

RESEARCH THEME: MATERIALS & SUSTAINABLE MANUFACTURING

LIGHTWEIGHT VEHICLE STRUCTURES

This project aims to build collaboration between Hefei University of Technology (China), Deakin University and AutoCRC in the areas of materials, manufacturing and simulation.



Project Leader

Dr Bernard Rolfe
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Project Participants Deakin

ADVANCED RIVETING SYSTEM PHASE 2

This project aims to further develop, validate, and demonstrate Friction Stir Blind Riveting technology using a robot-mounted riveting system designed and fabricated during Phase 1 of this project.



Project Leader

Prof Sri Lathabai
CSIRO
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Project Participants GM Holden
CSIRO

COULOMB DAMPED HOUSINGS

Coulomb Damping is a phenomenon observed when metallic components rub against each other. It is proposed to apply this concept to improve performance of motor housings. The development work will be based on a simple high pressure die-cast specimen design. It will explore requirements for insert material, thickness, geometry, coating and manufacturing method.



Project Leader

Dr Thang Nguyen
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Project Participants GM Holden
CSIRO

TESTING ELECTRICAL STEEL PERFORMANCE

The aim of this research is to develop a technology that will improve quality of electric motor products, therefore customer satisfaction by identifying components out of specification and reducing the production variation of low performance electric motors.

Project Leader

Dr Howard Lovatt
CSIRO
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Project Participants GM Holden
CSIRO

BEYOND LEAN: POST LEAN MANUFACTURING IN AUSTRALIA

Lean manufacturing is now the incumbent paradigm within the global automotive industry. Its success in the super competitive global automotive market has attracted the attention of manufacturing and service providers who are currently enjoying the benefits of waste reduction and lower operating costs with enhanced quality and customer satisfaction.



Project Leader

Ass Prof Roger
Labrooy
RMIT
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Project Participants RMIT
SMR

GAS METAL ARC WELD MODEL FOR ALUMINIUM

The aim of this project is to develop a three-dimensional, time-dependent, computational model of GMA welding of aluminium, in lap fillet weld geometry.



Project Leader

Dr Tony Murphy
CSIRO
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Project Participants

CSIRO
GM Holden

VIRTUAL SIMULATED WORK ENVIRONMENT

Project benefits include enabling accurate dynamic digital human modeling of operators performing assembly tasks from basic push/pull through to manipulation of flexible hose/cable and will significantly impact on ergonomic analysis of assembly processes and assist in build/design path optimisation of flexible materials.



Project Leader

Prof Saeid
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Project Participants

Deakin
GM Holden

PLASTICS MIRROR COATING DEVELOPMENT

The aim of this project is to develop a second generation manufacturing process that will eliminate the traditional liquid hardcoat system, replacing it with an in vacuum hardcoat (Plasma Enhanced Chemical Vapour Deposition) process. By converting the whole process into a single "black box" and eliminating all manual handling, a high volume process with significant cost savings can be realised.



Project Leader

Dr Peter Murphy
UniSA
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Project Participants

UniSA
SMR

LASER PROJECTION SYSTEM FOR WORK CELLS

This project will determine ways of evaluating an environment and selecting the most suitable areas to project information onto, and modifying the projection to appear as understandable as possible. The research will also investigate straightforward user interface technologies to support users on the shop floor.



Project Leader

Prof Bruce Thomas
UniSA
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Project Participants

GM Holden
UniSA

VIRTUAL PAINT PROCESS

This project focuses on developing two key virtual manufacturing capabilities for the vehicle paint process. Firstly paint oven bake simulations and secondly fluid access and drainage simulations. The aim is to assess, and where required, extend or replace the current simulations capabilities.



Project Leader

Chris Seeling
VPAC
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Project Participants

GM Holden
VPAC

ADVANCED ACTUATORS

This research will develop two complimentary technologies, the first associated with Shape Memory Alloys (SMA), which are a class of materials that undergo a phase transformation in the solid state. The second is an Integrated Actuator system that allows a single motor to provide multiple outputs, thereby overcoming the need for multiple electric motors and reducing component mass and cost. The Integrated Actuator will utilise the enhanced SMA technology developed in this project.



