Issue 36 • July 2014

Connection

The official magazine of Composites Australia

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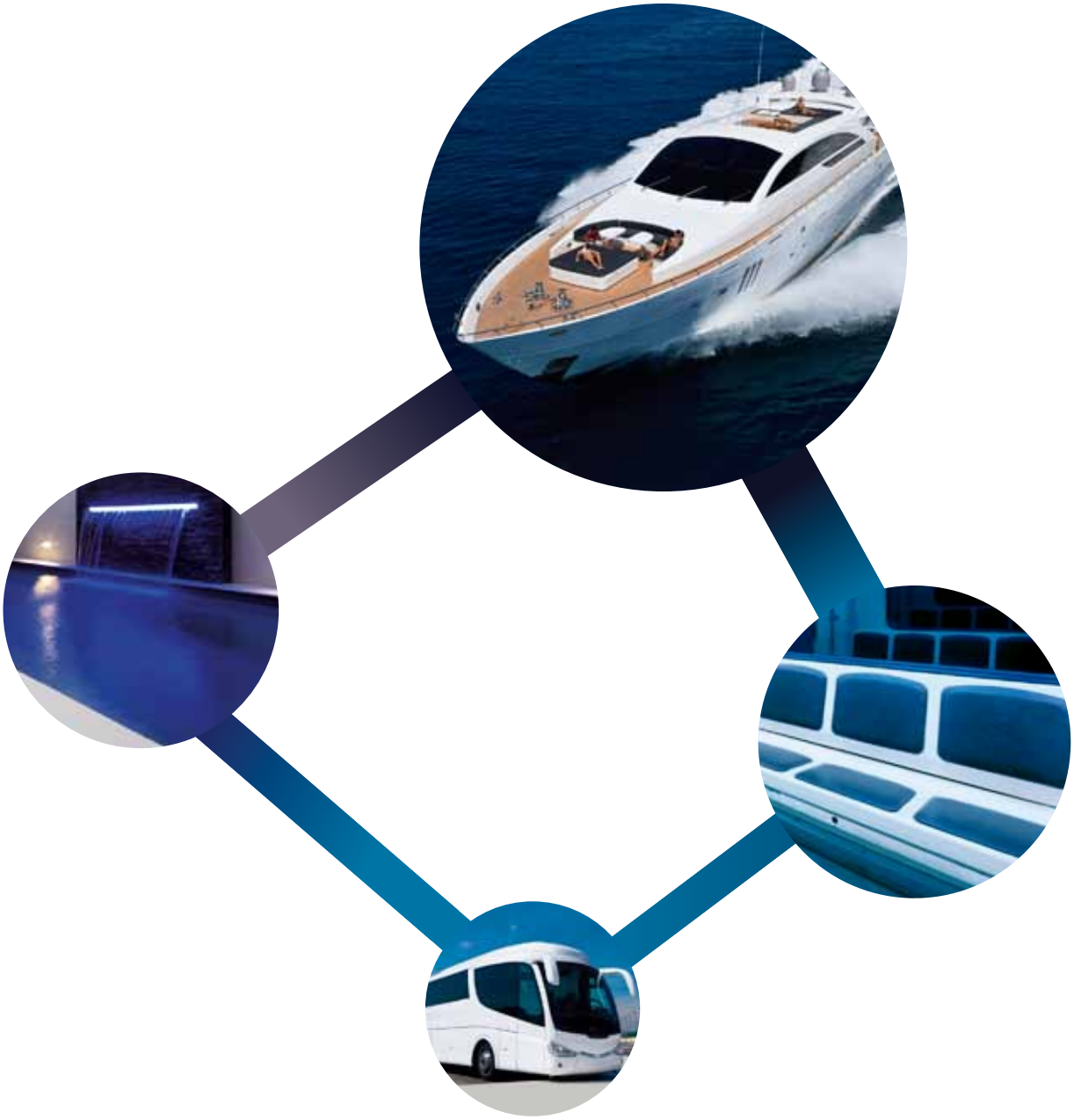
Opportunities to benefit health, aging, disability



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The 2014 Board of Composites Australia

President's letter

The 2014 budget delivered the news that a plethora of programs, including but not limited to Commercialisation Australia, the Innovation Investment Fund, the Enterprise Solutions program and Enterprise Connect, will discontinue. The Industry Innovation Precincts are unlikely to proceed, and the budgets for the Cooperative Research Centre Program and the Australian Research Council have been slashed.

The replacement program is appropriately named the Entrepreneurs' Infrastructure Programme. According to information released on budget night, the new program will focus on: supporting the commercialisation of good ideas, job creation, lifting the capabilities of small businesses, the provision of market and industry information, and the facilitation of access to business management advice and skills from experienced private sector providers and researchers. Additionally, the new streamlined Single Business Service initiative will also commence from 1 July 2014, making it easier for business to engage with government.

While I welcome Treasurer Joe Hockey's statement on budget night that the government would "refocus our effort on innovation and self-reliance", the challenge is to develop good policies that enable small businesses to thrive, particularly those that make things.

Having the Parliamentary Secretary, the Honourable Bob Baldwin, travel to Newcastle to officially open our 2014 conference was a heartening gesture of support and recognition for the composites industry.

Mr Baldwin set the tone for the conference with an upbeat look at what he described as the "inspirational" way the composites industry was rising to the occasion through innovation in the face of the tough challenges being thrown at the Australian manufacturing sector.

Signs that composites is broadening into a myriad of sectors and applications are increasing. The Small Bridges Conference, held in Sydney in May, featured presentations by Wagners, Gurit and the BAC Group, profiling examples of composite bridges to an audience of engineers, government representatives and council asset managers.

