Portfolio

jack@jacklow.com.au

Monash University, Australia

Bachelor of Engineering (Mechanical) (hons)
Bacherlor of Design (Industrial Design)

Glencore Xstrata Graduate Program,
Mount Isa, Australia

Mechanical Engineer - (2012 - current)
Underground Heavy Mobile Fleet Maintenance
Copper Smelter Fixed Plant

GM Holden Co-Operative Program

Perceptual Quality Analyst - (2010)
(Craftsmanship)

Formula SAE-Australia - (2007-2010)
Formula Student UK - (2010)
Young Achievement Australia - (2009)

Jack Low

About Me

Jack Low

I am versatile, creative problem solver

I am experienced in technical mechanical engineering and aesthetic industrial design through professional, education and extra-curricular pursuits.

I also understand intricacies of getting the right balance from business and cultural drivers are critical to overall success.

My strengths are in complex, multidisciplinary solution generation from concept generation all the way to production intent, working within and facilitating teams of stakeholders from all different disciplines.

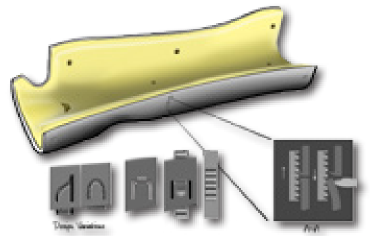
My workplace motivators are to learn and absorb as much around me, then input all my learnings to develop world class solutions to real world problems.

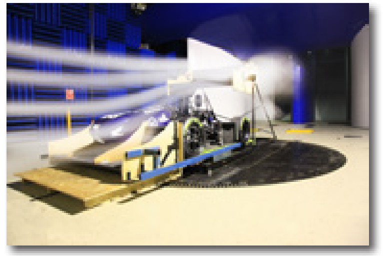
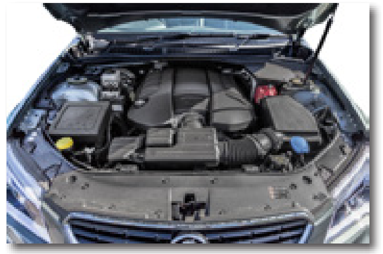
I use a diverse set of tools to produce analytical and practical outcomes and effectively present using a variety of tools and methods.

I am hands on, highly motivated, self managing and seek pride in my work and its implementation in real world solutions.









GM Holden Co-Operative Program

Perceptual Quality Analysis

Craftsmanship - Bridging Engineers and Designers

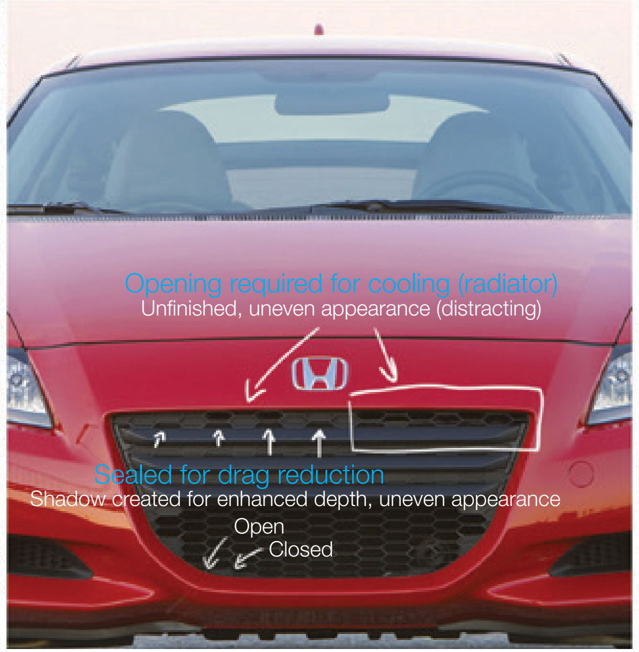
Hardware styling direction for components which lacked traditional studio support such as advanced powertrains components and 'b-class' surfaces

Dynamic and static benchmarking of competitive landscape and provided program team with key targets and insights to customer expectations

Mediated cross functional teams of designers and engineering to produce quality execution of proposed concepts with achievable production feasibility

Developed accurate hard and soft models reflecting production intent for important program decisions

Benchmarking



Tuning a front grille is a way for engineers to tune aero performance without affecting styling surfaces. By opening and closing holes in the pattern, it is possible to increase airflow into the radiator or deflect air into other paths of less resistance.

However, aesthetic issues are sometimes unintentionally created and must be balanced between styling and engineering

GM Holden Co-Operative Program

Perceptual Quality Analysis

VF Commodore (MY14) Production Underhood

MY06 Production

Hood Inner Sheet Metal
Smooth metal features
Equidistant, inline and balanced mechanical features

Hood Seal
Seal path balanced and hides fasteners behind

Hood Hinge
Manage aesthetic design along with manufacturability

Hood Liner
Clean look executed despite complex sheet metal surface and structural nodes behind for ped-pro performance

Although VF Commodore is shares architecture with the outgoing VE Commodore it replaces, several new components were required to be designed to enable weight savings and additional content.

The perceptual quality team liaised between engineers and designers to maximise customer appeal by balancing technical engineering and aesthetic design by providing studio support and thorough analysis conventional teams would not be resourced to do.

Development of the underhood compartment focused on “no cost” design improvements - by working with engineers while designs were still fluid, increasing perceived quality of the product without any additional cost investment.

Fender Attach
Managed aesthetics with strength balance

UBEC Cover Surface
Crown and surface to reference airbox

Headlamp Flange
Maximise area to block glossy tie bar below

Hood Latch Clearance
Reduce empty gap without hindering operation

Single Hood Strut
Bracket to look “designed”, not overly mechanical

Fascia Attachment
Managed and clean appearance while maintaining fastening and clearance issues
Remove clearance channel for hood seal

GM Holden Co-Operative Program

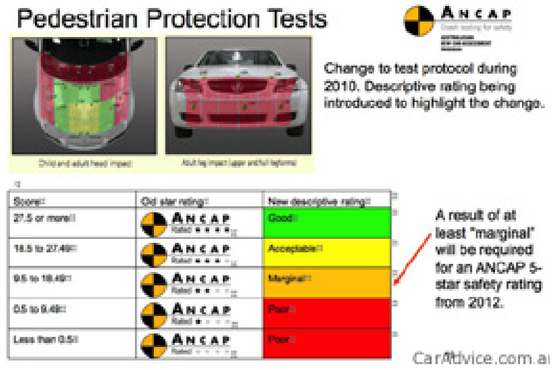
Perceptual Quality Analysis

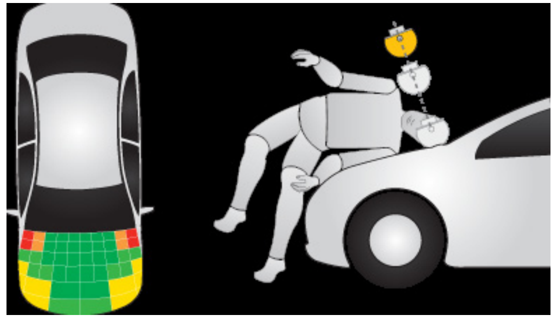
Underhood Management

Engineered components require specific materials, geometry, and locations to perform their tasks. The limited packaging space to accommodate component attributes also affects the vehicle's balance, HVAC, NVH, aerodynamics and other systems.

