



The 10th Annual Matthew R. Simmons
**WINDSTORM
CHALLENGE**

2025 Guidebook



What is the **WINDSTORM CHALLENGE?**

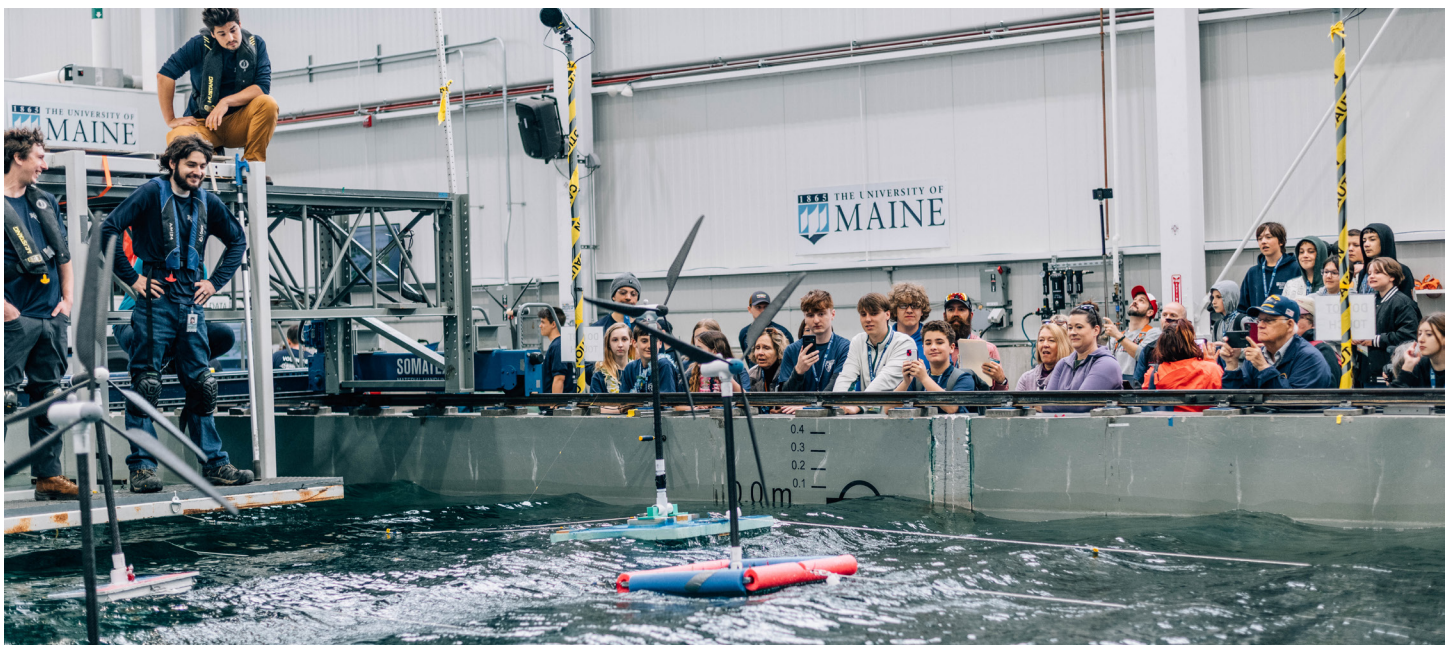
The Windstorm Challenge invites middle and high school students to design and build floating platforms for scale model wind turbines. The competition encourages participation from students with diverse interests and experience, offering two divisions: High School and Middle School. Both tracks follow similar rules, and the top three teams in each will be recognized at the end of the event.

Participants have access to an optional curriculum that explores engineering processes, sustainability, and wind energy technology. High school students who complete the curriculum and assessments can earn University of Maine micro-credentials.

Impact

The Matthew R. Simmons Windstorm Challenge prepares Maine's next generation of innovators, engineers, and clean energy leaders. In 2024, over 1,000 participants engaged in hands-on projects that taught STEM principles and floating offshore wind technology. The event fosters creativity, collaboration, and problem-solving, with a focus on inclusivity for students from all backgrounds.