The novel composite clamp, which was developed as a repair system for pipes with leaking through wall defects, to be used in the oil and gas industry, is another example that promises volume sales. Developed by Advanced Composite Structures Australia with Petronas, the system achieved a prestigious Innovation Award at the JEC Europe 2014 conference. Further examples of innovation are the components being produced to exacting aviation certification by Composite Constructions for Trakkacorp's innovative searchlights for helicopters and the lightweight FRP lavatory developed by RPC Technologies. These both attracted keen interest at the Composites Australia stand at the National Manufacturing Week exhibition in Sydney last month.

The high-profile official opening of the unique and cutting-edge carbon fibre research facility Carbon Nexus, at Deakin University in Geelong, provided exposure of advanced composites to a broader audience.

Composites Australia's professional development program, run by Executive Officer, Kerryn Caulfield and her team, includes a suite of workshops that have been very well received, providing a springboard of knowledge for composite practitioners, engineers and architects to use in exploring and adopting new technologies and applications.

I would like to thank Ms Caulfield and her team for a very successful conference at Newcastle and for her continuing work for Composites Australia. The Board appreciates Ms Caulfield's support and efficiency, and the results achieved over the time she has managed the association.

Genelle Coghlan

NEWS

Bolwell bounces back after factory fire

After fire gutted one of Bolwell's major plants in Mordialloc, Victoria, the prominent fibreglass and composites design and manufacturing company is on track to return to full production this month.

Design Director Vaughan Bolwell said that, while the fire was an emotional and costly setback, several factors mitigated the impact on operations and customers.

The fire, which started shortly after 6am on Thursday 24 April, quickly swept through the 2000 square metre factory, exploding resin drums and taking 80 fire fighters some 90 minutes to bring under control.

Contrary to media reports, the fire didn't started in the resin drums and the actual cause is believed to be electrical, Mr Bolwell told Composites Australia.

Workers quickly followed the company's well-rehearsed fire drill and no one was injured, Mr Bolwell said.

The factory housed the company's laminating works for its major trucking customers, namely Kenworth and IVECO, destroying 'quite a few' highly circulated moulds.

"What's helped us mitigate the impact on the business has been the fact we operate over multiple sites; our patterns are stored off site, and we have tooling facilities in different locations," Mr Bolwell said.

"Most companies move everything under the one roof to reduce overheads, however, in our case, the fact that we held separate, efficient work sites has helped us mitigate the fire risk and impact to our business."

The fire caused extensive damage. Photo: Nicole Garmston © Newspix

This meant the company could immediately transition the RV caravan site into a laminating site – a move that provided the opportunity to implement a more efficient production line, according to Mr Bolwell.

"We have been able to bring mouldings in from our Thailand factory while we create new tools from our patterns. While there have been logistical issues in terms of transporting raw materials and finished product, many customers have been astonished by the fast recovery we have been able to accomplish."

"We are looking at getting back to full production by the end of July, which is when all lost moulds will be replaced. Until then, we are running a split shift," said Mr Bolwell.

Meanwhile design and rebuild plans to replace the destroyed factory are already underway.

Mr Bolwell gave credit to employees and the composite industry for their response to the incident. "The whole experience has been unifying for our team, with everyone coming together to create minimal impact on our customers, and other companies have come to our aid with offers of caravan storage, equipment loans and advice. We have really appreciated how everyone – our workers and the composite industry in particular — have been so willing to help out."

CRC-ACS recognition

The work of the CRC for Advanced Composite Structures (CRC-ACS) was recognised with two awards at the Cooperative Research Centres Association Annual Conference in Perth in late May.

The CRC-ACS team for the project, Deep Water Composites, received an Award for Excellence in Innovation for its work on the development of a novel composite clamp for pipeline repair. The project, which was also recognised at this year's JEC Europe innovation awards, is a partnership with Pacific Engineering Systems International, PETRONAS Research (Malaysia), Supacat, Newcastle University (UK), University of Southern Queensland and Merit Technologies (Malaysia).

Current University of Queensland PhD student, Mr Luigi Vandi, was judged the best presenter in the Early Career Researcher Showcase, in which there were 48 candidates and five finalists, with each candidate submitting a 30-second video explaining the key aspects of their research.

The presentation outlines Luigi's research on understanding interphase formation in thermoset composite welding, which is key to the work being undertaken in the CRC-ACS materials and manufacturing projects for next-generation assembly of composites for aircraft structures.

Leading composites societies join forces

Australia's three leading societies for the advancement of composites knowledge, technologies and applications have joined forces under a memorandum of understanding.

The MOU brings the Australian Composites Structures Society (ACSS), Composites Australia Inc. and the Society for the Advancement of Material & Process Engineering – Australia Chapter (SAMPE) together on projects of mutual benefit to members of the organisations.

The memorandum was signed at the 2014 Composites Australia CRC-ACS Conference by Professor Murray Scott, President of ACSS; Ms Kerryn Caulfield, Chief Executive Officer of Composites Australia; and Dr Rik Heslehurst, chair of SAMPE's Australian Chapter.

From left: Dr Rik Heslehurst, Ms Kerryn Caulfield and Professor Murray Scott pave the way for exciting joint initiatives.

"By bringing together the two leading learned societies for the structural application of composite materials in Australia with the peak national industry association, the MOU provides the framework for the planning and delivery of some really exciting initiatives that will benefit the composite practitioners within each organisation," said Ms Caulfield.

"Innovations in the fibre pre-forms, matrix materials and manufacturing processes are widening the opportunities for the application of composites for a broadening range of structural components. It is only through the sharing of knowledge, ideas and experiences that engineers, designers and manufacturers can successfully take advantage of these developments and contribute to the manufacture of new components and products. Composites Australia is really looking forward to working with ACSS and SAMPE to provide opportunities that achieve this goal."

"Cooperation is the key to further developing the Australian Composites Industry and taking leading companies into global supply chains for advanced applications," said Professor Scott. "By formalising our engagement, ACSS, CA and SAMPE will bring highly complementary networks together to achieve even better outcomes for our members."