Project Leader

Dr Martin Leary
RMIT
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Project Participants

Futuris
RMIT

AUTOMOTIVE AUSTRALIA 2020

In partnership with the Australian National University (ANU) and the Australian Commonwealth Science Industrial Research Organisation (CSIRO), and supported by the Commonwealth and Victorian governments has the objective of developing a strategic industry roadmap. This roadmap assesses the current and developing industry capability in the "capability map" builds on these capabilities to define an industry direction the "innovation roadmap" to 2020 and beyond.



Project Leader

Matthew Doolan
ANU

Project Participants

DIIRD
ANU
CSIRO
Deloitte Touche
Tohmatsu
IfM
VPAC

COMPOSITES DEVELOPMENT

The objectives of the composites development project are a lightweight, high strength composite technology of low cost, high manufacturing speed, and low environmental impact. The final outcome will be demonstrator sample seat frames suitable for application in a car and a recommended process and material system with a detailed costing of each.



Project Leader

Dr Niall Finn
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Project Participants

CSIRO
Deakin
Futuris

PLASTIC MIRROR DEVELOPMENT

The aim of this project is to develop a cost effective plastic mirror to replace the traditional components of glass, backing plate and screen printed resistive heater pads on automotive exterior mirrors utilising technologies that include injection compression moulding, vacuum metallisation and resin based hard coatings. The proto-type product at present has several limitations, including optical quality and coating performance.



Project Leader

Dr Peter Murphy
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Project Participants

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SMR

ADVANCED RIVETING SYSTEM, *completed, contact AutoCRC for details*

Fuel economy has become increasingly important in this day and age due to environmental and economical pressures. Decreasing vehicle weight by using HSS, Aluminium and Magnesium alloys, are options to facilitate this. Increased use of these metals in the Automotive industry has caused the need to further develop joining technologies. This project aims to further develop, validate, and demonstrate the effective, efficient application of GM patented rivet technology.

Project Leader

Dr Sri Lathabai
CSIRO

Project Participants

CSIRO
GM Holden

TOOL WEAR PREDICTION

The increased usage of Advanced High Strength Steels (AHSS) in stamping has led to higher press forces, tooling loads and consequently an increase in tool wear problems. Expensive die steel inserts, complex tool coatings and heat treatments can be used to combat these problems but can significantly increase tooling cost and potentially increasing tooling development time. Ultimately this project will develop a tool to predict the likelihood of tool wear problems for a new tool design and facilitate solutions to those problems.



Project Leader

Dr Tim Hilditch
Deakin
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Project Participants

Deakin
GM Holden
Swinburne

RAPID TOOLING DEVELOPMENT

With the development of new virtual design capabilities and shorter concept-to-production-times the Rapid Tooling Development project will ensure new tooling development does not create production bottlenecks. A scoping study will identify areas for major improvement. A series of sub-projects will identify new die-making technologies, reduce proving-time for new dies, and investigate design requirements for high-strength steels.

Project Leader	Dr Tim Hilditch Deakin P: 613 5227 2265	Project Participants	CSIRO GM Holden Swinburne Deakin
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ADVANCED WELD MODELLING

Fuel economy has become increasingly important in this day and age due to environmental and economical pressures. Decreasing vehicle weight using Aluminium, Magnesium and HSS is one way to facilitate this. Increased use of these metals in the automotive industry has in turn brought about the need to further develop associated joining technologies. This project looks at modeling welding processes to optimise manufacturing processes.



Project Leader	Tony Murphy CSIRO P: 612 9413 7150	Project Participants	CSIRO GM Holden
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DEVELOPMENT OF THE NEXT GENERATION CONVENTIONAL POWERFOLD

The project aims to develop a new powerfold product with improved vibration performance, quieter operation, superior torque capability with higher mass ratings and other value adds to cater better to the needs of a growing automotive powerfold customer base. It is anticipated that the outcomes of this project will directly enhance the global competitiveness of this technology and the sustainability of this industry sector through smarter actuator design and improved manufacturing flexibility and efficiency.



Project Leader	Prof Aleks Subic RMIT P: 613 9925 6080	Project Participants	RMIT SMR
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ALTERNATIVE SEAT ADJUSTER MECHANISM

The development of a novel, possibly integrated, design of an automotive seat adjuster system for worldwide application. The main objective is a manufactured and tested proof of concept model and a full assessment of its possible commercial application.

