

2 – 4 November 2016

Venue: Lifesaving Victoria, 200 The Boulevard, Port Melbourne



Purpose

The course is in two parts and is run over three days and covers 16 modules including:

Truck and trailer engineering

Wednesday 2nd November

1. Engine and transmission development
2. Tyres, axles, ride, alignment and steering
3. Adaptive braking systems
4. Tyres
5. Roadworthiness, homologation and modifications

Thursday 3rd November

6. Forensic investigation
7. Truck and trailer fire causation
8. Vehicle dynamics and crashes
9. Failure modes of metals and plastics
10. Vehicle braking and stability
11. Chassis Ladder Design and Stress Analysis

Certification

Friday 4th November

12. Heavy Vehicle Certification Procedures
13. The Performance-Based Standards Project
14. Modification of Heavy Vehicles
15. The Road Vehicle Certification System (RVCS)
16. Certification of heavy trailers

Who Should Attend:

Workshop managers, fleet operation managers, vehicle engineers, insurance investigators, inspectors. The course will be informative for anyone with a professional interest in heavy truck and trailer safety and mechanical performance.

Course costs:

Courses are ARTSA members: \$880 per day inclusive of GST and non-members \$1100 inclusive of GST. Participants can elect to attend on any or all of the three days. To attend contact ARTSA Executive Officer Rob Perkins on exec@artsa.com.au or phone 0411 402 832

Part 1 *Truck and Trailer Engineering*

A two day course covering 11 topics

DAY 1 – Wednesday 2nd November 2016

Introduction 8:30 am The scope and structure of this course - Peter Hart

9:00 am 1. **Engine & Transmission Developments** - Guy Macklan
Diesel engine technologies, engine failure modes, engine emissions and fuel economy developments, CAN bus, engine controller data storage, incident storage, RSL tamper response, virtual technician developments, telematics,...

Morning Break 10:30 – 11:00

11:30 am 2. **Tyres, Axles, Ride, Alignment & Steering** - Peter Hart & Alan Hogan & Jas Babilija
Vehicle dynamic modes, chassis vibration modes, tyre ratings, tyre wear modes, tyre slip curves, variation with inflation pressure, tyre lateral stiffness and centring moments, wheel alignment measures, camber, caster, Ackerman angles, axle bending, suspension responses, suspension braking reactions, shock absorber performance, driver vibration levels, road friendly suspensions,...

12:30 – 1:30 Lunch

1:30 am 3. **Adaptive Braking Systems** - Tony Cheyne
Basic components of modern brakes systems. Differences between North American, European and Japanese motor vehicle brake systems.
Electronic Stability Control (ESC) for trucks and trailers, types of interventions, adaptive brake distribution, voltages and earthing requirements, autonomous braking, steering and lane assist, intervention monitoring, fault condition performance, correction limits,...

3:00 – 3:30 pm Afternoon Break

3:30 pm 4. **Tyres** - Marcus Coleman and Chet Cline
Tyre performance characteristics and classifications. Tyre standards. Tyre testing. Variation of parameters with inflation pressure. Variation of braking distances and road-handling performance with tyre type and parameters. Novel tyre types. Technical standards. Load and inflation limits of tyres in Australia.

4:30 pm

5. **Roadworthiness, Homologation and Modifications** - Peter Hart

Legal requirements, Vehicle Standards Bulletins, types of body attachments, tow coupling strength, brake modifications and calculations, chassis rail extensions, rail stress calculations, torsional strength of vehicles, RVCS approval structure and details available in the public domain, National Heavy Vehicle Law, National Roadworthiness inspection manual, condition of heavy vehicles on the road, NHVAS inspection requirements Chassis strength calculations.

5 pm close

Day 2 Thursday 3rd November 2016

8:30 – 9:00 am Review - Peter Hart

9 am 6. **Forensic Investigations** - Peter Hart

The role and responsibility of the forensic examiner. Legal requirements.
Fire scene examination, protection of evidence, one-chance inspections. Inspection of exemplars, recalls, anecdotal reports.
Witness statements, notes, sketches and photographs. Court appearances. Fire patterns, fuel loadings, ignition and melt temperatures, electrical arcs, common failure modes of electrical and mechanical systems. The importance of technical standards. Many examples of fire scene examinations – vehicles and houses.