Dr Heslehurst (SAMPE) agrees: "The mutual benefits to all three associations cannot be under-estimated. This agreement is a win, win, win for the Australian composites community."

Composites contribute to next generation armoured defence vehicle

Composites are gaining momentum as materials of choice for an increasing range of specialist defence applications.

Composites offer impressive strength-to-weight characteristics together with exceptional corrosion resistance and lifelong performance. They also offer the ability to produce complex shapes to enable multiple components to be moulded into one part which also helps reduce weight and manufacturing costs.

Designers from Thales Australia rated these qualities highly when enlisting design advice from specialist Australian composite manufacturer, RPC Technologies for the manufacture of prototype parts for their landmark Hawkei Protected Vehicle development.

Building on the experience gained from the development of their highly successful Bushmaster troop carrier currently manufactured at their Bendigo plant, Thales Australia is seeking to set new benchmarks in the tactical defence vehicle market with its next generation protected vehicle, Hawkei.

Weight target for helicopter deployment

Designed for rapid helicopter deployment, the Hawkei must not exceed a weight target of seven tonnes so Chinook helicopters are able to carry the vehicle and troops into the field.

It must also meet the needs of defence forces constantly challenged by Improvised Explosive Devices (IEDs), mines or small arms ambushes.

RPC Technologies will assist Thales in vehicle weight reduction by manufacturing composite dashboard assemblies for the Hawkei. RPC has also previously been involved with the Bushmaster program and also Thales Underwater Systems.

Deployed in Afghanistan by Australian and Dutch defence forces and with over 1000 vehicles sold worldwide, the Bushmaster supply chain comprises around 120 Australian companies. The vehicle contains 65 per cent Australian content, generating long term revenues for a wide range of local component manufacturers, including the composites industry, and supporting hundreds of Australian jobs.

ADF prototype testing underway

Six Hawkei prototype vehicles are currently undergoing testing by the Department of Defence under the LAND 121 Phase 4 project that seeks to provide up to 1,300 protected light vehicles for Australian defence forces. Subject to successful testing, final approval of the project is expected in 2015.

In the meantime, Thales Australia is leveraging its specialist procurement experience developed during the Bushmaster program to source industry participants to supply Hawkei components. The company is also using the industry's technical and design capabilities to further reduce cost and weight.

Having seen the benefits gained from the use of composites during the prototype stage, Thales is considering extending the use of composites to other parts of the Hawkei, such as the inner and outer guards, side steps, water tanks, fuel tanks and internal trim.

Hawkei: Australia's next generation lightweight, high mobility protected vehicle. Image courtesy Thales Australia

RPC Technologies Managing Director Tony Caristo said his company has been working closely with Thales during the preproduction phase to continually enhance vehicle design and to incorporate additional improvements to further reduce weight, increase strength and reduce cost.

This has included comprehensive engineering support from concept to CAD modelling to FEA analysis, physical testing and validation capabilities. "This has allowed the designs and composite material selection to be optimised for thickness to achieve optimum strength at a reduced weight and cost," said Mr Caristo.

Breathing down your neck: the new ISO respirator standard

by Graham Powe, Managing Director of Safety Equipment Australia Pty Ltd

Users are expected to benefit from new international standards for breathing devices. Image courtesy Bolwell.

New advances in Australian standards will bring big changes to both manufacturers and users of breathing protection equipment, with the focus shifting to the wearer and the work that they perform.

Australia is one of 22 countries intent on adopting the new ISO (International Standards Organisation) Standard on Respiratory Protection Devices when it is finalised.

We are in good company. The United States, Canada, Mexico and Brazil are signatories, as are most European nations, along with South Africa. On the Asian continent, Japan, South Korea and, most recently, India are also preparing for a changeover to the new international standard.

The new ISO standard will replace the Australian Standard for respiratory protective devices that has existed for many decades. It is both familiar and important to many respirator users in the composites industry.

What is the new ISO standard?

The ISO standard brings with it a whole new way of thinking. While the world's disparate standards have been focusing on the product, the ISO standard focuses on the wearer of breathing protection and the work performed.

While there have been well over 40 product standards, under the ISO standard there will be two main performance standards: one for supplied-air devices and the other for filtering devices.

The ISO standard determines whether a breathing protection device is 'Fit for Purpose' dependent on how and where it is used.

This means that a number of human factors come into the equation, many of which have never before been part of existing standards. These include:

- Ergonomics
- Work rate
- Facial features
- Dead space in the device
- Work of Breathing
- Thermal effects
- Psychological effects
- Hearing and speech transmission

One of the most important human factors is how much air the wearer needs. The ISO standard uses a staggered scale of work rates. This means that a respirator is classified according to how hard the wearer can work without 'out-breathing' the device.

Inward leakage is another important factor, and here the ISO standard presents several levels of protection. Again, the wearer is the focus, and the leakage test is not carried out on laboratory machines, but on a panel of 25 people of various face and head shapes and sizes, performing various physical tasks.

Naturally, the efficiency of both particle and gas filters is also classified on a staggered scale.

Apart from those mentioned above, many other criteria are used in the ISO standard, some of which are absent from existing standards. One important factor is Work of Breathing, which is not only a measurement of peak breathing resistance in the device, but addresses the overall physiological load on the wearer.

Timeframe

Parts of the new standard have already been published, but the current target date for completion is May 2015.

The Australian Standards Committee for Respiratory Protection has participated in a significant way in the formulation of the international standard.

Safety Equipment Australia, a Composites Australia member and active contributor to the development of the ISO standard, is currently lobbying for finalised sections to be adopted by Australia. We have always promoted the philosophy that it is the user and the task that are central to respirator selection, and that the protection device must suit both the person and the job.

The search for new opportunities

Expanding markets: Stephen Campbell at his factory in Melbourne's Braeside, with a sample from the Trakkacorp searchlight project.

Stephen Campbell's passion is boats, which is what his Melbourne company, Composite Constructions, is known for.

