide answers while Toyota and Honda make a fortune in the USA's own backyard. It wasn't long ago when the Harvard management gurus were saying that Japan could not be innovative.

The US government had already tried to bale out the system in the 80's with a US\$200Bn injection by Alan Greenspan. Even Freddie Mac and Fannie Mae are in trouble.

One trillion US\$ represents 8% of then total GDP of the US economy and the US economy is still the world's most important economy, so we can see the true magnitude of this crisis.

The world's largest bank, Citibank, was luckily supported by various Middle Eastern countries and sovereign funds like China Investment Corp. and Tamasek Holdings. It has been reported that for the first time in over 50 years, the US banks are in deficit to the Federal Reserve.

70% of the growth in the Gross Domestic Product (GDP) of western countries like Australia and the USA is funded by internal consumption which in turn is funded by credit on housing assets. In the US house prices dropped 10% in 2007. This represents a drop of \$US2 Trillion in householder wealth in the USA.

The US economy could be heading for stagflation, a recession with inflation. Fueling inflation is not only the increase in the price of commodities and in particular, food, but also the rising wage and salary base in China and India as these countries enjoy the benefits of the high rates of growth they have achieved over the last 10 years. This means that the disinflation enjoyed to excess by the rest of the world is coming to an end and the real burden created by over-consumption and trade deficits and net corporate company debt, at say 80% GDP in Australia, will be felt very severely in the next 20 years. This has gone unnoticed by economists. In fact their record of prediction is abysmal. They failed to predict the Japanese recession, and stagflation, the strength of the US recovery in 1994, the depth of the German collapse at about the same time, the Asian crisis, the Wall Street crash in 1987, again the Wall Street crash in 2007 and so the list goes on. The US Current Account Deficit (CAD) is 6.5% GDP, Australia's is even greater at 7.5% (GDP). Australia's net foreign debt is now 3 times greater than at the time of Paul Keating's famous banana republic statement. John Howard was far from transparent about the deterioration of our CAD, foreign debt and our trade balance which has been overall negative despite the resources boom. The Australian savings rate is negative like the US as the population lives beyond its real income. Australia's assets, some of them strategic, are being sold off as we, like the Americans, continue to live beyond our means.

Finally the financial sector completely obliterates the value of the real economy. Thirty years ago the financial wealth equaled the world GDP. Today the so called financial wealth equals three times the world GDP.

World trade in 2007 was approximately US\$13 Trillion. At the same time the volume of traditional and derivative foreign exchange transactions was US\$5 trillion per day. Unfortunately, because of the multiplier effect of these transactions, this has resulted in a massive increase in financial market volatility. On top of this the speculative short sellers and CFD traders are causing even more froth. This has a very profound influence on the real economy and trade.

George Soros has already alerted us to the problem

and has postulated that “market fundamentalism” has failed. Reforms and corrections are needed urgently. Why is it that the economists hold so much power and only react after the event, i.e. employ corrective action. Perhaps they should learn from the best manufacturers in the world, the Japanese, who practice prevention not corrective action. We have the tools to do this and the knowledge to fix the problem but sadly the economists in power cling to old beliefs. Einstein once said that you can’t solve problems using the same methods that created them. The lesson is clear.

The link to the world crisis regarding climate change is an even more serious scenario. Rich country profligate resource usage and excess waste and energy consumption has led to a more rapid rise in climate change than otherwise would be the case. The two major arguments based on the IPCC and Stern reports postulate urgent action to address the CO₂ green house gas increase. That man’s effect on world climate is real and it is not simply what is described by the Milankovitch effect (changes in the eccentricity of the earth’s orbit, angle of tilt and precession) is now supported by a litmus test. If the climate change we are witnessing was caused by the variables such as orbital and spin changes of the earth around the sun then the temperature increase at the equator should be greater than the temperature increase at the poles. This is not the case. Clearly something strange is happening. This is indisputable evidence that man is at least significantly partially responsible for the climate change we are witnessing. The polar ice melts and flows into the world’s oceans markedly altering the sea current and tidal flow as any sailor in the Tasman Sea knows full well.

