

RTSA NSW CHAPTER NEWSLETTER

RTSA



AUGUST 2014 EDITION

NEXT MEETING – MONDAY 25th AUGUST

NORTH STRATHFIELD RAIL UNDERPASS

Tunneling Under a Live Railway

Nicolas Law de Lauriston,
Engineering Manager, NSRU Alliance



The North Strathfield Rail Underpass (NSRU) Project is part of the Northern Sydney Freight Corridor (NSFC) Program, a joint Australian and NSW Government initiative to improve capacity and reliability of freight and passenger trains between Strathfield and Newcastle.

The NSRU project will provide an underpass beneath the existing Main North Line which will remove conflicts between southbound freight trains and northbound passenger trains, while also providing holding capacity for freight trains clear of southbound passenger trains.

This presentation will provide an overview of the construction methodology being used to construct the underpass below three live railway tracks, how the key requirements have been met in the design and progressed to the physical site works, and why a multi-disciplinary approach is necessary for this project.

RTSA TECHNICAL PRESENTATION

VENUE:

Bradfield Room,
Central Station
Meeting Rooms, -
next to Left Luggage,
opposite Platform 1

DATE:

Mon 25th AUGUST 2014

TIME:

11.30am for 12.00pm

*LIGHT REFRESHMENTS
WILL BE PROVIDED
FROM 11.30am, PRIOR TO
THE PRESENTATION*

**MEMBERS, GUESTS AND
INTERESTED FRIENDS
ARE MOST WELCOME TO
ATTEND.**



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WORDS FROM THE CHAIR – STEPHEN MUSCAT

Welcome to the August edition of the RTSA NSW newsletter.

Well the time has come for me to hand the reigns over to the next willing and capable individual, who will be determined at the AGM prior to the August Technical Presentation.

Yes, these will be some of the last words I write as the Chapter Chair. As such, these will be words of reflection and gratitude. This journey began two years ago over which time I've met so many stimulating and passionate members of the RTSA, many of whom have helped and contributed to make this technical society the success that it is today.

Over the past two years several technical presentations were delivered by enthusiastic speakers who were given the time and opportunity to prepare and present by companies that support the rail industry and ensure that it thrives.

The RTSA has also organised social events bringing industry representatives together. This would not happen without the support of companies who provide sponsorship, volunteers available to organise events and willing representatives to deliver credible and thought provoking perspectives of the industry.

The committee I have led during my tenure have always ensured that member interests remain paramount during all decisions made. In doing so they have volunteered their own time to maximise member benefit from the RTSA.

It's been a pleasure representing such a learned group of industry professionals. It has been an incredibly fulfilling and educational role. I thank you all for the opportunity and I look forward to many more years of RTSA success.

RTSA NSW CHAPTER – ANNUAL GENERAL MEETING

Just a reminder that the RTSA NSW Chapter AGM will be held prior to the technical meeting on 25th August. The business to be conducted will be brief

but will involve elections for office bearer positions on the Committee, once again in the capable hands of our regular Returning officer, Alex Stoney.

POINT OF VIEW – MAX MICHELL

Sydney was rather slow off the mark with containers. The original port facilities were at Pyrmont in a constrained area backed by a vocal residential population with rather congested road and rail links to the rest of the land-side. Melbourne on the other hand made good use of its position as the small manufacturing centre of Australia and created a completely new port, although still with constrained land-side transport links. In time Sydney bit the bullet and moved its

activity to a new site in Botany Bay in an area already heavily industrialised. Rail facilities to the new port were installed almost as an afterthought (more as a result of port and stevedore policy than from disinterest by the railway) and were underutilised right from the start. In time the less than adequate road system became something of a political issue while shortage of suitable container handling land near the port was giving rise to the concept of 'satellite terminals'. Hence a political



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dictum that 40% of the container traffic to and from the port should be on rail – although that now seems to have been quietly dropped..

Botany will soon have three 'container ports' with an nominal capacity of 3.5 million TEU (twenty foot equivalent) each year – a volume somewhat in advance of existing demand. Each of the ports will have their own rail connections and loading tracks, albeit all three will essentially deal in trains of only 650 metres (approximately 90 TEU) at a time. To some degree port terminal constraints will require rail capacity enhancement to create a viable and balanced system.