As the vehicle is designed for dynamic loading, clearance tolerances are enforced to allow the components to move while the chassis bends through tight corners

To reduce cost and mass, components are often assembled on body structures and are not covered with decorative covers. Component connectors are designed efficiently to improve assembly and cost/mass implications.





Strategy, Cost and Investment

The underhood compartment is a complex business case.

Customers view of underhood appearance vary significantly.

"A to B" drivers may never open the hood of the car, sending for servicing as required.

The smaller percentage of customers that are car enthusiasts (and possibly brand loyal) take more pride and may showcase the engine bay.

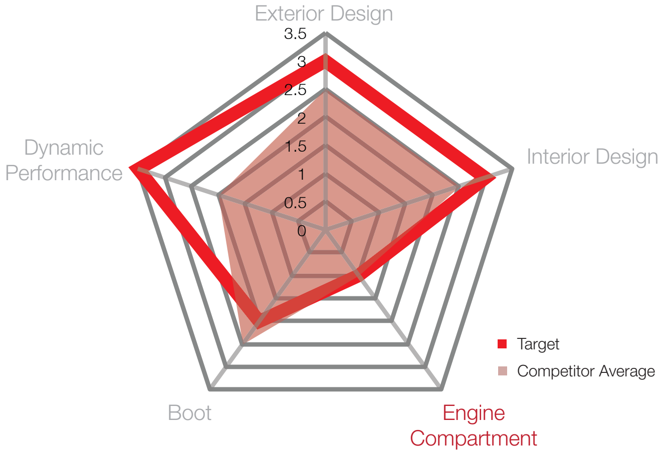
Furthermore, performance vehicles share the same auxiliary components are affected by base model cost reductions and investments.

Generally more money is spent on dynamic performance and high customer interaction areas such as exterior and interior design.

The engine compartment is perceived to be an engineering area that houses all the mechanical components to the car to perform its function. The cost/benefit of budgeting for aesthetics in the engine compartment may not be as well valued if spent on better interior fabrics or exterior garnishes.

Depending on their locations, underhood parts may have an effect on the exterior appearance as they may appear through cut lines or ventilation channels.

Working with engineers on developing CAD from early stages allows for implementing inherent design craftsmanship without significant tooling and cost investment as well as weight from cosmetic covers.



Monash Motorsport

Formula SAE-A Competition

Mechanical Engineering / Industrial Design student

Body work development and manufacturing

Sponsorship and team support

Static events coordinator
Design board designer
Presentation event design support

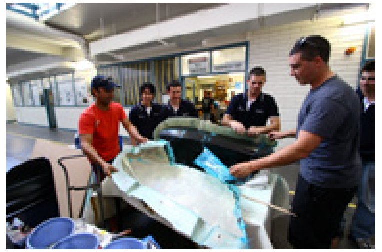
Formula SAE-Australia	2007-2011
	2009 - 1st
	2010 - 1st
Formula Student UK	2010 - 3rd

Monash Motorsport

Formula SAE-A Competition

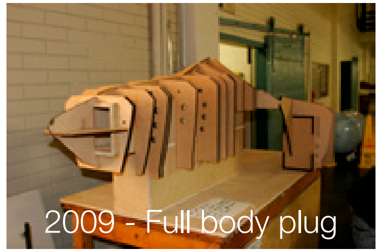
Body work development

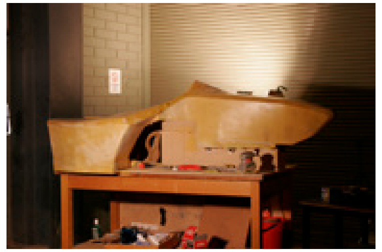

2008 - Single plug



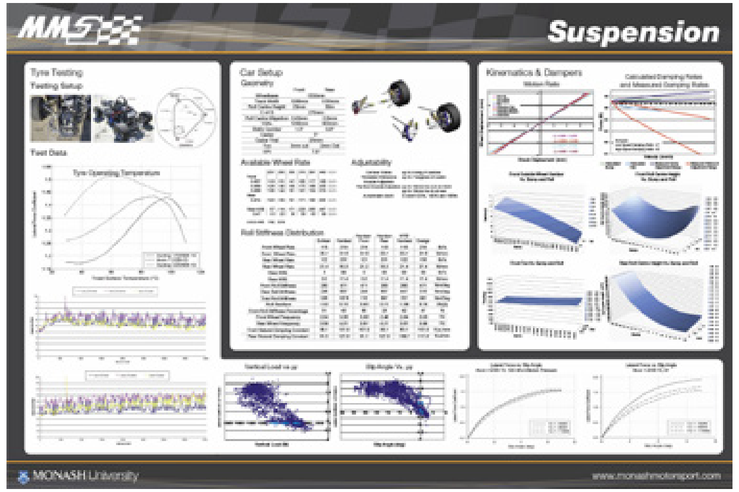
Design, testing, fabrication and repair of parts

MDF/Body filler plug
Fibreglass moulds
Carbon fibre parts

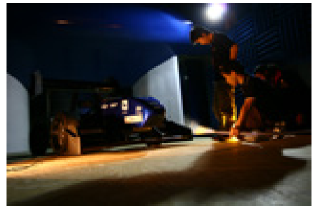

2009 - Full body plug

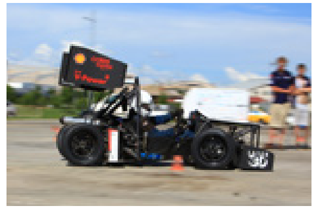


Static Events Coordination

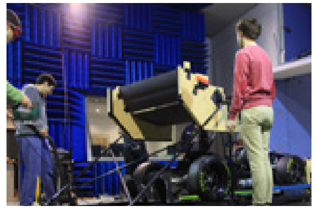


Testing




Track testing


Component design and manufacturing


Full sized wind tunnel testing

Final Year Project

Redesign of an Orthopedic Arm Cast

Mechanical Engineering and Industrial Design Thesis - Conceptualisation and development of an orthopaedic arm cast

polyurethane expanding foam inner cast abs cast sculptor and exoskeleton

- increased user friendliness
- increased focused immobilisation
- adaptive to healing process
- less requirements for medical staff

Final Year Project

Redesign of an Orthopedic Arm Cast

Highly user-centered developed design

Defined external functional surfaces to cater for every day postures and hand interactions.