There has to be a fundamental change in the way we use our knowledge and skill. All that energy directed to thinking up a new ways for financial markets to create money for the few without adding to the wealth of the many has to be redirected to the science and engineering of manufacturing solutions using all existing knowledge and resources. Punitive measures must be introduced to punish those financial organisers who use investor funds in dicey high risk strategies but protect themselves by putting assets in their wife’s name so that if they fail no claim on this asset can be made.

Renewable energy such as wind and solar must be part of the strategic initiatives of the nation and given the highest priority. Agencies such as the CSIRO, must prioritise their efforts and discard research into the multitudinous areas where Australia does not have a comparative advantage. The nation must be educated to understand the new directions we have to take. Overseas owned enterprises must not be allowed to take our R&D and IP and use it elsewhere without a reasonable reward flowing back to the initiators. We need to be smarter and more strategic and focus on the long term.

The international financial crisis and accelerated climate change are therefore linked and both the result of profligate human behaviour.

We need to change and act now.

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Creating a Competitive Advantage for Australian Manufacturers

Dr John Blakemore, National President, Manufacturing Society of Australia

Australia’s Current Account Deficit (CAD) continues to be of some concern particularly since our terms of trade are so good. In addition, the drive by overseas governments, notable China and Singapore and international companies to purchase what some people regard as strategic assets such as coal mines will ultimately contribute to a reduction in favourable terms of trade and possibly non realistic transfer pricing. Generally, our whole economy is based upon low value added products whilst world trade is predominantly about high value added products. Commodity prices and the terms of trade have been high for the last two years. Australia’s high value added infrastructure is very poor. Intimately woven with this is our poor industrial R&D effort. This is due to the high preponderance of small businesses and their focus on short term cash flow. This in turn is due to the low level of process control and innovation. It is not logical to push these firms into making new products, since

their processes are generally very poor. They do, however, need to innovate and renew their business and manufacturing processes. They urgently need process innovation. As well as this climate change, whether it is anthropological or a natural consequence of the changes in the earth’s orbit around the sun, the changed angle of tilt or the SOHO effect, does create significant opportunities for innovative Australian manufacturers.

The Manufacturing Society of Australia and Blakemore Consulting International conducted a development program through the Federal Government’s Innovation Access program called “The Creative Innovative Company Program”. It is already clear from the very positive results obtained so far that small manufacturers (less than \$50M p.a. turnover) need special help which is not covered by existing support programs. The last thing they need at this stage is a new

product. In addition, it is now recognised that 70% of the nation's new investment comes from its existing industry base. Hence, this is a good reason to expand it.

Manufacturing generally is not well represented at the professional level and small manufacturers appear to have no group representing them at all. During a discussion with the National President of Engineers Australia last September I was told that "manufacturing is not really engineering". This is borne out by the fact that they do not even have a college of manufacturing. General industrial engineering and operational process methods and knowledge are absent from almost all small manufacturers. Attempts to successfully use the continuous flow techniques (Toyota Production System), have often failed because most companies, particularly SME's, cannot adapt the Toyota assembly systems to Australia's multi-product short run environment. American advisers cannot see past low variety long run supply and hence the methods that will be successful in Australia are significantly different from their perceptions. Australian innovations have already been developed and applied successfully.

Conventional manufacturing methods and planning systems in Australian SME's are highly inefficient but this problem can be rectified if the connection between process innovation and product development is made focusing on the creative flow techniques pioneered by Japanese car manufacturers. Process innovation is a precursor to good product development. These techniques can be applied to SME's. The problem is not the immediate introduction of new products it is the creative innovation and development of the existing processes to manufacture all products. This includes the development process itself. At a recent forum in Sydney, Harvard Professors Sam Hayes and Warren McFarlan now recognise, belatedly, that the key to Japanese automotive success is process innovation and internal R&D and a strong link between process and product innovation, not acquisition, something not widely recognised.