Rail currently handles perhaps 10% - 15% of the port task, perhaps around 150,000 TEU p.a., through satellite terminals at places such as Leightonfield, Yennora, and Minto in the Sydney area and at various locations in the country such as Narrabri, Wee Waa, Bathurst, Dubbo, Warren, Griffith, Leeton, Harefield, Bomen and Ettamogah (although the last five at present use Melbourne as their port of choice). The country locations mainly load for export, with empty containers being railed from Sydney for that purpose. Some trains are longer than the port constrained 650 metres but they may also be destined for more than one port at Botany. QUBE, through their recently acquired Minto terminal had (and may still have) a concept of running longer distance export trains into that terminal, mixing and matching loading into single port loads then despatching blocks to a single Botany terminal, thus gaining the benefits of larger mixed trains on the long haul but avoiding the worst aspects of those trains at the port.

What if rail was carrying the postulated 40% of containers to and from Botany? Rather than 150,000 TEU it would be handling maybe 650,000 TEU, a task that would require four times the number of existing size trains or (hopefully) by using full length trains would require only 24 trains per day everyday of the year. Only!! A 650 metre train arriving or departing just about hourly every day, every week, every year. At Botany's longer

term capacity of 3.5 mill TEU the rail task would be close to the current port throughput, at 1.4 mill TEU.

However admirable the concept of '40% on rail' may be there are a number of quite significant issues that need to be resolved for this to happen. The first is where would such large numbers of containers go to? The Port of Sydney is planning a 300,000 TEU p.a. facility at Enfield (unless this has been quietly dropped as well) while beyond that there is some potential for expansion at Minto and a new facility at Moorebank that could service 500,000 or more TEU p.a. Combined these would provide capacity through into the 2020's (on current port predictions). Elsewhere there have been proposals, mainly centred around the St Marys / Eastern Creek area but at this stage there is nothing definite. Notably among these proposals there are no satellite terminals north of Sydney apart from Newcastle, which (sort of) has its own container port expectations.

The second issue is one of track capacity. From Botany to Enfield the goods line provides the basics, although enhancement of the single track Botany – Cooks River section would be needed along with yard enhancement in the Botany area. Equally between Enfield, Moorebank and Minto (and further south) the Southern Sydney Freight Line provides a suitable freight track but probably requiring some capacity enhancement as local container business grows. Access to locations on the Western line would have to be fitted into a continuing curfew situation since a dedicated freight line in that direction is unlikely. Access to Newcastle or any proposal for an intermediate northern 'on line' satellite terminal, will presumably be facilitated by the current freight capacity works at North Strathfield, Thornleigh and Gosford.

The third issue is one of above rail resources. Even if terminal operations were to be streamlined there would be a need for a significant number of additional locomotives and wagons. Contrary to the wisdom applicable to longer hauls, short haul



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port shuttle trains could be made up using relatively old and inefficient (but reliable) equipment that suited the business. These trains will spend much of their time in terminals and only a small proportion out 'on the road', so things like distance based maintenance costs and fuel will not loom large in the scheme of things. Despite this there is little doubt that somewhere in the system there will need to be investment in locos and wagons, even if it is for long haul to allow the older gear to be cascaded down to the port business.

The fourth issue is one of terminal management and handling. Traditionally container trains arrive and stand while lifting equipment and usually trucks or tractor trains move along the standing wagons lifting containers on and off the train. In the port business there is a much better opportunity to lift direct from stack to train, and vice versa, than at the domestic inter-modal terminals but even in this case there may be more efficient ways of dealing with frequent standard consist trains. Ships these days are can be well over 10,000 TEU in capacity so there is little benefit in even attempting direct tranship between ship and any form of land-side transport. The practice is to stack the arrival containers for subsequent clearance by truck or train, while in the other direction deliveries over several days will be used to 'build the load' for a ship. Something similar, but on a much smaller scale happens at the satellite terminals with train loads being grounded for later individual delivery by road. In all this there may be some process changes that would reduce amount of terminal handling and the consequent costs that is one of the millstones for inter-modal rail.

In this area in particular there is an opportunity for some lateral thinking, which would be helped by some good process engineering. So for instance rather than take the container to the train is there a case to be made to take the train to the container? Rather than have remote dead end sidings at the back of the wharf is there a case for a balloon loop type concept? Is there scope for a facility that allows an incoming train to be left and the locos

immediately drop onto a standing loaded rake, thus enhancing both loco and rolling stock utilisation?

