

# MONASH HUMAN POWER NEWSLETTER

2024 - S2 EDITION



# FOREWORDS



MHP remains dedicated to breaking the world land speed record, a goal that continues to drive our team's passion and determination. As we work toward this achievement, we are relentlessly pursuing innovation in both design and manufacturing, perfecting our craft for the development of our next high-speed bike, the V4.

## Arosh - CEO

Building on our 2023 Battle Mountain success, the team is advancing with V4, our next speed bike iteration. We're pushing performance further by incorporating new features, notably a carbon composite chassis for reduced weight and increased strength. This is one of several innovations aimed at challenging the newly set Australian speed bike record.



## James - CTO



Thank you for your continued support, which has helped strengthen our team. We have onboarded two new sponsors, recruited 40 new members, and launched projects like improving our website and outreach. These efforts have made our team the strongest it's ever been. We appreciate your support and hope you enjoy the updates.

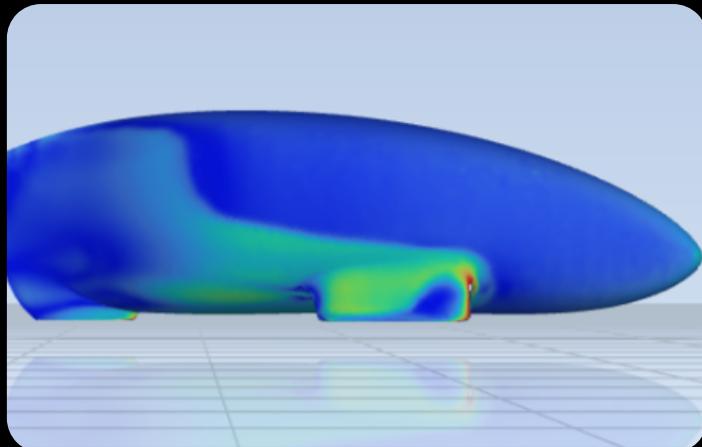
## Rhys - COO



# TECHNICAL OVERVIEW

# AERODYNAMICS

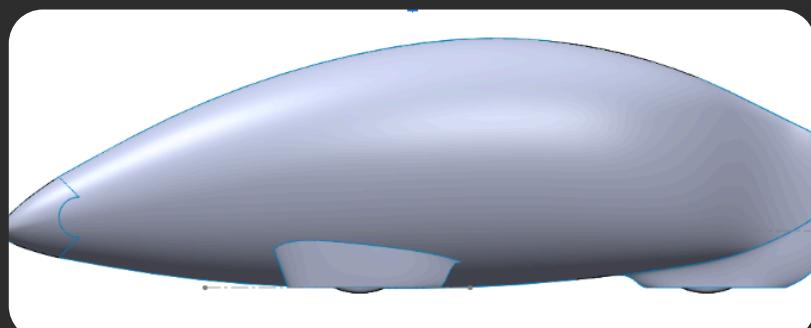
## Changes to Aero



- Revamped our approach, moving away from 'guess and check' methods to a first principles approach. Our new fairing features
- Extended laminar boundary layers, significantly reducing aerodynamic drag.

## Continued...

- The focus on extending laminar boundary layers through specific fairing shaping has led to a **60%** reduction in drag, a major breakthrough.