One of the most significant development projects in Australian Industrial R&D was the development of Colorbond (Zincalume) by what is now Bluescope Steel. I was the Chief R&D Development Scientist leading much of this project. This achievement was a result of process innovation.

The secrets of the future development of manufacturing depend upon:

- Taking advantage of our natural comparative advantages (Natural Gas, Aluminium, energy, iron and steel. Food products, for example)
- Capitalizing on the opportunities created by climate change
- Increasing competition and exposure to the international market
- Restrictions to industrial productivity improvement by improving Industrial Relations (This is probably going to occur)
- Focusing on and utilising industries (source and downstream) where we have a natural competitive advantage

(energy, bauxite, iron ore, power, nuclear, agriculture etc)

- Completing the supply chain so that we add as much value to the raw materials as possible (consistent with demand and isolation)
- Concentrating on export
- Continuous process innovation linked to product innovation
- Utilisation of patent know-how. (e.g. Colorbond)
- Process innovation by isolating the constraint and improving productivity and utilising the appropriate technology
- Introducing continuous flow techniques for all products
- Rapid product and process development (R&D)
- Replacing labour with capital
- Concentrating on the premium end of the market.

Relationship Between Process Innovation and Product Development

New products must be developed more quickly but it is not sufficient to just develop a new product. The method of development and the processes used to manufacture them must be innovative as well. This is not currently recognised and as a result programs are supported by the R&D Board when they should not.

General

Many of the principles are well established in manufacturing plants in a wide range of industries, particularly in Japan for automotive manufacturers, and electronic manufacturers. These principles can be introduced successfully into any manufacturing plant in Australia but unlike the USA environment, we need to modify the methodology to suit the fact that Australian plants most often must make a very large variety of products. This means that the production runs are often short and there is a lot of pressure put on the manufacturer to maintain high levels of finished goods inventory. In the USA often plants can be dedicated to low variety of products on very long production runs.

Good business practice aims for continuous and never-ending innovation and improvement. This means a continuous emphasis on new ideas in all parts of the business both in product and process but process innovation does not come naturally to all.

The methodology promoted has already been tried in a complex multi-product environment which is far more complicated (5500 products, 7 plants. 16 machine types, 20 different processes) than most plants.

Concept

The concept is to:

- Plan to eliminate the bottleneck and seamlessly link with suppliers and customers

- Create continuous flow and so increase value added time %
- Link process and product development
- Transfer the measurements to the Profit and Loss account and the Balance Sheet using throughput accounting
- Take the resultant working capital released and re-inject it into technology and new innovations to increase productivity and reduce labour cost
- Continue the process by further increasing the value added time %
- Continuously upgrade skills and learning of the workforce
- Aim for sustainability in all aspects of the business

Conclusion

SME's need help. Generally, the smaller the company, the greater the variety of products and the shorter the manufacturing run length(see March Edition of New Engineer on how to handle this problem). Simply thinking that the Toyota production System will work in the Australian manufacturing environment without significant innovations will lead to failure. However, these problems have been solved but more education is needed. The 'Commercial Ready' program which encouraged these companies to develop new products has been abandoned and this makes it harder for the SME's to find the time and money to do this work, but do it they must.

Dr John Blakemore

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Review of the National Innovation System – Submission

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Review of the National Innovation System
Department of Innovation, Industry, Science and Research.
GPO Box 9839, CANBERRA, ACT 2601*

*Submission by Dr John Blakemore, CEO and Principal Innovation, Blakemore Consulting International
Martin Place, Sydney masc@blakemore.com.au*

I. Background

Australia currently trades heavily in deficit even though our terms of trade are the best they have been for over 50 years. Commodity trade involves large volumes of raw materials which are of low value compared with moderately transformed or highly transformed manufactured goods. The main drivers of economic growth are productivity due mainly to improvements resulting from the application of technology and the new creation of intellectual property and its application, particularly by adding value to lower value products.