Over the past seven years, however, Stephen has been building the foundations to diversify into new local and global markets.

The opportunity literally came knocking on his Moorabbin factory door – the engineering manager for local company Trakkacorp wanted to know if Stephen was interested in building the mounting components for their high intensity helicopter searchlights.

With Trakkacorp's eyes on the global police, military, and search and rescue markets, they had to meet the strict certification standards required of aviation companies such as Airbus.

For Mr Campbell, it meant building rigorous processes that ensured high tolerance to specifications and traceability to gain ISO 9001 certification, confirming that the components are built to the Australian 9001 aircraft standard. The Federal Government's Enterprise Connect Tailored Advisory Service assisted.

"I virtually reverse engineered the process, designing and building the method and developing custom programs to meet the standards," said Stephen.

The work was a small, but essential, component of the three years of work Trakkacorp put into meeting the stringent criteria to gain serial production qualification from Airbus Helicopters in Germany for its Trakka A800 searchlight. The approval opens the market to sell to operators of Airbus's EC135, EC145 and EC175. The searchlight was already type certified for Airbus's EC155 and EC225 helicopters.

Composite Constructions' ability to meet the standards has opened the doors to other platforms so that the searchlight is the preferred solution for the Agusta helicopters and standard fit on the Bell 429 and 525.

Based on the Trakkacorp's rudimentary conceptual mock-up of the searchlight mountings, Stephen made the moulds for the production process, which is based on GURIT's Sprint prepreg fabric.

While production of the searchlight components is not at full capacity, Stephen's diversification plan is well underway. Aside from the core marine business, he and his staff are manufacturing drivers' doors for Melbourne trams, components for high performance racing cars, and high-end entertainment speaker consoles.

Armed with the quality assurance standard, the scope for new work has broadened.

Repairing Australia's aging bridges

Advanced composites promise savings, increased strength, durability

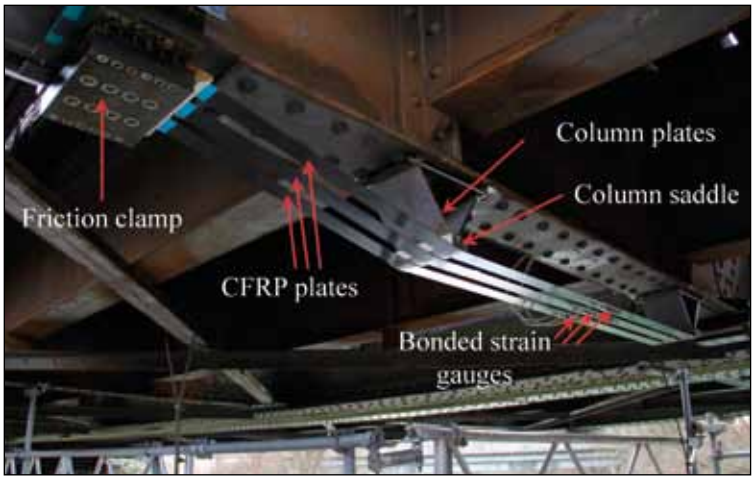
The recent successful repair of the historic Münchenstein Bridge in Switzerland is advancing Australian efforts to develop a repair system for the world's aging metal infrastructure, using advanced carbon fibre reinforced polymer (CFRP) materials.

In a collaboration with leading Swiss engineering research institutes, infrastructure authorities and industry, Professor Xiao-Ling Zhao, Chair of Civil Engineering at Monash University, participated in the development of the solution for the bridge. Built in 1892 across the Birs River near Basel, the bridge carries both passenger and freight trains.

Two girders, the most critical elements against fatigue on the 45.2 metre single span wrought iron bridge, were strengthened using carbon fibre reinforced polymer materials (CFRP). The repair system does not required glue to bond the CFRP plates to the metal, which substantially reduces the time and cost needed for surface preparation, says Professor Masoud Motavalli from the Swiss Federal Laboratories for Materials Science and Technology (a major contributor to the Münchenstein Bridge project). The system is also able to pre-stress the CFRP plates to the desirable level to prevent fatigue and cracking.

In comparison, the conventional method of repairing or strengthening aging metallic structures often involves bulky and heavy steel plates that are difficult to fix and prone to corrosion, as well as being prone to fatigue of their own. The process can also be harmful to sensitive environments, says Professor Zhao.

Above. Strengthened to withstand current and future loads, the Münchenstein Bridge in Switzerland is advancing Australian efforts to develop CFRP infrastructure repair systems. **Below**. The innovative repair system using carbon fibre reinforced polymer (CFRP) materials.



Urgent global need

Repairing and strengthening steel infrastructure, especially bridges, to prolong service life and take increasing loads, is becoming an urgent need globally, says Professor Zhao. In Europe, nearly 70 per cent of metallic bridges are older than 50 years and 30 per cent are over 100 years. In the USA, more than 62,000 metallic bridges are classified as structurally deficient.

Similarly, there are major deficiencies in Australia's state and local road bridges, according to Engineers Australia's latest Infrastructure Report Card.

Professor Zhao says the success of the Münchenstein Bridge repair confirmed CFRP had great potential to strengthen metallic infrastructure in terms of increased strength (five to six times stronger than steel), ductility, energy absorption and fatigue life.

Recognising the need, Monash research, mainly sponsored by several Australian Research Council Discovery Grants in collaboration with researchers in the USA, China and Switzerland, is seeking to develop a reliable CFRP strengthening system that will reduce the maintenance time and increase the service life of metallic infrastructure, even under

harsh environmental conditions. Further, a CFRP repair solution would also increase the load carrying capacity of major bridges to cope with increased tonnage carried by trucks and trains, says Professor Zhao.