High school participants can earn micro-credentials, and the winning team receives a four-year work-study internship at the Advanced Structures and Composites Center, valued at \$20,000 per student. By connecting students with UMaine's programs, the challenge inspires future leaders in sustainability and renewable energy.



The Challenge

Teams must independently design and construct a floating platform for a 1:100 scale wind turbine, modeled after a full-scale 285-foot, 5 MW turbine. The designs should optimize stability in varying wind and wave conditions. On competition day, platforms will be tested in ASCC's wind-wave simulation basin. Teams will be scored on performance, technical design, and a brief oral presentation. The scoring rubric is provided in this guide.



The Curriculum

The optional curriculum offers students a hands-on learning experience, guiding them through the design process, problem-solving, engineering, and sustainability. High school students can earn micro-badges and a micro-credential by completing the program, which covers renewable energy and wind technology. The curriculum aligns with UMaine's undergraduate courses, providing a foundation in renewable energy and offering students a head start in their academic journey.



Awards

High School Teams: Members of the top three qualifying teams will receive internships at the University of Maine Advanced Structures and Composites Center, contingent upon their enrollment at UMaine. This award is valued at over \$20,000, derived from biweekly paychecks based on 20 hours/week during the academic year and 30-40 hours/week in the summer for four years.



Note: this award is not a scholarship and is not dispersed to the student in a lump sum. Rather, this value is derived from biweekly paychecks assuming 20 hours/week during the academic year and 30-40 hours/week during the summer months throughout a four-year undergraduate career.

Middle School Teams: Members of the top three teams will be recognized during the event's award ceremony.

Curriculum and Microcredentials

Windstorm Challenge Micro-Credential

High school students can earn a micro-credential that verifies the skills gained through the Windstorm Challenge. Designed alongside the new curriculum, this credential provides a clear roadmap for students and supervisors to navigate the challenge and document their achievements.

What are Micro-credentials?

Micro-credentials at the University of Maine System are digital badges that recognize specific skill sets gained outside traditional coursework. They validate hands-on experiences from projects, jobs, or extracurricular activities. Micro-credentials highlight your mastery of skills for employers or admissions personnel, showing practical application in team or project-based settings. The Windstorm Challenge micro-credential verifies knowledge in renewable energy, offshore wind technology, physics, and the engineering design process, along with teamwork, communication, and problem-solving skills.



What do I have to do to earn the micro-credential?

To earn the Windstorm Challenge micro-credential, you must:

- Participate on a Windstorm Challenge team and build a competition platform.
- Complete assessments and assignments, including:
 - A test of knowledge of renewable energy, offshore wind in Maine, physics related to floating offshore wind platform design, and the engineering design process.
 - Documentation of teamwork skills.
 - Documentation of the stages in your team's engineering design process.
 - A reflection on your learning experience including an analysis of the competition results.

A curriculum is available, and your supervising adult can help guide you through completing the requirements.

More information on UMS micro-credentials can be found here:

maine.edu/student-success/micro-credentials/



Who can earn the Windstorm Challenge Micro-credential?

High school students (grades 9-12) with parent or guardian permission are eligible to earn badges. An adult supervisor, such as a teacher, club leader, or parent, must also support the student's project and work with us to verify their learning and skill development.

How do I sign up for the Windstorm Challenge micro-credential?

Registration can be found at composites.maine.edu/windstormchallenge.

I'm the Adult Supervisor, what do I have to do?

We're providing a curriculum for students to earn the Windstorm Challenge micro-credential, and we need your help to evaluate their work. You'll assist by assessing assignments, using provided rubrics, and helping students complete the requirements.

Rubrics, training, and UMaine staff support will be provided, along with a webinar introducing the micro-credential process. The micro-credential is optional, but it's a great way for students to showcase their skills in engineering, teamwork, and problem-solving. The curriculum is available to all students, whether or not they choose to earn the micro-credential.



Guidelines and Scoring

Winning Criteria:

Middle school teams: Most stable platform.

High school teams: Most stable platform and best presentation.

Scoring (100 points total):

Platform performance: 50 points

Design quality and creativity: 25 points

Presentation: 25 points

Testing:

Platforms will be tested in a wave generator (6-inch waves simulating 50-foot waves) and wind machine (5-6 mph wind simulating 55 mph). Each platform faces two minutes of wave simulation, with maximum acceleration values recorded.