None of these concepts are new; rather they are used on other parts of the rail network for other traffics. The inland port business not only presents an interesting short haul opportunity (despite all those parrots who keep babbling the 'long haul' mantra) but because of its particular nature would allow for some innovative thinking in the way of train operations and terminal interfacing, some of which might also have a wider application to the seriously long haul domestic container business.

The port-rail business has relevance to all capital cities where there are regular ports of call by large overseas container ships. Sydney is probably the choice of a prototype port since its geography and relatively congested urban road network lend themselves to distributed container terminals at places where rail is an option, but sooner or later other cities are likely to find something similar is required. Melbourne talks of a plan for 30% to be on rail for instance despite the difficulties of a two gauge problem. Fremantle already has a regular rail link to Kewdale, although still handling a small share of the total containers, while Brisbane is possibly unique in that it has quite substantial land available to conduct not only port container business but to provide capacity for domestic containers if it so desired. There are other port related short haul opportunities among which the import motor car business from Port Kembla to Sydney (and NSW?) is probably one of the more interesting. The same issues will apply to this sort of business as for the container business.

The short haul port traffic will not just devolve to rail as a result of a political dictate. Rail needs to be proactive in the running of trains, interfacing at terminals and provision of adequate but cost effective resources if this opportunity is to be realised. For many years rail has competed with the burgeoning road industry on a terminal to terminal basis rather than on a door to door basis. The consequence has been that the 'doors' of



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industry are now mainly located well away from direct rail access. This has been a long drawn out but costly mistake on the part of the rail industry. The short haul port business does not have

sufficient margin to afford such a *laissez faire* approach, even if the stars are lined up in rail's favour in other respects.

JULY MEMBERS MEETING REPORT - MALCOLM CLUETT

MERMEC SOLUTION – AN INTEGRATED APPROACH TO INFRASTRUCTURE MONITORING AND MAINTENANCE.

Speaker: Mr Saviero Ditroilo, Area Sales Director, Mermec Solution

Mr Ditroilo has worked in the Rail Information Diagnostic field for twelve years. This involves the collection of data on rail track, overhead and lineside structures. The data resulting from the rail diagnostic vehicles is used for condition monitoring and predictive maintenance.

Company overview:

MERMEC Solution is involved in transport and aerospace, including satellites. It has 750 employees. Regarding the railway industry it supplies diagnostic vehicles and equipment, and also Signalling Systems.

MERMEC has considerable corporate knowledge within the company, in different fields. Over the years it has built up layers of expertise in its 750 employees. Ten percent of the company's revenue is used for R&D in conjunction with universities and external research centres. There are currently over twenty such projects.

The company has achieved many international awards for its research activities. It has many worldwide customers – including in Australia. It has headquarters in Italy, and offices around the world including Sydney, Australia.

The company has introduced eighteen new railway products in the past three years, including:

- European Rail Traffic Management System L1/L2
- Unmanned track geometry diagnosis
- SIL4 Train Inspection Portal

- Tunnel inspection systems including measurement of clearances

The company's core competencies in the field of railway diagnostics are:

- Opto-electronics (ie, high speed scanning cameras, etc)
- Vision systems (ie, laser scanning devices)
- Safety-Critical Products
- Decision support software (Ramsys system)
- Self-propelled rail vehicles to support the above functions

Mermec Solution is the world's leading supplier of such equipment.

ROGER DIAGNOSTIC VEHICLES – (self propelled railcars)

MERMEC claims to be the only company capable of supplying both the diagnostic and measuring equipment, and also the rail recording cars. These come in a variety of shapes and specifications, and are known as ROGER recording cars. These have been purchased by Sydney Trains and BHP Billiton, among others. Pictures were shown of the recently-purchased Sydney railcar units under trial in Italy. The diagnostic scanning cameras protrude out from the bodywork at the ends when deployed, above the coupler and below the front windows, but retract when not in use. Other scanning equipment is mounted under the body. The diagnostic vehicles for Sydney Trains can operate at a maximum speed of 140 km/h.

What can a diagnostic vehicle measure ?

