

# RTSA SA CHAPTER NEWSLETTER

# RTSA



JUNE 2015 EDITION

**NEXT MEETING: THURSDAY 4<sup>th</sup> JUNE 2015**

Welcome to the June edition of RTSA SA Chapter Newsletter. The RTSA's most prestigious award will be presented at the CORE 2016 Gala Dinner in Melbourne in May 2016. The Individual Award is now open for nomination and it closes by Friday 3<sup>rd</sup> of August 2015. Details of the judging criteria and specifics are available on the website and I encourage every member to log on to [www.rtsa.com.au](http://www.rtsa.com.au) to find out more about this award nomination.

The upcoming joint PWI and RTSA event will be a technical presentation on the Whyalla to Iron Knob Railway Track Restoration Project. The presentation highlights the track work required to upgrade the old railway line between Whyalla and Iron Knob that was originally constructed in the year 1901. Yes it's just over a century ago! The presentation explores the many planning considerations that were required to ensure effective management of the various project activities and this includes key construction issues that were successfully overcome to complete the project ahead of schedule and achieving all key performance indicators.

We also look forward to welcoming Dr. Anjum Naweed back in July for another presentation at on human factors in rail – this time focusing on trams. You should receive more details of this presentation via email shortly.

## WORDS FROM THE CHAIR – PHILLIP CAMPBELL

Your Committee has been working in concert with like-minded organisations such as the PWI to develop an interesting program for the remainder of 2015. Month by month there are interesting presentations and site visits. I request that you maintain a high level of involvement, as there are benefits to yourself and also benefits to less experienced members as they interact with you.

It is the time of the year to consider individual awards for excellence as awarded by the RTSA. Please think about those worthy of an award, and actively put together a submission about them. We are sometimes reluctant to single out an individual, however our Society provides a vehicle to recognise those in the industry who go the extra mile.

The International Heavy Haul 2015 Conference in Perth in June, co-sponsored by the RTSA, is getting close now, and there is still time to register. The technical program includes a visit to FMG port facilities in the Pilbara at Port Hedland. Such a visit is a great opportunity to see heavy haul rail in full flight.

The request for papers for CORE 2016 has gone out, so those of you contemplating a paper have been warned! I would encourage members to write about their experiences and seek publication.

## RTSA TECHNICAL PRESENTATION

*Whyalla to Iron Knob  
Railway Track  
Restoration Project*

### VENUE:

Hilton Hotel  
264 South Road, Hilton SA  
(corner of Sir Donald  
Bradman Drive)

### DATE:

**Thursday 4<sup>th</sup> June 2015**

### TIME:

**5.45pm for 6.00pm start**

**LIGHT REFRESHMENTS  
WILL BE PROVIDED  
FOLLOWING THE  
PRESENTATION**

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

[www.rtsa.com.au](http://www.rtsa.com.au)



**RAILWAY TECHNICAL SOCIETY of AUSTRALASIA**

The RTSA is a joint technical society of Engineers Australia  
and the Institution of Professional Engineers New Zealand



# Rail Network Modelling Programs and Tools

May 2015 Presentation

Ian Fox, Network Modeller, ARTC



Ian Fox, network modeller from ARTC gave a presentation on various Rail network modelling programs and tools. This presentation covered several topics of interest in relation to rail network modelling consisting different types of network modelling programs, categories of network modelling, Railsys history and functionality, and other simulation programs within the rail industry.