The Melbourne West Gate Bridge widening project also confirms the benefits of CFRP in infrastructure repair and Australia's research capabilities in this field. Retro-fitting structures with advanced composite materials is a focus of research by Riadh Al-Mahaidi, Professor of Structural Engineering at Swinburne University of Technology and an Adjunct Professor at Monash. Professor Al-Mahaidi played a key role in the development of the CFRP strengthening solution for the widening of the West Gate Bridge. The innovative solution to strengthen the bridge's concrete deck, developed and put to the test at Monash and then Swinburne, has gained global recognition.

It saved millions of dollars in implementation costs, according to consulting engineers for the Westgate Bridge Strengthening Alliance, Sinclair Knight Mertz (SKM).

However, this knowledge and expertise developed for use of CFRP in concrete repair cannot be directly applied to metallic structures due to the distinct difference between the debonding mechanism of the two materials, plus the unique failure modes for metallic members and connections.

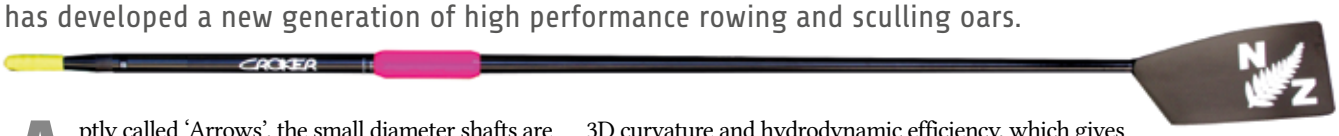
The history of the Münchenstein Bridge illustrates the importance of ensuring strong safe infrastructure. The original bridge across the Birs River was designed by Gustave Eiffel, who later built the Eiffel Tower in Paris. In 1891, after 15 years of service, the bridge suddenly collapsed, killing 73 train passengers. It was replaced in 1892 by the current, now strengthened bridge.

Material-specific solutions required

Professors Zhao, Motavalli (an Adjunct Professor at Monash) and Al-Mahaidi are seeking to progress development of CFRP systems for infrastructure repair through a partnership with VicRoads and S&P Clever Reinforcement Company. An Australian Research Council Linkage Grant announced in June gives a boost to this research.

Powering to gold with new generation oars

Drawing on carbon fibre technology used in the most recent America's Cup, Croker Oars has developed a new generation of high performance rowing and sculling oars.



Aptly called 'Arrows', the small diameter shafts are made from high modulus carbon using multiple layers of thin carbon plies at various angles, to achieve a balance of strength and torsional stiffness. The oars are also very light in weight.

"The thin shafts have less aerodynamic drag than normal shafts and, because they weigh less, they have less rotational inertia," says Managing Director, Howard Croker.

"But we have to be careful to make sure the shafts are not too stiff. Shaft stiffness is an important factor and the oars are matched to the rower like golf clubs or archery bows."

The rowing and sculling blades, designed to fit on the smaller shafts, feature thin edges, low wind resistance, 3D curvature and hydrodynamic efficiency, which gives good lockup in the water but is still clean on entry and exit, according to Mr Croker.

"Our blades have been known for cleanliness and lack of splash and these new blades take it one step further."

"Using a heavy duty router built to our specifications by an Australian manufacturer, we now machine our models and tools, moving from a design to a finished tool in one week, which is very helpful for the production of prototypes."

Based on the mid-NSW coast, the company makes over 10,000 oars a year. Sporting the distinctive Croker branding of black with pink trim, the Arrows have been put to the test in this year's state and national championships, with several crews taking out Gold.

The Shore School coxed 8 won Gold at the Australia National Rowing Championships 2014 in March using Croker's new-age oars.

Composite Sandwich Structure Design Requirements

Composite Engineer's Viewpoint
By Rik Heslehurst PhD, MEng, BEng (Aero) FIEAust, FRAeS, CPEng

Part 1 – Applications

This article starts a new series of discussions on the design requirements and issues when considering composite-skinned sandwich structures.

In a previous article on the design requirements of composite structures, we noted that there are several aspects that require a design decision, such as fibre and resin type; fibre form; manufacturing process leading to fibre/resin weight or volume ratio; fibre orientation; stacking sequence; and detail design. When composite laminates are used as skins in a sandwich structure, core type, core density (both of these provide core mechanical properties) and core depth are added to this list of design requirements.

Composite sandwich structure applications

An appreciation of the potential applications of composite-skinned sandwich structures will provide significant guidance in the development of their structural design.
Some illustrative examples of composite-skinned sandwich structures are:


Sporting Vessel


Sport Vehicle


Gas Turbine Nacelle


Thermal Insulation


Wind Tunnel


Radome

	Aerospace	Marine	Land Transport	Infrastructure	Sporting Equipment	Energy Absorption	Noise Abatement	Thermal Control and Insulation	Flow Directionality	Electromagnetic Energy Transmissibility
Compatibility with other materials	H	H	M	L	L	L	L	H	L	L
Controlled deceleration	H	H	H	L	H	H				
Controlled EM signature	H	M								H
Controlled thermal expansion behaviour and transportation	H	L	M	L	L		L	H	L	L
Corrosion resistant	H	H	M	M	L			L	L	
Cost efficient	H	H	H	H	M	L	L	L	L	L
Damage tolerance and durability	H	H	H	H	H	H	L	L	L	L
Durability and longevity	H	H	H	H	M	L	L	L	L	L
Dynamic crush strength	H	M	H	H	M	H				
Efficient designs	H	M	H	M	M	L	L	L	L	L
Environmental resistance	H	H	H	H	H	L		L	L	L
High crush strength	H	M	H	M	M	H				
High stiffness-to-weight ratio	H	M	M	M	H					
High strength-to-weight ratio	H	M	H	M	M					
Light weight	H	M	H	M	H	L	M	L	L	M
Low cost	M	H	H	H	M	L	M	M	M	L
Low dielectric properties	H									H
Low sound transmission losses	H	M	H	M	L		H	L	L	L
Maintainable and repairable	H	M	M	M	L	L	M	M	L	M
Manufacturing efficiency	M	M	H	H	M		M	M	M	M
Manufacturing simplicity	M	H	H	H	M	L	L	L	L	L
Marketing advantage	H	H	H	H	H					
Minimal medium blockage							H	H	H	H
Minimal impact rebound	H	M	H	M	M	H				
Performance (weight, strength, aerodynamics)	H	H	H	H	H	L	L	L	L	L
Repairable	H	H	M	M	L	L	L	L	L	L
Reproducible	H	H	H	M	H	L	L	L	L	L
Salt water environment	H	H	H	H	M					L
Simple and effective manufacturing methods	M	H	H	H	H	L	L	L		
Simple design	M	H	H	H	H	L	L	L	L	L
Simple installation	H	H	H	H	L		H	H	H	H
Slamming loads		H	L	H	H					
Small pressure drop									H	
Stable medium control							H	H	H	H
Strength and stiffness criterion	H	H	H	H	H	L				
Structural and operational effectiveness	H	L	H	L	H		L	L	L	L
Vibration and seismic considerations	H	L	L	H	L		L	L	L	L
Wide noise spectrum										H