# CHASSIS AND DRIVETRAIN

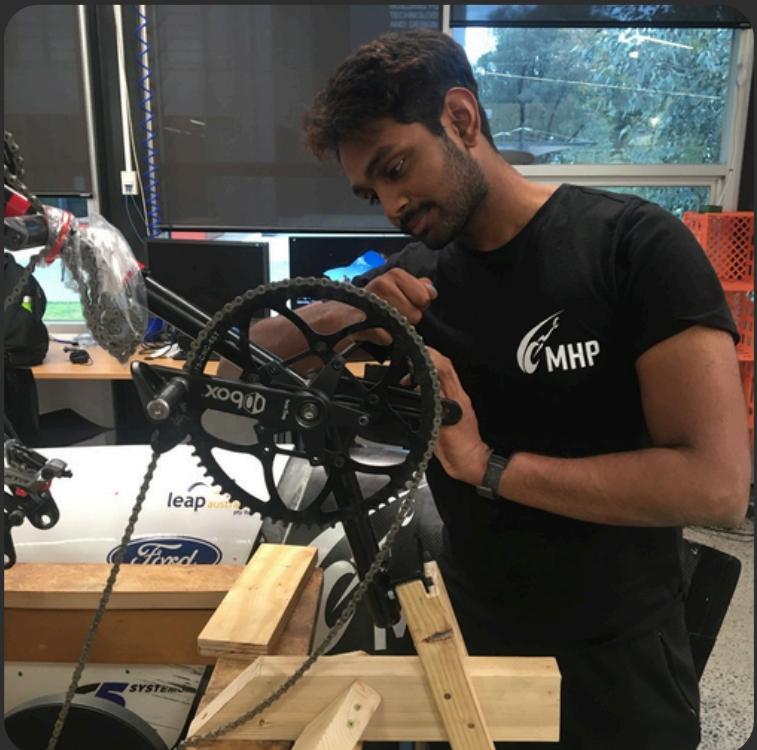


## Changes to chassis

- New composite chassis using a lightweight 'sandwich-plate' carbon fiber design
- Smaller, lighter front fork for better efficiency
- Enhanced display mounts with improved stability and adjustability

## Continued...

- Custom wheel hubs redesigned for V4 Reengineered integration between chassis and fairing.
- Optimized drivetrain for greater efficiency and reduced power loss.
- Overall weight reduction and performance improvements



# MATERIALS



## New Materials

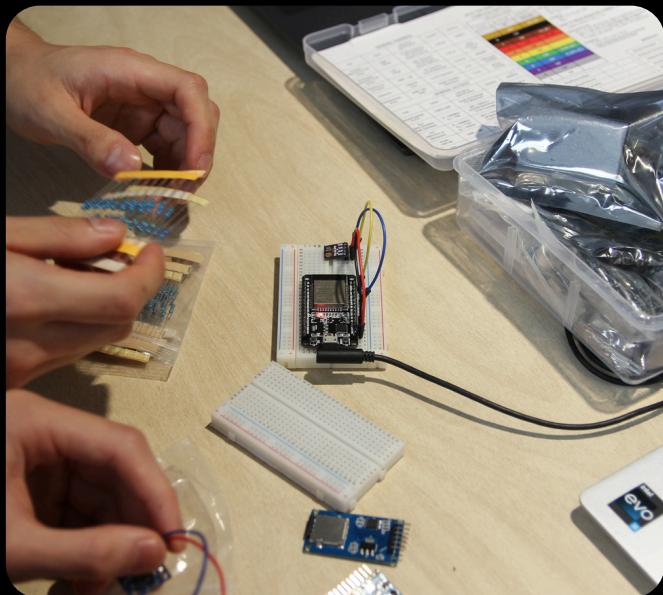
- Changed the metal frame to a modular composite chassis to reduce weight. and improve aerodynamics. Improved resin infusion process to help get more accurate moulds.

## Continued...

- Improved tail design to incorporate fiberglass to reduce the fragility.
- Testing a new composite roll hoop in place of the metal arch to further reduce weight.



# ELECTRICAL



## Hardware Updates

- Developed a centrally mounted battery to power the whole system.
- Using a mobile phone for data collection, live telemetry, and analysis.
- Completed new PCB designs for V4.
- CAN bus for improved data reliability and speed.
- Adding a sensor module for brake temperature, battery voltage, and more.

## Software updates

- Add support for CAN bus, improve trike application to include live telemetry and data analysis.
- Update MHP's dashboard website to display data on the trike and V4.
- Code in C++ to operate V4's wired modules.
- Assist operations with MHP's official website that is open to the public.



# RIDER DEVELOPMENT



## What's New

- Welcomed 2 female riders.
- Embarked on a new journey - trike racing  
Built connections with the trike-racing community.
- Provided consultation and advising for
- technical sub teams throughout V4 design process.  
Increased number of MHP members are
- participating in racing.
- Won the Nathan Boon Award for sportmanship

## What's Next

- Trike Race 4 in October
- Upgrades for trike in summer
- Training sessions in summer to improve performance
- Get more involved with technical sub teams to manufacture V4



# OPERATIONS



## Operation updates

- Had our 2024 Showcase updating the community on our progress on V4 while reflecting on Battle Mountain in 2023. Excitingly we were joined by Gelteq and Engineers Australia who generously spoke at the event.
- This semester saw the launch of new website, and new headshots - modernising the team.

## Continued...

- launched a new rider development workshop for outreach.
- upskilled our team with classes in composite manufacturing.
- Observed our educational content explode on social media, increasing our exposure.