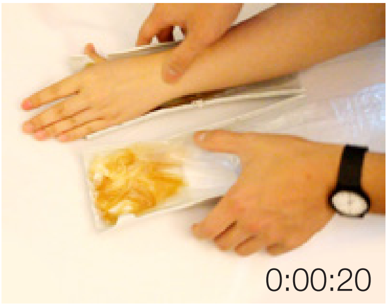
Adjustable cast tightness allows for adjustment for swelling and adaptability to healing process.

Ability for safe partial removal allows for ease of medical diagnosis and access for cleaning, reducing itching and increasing comfort.

Streamlined application process

Patient interaction complete in 1 minute with minimal effort to avoid moving broken arm.
Cast set in 5 minutes and adjusts for swelling.

Break internal seal and agitate foam mix



Place injured wrist in exoskeleton

Close and lock exoskeleton

Foam generation naturally positions wrist in optimal position and sets firm

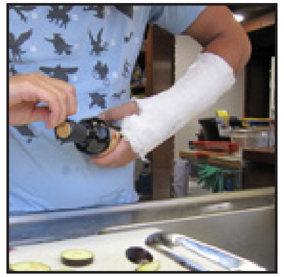
Final Year Project

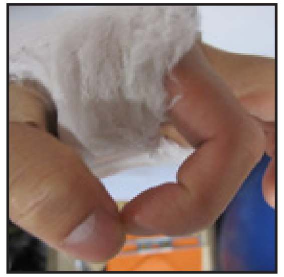
Redesign of an Orthopedic Arm Cast

Overview of key product development processes over two 13 week semesters

Experiential research

Voluntarily wore a cast for one full week fully understand experience, identifying and prioritising requirements of cast redesign





Immobilising a healthy wrist stresses physical characteristics of the plaster cast beyond normal operating conditions

Establish functional requirements

maintain effectiveness of immobility

provide high standard of immobilsation to allow natural healing process to occur

allow good environmental and operational resilience and increase hygiene

must be resistant to water damage and cyclic impact forces without deterioration

reduce bulk and mass

increase user comfort

allow easy application and reduce setting time

reduce need for medical staff and skills required to ensure successful application

adapt for the healing process

allow for adequate strength throughout use

allow easy removal

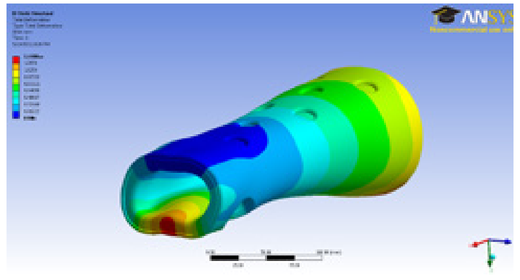
alleviate patient stress during removal process

minimise cost

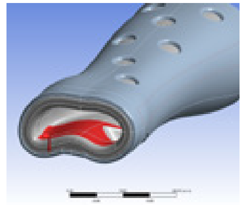
maximise accessibility to all patients and medical practitioners

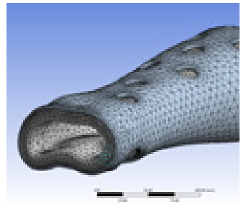
Simulate performance criteria

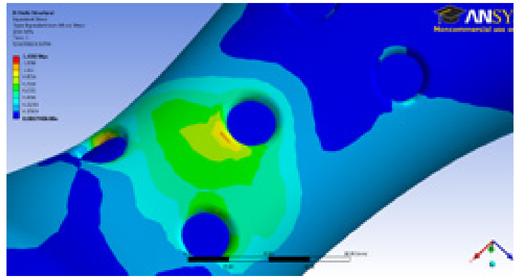
CAD + FEA analysis to simulate results to guide initial prototyping before investmentof tooling and materials



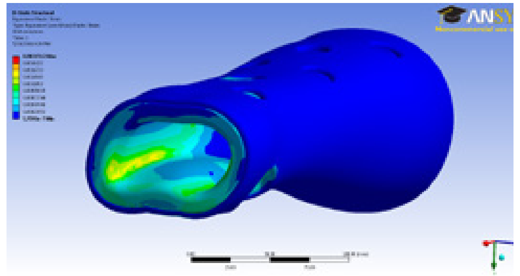
14mm deflection @ 10kg load





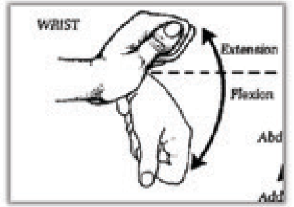


localised stress concentrations can induce crack propagation



exoskeleton provides most stiffness to cast

Establish technical requirements



During cast experience, greatest force that needed to be restricted was wrist flexion. A maximum load that a full strength wrist was roughly be 10kg.
To satisfy performance criteria to handle 10kg wrist flexion, analysis shows the product requires:

10mm medium density polyurethane foam ‘insert cast’
3mm ABS exoskeleton

More testing required to understand requirement for damage tolerance to impact forces with hybrid cast

Final Year Project

Redesign of an Orthopedic Arm Cast

Product vision

Concept validation

Self applicating design

Foam places broken limb in correct position Naturally and holds position within 4 min, reducing requirement for medical experience and expertise

Mass and bulk reduction

ABS foam hybrid provides increased cyclic damage tolerance with similar shock resistance

Hybrid material selection

Materials are water stable and antibacterial. Shock resistant and stiff for high damage resilience where on outer shell where required

Greater effectiveness of immobilisation

Stiff foam goes closer to the skin and restricts muscle movement as well as bone movement.