The table (above) provides an indication of the capabilities and needs of sandwich structures in 10 typical application areas. The nomenclature for the table is as follows:

H Of high importance and need
M Of moderate importance and need
L Of low importance and need
Blank Space – not applicable

In the next issue of Connection we will discuss design requirements for sandwich structures. Since there are several unknown parameters in composite-skinned sandwich structures, a good set of design requirements are invaluable to the successful development of this type of structure. All published articles on this and previous topics are available online at www.compositesaustralia.com.au under 'For Industry'. Rik welcomes questions, comments and your point of view. These, and his responses, may be published in future newsletters.

Contact: Rik on rik@abaris.com

Technology transfer

Composites Australia is hosting an intensive training clinic that will introduce local manufacturers to a new closed moulding process – infusion.

The infusion process is taking over as a preferred production method for composite components.

The training will combine practical information with demonstrations and hands-on instruction on the infusion process and methods, including how to tool the mould, build the re-usable silicone membrane, and how the process becomes nearly automatic with the use of an injection system and integrated accessories.

Attendees will learn the benefits of infusion and how to move their production from open moulding to closed moulding. Leading international RTM/ Infusion technical instructor, Charles Tur (right) of Magnum Venus Products, will present the training.

To be held at Composites Constructions, in southeast Melbourne on 21 and 22 August, the clinic is made possible through the support of the Victorian Government's Manufacturing Productivity Networks Program, French supplier Magnum Venus Products, and regional distributor Ducept.

State Government Victoria

Manufacturing Productivity Networks Program

For more information and to register visit www.compositesaustralia.com.au/events

Flying the flag for composites

Over four days in May, the National Manufacturing Week 2014 exhibition was held at Sydney's Olympic Park complex.

The week aims to play a supporting role in encouraging and showcasing innovation, maintaining confidence and driving activity in the Australian manufacturing sector. Organisers of the event reported that despite the challenges facing manufacturing, the level of support was again most encouraging, with more than 10,000 delegates, exhibitors and guests representing a very broad range of interests and industries.

Again, the diversity in exhibitors and equipment on show was impressive, with a very strong theme around automation, innovation, control systems and 'smart' processes and technologies.

The Composites Australia booth featured displays and products from Colan Australia, Composites Constructions, CST Composites and RPC Technologies, and suceeded in attracting plenty of interest. Also supporting the Composites Australia team was ACS Australia, with key staff helping to spread the composites message, and Lavender Composites, who occupied the adjoining booth.

Visitors explore the display with Composites Australia Executive Officer Kerryn Caulfield

To take advantage of the interest in the exhibition, Composites Australia conducted a seminar at the venue focusing on 'Opportunities for Government Assistance for Manufacturing'. Speakers from Enterprise Connect, Industry Capability Network, Manufacturing Skills Australia and the NSW Trade and Investment Department outlined how their respective agencies were able to assist the manufacturing industry. To provide an industry perspective, representatives of RPC Technologies and CST Composites provided an overview as to how their companies had leveraged various assistance packages to advantage.

Designing our composites future

Industrial designers are key to expanding adoption of advanced composite materials in manufacturing, according to Geoff Germon, CEO of Sydney-based carbon fibre and Kevlar product designers, Talon Technology.

"The development of consumer products usually involves professional industrial designers who generally make the decision on the right material for the task. By the time the project goes to engineering the materials are locked in. So why are almost all the carbon fibre studies at a university level in Australia focused on engineering and not design?" asks Germon.

Working with his alma mater, the Design School at the University of Canberra, Geoff is seeking to bridge that knowledge gap.

The first step is an event to be held as part of the Sydney Design 2014 festival in August. In keeping with the festival's theme 'Design Futures', the forum is called Designing our Composites Future.

Event chair Dr Stephen Trathen, Assistant Professor, Industrial Design at the University of Canberra, hopes the forum will be the start of an ongoing conversation with the industrial design community that will engage them in future symposiums where they can gain further understanding of the use of carbon fibre today and its potential for the future.

Industrial designer Genevieve Rossi investigates the needs of the user when developing her carbon fibre guide dog harness.

Talon carbon fibre chairs can be seen at The Yahoo Internet Café in Tokyo and Terminal 3 Sydney domestic airport.

"It is important for Australia's place in advanced manufacturing that we can diversify into areas such as carbon fibre and composites and therefore inevitable that high performance composites will increasingly take over traditional materials in design.

The university's experience and knowledge in designing with high performance composites has developed through a range of assignments, including projects to improve athlete safety and performance for the Australian Institute of Sport.

"At the University of Canberra we look for design opportunities and we recognise there is a paradigm shift in manufacturing and design practice and education needs to keep pace," says Trathen.