10:30 – 11:00 Morning Break

11 am 7. **Truck and Trailer Fire Causation** - Peter Hart & Robert Morley

Scale of the truck fire problem in Australia. Detailed presentations on the types and frequency of various types of fires in vehicles and in particular in heavy vehicles. Electrical fires generally, battery capacity, battery explosions, fuses and circuit breaker performance, hot terminals, assessment of arc-melts,...

	Fuel system fires, exhaust spacing requirements, fuel-line ruptures, turbo-charger failures, exhaust fires, bearing fires, tyre fires, environmental factors, ... Bearings and wheel-end problems.
12:30 – 1:30	Lunch
1:30 pm	8. Vehicle Dynamics and Crashes - Peter Hart & Jas Babilija Crash scene inspection, measuring the road, curvatures and superelevation, road friction assessment, bitumen surface features, weather conditions, reading skid marks, assessing vehicle trajectories, impact speed estimation, ... Review of some heavy-vehicle crashes. Dynamic modes of vehicles, roll-over thresholds, simulation of heavy vehicle roll-overs, suspension compliance, height of C of M calculations, downhill speed gain, plastic and elastic collisions.
2:30 pm	9. Failure Modes of Metals and Plastics - Peter Hart & Jas Babilija. Brinelling marks, fatigue, beach marks, stress fractures, shear damage, friction and wear, bearing wear and failure modes, lubrication, types of welds, welding practice, stress risers, corrosion reactions, electrolysis, cavitation, lubrication, surface protection, ...
3:00 – 3:30 pm	Afternoon Break
3:30 pm	10. Vehicle Braking and Stability - Peter Hart & Jas Babilija Stopping distance calculations. Friction utilization, load transfer, brake equations, aspects of brake balance, tyres and braking, threshold pressure, limitation of braking performance of combinations, adaptive brake systems, recommended combinations of technologies, characteristics of drum and disc brakes, mixing of brake technologies, basic brake balance calculations, auxiliary brake performance, design rule and in-service rule requirements, design-rules, ...
4:30 pm	11. Chassis Ladder Design and Stress Analysis of Chassis - Jas Babilija & Peter Hart Chassis ladder design. Cross-member strength, calculation of chassis rail stress, factors of safety for fatigue, torsional stiffness of the chassis ladder, making things stronger with less metal, attachment design, ...
5 pm Close	

Day 3 -

8:30 am

Friday 4th November 2016 Certification

A one day course covering 5 modules

8:45am

Outline and Review

12. Overview of Heavy Vehicle Certification Procedures

- **Peter Hart**

State v Federal responsibilities, NHVR, in-service v new, public road v private-road.

Importation requirements and procedures. (Licensee, special, RAWs, personal)

Registration types and categories. Permit and special-purpose vehicle types.

Special purpose vehicle registrations. Evaluation vehicle registrations.

Plant vehicles and dangerous goods vehicles.

NEVDIS & registration procedures, VIN reporting requirements

9:30am

13. The Performance-Based Standards Project

- **Anthony Germanchev**

Basic concepts and standards. Detailed description of safety and infra-structure standards. Simulation procedures. Tyre performance. Endurance braking.

10:30 – 11:00

Morning Break

11:00 am

14. Modification of Heavy Vehicles

- **Peter Hart**

Legal requirements, Vehicle Standards Bulletins (VSB4, VSB6, VSB14), NHV Law and Regulations. Dealer requirements. Types of body attachments, tow coupling strength, brake modifications and calculations, chassis rail extensions, chassis rail strength, rail stress calculations, torsional strength of vehicles, RVCS approval structure and details available in the public domain, VSB 6 checklists, manufacturer's Body Builder's Guides, National Heavy Vehicle Law, Approved Vehicle Examiners, responsibilities of OEMs and dealerships.