Cost competitive

Raw materials are cheap and tooling costs can be offset by dramatic reduction of medical staff time and related service costs

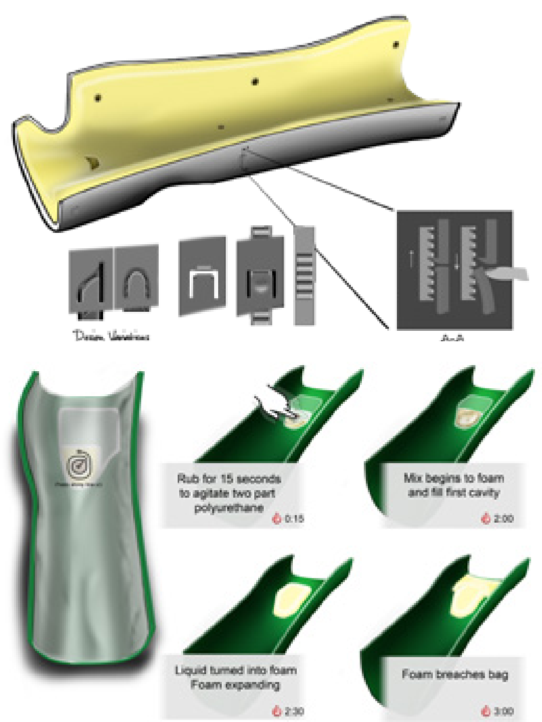
Adapts to healing process

Proper temporary removal to allow for gentle cleaning of skin when sufficient bone healing is reached

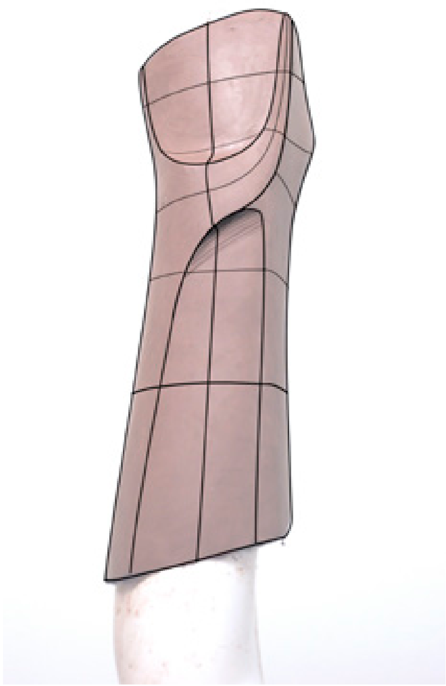
Final Year Project

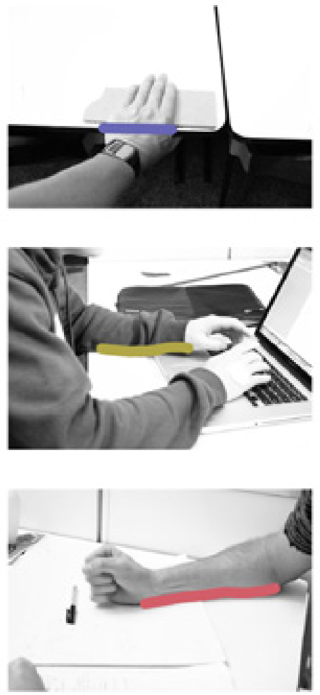
Redesign of an Orthopedic Arm Cast

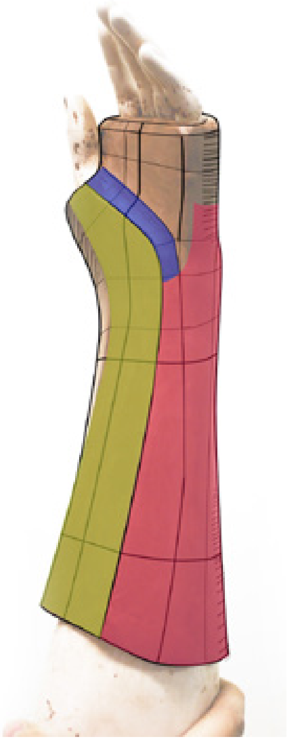
Conceptual sketches



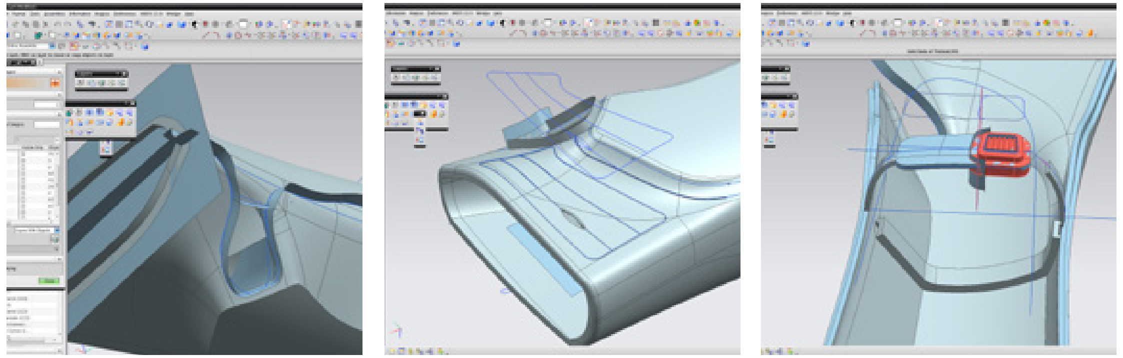
Clay form exploration

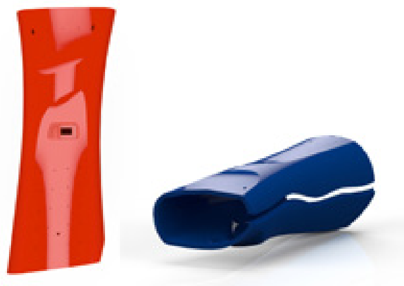






CAD development (UGS NX7)