"With this event, we are saying to the design community, let's start looking at high performance composites and take a design approach. How is the material being used currently, look at the need and what might be possible – in architecture, sculpture, domestic environments; and how they could be used in such areas as aging, health and disability to 'do good', improve lives.

"The aim is to give current designers an extended palette of materials, but to do this they need an understanding of carbon fibre and composites and they need to understand the processes in manufacturing with these materials," says Trathen.

Looking to the future, Trathen wants to develop more content on carbon fibre and composites in the university's undergraduate industrial design course and expand the research focus. Germon added:"It is also important that the composites industry gets closer to the universities and helps shape the course outcomes, so that graduates have useful skills and exposure to what high performance composites are good for in the real world."

LG's curved Organic LED TV is pencil thin. It boasts a screen depth of only 4.3 millimetres (at the thinnest section) and a weight of just 17 kilograms, all made possible by the use of Carbon Fibre Reinforced Plastic (CFRP). Used for the back cover, the CFRP adds strength to the curved screen and helps the TV to achieve its minimalist, appealing design and low weight.

Designing our Composites Future
Sydney, Thursday 21 August 2014
Visit www.compositesaustralia.com.au/external-events/

Composites industry moves from strength to strength

The importance of strategic innovation, diversification and research utilisation in a challenging economic climate was the common thread at this year's Composites Australia and CRC-ACS Conference.

Close to 200 delegates from as far afield as the United States, Germany, Malaysia, Israel, Austria and Finland attended an array of almost 60 sessions, with speakers representing the global and domestic composites industry across business, research and technology.

Now in its 11th year, the 2014 conference, held in Newcastle NSW, offered a wealth of knowledge and perspectives on the theme — Materials for a lighter and smarter world.

The Honourable Bob Baldwin, Parliamentary Secretary to the Minister for Industry, set the tone for the conference with an upbeat look at what he described as the 'inspirational' way the composites industry was rising to the tough challenges being thrown at the Australian manufacturing sector.

"There is no sugar coating it," Mr Baldwin said. "Manufacturing in this country is facing very tough times. The high dollar, intense international competition, high input costs and low profit margins are just some of the factors conspiring to make life a little bit more difficult for the sector. Our manufacturers must be prepared to transform, adapt and reinvent themselves."

Mr Baldwin emphasised the key role composites played in Australia's transition towards the "prosperous high-technology, high-value add manufacturing sector of the future", reiterating that the possibilities for the composites industry were "boundless". He congratulated the CRC for Advanced Composite Structures for its critical role as a world leader in the development and application of composites, as well as for the estimated $7.5 billion it will have contributed to the Australian economy by 2017.

Mr Baldwin's sentiments were echoed by Professor Murray Scott, Chief Executive Officer for the CRC-ACS, who shared with delegates the CRC's approach to bringing the Australian composites industry into the international global supply chain by focusing on three end-users — the aeronautical sector (the Airbus Group); the defence sector (Defence Science and Technology Aerospace Division) and the oil, gas and petrochemical sector (Petronas).

Building customer confidence

The keynote presentation by The Boeing Company Senior Manager, Nicholas Melillo, was an early highlight. He spoke about the advantages of prototyping in building customer confidence for cutting-edge composites, as well as in the development of high-risk technologies without a commitment to production.

Mr Melillo said the light-weight qualities of composites made them the natural choice for the aerospace industry and had been applied since the 1970s, when about two per cent of a craft was composed of

Top left. Tony Caristo (left), CEO of RPC Technologies chats with keynote speaker Nicholas Melillo from The Boeing Company at the welcome reception.
Below. Parliamentary Secretary to the Minister for Industry, Bob Baldwin (centre) chats with Professor Murray Scott, CEO of CRC-ACS and Ms Genelle Coghlan, President of Composites Australia
Bottom left. (from left) Partec Manager, Roger Cater with Sharon Swan, Director of LSM Advanced Composites and Krystyna Nikolas, Director of Marky Industries
Bottom right. Professor Murray Scott welcomes Israeli guests Hary and Marise Rosenfeld from the aerospace industry

composite materials. Today, he said, it was about 35 per cent, with Next Gen craft expected to consist of between 35 and 55 per cent composite materials.

Notwithstanding the ever-increasing use of composites in the industry, it was vital to give partners, particularly risk-adverse clients like NASA, tangible evidence of how a composite would work in a given situation, he said. Boeing's ability to build prototypes at an early stage had enabled it to showcase new technologies and capabilities while reducing risk and building confidence. He described three examples — Boeing Phantom Eye, NASA composite cyrotank and the ceramic matrix composite nozzle — in which prototypes had been built to 'sell' composites as a solution for designs that had very specific requirements.

"Our customers recognise the value of prototyping, and now they demand it," said Mr Melillo. "Rapid advances in structures and manufacturing have driven a need for prototyping because, in recent years, production program costs have led to new incentives to develop technology early."

Innovation and diversification

The industry sessions provided a diverse wealth of knowledge, with some of the most successful business brains in the composites sector sharing insights into how their companies were manoeuvring through the rapidly-changing Australian manufacturing landscape.

This included Brian Hughes, Managing Director of Composite Materials Engineering, whose company has navigated a diversification journey that took it from relying on one product for 80 per cent of its business, to formulating and producing composites spanning the roofing, automotive, mining, food, electrical, industrial and transport industries, and exporting to about 40 countries.

Talking about his company's diversification strategy, Mr Hughes said he knew the time had come to diversify when he realised that, as long as the company was only making products for other people, it had no control over its future; rather, it was relying on customers to make decisions.

"I realised that it was the customer deciding when they were going to make it, what product they were going to use, and how many of them they would order. I think there are moments in business that make you realise it is time to make a decision about the way you are going to move forward," Mr Hughes said.

"Things tend to work in factors of four in business and every four years or so there seems to be one of those defining moments. I think the secret is working out exactly what you want to do in your business and then how to get it done. In our diversification strategy, we worked hard to position ourselves as a leader in the market, not a follower; and now, if you look at all the products we make, most were Australian firsts."