It is in the long term national interest to trade in surplus not deficit otherwise there is a never ending loss of control of national assets. Economists argue that trading in deficit does not matter as long as overseas companies are willing to invest in Australia but what this view fails to recognise is that the control moves overseas and therefore most often decisions made are not necessarily in the Australian national interest. For a nation well endowed in resources like Australia, there is a strong temptation to use this wealth to live well and rely on imported international goods. Unfortunately this attitude has led to a burgeoning international private personal and private corporate debt which is balanced by a massive inflow of capital much of which is used to buy assets or invest in developing intellectual property which is owned by the overseas entity. Some capital is used to re-equip existing plants but these are often overseas owned. Entity purchase here is not balanced by Australian investment in overseas entities because the Australian funds are not available.

There is only one practical solution in the short term. This involves the painful reconstruction of a viable value adding manufacturing industry. The service industry provides 70% to our GDP but has not helped reduce our CAD to any large extent. We must create a value adding society, focused on innovation and education using our natural comparative advantages. Some of this can be in the service industry like education, design, research, medicine, for example, but the opportunity is greater in manufacturing because some significant comparative advantages are there already.

It is essential in an advanced developed nation that equal opportunities are given to all talented people regardless of

their profession or special skills provided that these are in the general national interest for the betterment of society. Increasing our manufacturing capability is one significant way of achieving this and broadening intellectual opportunity at the same time as improving our standard of living and balancing our trade.

Recent studies of productivity growth in Australia have revealed that the most significant contributor to productivity growth is *warehousing*. Warehousing does not add value to a community other than enable them to consume imported manufactured goods and perhaps employ a small number of people in the supply chain. This does not contribute to value adding for society even though it increases our GDP. One can argue therefore that the raw economic measure of productivity growth based on GDP is in error. After all, Italy once increased its GDP by 20% by suddenly estimating the size of the black-market and then claimed at that time that they were more productive than Britain.

We urgently need to develop an intellectual culture that values highly, skills in science and engineering that add to the wealth of society.

An innovation policy must aim to create wealth from industries and activities where, at least in the first instance, we have a comparative advantage. Later we can create strategic advantages. Such an advantage must account for our natural resources in materials and people and position in the world aimed at competitive equilibrium but mindful of all moral sentiments.

This means we must develop an innovative system which enables small Australian owned businesses to tap in to the world's intellectual knowledge quickly and seamlessly and use the technological scientific and engineering resources available which are continuously upgraded with superior education facilities at school, colleges and universities. It is useless however to train more scientists and engineers if they have no job to go to. Barriers to business created by state bureaucracies must be removed.

Professional bodies can also play a significant role in the wider community. Scientists and engineers should no longer be invisible. A totally free market or completely unhindered free use of capital is not the answer as the current financial crisis has illustrated. A model similar to that in Denmark

with a superior balance between the welfare state and Adam Smith's invisible hand and flexible security systems can improve Australian society significantly, but first we need to trade in surplus.

The government and Keynesian economics are the way forward. Incentives are needed in a truly cooperative system with an elevation of the need to create a new society focused on long term growth using science and engineering education and its application to innovative processes and products as a driver.

The current innovation system is not yielding the best result for the Nation. Much of this has already been enunciated in recent Productivity Commission reports and two recent parliamentary studies. It is not intended to repeat their findings here but the following facts are highly relevant to this current review of our National Innovation System.