12:30 – 1:30 pm

Lunch

1:30 pm

15. The Road Vehicle Certification System (RVCS) - Peter Hart

Type approval schemes v individual vehicle approval schemes. Purpose

and Structure of the RVCS. RVCS Website as a resource. UN ECE, EU Directive and GTR rules. RVCS vehicle categories (NB1, NB2, NC, TC, TD, MD4, ME). Special approvals.

RVCS approval types (full, low volume, secondary, RAWS). L, D, S, P, A and T numbers. Second-Stage of Manufacture approvals. Introduction to Informed Filler and custom SE & SF forms. Administrative Circulars. COP and TFI Audits. Compliance plate supply and cost. How to compose an application for a compliance plate application.

Afternoon Break 3:00 – 3:30 pm

3:30 pm

16. Certification of Heavy Trailers - Peter Hart & Jas Babilija

Drawbar strength, typical trailer chassis rail designs, ADR requirements, SARN approvals of brake subsystems, air brake controls, brake system calculations, park brake and emergency brake calculations, ECE R13 and trailers, drawbar calculations, certification requirements,...

5pm close

Presenters

- David Axup,** David Axup and Associates, vehicle crash investigations. David has 50 years' experience investigation road crashes, firstly as superintendent of police responsible for major crash investigations, and later as a consultant to major fleets in the truck industry. David's knowledge and experience of crash investigations is unsurpassed in Australia.
- Tony Cheyne,** Technical Manager, Wabco Australia. Tony is an expert on advanced braking and stability control systems. Tony provides high-level technical support for all Wabco brake equipment in Australia and New Zealand.
- Anthony Germanchev,** Team Leader, Freight and Heavy Vehicles at Australian Road Research Board (ARRB) Anthony is a qualified mechanical engineer. He conducts specialist investigations into vehicle strength and dynamic performance. Anthony has overseen the development of a world leading tyre and pavement testing machine at ARRB.
- Marcus Coleman,** Managing Director of Tiger Spider. Marcus supervises the development of innovative vehicle designs including PBS designs. He has a deep knowledge of tyre performance characteristics and the application of different tyre types on PBS vehicles. Hartwood Consulting Pty Ltd. Consulting mechanical Engineer.
- Jas Babilija,** Jas is involved in all aspects of heavy-vehicle certification and with assessments of mechanical performance of mechanical designs.
- Robert Morley,** Hartwood Consulting Pty Ltd. Consulting electrical engineer. Robert is involved with electrical-forensic investigations and with electrical and fire-safety investigations.
- Chet Cline,** Air CTI Pty Ltd. Chet is the founder of Air CTI. He has a passionate interest in truck safety and this has resulted in a detailed knowledge of tyre performance as it depends upon inflation pressure. Chet will describe the dependence of road handling and braking performance on tyre pressure.
- Alan Hogan,** Hogan's Axle Corrections. Wheel alignment, road handling, corrections. Alan has spent his working life alignment and axle corrections. His knowledge and reputation are well-known throughout Australia. Alan will describe in detail the process involved in assessing road handling problems and correcting them.
- Guy Macklan,** Engineering Manager Detroit MTUDD (recently retired). Mechanical engineer and engine-technology expert. Guy Macklan has been the engineering manager of Detroit Diesel and later Detroit MTU for more than 30 years. There is nothing Guy does not know about diesel engine technology. His experience covers both the mechanical and the electrical aspects of diesel engines, large and small. He has been deeply involved with the application of electronic control and monitoring onto diesel engines.
- Peter Hart,** Hartwood Consulting Pty Ltd. Consulting engineer, convenor. Peter is an electrical engineer. Peter has fifteen years' experience as a forensic examiner and is an experienced expert witness. Peter is also an Agent in the Road Vehicle Certification System and a VicRoads engineering signatory.

**For more details go to: www.artsa.com.au/training
or contact Rob Perkins on 0411 402 832**