

Strategic Integration Of Design For Manufacturing (DFM) In A Custom Trophy Project With A Tight Time Crunch For The Cornfield Clash Robotics Competition

Each year, the Illini VEX Robotics team, proudly sponsored by Prismier LLC, hosts the Illini Cornfield Clash, an annual robotics competition held amongst Midwest colleges. Central to this event is a custom trophy, which stands not just as a symbol of victory but also of the team's ambition and creativity. The students elected to have their own hands in both designing and building it, and this year, time was running out fast.

This case study explores our role in addressing the challenges faced by the VEX Robotics team during the trophy design and manufacturing process, underpinned by a tight timeline for their upcoming robotics competition.



Figure 1: Illini VEX Robotics' booth at Cornfield Clash displaying competition awards.



Figure 2: Trophy's Backplate, displaying the team's custom robot parts.

CHALLENGES AND SOLUTIONS

Problem 1: Design Considerations

The students envisioned a trophy that integrated custom parts from past robots onto the back plate, aiming to weave their team's storied history into its design, showcasing past achievements. However, they faced a challenge: their vision was constrained by limited in-house 3D printing capabilities.

On the front of the trophies, the students' design originally proposed that their messaging be etched into the front plate. Our advice revealed that while laser etching might be straightforward, it wouldn't provide nearly enough visibility—preventing a potential misstep in the Prototyping process.

Design Considerations: Solutions

Prismier's advanced 3D printing technology enabled the student's original proposal, creating a space where they didn't need to limit themselves on their design. Using our equipment and materials, the team explored 3D printing's capabilities within a new context, ensuring Illini VEX Robotics' history was prominently and creatively featured through a visually striking and meaningful back plate for the trophy.

Regarding the front plate, it was our suggestion to explore an alternative approach—incorporating a combination of material cut-through and etching, instead of solely etching—which allowed for a unique showcase of the trophy's internal components through the front. It proved to be a pivotal moment in the design's evolution, as it highlighted the trophy's complexity through contrast, shadowing, and creative geometry—all elements that etching alone could not achieve. This solution accomplished feasibility while also uncovering a new design element as a bonus, turning a potential limitation into a brand new distinctive feature.