1. Australia's trade balance continues to be negative and has been seriously so for at least the last 12 years. In fact the February CAD was approx \$3.3Bn, the highest ever recorded. The boom in exports of mined commodities has assisted but not rectified the problem or pushed the trade balance into largely positive territory. Our CAD has now reached the alarming level of 7% GDP. Economists claim that this does not matter as they continue to ignore our low savings rate and claim that a young country needs investment capital and hence we should expect a deficit in our current account. China also has a very great need for capital but trades in surplus and has a high savings rate which is used to invest in its own innovations and buy assets abroad. Australia's savings rate is one of the lowest in the developed world.
2. Our research and development expenditure as a percentage of GDP is low for as developed country and is mainly in the public sector by institutions such as the CSIRO. In the aggregate, private companies contribute little because of the poor R&D effort of many corporate overseas giants. Some small SME's contribute up to 20% of their turnover to R&D to remain ahead.
3. The CSIRO's contribution, whilst significant, unfortunately is too thinly spread in too many areas and in fact 50% of its expenditure on R&D in manufacturing is in areas where Australia does not have a comparative advantage and is therefore not used as effectively as it could. It is recognised that too sharp a focus can stifle creativity and inhibit the development of new products, however, we need a better balance.
4. The current Commercial Ready scheme in the past has been overly bureaucratic and the failure rate is high. Recent changes have been very beneficial. Successful projects are rarely commercialised in Australia because of the reluctance of Australian venture capitalists to take a reasonable risk on innovative products and processes. VCs are focused on money so we need some sweeteners from government, tax concessions or matching grants.
5. Overseas ownership and control often results in ideas developed here being exploited overseas instead of Aus-

tralia. This has occurred with three major Blakemore Consulting Innovations. Worse still, multi-nationals with operations in Australia tend to do their R & D closer to their head office.

6. Scientists and engineers are largely invisible in Australian society and comments made by those who wish to make public statements are not supported by those who control the media. Hence a lot of incorrect scientific information is spread about. Many journalists and economists are guilty of this. Such misinformation is probably due to the very poor understanding of science by the general population. Engineers and scientists have a good understanding of many technological problems. However, because they realise they are not experts, they are reluctant to make public comments. This vacates the stage for people with little or no understanding of the problem who are usually driven by ideology. Scientists and engineers need to stand up and be heard and need a strong advocate in government.
7. The CSIRO and Universities staff and equipment are not readily available to the general business community who therefore are unaware of the true capability of this resource and the untapped knowledge. R&D innovations need to be digested and promulgated to the business and general community.
8. Professional institutions like the Australian Institute of Company Directors and The Australian Institute of Management are not scientifically focused. Additionally, many companies do not have a scientist or engineer on the board and they have no policy on innovation.
9. Venture capitalists are reluctant to invest in technological research or they place unrealistic timetables to deliver outcomes. This is related to their lack of scientific understanding, risk aversion, and their short term focus and the fact that they do not understand the nature of the spin-offs that will occur. VCs are not risk averse in general but tend to take risks in the financial world which they believe they understand a little better.

2. The Current Innovation System

The poor performance of our existing innovation system therefore has the following elements:

- A non integrated approach of the necessary parts needed to achieve success.
- Lack of cohesion and priority setting between the universities, private and public R&D centres, CRC's, and particularly SME's. Each commercialisation project needs an effective leader who can bring together all the resources necessary to improve the probability of success. Perhaps the government should support SME entrepreneurs up front after rigorous project evaluation, and insist on payback only after success is achieved.
- Trying to be expert in too many industry sectors without a recognition that we have a significant comparative advantage in some areas but not others.

- A mining sector that has adopted a short term vision of maximising short term profit by sacrificing downstream value adding activities. (e.g. the separation of BHP Billiton from OneSteel and Bluescope Steel). Maybe we need to tax them more heavily unless they contribute in a more cooperative way to downstream processing.
- The lack of simple mechanisms to raise capital, in particular by SME's.
- The lack of mechanisms to retrieve knowledge from patents, universities and research establishments. With regard to patents, the information is available to some extent from IP Australia and overseas web sites, but it is not easy to access. A journal digesting and summarising latest published applications and granted patents may make patent information more available to both business and technologists so the left hand knows what the right hand is doing.
- The lack of a suitable Australian journal for publication with a large number of fragmented journals all doing a piecemeal job. 'New Engineer' attempts to do this but is under-funded and the circulation is poor.