Pre-testing:

All teams should perform pre-tests (float and inclination) before competition day. Submit videos of successful tests prior to the event.

Pre-testing details:

Float Test: Ensure platforms float for 30 seconds.

Inclination Test: With the turbine attached, tilt the platform 15 degrees to check stability.



Team Requirements:

- High Schools are limited to 5 teams to represent their school.
- All teams must have a chaperone (18+ years old) and choose a team name.
- Teams must consist of 2-4 members for high school and 2-10 members for middle school.
- Homeschool and community teams are welcome, with the same age and team size guidelines
- Combined teams of middle and high school students will be scored with high school teams.

Windstorm Challenge Judges

- Performance Judges: Offshore wind basin testing team members will score your platform's technical performance during testing.
- **High School:**
 - Platform Design Judge: Teams will discuss their design decisions with an offshore wind expert, who will assess their understanding of technical concepts.
 - Presentation Judges: Experts in communication, teamwork, and organization from UMaine will evaluate team presentations.
- **Middle School:**
 - Judges for the middle school presentation will talk with students prior to their testing to work through their process and understanding.

What to Expect on Competition Day

Check In: Upon arrival, teams receive nametags, a Windstorm Challenge T-shirt, and a team packet.

Presentation: Arrive 10 minutes before your assigned time. Presentations will be loaded on ASCC computers—no need to bring devices.

Ticket to Test: Given after passing the float and inclination tests. Teams submitting pre-test videos will find their Ticket to Test in the packet.

Repair Station: Tools and supplies available for last-minute fixes.

Lunch: Provided for students and staff. Contact Taylor Ward (taylor.ward@maine.edu) for dietary needs.

Additional activities will be available on campus for students. More details will be available closer to the date of competition.

Scoring

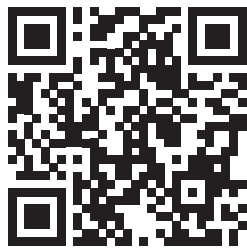
Stability and Performance (50pts)

Rank order scoring will be used, with a maximum of 50 points awarded based on basin test results. The grading metric for stability is the nacelle's acceleration—how much and how fast the top of the turbine moves. The team with the least movement will receive a perfect score, with other teams scored in comparison.

Stability is measured using an accelerometer or infrared diode at the top of the turbine, tracked by 3D cameras. These technologies are similar to those used in cell phones, video games, and film production for precise motion tracking.

For more information on our equipment, scan the QR codes below.

**Axivity AX3 3-axis logging
Accelerometer**



axivity.com/product/ax3

Qualisys Motion Tracker



qualisys.com/entertainment/animation/

Presentation (25 pts)

- **Language:** Each team will create a presentation that outlines the engineering design process used to develop, build, and test their platform, along with the final design specifications. Teams should highlight challenges faced and innovative solutions, emphasizing creativity and teamwork.
- Presentations should reflect team contributions, enthusiasm, and clearly communicate key ideas, engaging the audience and encouraging discussion. Scoring will focus on communication of the design process, problem-solving, organization, public speaking skills, and teamwork, as detailed in the rubric.
- Presentations must be submitted one week prior to the event by emailing Amanda Collamore at amanda.collamore@maine.edu. They should be 4-6 minutes long, followed by 2-4 minutes of discussion with judges. Be prepared to answer questions about the design process, inspiration, teamwork, and learning.