Sykes Managing Director Jeff Lawrence also talked about the need to stay ahead of the market through innovation in composites. The boutique company, which has a long history of innovation in the manufacture of light-weight racing boats for the rowing market – including Olympic craft – was continually faced with the challenge of staying relevant in a rapidly evolving marketplace. The core attributes for the company's success are engagement, collaboration (industry and external), innovation and diversification.

For Sykes, which began making timber boats in 1966 and introduced composites in 1981, the defining moment came in 2008 when the company realised it was imperative to refine its processes to stay competitive.

"Whenever you manufacture something that attracts a healthy margin, copycats will quickly follow," Mr Lawrence said. "We need to constantly enhance our product to stay ahead."

Mr Lawrence described a shift in the operational culture at Sykes; to one that engaged all employees in a new lean manufacturing process in a purpose-built factory. It was in this environment that the company set itself the challenge of making a boat in 40 hours that normally took 90 hours – a challenge that was met four times.

Diversification and new applications for composites are driving profitable growth for Excel Composites, said General Manager Stephen Smith. In his presentation, Mr Smith described the importance of educating potential customers about composites and the many ways in which they could be used, particularly in the transport industry. Excel Composites, which manufactures a number of light-weight exterior panels and interior profiles for the European rail and bus industry, forged its way into the competitive market through technology and innovation, and by showcasing the benefits of composite materials on various international contracts, according to Mr Smith.

Adhering to classifications and standards is an integral part of innovation and diversification, as is a thorough understanding of the system. Engineering Manager for RPC Technologies, Pierre Gouhier, outlined the technicalities of the different Fire Standards pertaining to composite products. The informative session deconstructed the Fire Standards system, looked at various individual standards and their classifications, how to ascertain which classification a new composite product would come under, testing a product, and analysing outcomes.

The role of research

The Peer Reviewed streams showcased the depth and diversity of composites research currently being undertaken. The papers, presented at almost 40 sessions, highlighted an extraordinary range of research across Australia – indeed, around the globe – and demonstrated the depth and breadth of knowledge and expertise focused on the advanced composites sector.

From Dr Kok-Chong Yong, Senior Research Officer at the Malaysian Rubber Boards, who presented the paper — 'A flexible laminate composite based on natural fibre wood fibres' — to Johannes Wolper, Research Associate at the DLR German Aerospace Center, who spoke on his work — 'Sizing method for 3D modelled scarf joints using advanced finance element analysis' — the range of topics was diverse, shining a light on research that may one day lay the foundation for new composites solutions.

Another session of interest came from Principal Research Scientist at CSIRO, Russell Varley, who talked about the CSIRO's role in the development of sustainable polymer composites, focusing on synthesis, simulation and self-healing.

In her summary of the conference, Composites Australia President Genelle Coghlan thanked sponsors, speakers and delegates for their contribution. The conference had been a 'carnival of knowledge' for manufacturers, suppliers, researchers and educators. "What brings us together is a faith in making things," concluded Ms Coghlan.

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Events Schedule 2014

July

Thursday 17
Victoria

High Performance Textiles for Advanced Composites
One day technical workshop delivered by Dr Dieter Veit, Vice Director of the Institute for Textiltechnik der RWTH, Aachen University, Germany.

August

Thursday 21 – Friday 22
Victoria

Closed Moulding Technology Workshop
A two-day technology clinic offering Australian practitioners high-level instruction and hands-on demonstrations of the next generation of closed moulding technology – Infusion – now taking over as the preferred production method.

Thursday 21
Sydney

Designing our composite futures
Organised as part of Sydney's Design Festival, this event brings together speakers to explore the design potential of High Performance Composites (HPC) in products for ageing, sporting, health and disability

September

Tuesday 2
South Australia

Practical Design & Analysis of Composites
A full day technical workshop with Dr Rod Thomson, Program Manager for Design and Analysis at Advanced Composite Structures Australia Pty Ltd (ACS Australia).

Tuesday 9
Queensland

Emerging Manufacturing Techniques Workshop
One-day technical workshop delivered by Mr Rowan Paton, Program Manager, Materials and Manufacturing at Advanced Composite Structures Australia Pty Ltd.

Wednesday 17
Victoria

Composites in infrastructure: building for the future
Led by Professor Riadh Al-Mahaidi, Professor of Structural Engineering and Director of the Smart Structures Laboratory at Swinburne University, this half-day seminar will explore case histories and growth opportunities for the application of composites in civil infrastructure with discussion led by a distinguished panel of research and industry presenters.

October

Tuesday 14 – Thursday 16
Orlando, Florida, USA

CAMX – The Composites and Advanced Materials Expo
ACMA and SAMPE have joined forces to produce a new super industry event that connects and advances all aspects of the composites and advanced materials communities. Visit www.theCAMX.org USA

Tuesday 28
Western Australia

Bridging the Gap: Composites solutions satisfying engineers and the community
A half day seminar and networking opportunity highlighting how composites can deliver innovative solutions to satisfy both the engineering and general communities. Positive experiences from the construction and installation of the pedestrian bridge in Gosnells will be shared by a panel of key presenters.

Thursday 30
Victoria

Carbon Fibre Composites: Designing for Growth Opportunities
A half-day workshop and networking opportunity with Professor Alma Hodzic, Professor in Advanced Materials Technologies and Director of both the Advanced Manufacturing Research Centre and Composite Systems Innovation Centre at The University of Sheffield, UK. This event will be hosted at Deakin University, Geelong, the home of Carbon Nexus.

November

Thursday 27
Queensland

Composites Australia end-of-year function
Evening presentation and networking event

For full details and to register go to
www.compositesaustralia.com.au/events

Disclaimer: This schedule was current at time of going to print but is subject to change. Composites Australia is not liable for any loss or expenses incurred due to changes in the program.