3. Conclusion and Improvement Concepts

An innovation system policy should be needs driven and therefore focus on the following. It is recognised that tax and other incentives will be needed to implement many of these concepts.

- A long term innovation plan for the next 25 years, updated every year as circumstances change, sharply focused on rebuilding an economy which trades in surplus not deficit.
- Insisting that at least until our Balance of Payments problems are solved, programs of R&D are sharply focused on the national interest on value added activities where we have a natural comparative advantage, capitalise on our resources like minerals, sunshine, wind-power in the south, natural gas, bauxite to lightweight transport and aerospace components, high value technology and medical and scientific instrumentation for example.
- Focusing sharply on solar energy, photo-voltaics and wind power and cleaning up coal fired power stations. We have already shown we can be world leaders in photo-voltaics (Suntec China), but the opportunity to commercialise was not supported.
- Supporting the focus of Government's efforts to build cooperative networks in research institutions, universities, the CSIRO, TAFE colleges and industry.
- Encouraging Government to establish systems to enable a less costly access to professional staff at these institutions for industry.
- Enabling quick and shared access to equipment, facilities and knowledge at universities and the CSIRO in the first instance.
- Supporting industry leaders in science and engineering to offer services and experience to schools and educational institutions.
- Rewarding process innovation equally as product development and applied and basic research.
- Encouraging industry to license intellectual property until they catch up.
- Encouraging venture capitalists to invest in the commercialisation of Australian intellectual property rather than risky opaque methods of financial shuffling.
- Setting up cooperative research centres run by business people not academics (similar to Panasonic or the Irish model).
- Reinstating a more attractive tax regime for research effort in the private sector with special emphasis on commercialisation particularly for Australian owned enterprises but offering less support for overseas owned entities unless they provide a plan to build our economy not simply ship profits back to the parent.
- Establishing a patent information referral centre like the original Australian Patent Information Service (APIS) and marketing its value to industry.
- Offering a graduated scale of R&D grants which are more attractive for targeted industries in the national interest where we have a defined comparative advantage but less in areas where such an advantage has not been established.
- The development of a data base of all Australian expertise.
- Educating CEOs and board members so that innovation is firmly established on the board's agenda.
- Educating CEOs on how process innovation can pay for itself quickly and soon add significant value to the triple bottom line using demonstration projects.
- CRC's run with a business CEO or professional business oriented engineer or scientist, not an academic in charge, modeled like Panasonic, Sony, TDK, JVC., and the models in Ireland in particular using rapid development process and product innovation systems like Honda.
- Direct encouragement for manufacturers to continuously increase the value added component of their business following the principles ably practiced by Honda, Toyota, Panasonic, Canon, and encourage the use of point of sale digital data to accelerate process innovation and supply.
- Encouraging cooperative programs of research in Australia particularly with Japan.
- Measuring and rewarding R&D grants by output instead of input. We don't want to duplicate the ARC grant system to universities where excessive emphasis is given to academic publications and previous research grants. This leads to a 'rich get richer' effect which makes it difficult for new players and ideas to get support.
- Increasing the awareness of scientific thinking in schools, universities and colleges and the wider community.
- Teaching the scientific method to all and demonstrating what science and its application can do for the finance industry.

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Anonymous

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Monday 1st December 2008

0830 Registration & coffee

0900 Welcome address from the Chairperson

0915 Session One – International Keynote Presentation Sustainability in lean manufacturing: the next competitive advantage

Sustainability is the next wave of competitive advantage. It leverages a company's investment in lean but goes much farther. Just like lean showed how to have low inventories and high customer service, and low prices and high quality, sustainability shows how companies can improve profits by honouring people and respecting the planet. Sustainability goes beyond green (planet) to also include people and profits, creating the triple bottom line

- The world is changing - understanding how the changes and challenges of today and tomorrow are connected
- Using sustainability as a strategy to gain the best customers, best employees, best suppliers and best investors
- The seven steps to successful sustainability - a proven implementation road map