- **Video** - Track and overhead



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- **Localisation** – speed and position
- **Overhead** Geometry, contact wire wear, defect detection, electric parameter analysis, pantograph/catenary interaction, electric arc detection, contact-wire thermal scanning, mast detection. Longitudinal and transverse alignment monitoring
- **Perway**, track geometry, rail profile, rail corrugation, rail flaw measuring systems, vision systems, fishplate inspection, head check detection (Head checks are difficult to detect - needs eddy currents in the rail.)
- **Missing rail fastening clips**
- **Rail Joint gap analysis**
- **Sleeper spacing**
- **Lineside object identification**
- **Tunnels** - Clearance profile detection (generating a point cloud), tunnel wall inspection, ground-penetrating radar
- **Ballast Profile** (also generating a point cloud)
- **Vegetation**

The diagnostic systems can also be installed on rolling stock supplied by the Client (as on some of the High Speed lines). The optical machine functions like a microscope which records data at line speed, so it is a remarkable piece of equipment.

MERMEC operates in all rail market segments, from rapid transit to HSR. The company dominates HSR train diagnostics, with ten out of the twelve systems worldwide using MERMEC equipment.

Other diagnostic equipment from MERMEC includes:

- Train Monitoring from wayside equipment
- Signalling systems
- Telecommunications and networks

A picture was shown of a management tool to visualise the data flow. It looked like a wheel with four positions.

- Data Collection

- Data analysis
- Planning
- Control

Problems which have occurred in the past with manual or separate diagnostic systems include:

- non-integrated data (ie, localisation of track alignment, track defects, overhead, wayside features, video, etc)
- No predictive analysis
- No objective rules for when a defect is considered serious enough for corrective action.
- If manual inspections were done by five different people, there would be five different reports, due to opinion and varying levels of experience. Automated inspection is consistent

With MERMEC diagnostic equipment, a rail operator can have a fully integrated approach, when compared with manual inspections. Tracks and structures can be checked at a high measurement speed, up to the line speed.

Some further benefits of automated inspection:

- It is possible to increase the inspection frequency over that possible with manual inspections
- Measurements are more accurate than manual methods
- Complete and systematic inspection of the railway infrastructure is possible. Items of interest are monitored and saved in digital format in a database
- Immediate discovery of incipient defects which could affect safety
- Defects can be detected in a preliminary stage when preventive maintenance is still possible
- Based on the diagnostic database, it is possible to perform trend analysis. This optimizes the planning of maintenance



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- Vision and Monitoring data can be linked due to localisation. (ie, a railhead defect can lead to ballast degradation)
- Increased safety of inspection staff – less need to walk on and around active railway lines

MERMEC aims to make the considerable amount of data accessible, so it does not end up in a data graveyard. MERMEC's software for analysis of such data is known as the RAMSYS system. MERMEC does not dictate how to run a railway to its customers. Rather, it collaborates with the customer to achieve the optimum outcome.

It is best if there is some combination of automatic and manual inspections, and total reliance is not made on the technology. Manual validation of false positive indications is a typical ongoing function. For example, the diagnostic equipment will detect missing fasteners with a high level of accuracy, but may also generate an occasional alarm of a missing fastener which is still present. It is better to have an occasional false positive than a missing negative result from the test run.

The overall aim is to reduce Corrective Maintenance (which is expensive and disruptive to customers) by more Planned Preventative Maintenance.

Finally, the speaker told us of the savings which are possible, in terms of condition-monitoring and not scheduling maintenance and close-downs more often than is required.

Questions and Answers

Q Is it possible to measure wear on the Contact Wire ?

Yes, by a non-contact optical system. The wire profile is sampled at points.

Q Crack Detection in rails and welds – what is the smallest crack that can be detected ?

This depends on the resolution of the cameras fitted. 0.2mm is an indicative figure.

Q How is the position of the vehicle determined ? (localisation)

The best solution has 2m cumulative loss of accuracy per km, due to wheel conicity, wear, sliding, etc. So position is corrected frequently by a differential-GPS system and an encoder. Recalibration of localisation is done by a point cloud (with GPS assistance). Balises can also be used for localisation. If higher accuracy is desired, more frequent target points can be attached to the track (ie, on an underground metro where GPS is not available).

Q Many defects are progressive and speed-dependent. Is it common for MERMEC to recommend speed limits for the rail operator ? Also, how much are the speeds reduced when defects are found ?