3D printing and preparation

Industrial Design Project

Motegi
Racing Cockpit

Archetype +1 Design Exercise
Gaming Steering Wheel Seat + Stand

no tool assembly - slot based

Flat packed delivery and storage

assembly time - 7 minutes

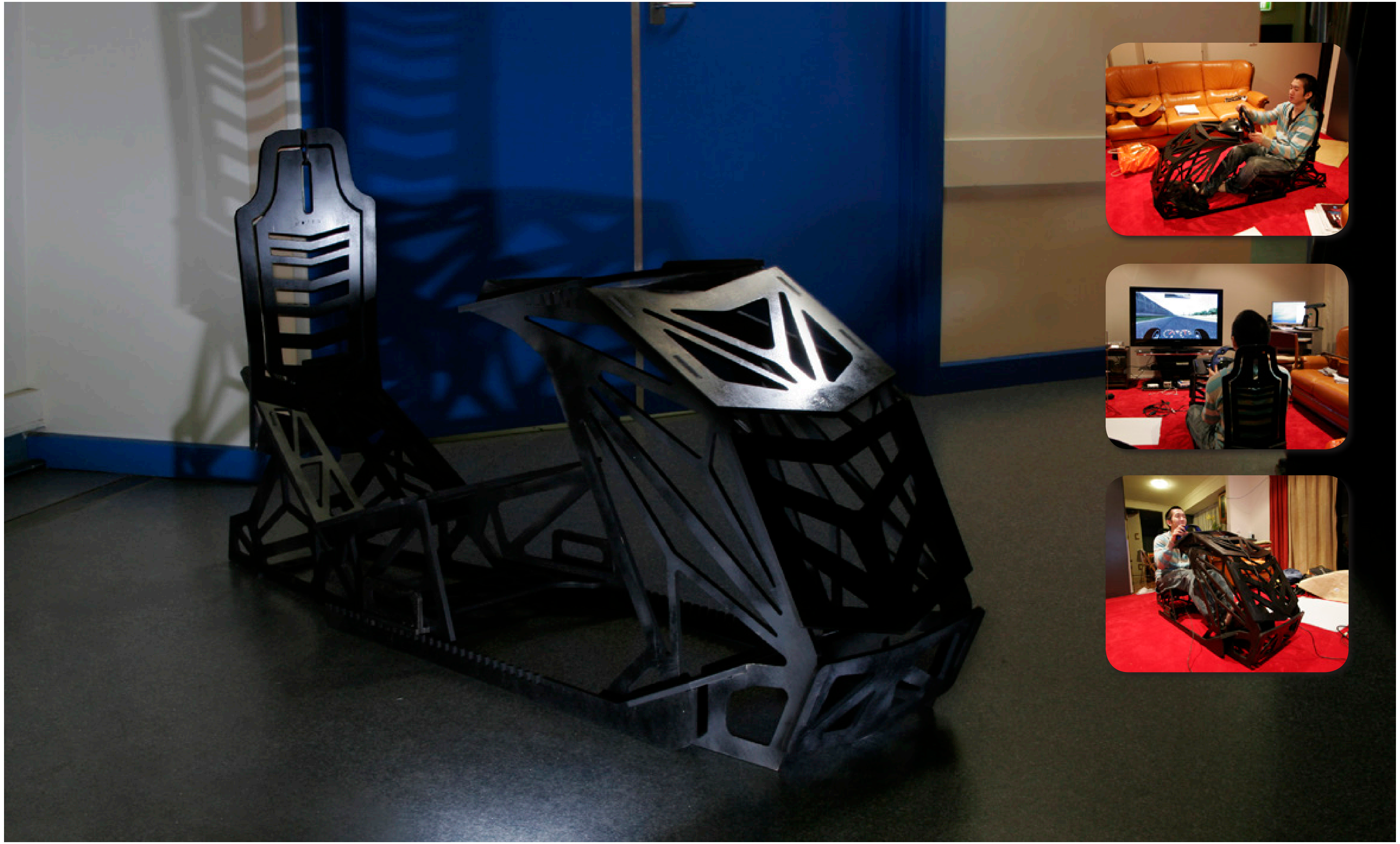
weight - 5 kg

adjustable seating position

designed for correct positioning for 50th percentile male (SAE spec)

FEA studied

Lasercut wood



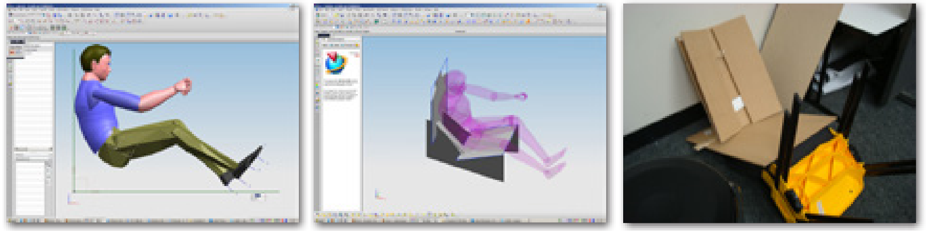
Industrial Design Project

Motegi
Racing Cockpit

Rapid Design Process

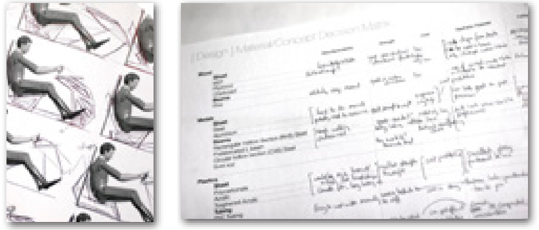
1. Ergonomic study

SAE ergonomic model sourced in CAD
Rig mockup confirming comfort and final seating angles



