Velocity Vortex

Trade Display Folio
State Finals 2025

Render of the car - Credit Sebastian. R, Liam. B

STEM RACING AUSTRALIA · BUNNINGS warehouse · North East Motor Repairs · BocaBearings · Adelaide University · John Gardner MP MEMBER FOR MORIALTA · ROWELL & SEARLE AUTOMOTIVE SERVICE · TROJAN ALUMINIUM

Trade Display Development & Car Display

Trade Display Design & Car Display Development:

The design of the Velocity Vortex trade display was a collaborative and iterative process, driven by a commitment to efficiency, cost-effectiveness, and compliance with competition requirements. Our approach was rooted in research, practicality, and creativity, ensuring that the final display would not only meet but exceed expectations.

Design Inspiration and Iterative Development:

Our design process began with a thorough review of past competition displays, both from our school and other teams. We analyzed what worked well and what could be improved, focusing on cost-effective solutions that aligned with our resources and goals. This research phase was critical in shaping our initial concepts, as it allowed us to identify proven strategies and avoid potential pitfalls.

- Software and Tools: We used Fusion 360 and FreeCAD for 3D modeling, though Fusion 360 encountered technical issues that required us to rely more heavily on FreeCAD. Despite these challenges, the software enabled us to create detailed and accurate representations of our design, facilitating discussions and refinements.
- Iterative Process: The final design emerged after multiple iterations, each informed by team discussions about aesthetics, functionality, and feasibility. While we can only showcase a few iterations in our portfolio, the process involved constant evaluation of what would look best, function effectively, and fit within our constraints.

Car Display: Showcasing Innovation

The car display is the centrepiece of our trade display, designed to highlight the car and its key components in a visually engaging manner.

- Acrylic Enclosure: We chose to place the physical model of the car behind an acrylic panel, a decision driven by both practicality and aesthetics. Since we already had acrylic available, it made sense to use it—reducing costs while providing a clear, protective barrier that allows viewers to appreciate the car's details.
- RGB LED Lighting: To enhance the visual impact, we incorporated RGB LED lights in our team colors (black, white, and orange), with an emphasis on the orange. This choice was both stylistic and practical: RGB LEDs are energy-efficient and can be powered by batteries or power banks, which is essential since the competition rules prohibit plugging into external power sources. The vibrant lighting not only draws attention to the car but also aligns with our team's branding.

Modularity and Adaptability:

The trade display was designed with modularity and expandability in mind, ensuring that it could adapt to future needs without requiring a complete redesign.

- Adjustable Frame: The aluminum frame, repurposed from previous teams, is adjustable, allowing us to modify the layout as needed. The panels sit on top of the frame, making it easy to reconfigure or expand the display for different events.
- Testing and Validation: We conducted multiple setup tests to ensure that the display could be assembled efficiently and that the lighting and other components functioned as intended. These trials confirmed the display's practicality and helped us refine the assembly process.

Compliance and Sustainability:

From the outset, we prioritized compliance with competition regulations, which influenced every aspect of the design.

- Size and Material Restrictions: The display had to fit within specific size limits and be transportable in standardized boxes, which ruled out monolithic or overly complex structures. We adhered to these constraints while maximizing the use of space and ensuring that all materials met the competition's safety and environmental standards.
- Repurposed Materials: Sustainability was a key consideration. We repurposed the aluminum frame and wooden panels from previous teams, significantly reducing costs and waste. Additionally, our school's tech studies division provided access to affordable materials like acrylic and wood, as well as tools for metalworking and woodworking.

Aesthetic and Branding Choices:

The display's color scheme—black, white, and orange—was chosen for its versatility and visual impact.

- Black and White: These colors provide a neutral backdrop that allows for flexibility in design and branding. They also create a sleek, professional appearance that complements the technical nature of our project.
- Orange: As a vibrant accent color, orange draws attention to key elements of the display, such as the car and informational panels. It also adds a dynamic contrast to the otherwise monochromatic palette, making our display stand out in a competitive setting.

Team Collaboration and Lessons Learned:

The development of the trade display was a collaborative effort, with each team member contributing their strengths.

- Riley led the CAD modeling, ensuring the design was both functional and visually engaging.
- Vivaan and Riley ovesaw material sourcing, liaising with previous teams to secure repurposed components and materials and coordinated with the school's Tech Studies division for use of tools and equipment.
- Assembly was a team effort, with Riley and Vivaan leading the process and other members providing support where needed.

Throughout the project, we faced challenges that taught us valuable lessons:

- **Time Management:** We found that tasks often took longer than expected, reinforcing the need for realistic timelines and built-in buffer times to improve reliability and reduce pressure.
- **Adaptability:** When issues arose—such as software issues or material limitations—we evaluated options and learned that flexibility and creative problem-solving led to more effective outcomes than forcing a solution.
- **Expecting the Unexpected:** Unforeseen changes became a consistent part of the process. This taught us the importance of contingency planning and staying prepared to adapt quickly to maintain project momentum.