There are thresholds which can trigger speed limits, related to type of vehicle, and also whether the track is class 1, class 2, etc.

On the SNCF and FS rail systems, an urgent message is generated if there is a severe threshold exceedance. Traffic can be stopped if necessary. However, it is the railway organisations that has rules about this, and makes the decisions. The MERMEC company does not make such decisions on the railway company's behalf.

Q Can the rail profile and the facets resulting from railhead grinding be monitored by MERMEC equipment ?

Yes, this can be detected by the MERMEC hardware, particularly in the critical gauge corner.

The speaker was thanked for an interesting presentation, which included photos and diagrams of the equipment around the world, examples of the data outputs and a video. In the monitoring field, at least, railways are in the league of a high technology industry.

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LETTERS TO THE EDITOR AND OTHER TITBITS

No letters but

One of the whimsical things that the Waratah trains have brought to Sydney is cars numbered 5555 and 6666 – apart from an XF (XPT) car these are the first modern carriages with single value numbers.

Maitland, along with a number of other Northern stations, has recently gained electronic train destination indicators. At around 08.40 each weekday morning the one on platform 4 shows the next train as the 08.47 Muswellbrook while that on platform 3 shows the next as the 10.57 Newcastle. In fact these are both the same train – platform 4 going north and the platform 3 returning south.

EVENTS AND GENERAL INTEREST

GETTING ON THE RAILS – ALBURY CAMPUS OF CSU, Wed 17th September (afternoon)

The Charles Sturt University Institute for Land, Water and Society is holding a half day symposium at the Albury (Thurgoona) campus of CSU on Wed 17th Sept to explore the topic of revival of regional rail freight. A trio of interesting speakers have been lined up including our member, Associate Professor Ian Gray, to present on the topic. Ettamogah Rail Hub, which is located only a few km away will also be participating. Time will be allowed after the presentations for an 'interchange' to discuss and ask questions around the regional

freight theme. Light refreshments and drinks will be provided after the formal proceedings which will provide a further opportunity to interact with like minded souls on this important topic.

The symposium is free but attendees will need to RSVP by Sept 12th to Kris Gibbs at kgibbs@csu.edu.au. Enquiries about the symposium and for information about times and location can be obtained from IGray@csu.edu.au

ENGINEERING INSIGHT COURSES – BRISBANE, September 23rd and 24th

Members are reminded that Brisbane will be host to the joint RTSA / ARA Engineering Insight courses on Rolling Stock (Sept 23rd) and Track (Sept 24th). These courses have been designed to inform and educate rail practitioners not directly involved in these specific disciplines and to provide

a better understanding within the broader rail industry. They have been held in a number of cities so far and have proved to be very useful and for that matter popular. Details can be found in the flyer sent to members earlier in August or from the RTSA website at www.rtsa.com.au

ELECTRIC RAIL – BUILDING AUCKLAND'S FUTURE – AUCKLAND, Oct 3rd and 4th

A joint initiative of RTSA, IPENZ and IRSE is a two day conference on the Auckland electrification which is being commissioned over the next year or so. As with Perth the Auckland suburban rail

system had declined to a point where it either had to be significantly improved or shut down. Local and national government showed some vision and combined to do a very considerable makeover, with



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a new city station (a most striking place), track upgrading and duplication, two new branch lines, new trains and of course electrification.

Friday 3rd of Oct will be a conference day while Saturday 4th will involve a tour of most of the key facilities and locations by electric train. For those

wishing to get additional benefit from the event an Automatic Train Protection seminar is being run by IRSE on Thursday 2nd Oct.

Full details and registration (which is now open) can be accessed at www.aucklandrailconference2014.org.nz.

RTSA NSW CHAPTER ANNUAL DINNER – SYDNEY, OCT 23rd

An excellent sponsorship opportunity exists to support our Annual Dinner to be held on the 23rd of October, 2014. With rapidly expanding opportunities in the NSW rail industry, and some new exciting rail projects about to proceed, the dinner will allow attendees to socialise, network and gain insight into wider aspects of the rail sector as presented by our guest speaker Howard Collins, CEO of Sydney Trains. This high profile event gives companies an invaluable opportunity to raise their profile in the rail industry.