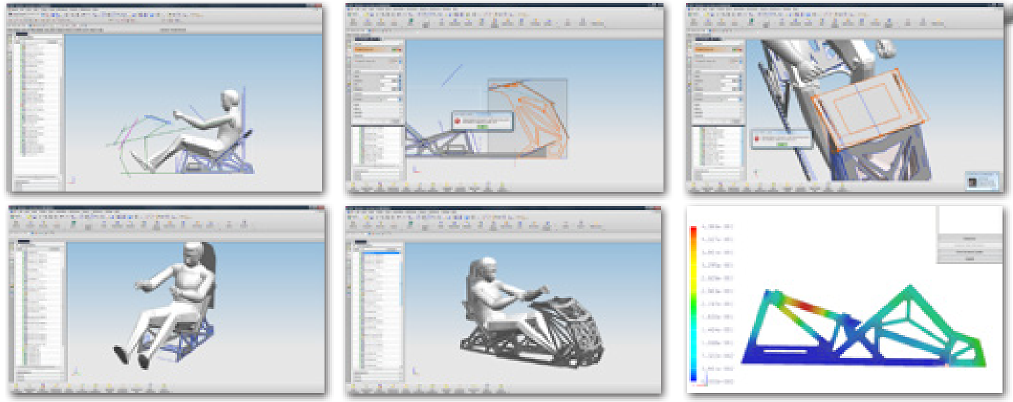
2. Sketch blitz and material selection

Laser cut MDF meets cost, strength and ease of work



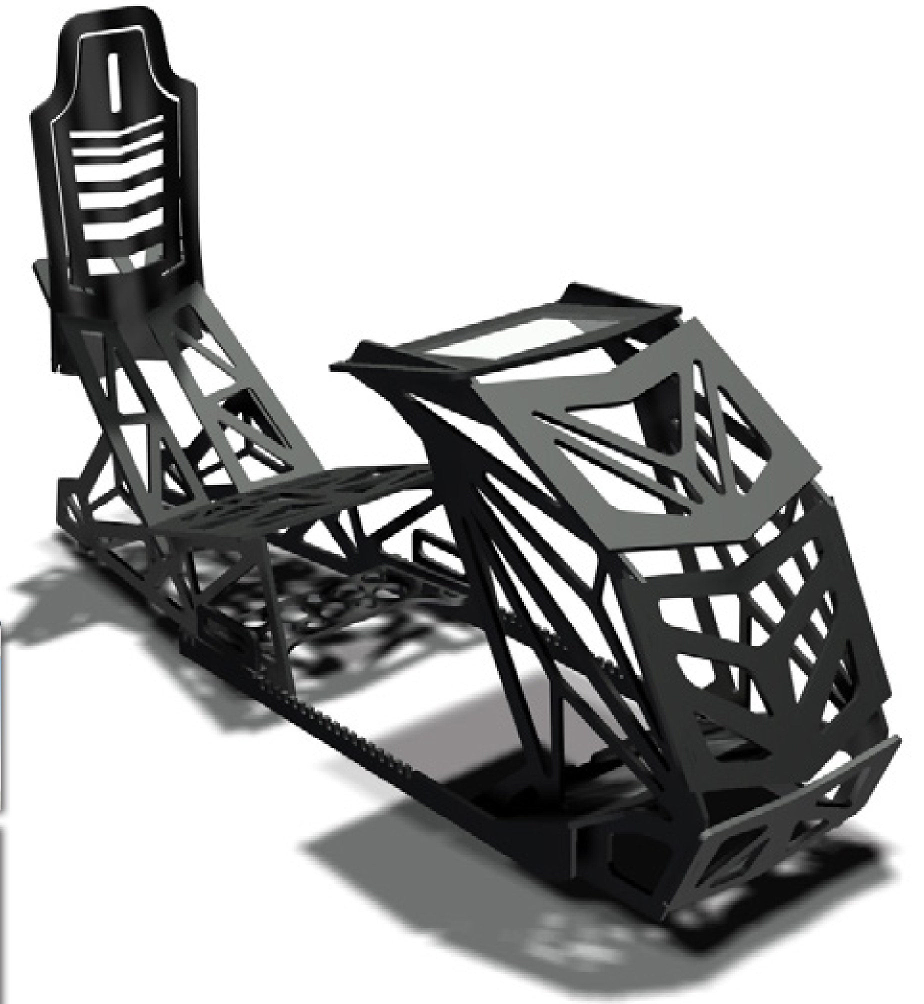
3. CAD Development

Flat pack design - 2D forms in 3D arrangement using slotting fastening systems
Quick FEA study to check load paths



4. Export to laser cut

Compile and nest components and send to cut



Young Achievement Australia
Young Entrepreneur Business Program

Amazia
Get Home Safe Kit

Managing Director

Lead Designer

Achieved 102% return on investment in under 20 weeks

Most awarded team of the State Competition, winning 8 awards of 10 nominated (of 12) including:

- Company of the Year
- Innovative Product of the Year
- Annual Report Award
- X-Factor (Overall Excellence) Award

Sponsored by

CITY OF MONASH

Supported by

Worldwide online printing

Supported by

13CABS Black Cabs

Young Achievement Australia

Undertook program to get practical, real world business exposure and develop entrepreneurial skills that was lacking in an engineering degree.

Understood realities and difficulties in transforming a product idea into a profitable business

Developed product with 22 commerce students, applying unique product development and manufacturing knowledge to create a low cost, high value product.

Led market research and translated findings into developing business plan and user experience

Sourced components from external suppliers and manufactured in house with design-to-manufacture considerations implemented to custom designed work

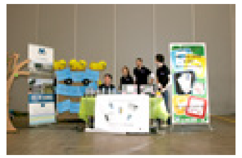
Achieved 102% Return on Investment within in the 26 week program

Drink-driving licked

New test is quick, easy, effective

Front page newspaper article

Board of directors

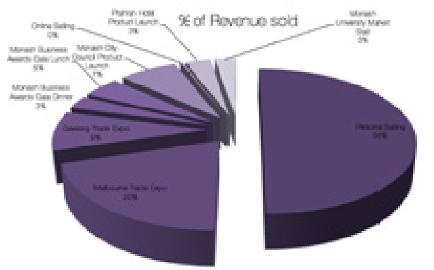


Melbourne Trade Expo

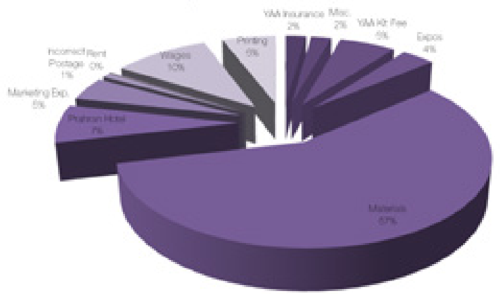
Business Goals

Strategic Sales and Spending

Sales Territories

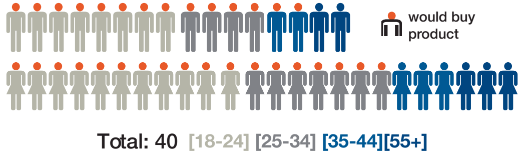


Expenses Breakdown

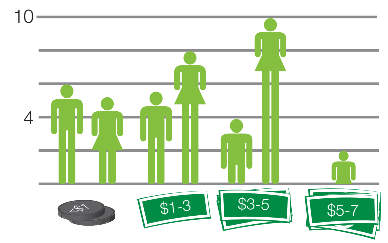


Initial Market Research

Survey Demographics



Perceived Value



Conclusion of research

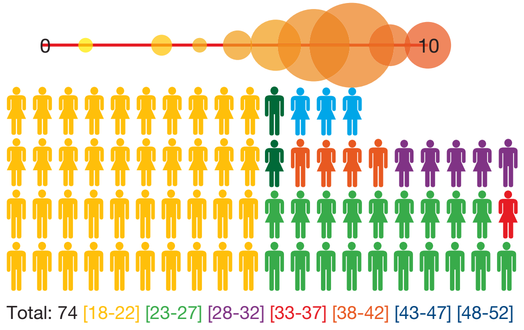
Price point at $5 a strip

Target Market : Young women

Product is financially feasible - product will be bought

Initial Sales Feedback

Product Feedback (rating 1-10)



Conclusion of research

Price point of $5 is selling well and is selling to a wide range of customers, specifically young adults and parents with young children.