Project Leader	Prof Aleks Subic RMIT P: 613 9925 6080	Project Participants	Futuris Monash RMIT
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AUTOMOTIVE SUPPLIER EXCELLENCE AUSTRALIA

The Automotive Supplier Excellence Australia (ASEA) Program is intended to assist the Australian automotive supply base in achieving international competitiveness and sustainability. Through the creation of an independent, best-in-class benchmarking process and targeted supplier assistance initiatives, ASEA aims to assist automotive suppliers in achieving world-class capability and competency levels.

Website: www.asea.net.au



Project Leader	Dr Victor Pantano ANU P: 612 6125 2694	Project Participants	FAPM ANU Toyota Ford GM Holden Mitsubishi
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ADVANCED SEATING SOLUTIONS FOR PU FOAM - *completed, contact AutoCRC for details*

The development of materials for the manufacture of automotive seating, with enhanced properties for recycling, reduced mass and reduced cost. The project will yield environmental advantages whilst maintaining the safety and comfort required from superior automotive seating technology.

Project Leader	Dr Stuart Lucas CSIRO	Project Participants	Futuris CSIRO
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DIAMOND LIKE CARBON AND HARD COATINGS - *completed, contact AutoCRC for details*

CSIRO Industrial Physics and Holden Innovation are researching the application of low friction diamond-like carbon (DLC) to components in the engine valve train. New technology is being employed to deposit DLC onto valves, valve followers and eventually camshafts using Plasma Activated Chemical Vapour Deposition. This process technology holds the promise of large scale coating of components for production engines to improve fuel efficiency.

Project Leader	Dr Phil Martin CSIRO	Project Participants	CSIRO GM Holden
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CARPET ACOUSTICS - *completed, contact AutoCRC for details*

This project under the leadership of Dr Xu Wang of RMIT, School of Aerospace, Manufacturing and Mechanical Engineering and in collaboration with Dr Stuart Lucas of CSIRO TFT, will explore methods of evaluating and assessing a number of alternative materials and constructions for light weight, recyclable automotive carpet systems. The objective is to establish a sophisticated portable method of optimising acoustic performance of carpet and interiors systems of future vehicles given different body in white and cost targets.

Project Leader	Dr Xu Wang RMIT	Project Participants	CSIRO RMIT Futuris
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LOW COST COMPOSITES FEASIBILITY STUDY - *completed, contact AutoCRC for details*

Low Cost Composites Feasibility Study This project is being lead by Dr Niall Finn of CSIRO TFT with the objective to study the capability and feasibility of producing 3D knitted composite preforms utilising a specialised knitting machine. Alternative knit patterns, fibre materials, binder materials, impregnation, forming techniques and curing methods shall be explored. The mechanical properties of simple 3D tube structures will be tested with the above variables prior to moving on to more complex branched structures to investigate the design flexibility of the concept process.

Project Leader	Dr Niall Finn CSIRO	Project Participants	CSIRO Futuris
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HVAC & REFRIGERANT NOISE STANDARDS - *completed, contact AutoCRC for details*

HVAC noise (heating, ventilation & air conditioning) is a major noise source for some fan operating conditions. The project will develop a design handbook for refrigerant systems and a design hand book for HVAC air noise to assist engineers develop strategies for noise minimisation at design.

Project Leader	A/Prof Simon Watkins RMIT	Project Participants	Air Thermal RMIT
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LOW GLOBAL WARMING POTENTIAL REFRIGERANT - *completed, contact AutoCRC for details*

Design and build, instrument and test, under Australian conditions, a car air-conditioning system that uses an improved working fluid with a low global warming potential. This project is to keep Australia abreast of developing European technology and legislation to utilise more environmentally friendly refrigerant gas than the current R134a (gas).

Project Leader	Chris Dixon RMIT	Project Participants	Air Thermal RMIT
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LIGHTWEIGHT WHEEL - *completed, contact AutoCRC for details*

The ultimate goal is to develop and apply new methodologies for wheel design that produce the lightest possible part while safely sustaining the actual loadings encountered. Lightweight wheels not only directly contribute to vehicle mass reduction but give lower suspension loads allowing savings in the vehicle structure for a compounding benefit.

Project Leader	Phachara Niemsawatt VPAC	Project Participants	VPAC GM Holden
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