Final Outcome: A Display That Represents Our Journey

Our trade display represents far more than just a competition requirement—it reflects our team's hard work, creativity, and dedication. It effectively showcases our car and the journey behind its development, while also promoting our team's identity and achievements. Through the use of cost-effective materials, a modular design, and cohesive and vibrant branding, we produced a display that is compliant, functional, and visually impactful.

This display stands as a testament to our achievements, and we are proud to present it as a reflection of our team's innovation and spirit.

Trade Display Digital Design & Render - Credit Riley. H, Vivaan. R, Sebastian. R

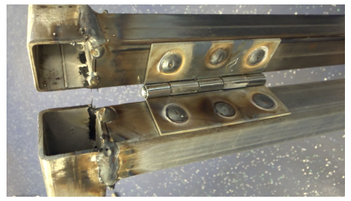
Visual and Informational Design and Impact

1. Inspiration and Team Formation:

- Recognized the importance of a compelling visual identity from a school class focused on branding, design coherence, and visual storytelling.
- Decided to form Velocity Vortex to combine technical excellence with creative presentation, ensuring our work stands out.

2. Naming and Branding:

- "Velocity":
  - Represents speed, a fundamental aspect of our project, especially in the context of our F1 car and high-performance goals.
- "Vortex":
  - Evokes aerodynamic forces and the dynamic swirling currents created by rapid movement.
- Together, the name Velocity Vortex encapsulates:
  - Energy, motion, and technical prowess.
  - A strong, memorable identity that aligns with our project's focus on speed and innovation.



Acrylic Car Display + Frame Hinge- Credit Sebastian. R, Vivaan. R, Riley. H

3. Logo and Color Palette:

- Logo Design:
  - Incorporates elements that visually represent motion, precision, and innovation.
  - Aligns with the team name and the aesthetic of the trade display.
- Color Palette:
  - Sleek Black (#000000):
    - Conveys sophistication, professionalism, and a modern look.
  - Vibrant Orange (#ff7033):
    - Represents energy, creativity, and a bold, eye-catching contrast.
  - Crisp White (#ffffff):
    - Ensures clarity, balance, and a clean, professional appearance.
- Integration:
  - Colors and logo were carefully integrated into the trade display and all branding materials.
  - Creates a unified visual language that is instantly recognizable and reflective of our team's spirit.

4. Trade Display Development Process:

- Foundation:
  - Started with repurposed materials from a previous team's trade display, providing a cost-effective and sustainable base.
- Iterative Refinements:
  - Conducted multiple design iterations to enhance both visual appeal and functional efficiency.
  - Focused on optimizing the layout to better align with our team's identity and goals.
- Structural Design:
  - Lightweight and Material-Efficient:
    - Ensured the display was easy to transport and resource-conscious.
  - Sturdy Metal Frame:
    - Incorporated strategic reinforcements to ensure stability and durability.
  - Modular Panels:
    - Designed for easy expansion and customization, allowing the display to adapt to future needs.
    - Ensures aesthetic coherence while maintaining flexibility.

5. Visual and Informational Design:

- Color Application:
  - Applied the black, orange, and white palette thoughtfully throughout the display.
  - Created striking contrasts to draw attention to the car and key elements.
- Logo Placement:
  - Positioned the logo prominently as a focal point, reinforcing our team's identity.
- Layout Optimization:
  - Refined the layout through multiple iterations to ensure clear and engaging communication.
  - Designed to guide the viewer's attention to the most important aspects of our project:
    - Technical specifications of the car.
    - Broader goals and achievements of the team.
- Informational Clarity:
  - Ensured that all information is presented in a clear, concise, and visually appealing manner.

Frame Hinge - Credit Sebastian. R, Vivaan. R, Riley. H

6. Compliance and Regulations:

- Adherence to Competition Rules:
  - Built on a proven design from previous competitions to ensure compliance with all regulations.
  - Made aesthetic improvements without altering the core structure, maintaining compliance.
- Testing and Validation:
  - Conducted tests to ensure the display meets safety, size, and material standards.

7. Sustainability and Adaptability:

- Repurposed Materials:
  - Used materials from previous teams to minimize waste and reduce costs.
- Environmental Responsibility:
  - Prioritized sustainability by maximizing the use of existing resources.
- Future-Proofing:
  - Designed the display to be adaptable, allowing it to evolve with the team's needs.
  - Extends the lifespan of the display, reducing the need for additional resources in the future.

The Main Frame - Credit Vivaan. R, Riley. H

8. Final Outcome and Impact:

- Visual Impact:
  - The display is visually striking, with a cohesive and professional appearance.
- Functional Effectiveness:
  - Effectively showcases our technical achievements and team goals.
- Brand Representation:
  - Reinforces our team's identity through thoughtful design and branding.
- Long-Term Value:
  - The modular and sustainable design ensures the display will continue to serve our team in future competitions.
- Pride and Purpose:
  - Demonstrates our ability to design with purpose, creativity, and pride.
  - Serves as a testament to our team's innovation and commitment to excellence.