## Network Modelling Programs on the market

- RailSys [Simu++]
- Rail//Sys
- OpenTrack
- TPAT
- Dynamis
- M//Train
- TRIMS
- Berkley
- Fuelmiser / Energymiser
- RailEdge movement planner
- Trip Optimizer
- Sketch
- ARENA
- SimOp

## Categories of Network Modelling Programs

- Timetabling
- Train Performance Modelling
- Rail Operations Modelling
- Process Operation Modelling
- Fuel or Energy saving

## Functionality of Network Modelling Programs

- Train Planning, Timetabling and Producing Train Graphs
- Planning track work possessions
- Calculating Signal Clearance Times & Headways
- Advising drivers on where to save fuel or electricity
- Comparing performance of different locomotives and train consists
- Evaluating changes to the network with new signalling, improved alignments, new passing loops, double tracking single lines.
- Identifying bottlenecks on the network
- Evaluating the robustness of timetables

## RailSys

- RailSys forms the backbone of this presentation
- Lots of overlap between RailSys and the other programs
- ARTC's main network modelling tool
- Had a licensee since 2008
- But used it before that through consultants

## History of RailSys

- Developed by the Institut fuer Verkehrswesen, Eisenbahnbau und -betrieb – IVE – The institute for traffic, railway construction and operations
- IVE was at the University of Hannover but has moved to Braunschweig
- Developed for Deutsche Bahn
- Development started in the 1980's
- Originally used Fortran and was known as SimuVII
- Moved over to C++ and became Simu++
- Later renamed RailSys to make it easier to market
- Commercialised by RMCon
- Australian office set up in 2001 for a high speed rail study

Operations Modelled

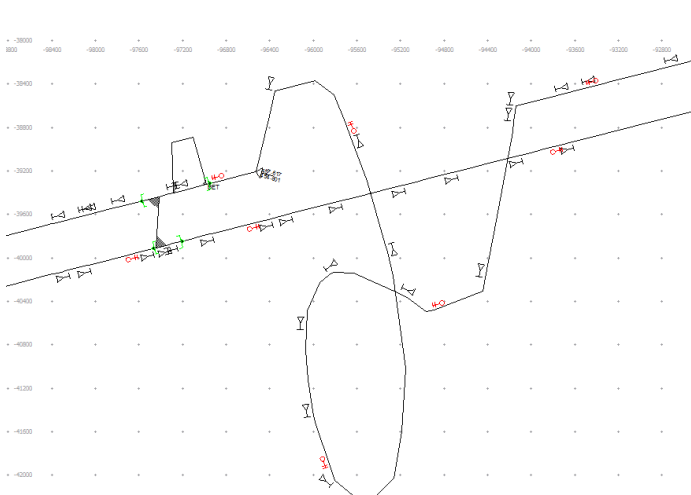
- Originally intended for European style rail networks
- Mostly double track
- High numbers of small & fast passenger trains
- Can achieve results within 5% of real world data
- RMCon adapted it to ARTC's need by adding time zones and the ability to have more than 4 locos
- Point mass loading was a problem

How it works

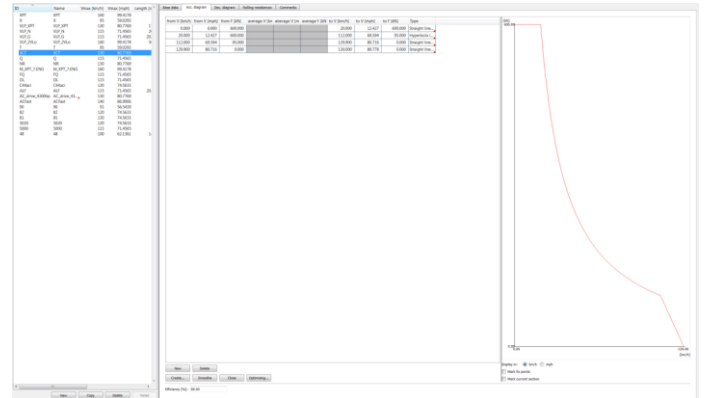
- 3 Modules
- Infrastructure module
- Create a computer model of the network
- Timetable module
- Create models of the train
- Run them over the network
- Develop timetables
- See how trains interact
- Run simulations with random delays
- Results module