Materials and Manufacturing

Injection Moulding Exercise

Exposure to basic components and theory of injection moulding

Familiarity with understanding limitations of injection moulding and implement strategies to overcome them

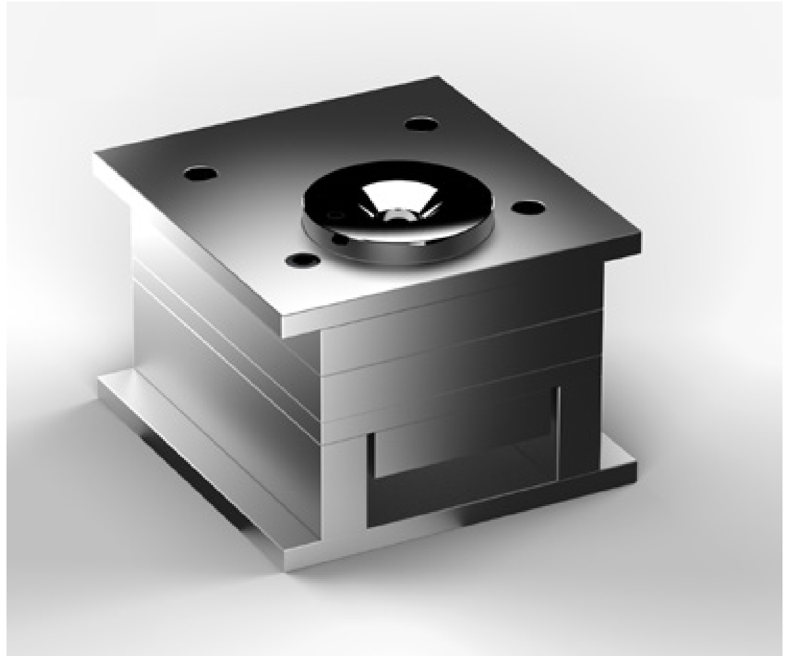
Specified off the shelf components required for production tooling

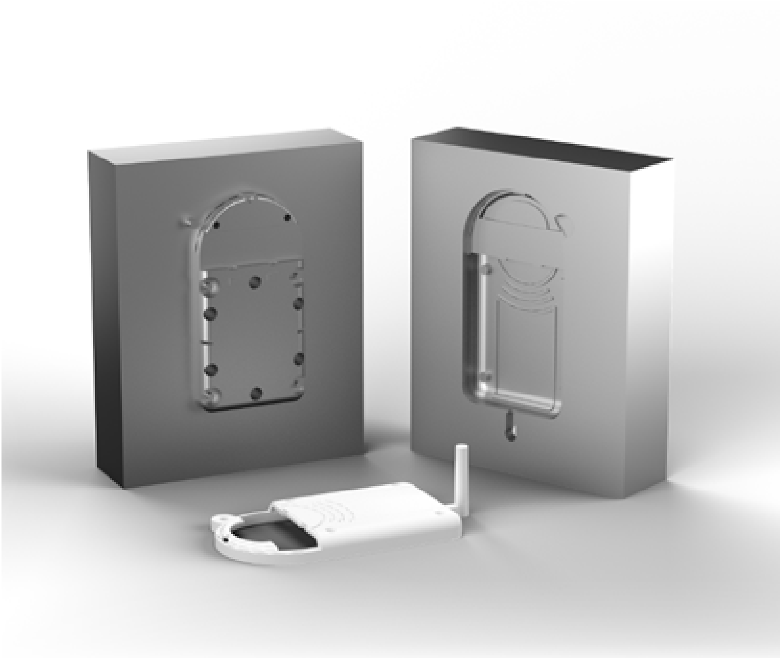
Guide Pins + Guide Bushings

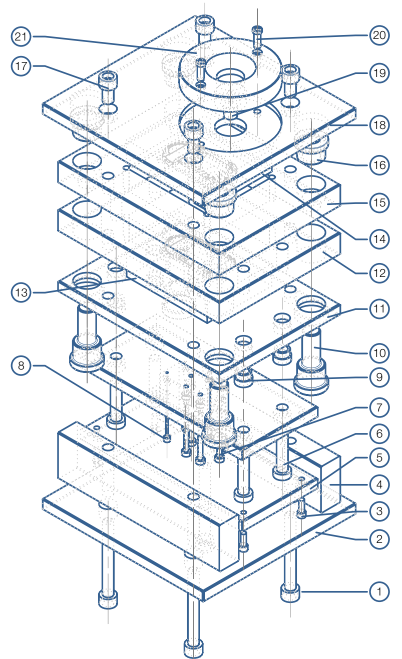
Hales Guide pins x4	MP-16-24-60
Hales Guide bushings x4	MB1620

Ejector Pins
DME GDP-ES-10-022-035

Sprue Bushing + Locating Ring
Wema Sprue Bushing
S4105/ 12x27x2.5x15.5 alpha = 30'
Hales Locating Ring LRB, machined to ø90mm



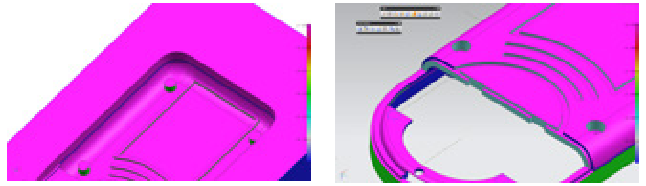




Assembly Drawing

20	2M	6x10	Locating Ring Bolts
19	1S	4105	Sprue Bushing
18	1F		ixed Platten Plate
17	4M	10x18F	ixed Platten Bolts
16	4G		uide Bush
15	1F		ixed Die
14	1F		ixed Cavity
13	1M		oving Cavity
12	1M		oving Die
11	4		Moving Backing Plate
10	1	MP-16-24-60G	uide Pillar
96		GDB-ESS-10- 017E	jector Bushing
82		Hej4	Ejector Pins (4mm)
74		Hej2	Ejector Pins (2mm)
64		GDP-ES-10-022-035	Ejector Guide Pin
52			NEP Plate
44			Rail
32		M6x10N	EP Plate Bolts
24			Moving Platten Plate
11		M10x80	Rail Bolts
No.Q	ty	Part No.D	escription

Development of production drawings ready for tooling manufacture.



Developmental CAD
Use of draft analysis to tune surfaces to allow part release and grain to be applied.

Mock Production Tool
3D printed cavity inserts and sliding ejector pins

Personal Project

Leyland Mini (1977) Restoration

Undertaken as a ‘hands on’ learning experience to understand vehicle systems and its inherent mechanical focus, and compare to today’s replacement systems

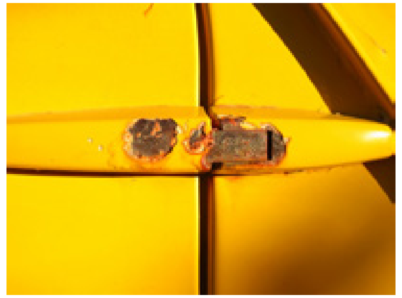
Suspension rubber cones (original) sagged over 37 year life. Cone metal structure rusted to suspension trumpet. Front suspension rubber components deteriorated

Removed seized rubber cone and trumpet. Replaced all rubber components and suspension pins (bump stops, etc). Installed adjustable suspension

Extensive rust in certain parts of the car. Car has been resprayed with non-standard colour and has not been recorded in car history.