Structural Design, Materials, and Sustainability

Budget Management and Financial Efficiency in the Trade Display:

The development of the Velocity Vortex trade display was not only a testament to innovative design and sustainability but also a model of meticulous budget management. Our team was committed to ensuring that every financial decision aligned with our goals of efficiency, compliance, and environmental responsibility. By carefully planning and monitoring expenditures, we were able to create a high-quality, functional, and visually striking display while staying well within our financial constraints. From the initial planning stages, we established a comprehensive budget that accounted for all necessary materials and components. The total forecasted budget was $672.00, with a maximum allocation of $915.00 and a minimum target of $530.00. Through diligent sourcing, repurposing, and cost-conscious purchasing, we achieved an actual expenditure of just $493.78, resulting in a favorable variance of $178.22—a 26.52% saving compared to our initial forecast. This financial discipline allowed us to allocate resources effectively and maximize the impact of every dollar spent.

Velocity Vortex Trade Display Budget						
Category and Item	Forecast/ Budget	Allocated Maximum Budget	Allocated Minimum Budget	Actual Expenditure	Variance	Comments
Corflute	$150.00	$200.00	$100.00	$176.00	Unfavourable	
SEG Fabric	$400.00	$550.00	$350.00	$290.00	Favourable	
Metal Frame	$0.00	$0.00	$0.00	$0.00	Favourable	METAL AVAILABLE AT SCHOOL FROM PAST TEAMS
Hinges	$12.00	$20.00	$10.00	$8.78	Favourable	2 Hinge Packets Purchased
Acrylic Display	$80.00	$100.00	$50.00	$0.00	Favourable	ACRYLIC AVAILABLE AT SCHOOL
LED Lights	$20.00	$30.00	$15.00	$16.00	Favourable	
Table Cloth	$10.00	$15.00	$5.00	$3.00	Favourable	2nd table cloth placed on iPad holders
Trestle Table	$0.00	$0.00	$0.00	$0.00	Favourable	TRESTLE TABLE AVAILABLE AT SCHOOL
TOTAL	$672.00	$915.00	$530.00	$493.78		

Trade Display Budget - Credit Vivaan. R and Riley. H

Cost-Saving Measures and Resourcefulness:

1. Repurposing Existing Materials:
   - The metal frame, a core structural component, was sourced from previous teams, eliminating the need for new purchases and saving the entire budgeted amount for this category. This not only reduced costs but also aligned with our sustainability goals by minimizing waste.
   - The acrylic display case was also available at school, allowing us to reallocate the budgeted $80 to other areas. The use of existing acrylic not only saved money but also supported our commitment to repurposing materials.
2. Efficient Procurement:
   - SEG Fabric: We secured high-quality SEG fabric for $290, significantly under the maximum budget of $550. This fabric was chosen for its durability and visual appeal, ensuring that our display would stand out at competitions and events.
   - Corflute: Although the actual expenditure of $176 slightly exceeded the forecast, it remained within the allocated maximum budget. Corflute was selected for its lightweight and versatile properties, making it ideal for creating modular panels.
   - Hinges and LED Lights: Both were purchased under budget, with hinges costing $8.78 and LED lights $16. These small but essential components were carefully selected for their quality and cost-effectiveness.
3. Utilizing School Resources:
   - The trestle table and additional table cloths were available at school, further reducing our expenses. By leveraging these resources, we avoided unnecessary purchases and focused our budget on critical components.

Aluminium Extrusions + Frame - Credit Sebastian. R

Modularity and Long-Term Value:

The modular design of the trade display was a key factor in our budget strategy. By creating a system that allows for easy expansion and reconfiguration, we ensured that the display could adapt to future needs without requiring significant additional investment. This forward-thinking approach not only extends the lifespan of the display but also provides long-term financial benefits by reducing the need for costly replacements or extensive modifications.

Compliance and Sustainability:

Our commitment to regulatory compliance and sustainability was reflected in our budget decisions. By repurposing materials and selecting recyclable options like aluminum and acrylic, we minimized both environmental impact and expenses. The display's compliance with competition regulations also meant that no additional costs were incurred for modifications or re-testing, further streamlining our budget.

Financial Summary and Impact:

The total actual expenditure of $493.78 was significantly under the allocated maximum budget of $915.00, demonstrating our ability to deliver a high-quality, compliant, and sustainable trade display while maintaining strict financial discipline. This approach not only maximized our resources but also ensured that the display would remain a valuable asset for future competitions and events.

Trade Display Prototyping & Testing - Credit Sebastian. R, Vivaan. R, Riley. H

By focusing on cost-saving measures, efficient procurement, and the repurposing of existing materials, we were able to create a trade display that is not only structurally sound and visually appealing but also financially responsible. The favorable variance in our budget is a testament to our team's resourcefulness and commitment to excellence, ensuring that the Velocity Vortex trade display is both a practical and sustainable investment for our school and team.