Infrastructure module

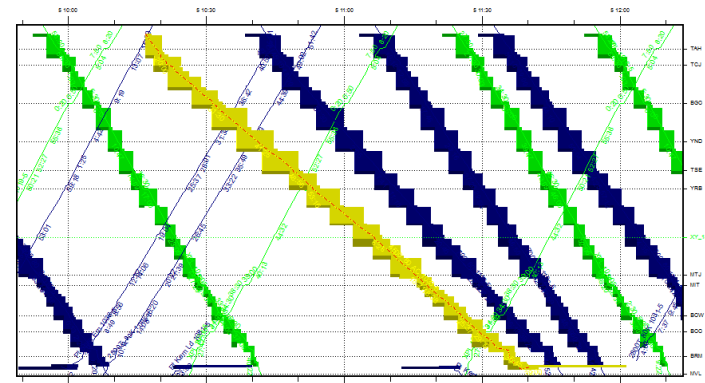
Line name	Line type	Line length (km)	Line speed (km/h)	Line status	Line category	Line description
Adelaide to Melbourne	Passenger	1000	160	Open	1	Adelaide to Melbourne
Adelaide to Perth	Passenger	4000	160	Open	1	Adelaide to Perth
Adelaide to Sydney	Passenger	3500	160	Open	1	Adelaide to Sydney
Adelaide to Brisbane	Passenger	4000	160	Open	1	Adelaide to Brisbane
Adelaide to Melbourne	Freight	1000	160	Open	2	Adelaide to Melbourne
Adelaide to Perth	Freight	4000	160	Open	2	Adelaide to Perth
Adelaide to Sydney	Freight	3500	160	Open	2	Adelaide to Sydney
Adelaide to Brisbane	Freight	4000	160	Open	2	Adelaide to Brisbane
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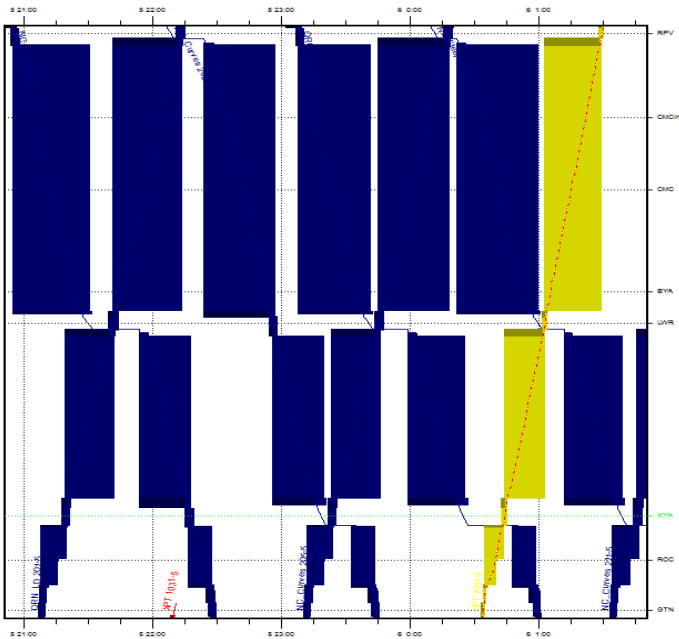


Timetable module



Train ID	Start Time	End Time	Train Length	Train Speed	Train Status	Train Category	Train Description
100001	08:00	09:00	100	160	Open	1	Adelaide to Melbourne
100002	08:30	09:30	100	160	Open	1	Adelaide to Melbourne
100003	09:00	10:00	100	160	Open	1	Adelaide to Melbourne
100004	09:30	10:30	100	160	Open	1	Adelaide to Melbourne
100005	10:00	11:00	100	160	Open	1	Adelaide to Melbourne
100006	10:30	11:30	100	160	Open	1	Adelaide to Melbourne
100007	11:00	12:00	100	160	Open	1	Adelaide to Melbourne
100008	11:30	12:30	100	160	Open	1	Adelaide to Melbourne
100009	12:00	13:00	100	160	Open	1	Adelaide to Melbourne
100010	12:30	13:30	100	160	Open	1	Adelaide to Melbourne