Gary Langenwalter Founding Partner
ConfluencePoint

Author of "The Squeeze" a business novel on sustainability

1000 Session Two – Expert Advice Lean leadership: Leveraging lean into green

Green will gain in importance not only because of environment but economic forces. Using those forces to push your business forward rather than holding you back will be the key to future sustainable success. We need to leverage lean into green

- Why are lean and green a marriage made in heaven?
- Identifying how lean can be made greener for the overall benefit of manufacturing
- Leadership throughout the lean and green manufacturing process

Glenn Seaby and Les Hewett Partners
Efficiency Works

1045 Morning refreshments & networking break

1115 Session Three – Case Study Green IT: A case study into a leading global company's commitment to being the greenest technology company on the planet

- Building a holistic sustainability roadmap
- How Dell designs, builds, ships and recycles for energy efficiency
- Initiatives for carbon neutrality and reduced carbon intensity
- Green engagement strategies across both the demand and supply chains
- Using the Dell direct engagement and relationship model with customers to make a difference

Clayton Noble Operations Director Australia/New Zealand
Dell Computers

1200 Session Four – International Case Study Investigating the journey towards a carbon neutral manufacturing establishment

As Australia moves towards a carbon reduction scheme in the very near future, most companies are unsure of what their carbon emissions are at present and how much it is going to affect them, the easiest way to start is to ascertain what level you are currently at, so commencement of reducing can start immediately

- Discovering how to measure your carbon footprint
- Developing a greenhouse gas reduction plan - including targets
- Assessing the effective implementation of actions
- Offsetting unavoidable emissions

Kathryn Maxwell Sustainability Manager
Department of Conservation New Zealand

1245 Luncheon

1345 Session Five – Case Study Committing to reducing resources as a cost reducing strategy

With simple, regular maintenance, producers can save significant amounts of energy and money. The challenges faced are finding ways to reduce packaging and ensure packaging is eco-friendly. Reducing packaging may require a social revolution and a complete change in how we think.

- Minimising costs of natural resources and disposal
- Applying lean packaging while maintaining customer requirements
- Packaging innovation – new concepts for packaging whilst keeping the eye catching material for customers
- Understanding the need for continuous improvement in the usage of critical resources
- Engaging staff to drive green solutions

Jim Gaffney General Manager Operations
Davey Products

1430 Session Six – Case Study Adapting/involving staff for the lean improvement process

- Dexion lean journey
- Empowering staff with the knowledge to make alterations immediately
- Managing the transition; overcoming the culture shock of lean thinking
- Identifying who is responsible for staff motivation
- Identifying and overcoming the stumbling blocks
- Engaging staff to drive lean & green manufacturing

Stephen Ng Continuous Improvement Manager
Dexion Australia

1515 Afternoon refreshments and networking break

1545 Session Seven – Case Study Lean and Quality Control - improving efficiency while maintaining quality

- Maximising the potential of lean and quality on your production facility
- Identifying the appropriate value added activities, thereby eliminating waste and improving flow
- Balancing compliance with best practice to improve productivity, profitability and maintain your competitive edge
- Improving customer satisfaction through lean implementation and quality information flow

1630 Session Eight – Panel Discussion Strategising for teaching people to be lean capable

- A practical insight to the nuts and bolts of lean manufacturing and understanding their impact on staff
- Understanding practical lean implementation
- Education Vs on Job Training (OJT); what works best and when?
- Identifying lean best practices for the manufacturing industry

Panelists:
Stephen Ng Continuous Improvement Manager
Dexion Australia
Glenn Seaby Partner
Efficiency Works
Professor Chris Berndt Director of Industrial Research Institute Swinburne
Swinburne University of Technology

1730 Closing remarks from the Chair and end of Day One

Why you must attend

This Lean and Green Conference will gather industry wide staff for a serious discussion on issues of sustainability. The Conference will bring to light the deep connections between lean and green, with both seeking to reduce waste. Explore how the proven business strategy of lean, a strategy already at work in most manufacturing plants, can naturally be applied to issues of sustainability.