	5 points	3 points	1 point
Design Process	The design process is discussed in-depth including design options, and evaluation and decision-making process. Final design is shown, and key design elements discussed.	The design process is outlined with limited discussion of design options, and the evaluation and decision-making process. Final design is shown with minimal discussion.	The design process is not clearly outlined or is missing key steps (design options, evaluation, decision-making process). Final design is shown with no discussion.
Problem Solving	The team identified and analyzed problems faced during the design or building process. Solutions indicate creativity and resilience.	The team identified obstacles faced and presented solutions without providing much analysis. Solutions are reasonable.	The team identified obstacles faced but were unable to provide solutions or the solutions were not clearly related to the problem.
Content	Presentation is logically organized. Slides are visually engaging, containing drawings, photos, figures, or other visuals with minimal text. Fonts are clearly visible.	Presentation is well organized. Slides provide some visual interest with graphics or photos but also contain significant text. Fonts are readable but not optimal.	Presentation is somewhat confusing. Slides contain nearly all text and fonts are not readable due to size or style.
Delivery	All speakers effectively communicated and engaged listeners. Speakers are confident and relaxed, make eye contact with listeners, and speak with normal tone, volume, and rate.	Most speakers engaged listeners fairly well. Some nervousness in body language or speech patterns. Speakers stayed calm and completed the presentation.	Most speakers had difficulty engaging listeners. Conveyed nervousness through body language or speech patterns. Presentation was very short.
Teamwork	Design: Team member contributions to the design process are described and evenly distributed. Presentation: Speaking time is evenly divided among the team. All team members help answer questions.	Design: Team member contributions are not well described or are distributed unevenly. Presentation: Speaking time is not evenly divided, but all team members speak. Not everyone answers questions.	Design: Team member contributions are not discussed or are distributed extremely unevenly. Presentation: One or more team members do not speak. Only one team member answers questions.

Platform Design (25pts)

Design judges will inspect the platform and ask questions to assess design choices and technical knowledge. No formal presentation is required.

- Teams are encouraged to use recycled materials and keep platform costs under \$100.
- Platforms (excluding turbine and anchors) must not exceed 30” x 30” x 40” and must weigh less than 30 lbs.
- Platforms must embed three provided eye hooks for mooring lines, with the forward-facing hook clearly marked.
- The male turbine coupler must be securely attached; failure to include it will disqualify the platform.
- A repair station will be available for last-minute fixes.

	5 points	3 points	1 point
Creativity & Innovation	Platform incorporates unique design elements making an immediate and memorable impression.	Platform has some interesting design components but isn't highly memorable.	Platform mimics an established design with no unique or interesting design elements.
Construction & Craftsmanship	Platform is very well-constructed with neat cuts, gluing, painting etc. Platform is visually striking.	Platform construction is good with some evident sloppiness in cuts, gluing, painting etc. Platform is visually appealing.	Platform is unstable and poorly constructed with considerable sloppiness in cuts, gluing, painting etc. Platform is not visually appealing.
Material Choices	Unique, unexpected, or recycled materials used throughout the design.	Some unique materials are used for a small part of the design.	No unique materials used.
Technical Knowledge	Team displays considerable technical knowledge by answering all or nearly all technical questions easily and correctly and linking science principles to design choices.	Team displays some technical knowledge by answering most technical questions correctly and attempting to link science principles to design choices (although not always correctly).	Team displays little technical knowledge, does not answer technical questions correctly and cannot link science principles to design choices.
Design Strategy & Execution	Design strategy is logical, succinct, and reflected in design choices. Ex: Our goal was to minimize cost by using recycled materials. The design uses all or mostly recycled materials.	Design strategy is unclear but reflected in design choices. Ex: Recycling is important. The design uses mostly recycled materials.	Design strategy is not logical and does not reflect actual design.

Materials

Windstorm Model Kit

After registration, teams will receive a basic model turbine for pre-competition testing to approximate the official test turbine's weight (680 grams). The kit includes a male/female PVC coupler and moorings, essential for your platform's design. Directions for assembly are provided. Note: turbine blades don't need to spin.

Platforms

Students are encouraged to upcycle materials for their platform designs. Platforms are scored on innovation, craftsmanship, material use, and technical design. Platforms must be safe to handle and durable for basin testing.

Turbine Couplers

Model kits will include a male and female PVC coupler that are essential to the success of your team's platform. The male coupler will need to be well integrated into each team's platform design, as it is the attachment mechanism for the official test turbine. **Please note:** the coupler has a specific arrangement in order to work on competition day. The male coupler must be attached in such a way that the competition day turbine can screw into the platform and be sturdy enough that the attachment can withstand the forces of a wind turbine. Coupling should be embedded in their platforms so they sit approximately 4" above the water line for optimal turbine height. **Important:** Failure to include the turbine coupler will prevent teams from being able to test. There will be spare parts at the repair station on the day of the event.