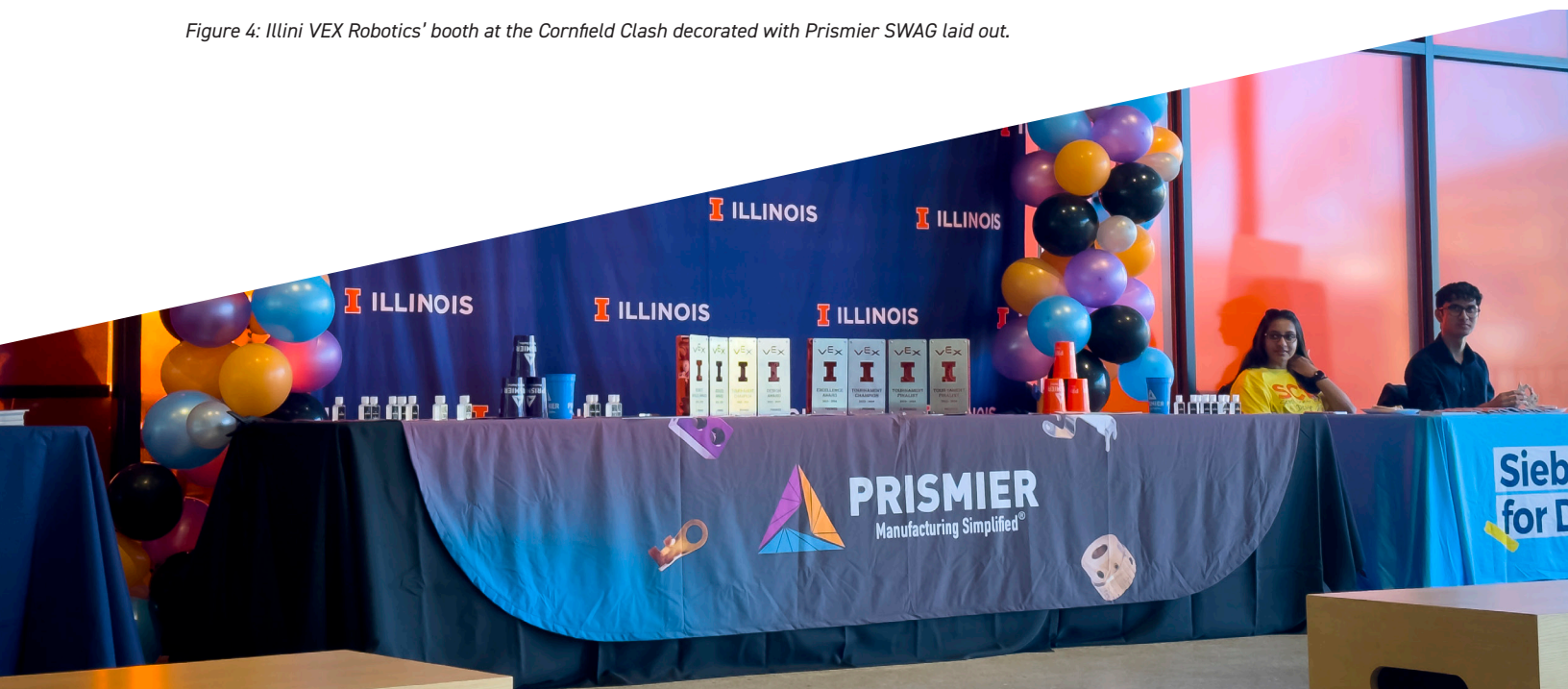


Figure 3: Trophy's Front plate, etched and cut-through to showcase backplate elements through the front.

Problem 2: The Time Crunch

With the Cornfield Clash rapidly approaching, the team grappled with the dual demands of balancing the intricate customization and design of the trophy with the responsibility of organizing the Cornfield Clash event, both tasks monumental in their own right. The project's tight schedule demanded efficiency; limited time for iterative design, complex customizations, and execution meant that each stage had to be approached with a greater focus on "getting everything right the first time," and expert assistance became crucial.

Figure 4: Illini VEX Robotics' booth at the Cornfield Clash decorated with Prismier SWAG laid out.



The Time Crunch: Solutions

The compressed iterative design process, bolstered by rapid communication and feedback loops with Prismier, was crucial at this stage. It minimized the need for time-consuming iterations and facilitated quick, decisive action.

By leveraging our comprehensive plastic and metal manufacturing capabilities and DFM expertise, we helped navigate the project's time constraints, surpassing

"Working with Prismier pushed us to rethink our approach to manufacturing. The suggestion to use through cuts for the trophy's faceplate opened up a new design opportunity. Seeing that feature come to life on the front plate was pretty cool - it prompted us to think about new ways to advance our design language for future projects."
~ Owen Harry

the team's in-house potential. This enabled the students to concentrate on their core strengths and responsibilities, leaving the complexities of manufacturing, materials, logistics, and beyond to us.

Furthermore, by embracing DFM advice from the start, the team was able to bypass the lengthy prototyping stage, moving directly to production with full confidence in their design's manufacturability and appeal- all while saving invaluable time.

The team's ability to work with a single partner for all manufacturing needs proved further invaluable; our vast array of 3D printing and finishing options at hand allowed us to quickly dial VEX's colors to their specifications; including the Illini orange for the back plate and a specialized brushed finish on the stainless steel top plate. These finishing touches, along with the polished front plate, underscored the trophy's premium feel and design.

Figure 5 & 6: Box of 3D printed material from Prismier and front-view of Trophy's front plate.



Results

This collaboration resulted in a trophy that perfectly balanced strict guidelines with innovative design elements that veered from tradition. Powered by Prismier, this project underscored the value of partnering with experts who can ensure your project not only meets but exceeds its design goals, however ambitious, however urgent.



Figures 7 & 8: Views of Trophy showcasing design elements from the back and how they show through the front plate.



Ultimately, this year's Cornfield Clash not only celebrated the legacy of Illini VEX Robotics but also set a precedent for their future innovation, demonstrating that with the right focus and partnerships, the constraints of time and technology can be masterfully navigated. It resulted in a trophy that embodies both the legacy of Illini VEX Robotics and the forward-thinking ethos of the competition. We can't wait to see what these innovative students do next!