A group of students in a classroom setting, looking towards the right.

**SHARED  
SUCCESS**

# OUTREACH



## Outreach events



- In 2024, MHP was able to reach approximately **400 students**. This includes; Malvern Primary, Monash Scholars, Epsom Primary, Korowa Primary , Melbourne Girls Grammar, Killester College, William Cooper Institute, Monash Engineering Girls, and Westbourne Grammar.

## Equipment Upgrade

- A more accurate wind tunnel, with greater laminar flow and circulation abilities was developed this year.
- Using a scale to measure the aerodynamic drag around a package space, the students were able to use the engineering design process to further their understanding of manufacturing.





# SPONSOR HIGHLIGHT



## Gelteq

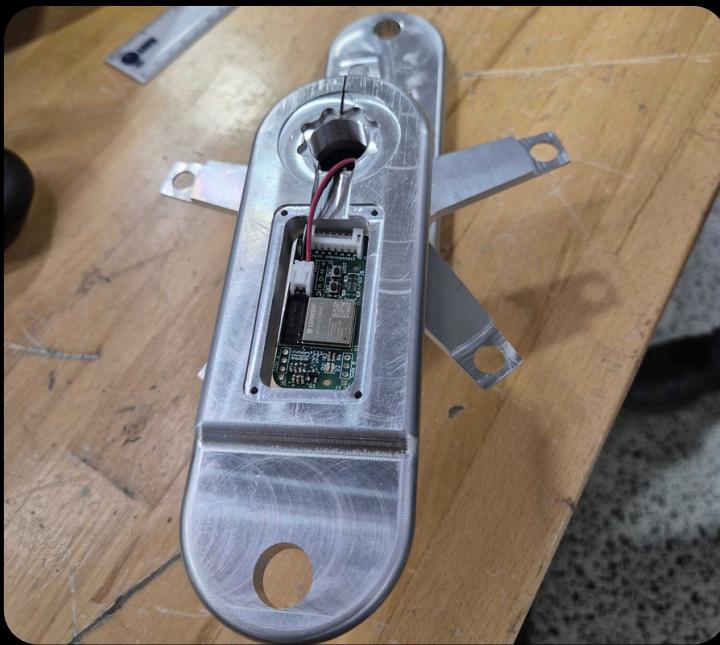
Gelteq are an incredible company who supply our trike team with gels for when they race. Not only do these gels taste great and have an easy to swallow consistency, they ensure our riders are energised and able to push through their races. We would have a much harder time during our upcoming race at Casey Fields without them.

## MTS

MSTI are a fantastic materials testing company located in southeast Melbourne. They are capable of providing a wide range of testing services, and helped provide feedback on samples for our upcoming composite chassis fairing. The information gleaned from their tests is invaluable for the manufacturing of our bike.