Moorings

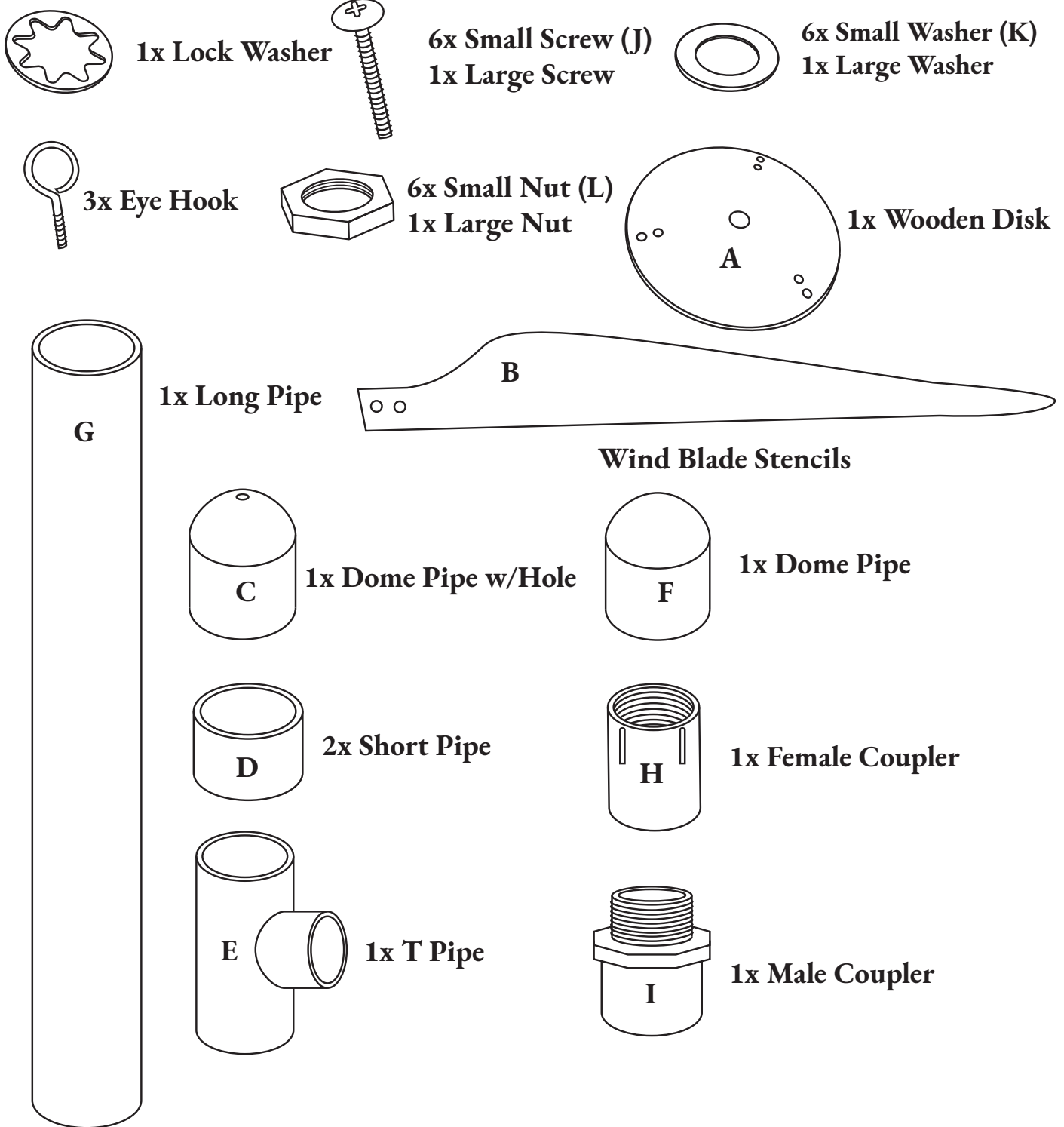
Three provided eye hooks must be integrated into the platform, spaced 120° apart. The forward-facing eye hook must be marked with paint or an arrow.