Knowledge of lean methodologies and the principles of manufacturing excellence are generally on par with the United States, however Australia lags approximately five years behind with regard to the number of companies who have implemented lean.

A common misconception is that lean methodologies deal only with production, when it should involve all processes within a business ("Whole of Business Approach"), including planning, research and development, engineering, purchasing, logistics, sales, marketing and distribution.

To successfully implement lean and improve performance and implement best practices, the need for a "Whole of Business Approach" and a structured framework is considered a high priority within Australian manufacturing establishments. A coordinated implementation plan that involves every department and importantly, commitment from top management is required from the outset, in this conference we will be looking at Leadership, Whole of Business Approach and engaging staff through a series of short presentations, with a panel discussion and a S.W.I.P.E (Steal With Integrity and Pride Everywhere) think tank.

Who must attend

Heads of:

- | | |
|---------------------------------------------|-------------------------------------|
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| • Continuous Improvement | • Sustainable Development |
| • Engineering | • Supply Chain |
| • Quality Assurance | • Corporate and Process Improvement |
| • Inventory Management & Demand Forecasting | |

From the manufacturing industry

Electronics, Steel works, Pharmaceutical, Clothing, Food & Beverage, Whiteware, Auto parts

Tuesday 2nd December 2008

Interactive Workshop Sustainable Lean Manufacturing

Session One

Lean Thinking : Introduction and recent advances from the world's best

- Why it works
- Toyota, Honda, Panasonic, Canon, Kawai,
- Dominance of culture
- Case Study 1 "Culture in a Carpet Factory" Shaw 1999to 2002

Session Two

History and evolution of Lean Six Sigma

- Customers
- Systems
- Innovation
- Teams and Training
- Planning
- Case Study 2 "Culture and Systems" Pirelli Cables 1987 to 1991

Session Three

25 Lean Rules for manufacturing and service

- Case Study 3 "Formula 1 Pit Stop at Warkworth Mine"

Session Four

Waste in organisations

- Waste Elimination
- Maximising Value Added Value Stream Mapping
- Case Study 4 "Waste Reduction at Canon Toride Japan 2006"

Session Five

Lean in practice operators

- 5S
- 7 Step Problem Solving
- TQM Tools
- Case Study 5 "Precision Valve 1988 to 2004"

Session Six

Measuring performance and costs

- What do we measure
- Precision, Accuracy, Reliability, Reproducibility
- Case Study 6 "WIP in a Paper Factory" CHH 2002

Session Seven

Lean Six Sigma in practice all functions

- Case Study 7 "Feltex Australia" 2002 to 2005

Session Eight

Conclusions and strategies to sustain Lean

Q&A

Workshop Schedule

0830	Registration and coffee
0900	Morning Session begins
1030	Morning refreshments and networking breaks
1100	Training resumes
1300	Networking luncheon
1400	Afternoon session begins
1530	Afternoon refreshments and networking break
1600	Training resumes
1700	Course concludes

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marcus evans would like to thank everyone who has helped with the research and organisation of this event, particularly the speakers and their staff for their support and commitment.

About the Workshop Trainer

Dr John Blakemore President
Manufacturing Society of Australia
CEO
Blakemore Consultancy

Dr Blakemore is President of the Manufacturing Society of Australia and the CEO of Blakemore Consulting which specialises in assisting businesses to improve systems and develop strategies to compete more profitably in the global marketplace. He has published two critically acclaimed books on Quality in 1989 and 1995, one translated into Chinese. He has also been an advisor to two Federal Governments on innovation and R&D and has invented and assisted in the inventing of numerous processes in manufacturing which have been developed and patented by his clients both here and overseas. He is a fellow of four professional societies and was acclaimed as one of the top 10 Influential Engineers for Engineering expertise in 2007.