# FEATURED PROJECTS

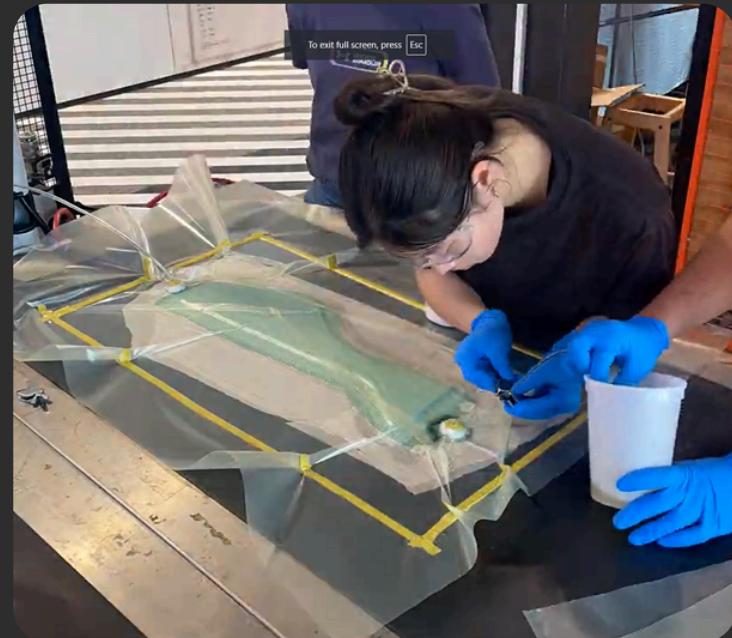


## Power meter

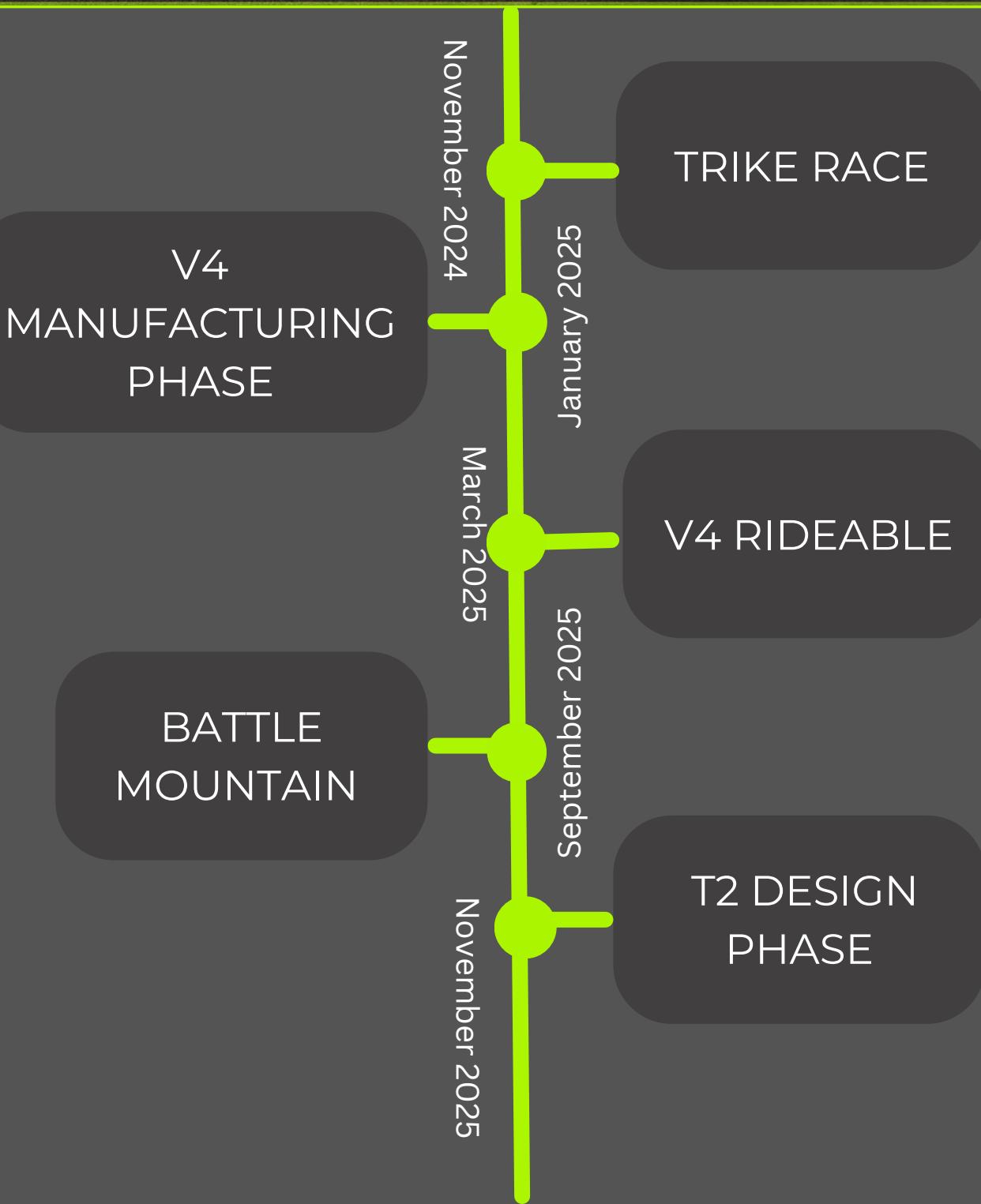
MHP is creating our own power meter instead of buying one as they are very costly. The power meter FYP enables the team to get data on rider exertion and speed of the bike via a resistor sensor. This is a crucial help to our current V4 design.

## Composite Chassis

MHP is aiming to design and manufacture a composite chassis to reduce bike mass and improve performance, replacing the heavier chromoly steel chassis. The project includes designing a chassis that fits the rider and fairing, integrating a steering system, conducting material tests, and performing static FEA analysis.



# LOOKING AHEAD



# A SPECIAL THANKS TO OUR 2024 SPONSORS



MONASH  
University