RMCON's continued development

- RailSys Enterprise goes beyond just network modelling
- Can be used to develop whole timetables and train graphs
- Can be used for track work planning
- Online train path requests possible

Other simulation programs - OPENTRACK

- The main rival to RailSys
- Very similar to RailSys
- Developed by the Swiss Federal Institute of Technology
- For SBB, Swiss Railways
- Marketed in Australia by Plateway

Other simulation programs – Berkeley Simulation

- An American equivalent to RailSys and OpenTrack
- Developed in Berkley California
- But no connection to UC Berkley

Other simulation programs – TRIMS

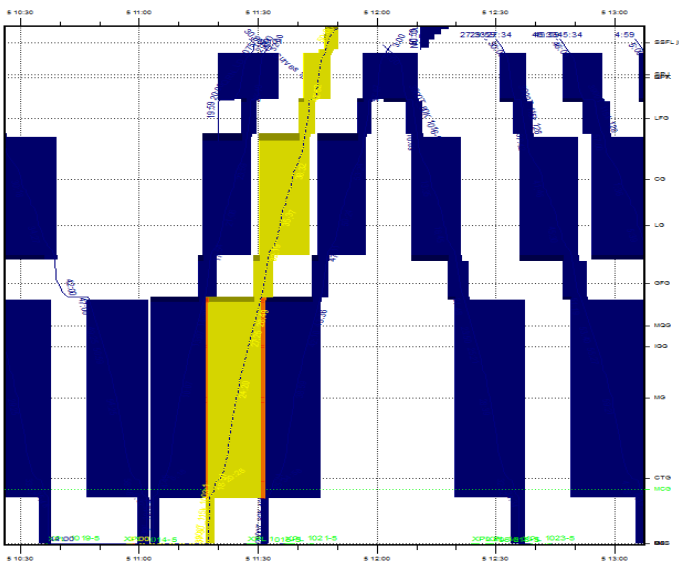
- ARTC's main timetabling tool
- Generates train graphs for Network Controllers to use
- Generates timetables to publish
- Does not do any modelling and needs inputs such as sectional run times
- Need to get the supplier to modify the network for us
- Developed by ICG as part of their Vizirail system
- Used also by QR, SydneyTrains, John Holland Rail

Other simulation programs – Energymiser

- Aka *Fuelmiser*
- Drivers cab display
- Advisers drivers where they can throttle back to save fuel whilst maintaining timetable
- Uses the timetable, network geography and train performance calculations to work out where best fuel savings can be had whilst still maintaining the timetable
- Marketed by TTG

What we use it for

- Comparing the performance of different train consists
- Calculating signal headways
- Calculating new sectional run times
- Evaluating the effects of new signal systems
- Evaluating the effects of new infrastructure such as new passing loops
- Evaluating the possibility of adding new services



- Developed from the work of Dr Peter Pudney, whilst at Flinders and then UniSA

#### Other simulation programs – GE Trip Optimiser

- An American equivalent of Energymiser
- Developed and sold by locomotive manufacturer GE

#### Other simulation programs – MTRAIN

- Works out train performance based on geography and locomotive tractive effort
- Can calculate section run times, signal clearance times and headways
- Can compare train consists
- Does not model a timetable or trains interacting with one another
- Original development started by Alex Wardrop around 1972 for NSW railways

#### Other simulation programs – Dynamis

- Similar to MTRAIN
- Developed by IVE - University of Hannover
- Supplemented RailSys
- Models a single train run in great detail
- Does not model a network

#### Other simulation programs – Rail//Sys

- No relation to RailSys but appears to do the same things
- Marketed TTG
- Has 3 parts:
  - Rail//Net to develop a railway network
  - Rail//Train to model train performance
  - Rail//Table to develop a timetable