Sand down to metal. Body filled and primed. Resprayed with closest matching yellow available at the time

Stopped rust propagation but will require professional colour matched paint in the future



Long Term Project Plan

Stage 1 Restore to driveable condition

Checkpoint – Roadworthy certificate and registration of car

Stage 2 Maintain reliable car to daily driver standards

Checkpoint – Achieve 500km free of breakdowns.

Stage 3 Reliable track day car (Hillclimb + Khanacross)

Checkpoint - Complete 5 motorsport events without mechanical incidents

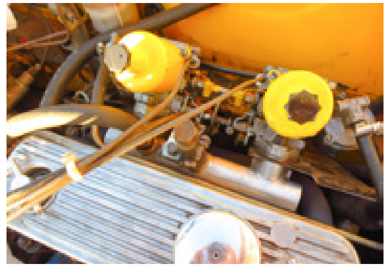
Stage 4 Enhanced track day / road rally car

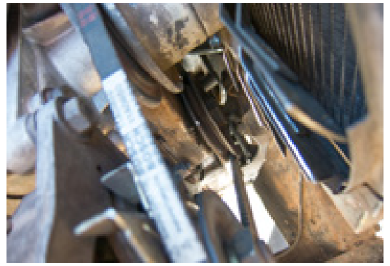
Checkpoints – to be determined in stage 3

Inital - black exhaust smoke, rough sounding and 1200RPM idle

Replaced distributor rotor and points // checked timing // tuned jets // replaced spark plugs

Result - idle at 750RPM, exhaust clear





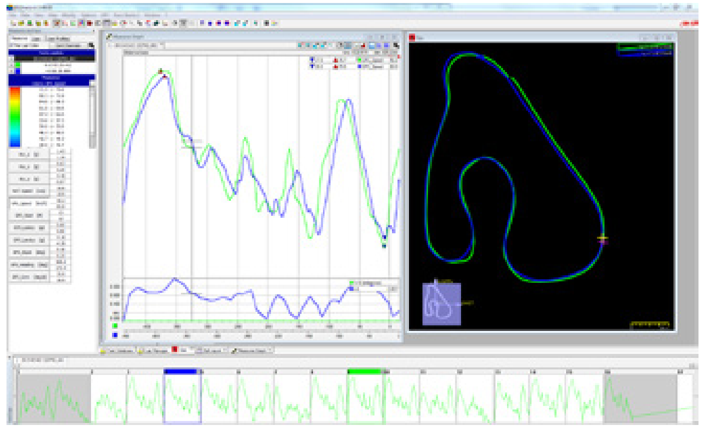
Personal Project

Go Karting (KT100S)

Undertaken as a ‘hands on’ learning experience to understand vehicle dynamics and sensitivities and developing racecraft for future projects and aspirations.

Practical exercise in ensuring proper checks and maintenance to ensure maximum track time, and short and long term solutions to racing wear and tear

Exposure to data acquistion (high frequency GPS) to understand correlation between driving methods and styles



Simple analysis of difference in lap times in particular parts of the track can rationalise lost time and assist in the learning curve

Rod end failure after ‘racing incident’

Professional and Automotive related experiences

Professional Experience

Monash University, Australia

Bachelor of Engineering (Mechanical) (hons)
Bacherlor of Design (Industrial Design)

Glencore Xstrata Mobile Fleet (2012 -) - Mechanical Engineer

Implemented $73,000/year of cost savings in maintenance consumables and identified $230,000/year of waste energy usage

1500% reduction in processing time generating monthly report data with greater depth and transparency through automation

Highlighted savings of over 2800 manhours/yr through completion of the Xstrata Graduate Program leadership program

Generated fabrication drawings that comply with statutory requirements and internal best practices to suit the harsh underground operational abuse and environment

GM Holden Cooperative program (2010) - Perceptual Quality Analyst (Craftsmanship) on VF Commodore

Executed customer-desirable production parts visible on current VF Commodore through collaboration with cross functional teams including creative designers, product engineers and program management from concept generation to physical validation

Pioneered rapid visualisation using various CAD and sketch tools to evaluate concepts for resource-critical decisions.

Developed production accurate hard and soft models reflecting production intent for important program leadership.

Executed benchmarking exercises of competitive landscape to highlight program content to leadership

Extracurricular and Hobbies

Formula SAE (2007-2010)

Monash Motorsport team member

Designed and fabricated lightweight functional and aesthetic parts punctually within limited time, budget and resources.

Involved and committed to a world class FSAE team over several years, learning past experiences and teaching and establishing foundation culture for better future practises

Go Karting (2012-2013)

Vehicle dynamics and maintenance

Leyland Mini Project

Restoring 1975 Leyland Mini Clubman

Experiences

Germany

Bavarian Automotive Museums and Factories

Mercedes Museum
BMW Museum
Audi Museum
Porsche Museum
Porsche Factory Tour

Nürburgring Nordschleife track day

Japan

Toyota Megaweb Museum - Tokyo
Mazda Museum and Factory Tour
Tokyo Autosalon

Australia

Australian International Motorshow

Australian Formula One Grand Prix - Melbourne

Skills

Engineering

Engineering/Technical Design

Defined, analysed, designed, optimised and implemented solutions for technical problems from initial concept to production.

Developed and executed testing regimes for data collection to define product requirements

Well practised in cross functional product development and using a variety of tools to effectively discuss intricate problems

Documentation of engineering decisions and change management

Business/Organisational Drivers

CAPEX Modelling
Execution of rationalised cost saving initiatives
Capital and operating expenditure to save money with suppliers

Teamwork

Proven involvement and management in high functioning multidisciplinary teams with numerous stakeholders and target metrics

Software

Highly competent and practised CAD modelling abilities, especially in development of parts in assemblies.

UGS NX5 (and related)

Solidworks 2013

ANSYS 12 CFD/FEA

Microsoft Office Suite

Microsoft Excel
Automation of complex calculations for reporting and tracking purposes
Microsoft PowerPoint
Microsoft Word

Adobe Creative Suite

Adobe Photoshop
Realistic photo manipulation and 2D implementation for quick studies
Adobe Illustrator
Adobe InDesign

Fabrication

Aware of manufacturing techniques for bespoke to mass production quantities

Understand and develop engineering drawings to AS/ISO standards

Practised in sensitivities of manufacturing tolerances for technical and aesthetic balance

Experienced in a wide array of different manufacturing techniques, and able to make components of varying functional requirements, from feasibility studies to production intent

Manual fabrication

Metalwork and Machining (TAFE equivalent)
Arc Welding (TAFE equivalent)
Fibreglass and carbon fibre application
Intermediate woodworking
Clay model development
Painting (preparation and final model)

Automated fabrication

Laser Cutting
3D printing