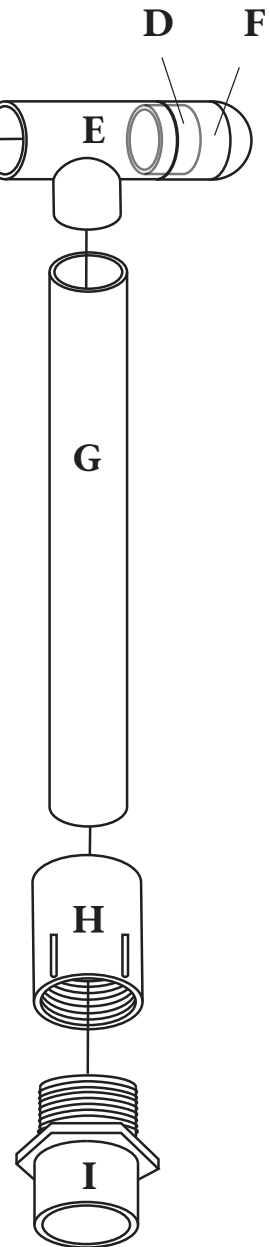
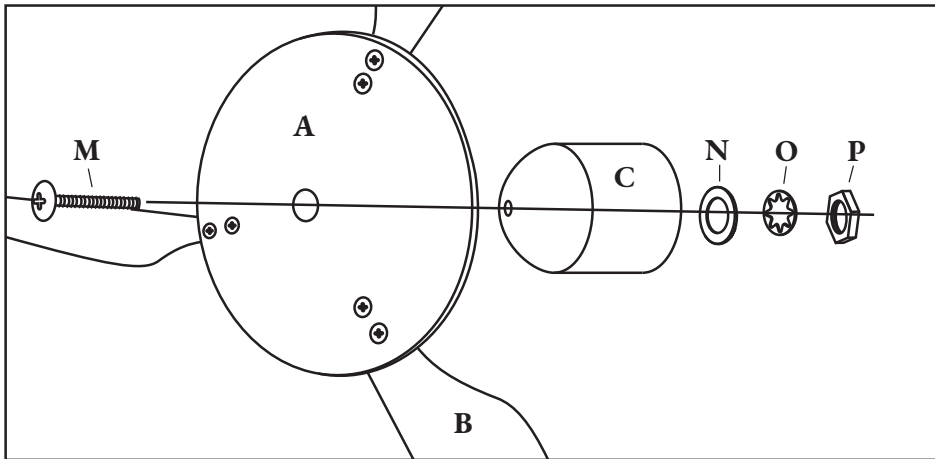
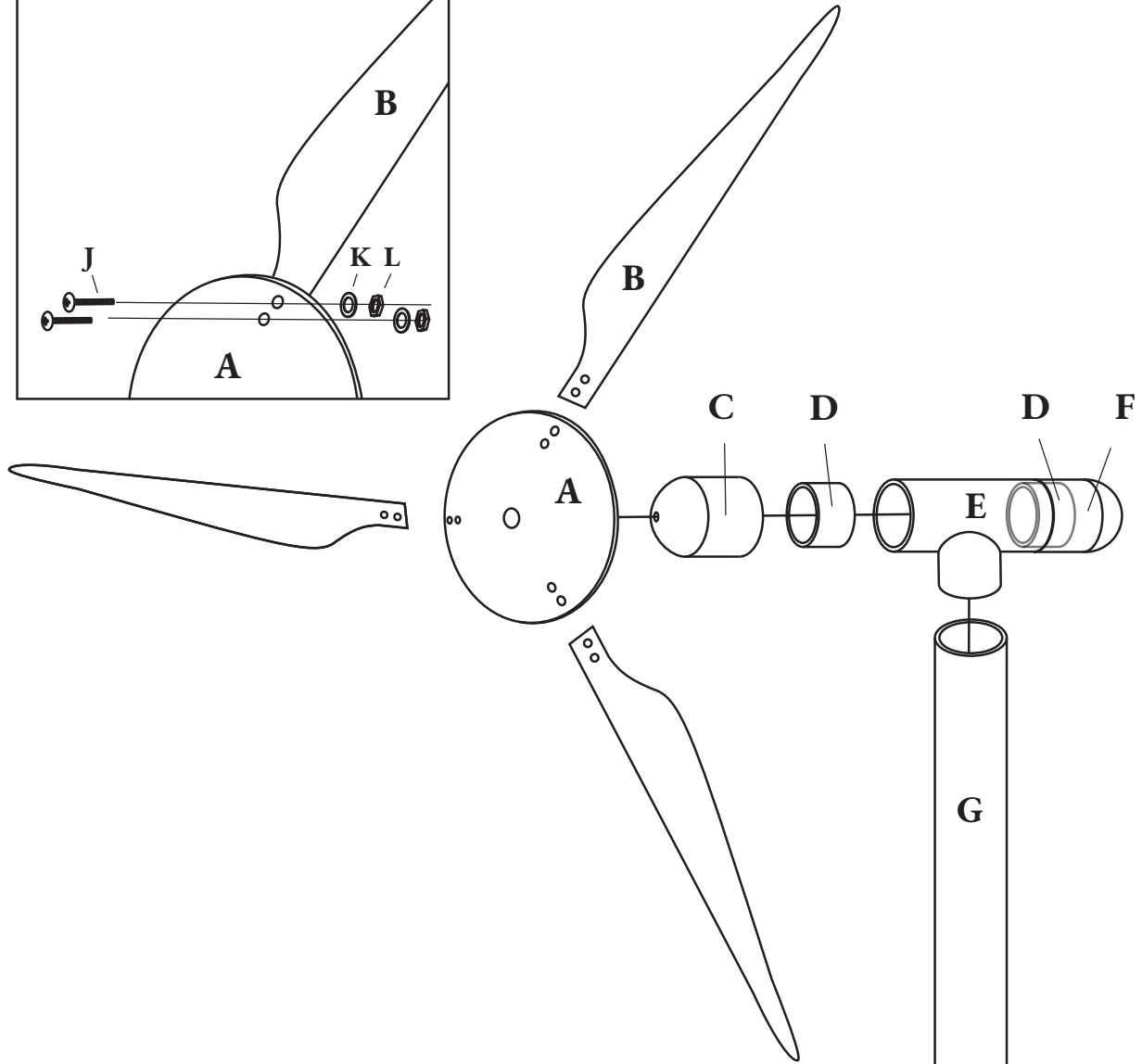
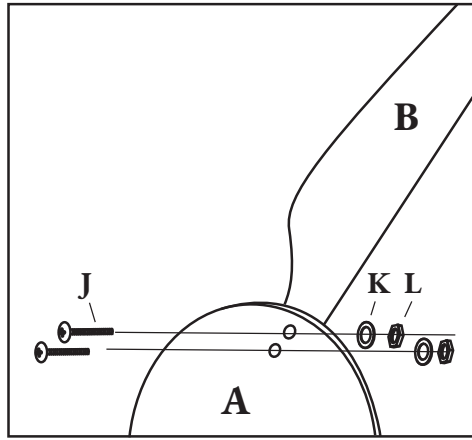
Competition Day Repair Stations