This year's Dinner will be held on Thursday the 23rd of October at the Sydney Harbour Marriot, Circular

Quay. The format is intended to remain the same with pre-dinner drinks and a presentation on the night. The cost will remain \$80 per person all-inclusive for members and partners, and \$120 for non members. Numbers for this event will be limited to 120 so get in quick.

All bookings for this event will be either via online services at <http://www.rtsa.com.au> or phone to Stephanie McMullen on 02-6270 6584. A flyer will be emailed to all members with specifics in the near future

AusRAIL 2014 – PERTH, Nov 11th and 12th

The theme for AusRail this year is Making Innovation Work. RTSA, RTAA and IRSE are all significant contributors to the technical streams at AusRail, providing the core program at the conference. At plenary sessions industry leaders, rail manufacturers and operators from across the Asia-Pacific region and beyond will discuss putting the latest innovations into practice.

In addition to an exciting technical program, the two-day conference and busy exhibition are invaluable platforms for networking and exchanging ideas with your peers across the sector.

Please visit www.ausrail.com to view the conference agenda and book your places **NOW** while the Early Bird rates apply.

Corporate readers may be interested in taking advertising space in the Official Event Guide (2014) or taking up an exhibition spot at next year's event at AusRAIL PLUS 2015, which are selling fast. Please contact Deborah Boccock for an update before the best Official Guide pages (AusRAIL 2014) and exhibition locations (AusRAIL PLUS 2015) are sold out - phone: +61 (0) 2 9080 4348, Email: deborah.boccock@informa.com.au



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FUTURE RTSA MEETINGS AND EVENTS

DATE AND TIME	ACTIVITY	LOCATION
Monday 25 th AUGUST 2014	North Strathfield Rail Underpass Nicolas Law de Lauriston	Bradfield Meeting Room Central Station Concourse Sydney
Monday 22 nd SEPTEMBER 2014	INLAND RAILWAY Max Michell	Bradfield Meeting Room Central Station Concourse Sydney
Monday 27 th OCTOBER 2014	TBA	Bradfield Meeting Room Central Station Concourse Sydney
Monday 24 th NOVEMBER 2014	North West Rail Link – Rapid Transit Project	Bradfield Meeting Room Central Station Concourse Sydney
Monday 22 nd DECEMBER 2014	NO MEETING	
Monday 26 th JANUARY 2015	NO MEETING (Australia Day)	
Monday 23 rd FEBRUARY 2015	TBA	Bradfield Meeting Room Central Station Concourse Sydney
Monday 23 rd MARCH 2015	TBA	Bradfield Meeting Room Central Station Concourse Sydney

For 2014 RTSA Meetings will be on the **FOURTH MONDAY** of each month from February to November. All meetings will be in the **Bradfield Room** off Sydney Central station main concourse. Any changes will be advised in the Newsletter, or if too late for the Newsletter then by special Flyer.

Presentations in **black are confirmed** those in **red are provisional** at the time of publication.

We seem to be getting into a situation where the calendar is going faster than our capacity to find meeting topics. Any reader with an interesting topic to present or suggestions for a presentation that is topical and relates to the overall objectives of RTSA should contact David Caldwell at DaCaldwell@pb.com.au at the earliest. David would appreciate having far too many topics to manage rather than too few.



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RTSA CONTACT AND SOCIETY DETAILS

The committee for 2013/14 comprises (this list will change in the September Newsletter)

OFFICE HOLDERS			
Steve Muscat	Chair	nsw-chair@rtsa.com.au	
David Caldwell	Deputy Chair	DaCaldwell@pb.com.au	
Malcolm Cluett	Secretary	nsw@rtsa.com.au	
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Andrew Mackay	Treasurer		
David Caldwell	Meeting Coordinator	DaCaldwell@pb.com.au	
COMMITTEE			
Andy Chiem	Bill Laidlaw	Siam Syed	John Watsford

For matters directly related to the running of RTSA please contact the appropriate office holder as listed above. For general matters or membership enquiries you should contact:
RTSA NSW Chapter, Engineers Australia, 11 National Circuit, Barton, ACT, 2600

The easiest way to submit contributions for the Newsletter is by e-mail to the Editor at max412@gmail.com AND the Assistant Editor at alternatively to the address shown above.

Engineers Australia members are reminded that attendance at RTSA technical meetings and events contributes towards CPD requirements. Each RTSA technical meeting generally has a value of 1 CPD point.

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