#### Other simulation programs – TPAT

- Developed by UniSA for ARTC
- Allows timetables to be compared back to back and infrastructure changes to be compared back to back
- Very basic tool for calculating the robustness of a timetable
- Such as the time within which a train will arrive 90% of the time
- A lot quicker than RailSys

- Can be used to supplement RailSys

#### Other simulation programs – ARENA

- Process modelling software
- Sold by Rockwell Automation
- Used by the HVCCC to model the movement of coal in the Hunter Valley
- Their model includes ships berthing, tides, coal stock piles, loading and unloading trains
- Includes rail movements at a basic level

#### Other simulation programs – GE RailEdge movement planner

- A network controller advice program
- Looks at trains running late on a network and how to recover them
- Runs numerous scenarios
- Advises the Network Controller of the best scenario
- Looks beyond what a single Network Controller can see, many hours into the future and across numerous boards.





## RTSA AWARDS UPDATE

Nominations for the 2015 RTSA Individual Award are now open. Details on how to nominate, including judging criteria, can be found on the RTSA website – [www.rtsa.com.au/awards/annual-individual/index.html](http://www.rtsa.com.au/awards/annual-individual/index.html)



# 2015 INDIVIDUAL AWARD

Nominations close **Friday 03 August 2015**

The RTSA's Most Prestigious Award will be presented at the CORE 2016 Gala Dinner in Melbourne in May 2016

### Judging Criteria

- Overall career service to the wider Railway Community
- Service to the wider Railway Community over the last three years
- Current Career Achievement
- Degree of Autonomy
- Articles, Publications & Papers

more details at:

<http://www.rtsa.com.au/awards/annual-individual/index.htm>



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<b>FUTURE RTSA MEETINGS AND EVENTS</b>
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DATE AND TIME	ACTIVITY	LOCATION
Thursday 5 <sup>th</sup> FEBRUARY 2015 3.00 PM	Site Visit 4000 Class EMU Simulator Tour by SYDAC	DPTI Dry Creek Railcar Depot, 9-13 Dean Harvey Drive, Dry Creek SA 5094
Thursday 5 <sup>th</sup> MARCH 2015 4.30 PM	Committee Meeting	Mile End Glass House, DPTI Mile End Depot 71, Richmond Road, Mile End 5031
Monday 16 <sup>th</sup> MARCH 2015 11.00AM	AK CAR Tour/Site Inspection	ARTC Keswick Passenger Rail Terminal
Thursday 2 <sup>nd</sup> APRIL 2015 4.30PM	<i>Cancelled due to Easter Break</i>	<i>Cancelled due to Easter Break</i>
Thursday 14 <sup>th</sup> MAY 2015 6.00PM	Rail Network Modeling Programming and Tools	Engineers Australia, Level 11, 108, King William Street, Adelaide 5000
Thursday 4 <sup>th</sup> JUNE 2015 5.45PM	Whyalla to Iron Knob Railway Track Restoration Project	Hilton Hotel, 264 South Road, Hilton SA (Corner of Sir Donald Bradman Drive)
Thursday 2 <sup>nd</sup> JULY 2015 4.30PM	Think you know trams? Think again	Engineers Australia, Level 11, 108, King William Street, Adelaide 5000
Thursday 6 <sup>th</sup> AUGUST 2015 4.30PM	<b>Laser measurement trolley</b>	<b>TBA</b>
Thursday 3 <sup>rd</sup> SEPTEMBER 2015 4.30PM	Presentation hosted by IRSE	TBA
Thursday 1 <sup>st</sup> OCTOBER 2015 4.30PM	Presentation hosted by PWI	TBA
Thursday 5 <sup>th</sup> NOVEMBER 2015 4.30PM	<b>Torrens to Torrens Project</b>	<b>TBA</b>

2015 RTSA Meetings will be on the **FIRST THURSDAY** of each month from February to December. Any changes will be advised in the Newsletter, or if a last minute affair then by special notice.

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



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