Repair stations will be available with supplies like epoxy, Gorilla tape, zip ties, and other tools to troubleshoot any last-minute issues.

WINDSTORM CHALLENGE

Kit Contents





Resources

University of Maine Media Release Agreement

We request that participants fill out a Media Release Agreement form (parent or guardian signature is required if the visitor is under 18.) Forms can be emailed to **Taylor Ward** at taylor.ward@maine.edu and can be found with the following QR code or link:

<https://umaine.edu/campusrecreation/wp-content/uploads/sites/11/2021/04/Photo-Release-fillable.pdf>

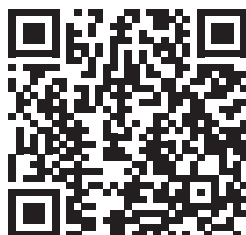


Travel Support

Travel stipends are available for schools participating in the Windstorm Challenge. Please contact Taylor Ward to indicate your interest and need in a travel stipend. Requests will be granted based on availability of funds and will be prioritized for schools by need.

COVID-19- No masks or vaccination documentation is required. All of the University of Maine's Covid-19 guidelines can be found with the following QR code or link:

<https://umaine.edu/return/category/health-and-safety/>



If you have any questions, concerns or accommodation requests please do not hesitate to contact



Taylor Ward
taylor.ward@maine.edu



Amanda Collamore
amanda.collamore@maine.edu



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