

2014 MATE ROV COMPETITION

GENERAL INFORMATION

Information about competition classes, eligibility requirements, regional contests, financial assistance, and more

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MATE COMPETITION PHILOSOPHY

The MATE ROV competition is about **student learning**.

It is designed to be an event that challenges **students** to apply the physics, math, electronics, and engineering skills they are learning in the classroom to solving problems from the marine workplace.

Mentors (teachers, parents, working professionals) are expected to limit their input to educational and inspirational roles and encouraged to focus on the benefits of the **learning process** and not simply on “winning” the competition.

OVERVIEW

The **MATE Center** and the **Marine Technology Society’s ROV Committee** coordinate an underwater robotics (remotely operated vehicle or ROV) competition that includes an international event and a network of regional contests that take place around the world. Students from elementary through college level are welcome to participate in the competition, which includes four different “classes” of vehicles that vary depending on their complexity and the mission requirements.

Each year employers (industry, businesses, government agencies, and research organizations) and working professionals contribute to the event by donating funds, building materials, equipment, and facilities in support of the teams competing in both the international and the regional events. Working professionals also volunteer their time and technical expertise as mentors, technical assistants, and competition judges.

GOALS

The MATE Center uses underwater robots as a way to get students excited about science, technology, engineering, and math (STEM) and help them to see the practical applications of these subjects. In this way, the MATE Center is working to encourage and motivate students to study STEM and pursue careers in ocean STEM fields.

Specifically, the MATE competition's goals are to:

- Increase the awareness and visibility of marine technical fields, educational and career opportunities, and potential employers.
- Help students develop the skills necessary to enter careers in technical fields. These skills include the ability to problem solve, think critically, troubleshoot, communicate effectively, and manage projects. These also include entrepreneurial skills – the ability to see the “bigger picture” context of their work and to tackle problems in creative and innovative ways. In addition, students develop interpersonal skills as they work together to solve problems and overcome challenges.
- Connect students and educators with employers and working professionals. Working professionals have the opportunity to share their knowledge and experience as team mentors, complementing what the students are learning in the classroom. Students can explore potential careers. Employers are able to evaluate students as potential employees.
- Increase students' understanding of the role that ROVs play in shipwreck exploration, scientific research, and conservation.

COMPETITION THEME & COMPONENTS

Each year the competition focuses on a new theme in order to expose students and educators to the many different aspects of the ocean workplace and the scientific and technological advancements that are taking place. This year's competition theme highlights the role that ROVs play in exploring and documenting shipwrecks, studying sinkholes, and conserving our national maritime heritage sites in the Thunder Bay National Marine Sanctuary.

Regardless of the theme, the competition consists of the following components:

- **Underwater mission tasks**
- **Technical reports**
- **Engineering presentations**
- **Poster displays**

COMPETITION CLASSES

There are four classes in which teams can compete – **EXPLORER, RANGER, NAVIGATOR, and SCOUT**. The [2014 Competition Mission Briefing](#) includes information about these classes. Specific eligibility information for each of these classes is included below.

PARTICIPATION FEE

The 2014 participation fees are as following:

EXPLORER class – \$100

RANGER class – \$75

NAVIGATOR class – FREE

SCOUT class – FREE

NOTE: The fees are your team’s commitment to participate in the competition. The fee will be returned to your team in the form of lunches, trophies, and prizes at your regional or international competition event.

Instructors and mentors of EXPLORER and RANGER class teams are required to pay the participation fee when registering their team. Information about the fee, including how to make a payment, is included within the registration form. Participation fees will NOT be refunded or applied to next year should your team withdraw from the competition. Teams participating in regional contests that take place outside of the U.S. may be exempt from this fee (the registration form will tell you). **Regional winners moving on to the international competition are NOT required to pay another registration fee UNLESS they have not already done so.**

ELIGIBILITY – GENERAL

(See below for eligibility as it applies to specific competition classes)

- Open to middle school (grades 5-8), high school (grades 9-12), community and technical college, and four-year university students as well as home-schooled students of comparable grade levels. Students of comparable grade levels participating in afterschool programs or organizations such as the Boys & Girls Club or Boy/Girl Scouts are also welcome to compete.
- Elementary school (grades K-4) students are eligible to participate, but only in the SCOUT class and only if their regional event can accommodate their participation. Contact the [regional coordinator](#) in your area for more information.
- Graduate students are NOT eligible to compete as student team members, but are welcome to serve as team mentors or lead instructors. Graduate students are encouraged to contribute to the team via advice and technical assistance.
- Students can participate in the competition as a part of a school course, afterschool program, club, or community organization. However, regardless of how the team is formed, it must demonstrate that 1) the participating students fall within the eligible grade levels and 2) if minors, the students are working under the supervision of a responsible adult mentor.

- Teams can consist of students from different schools and/or grade levels.
- Teams must have at least **three** students with at least **one** faculty member or adult mentor involved in the process. One student should be designated as the team leader/company CEO.
- The role of the faculty member or adult advisor must be limited to educational and inspirational support. Actual construction of the vehicle, particularly in the complex electrical and software areas, must be completed by the students. Students will be questioned extensively by the judges on their role in designing and building the ROV.
- Individuals from industry, businesses, research organizations, and/or government can act as mentors during the design and building process. The role of these individuals must be limited to technical guidance. Industry mentors should not participate in the actual construction of the vehicle.
- **Teams competing are discouraged from using complete, commercially available, off-the-shelf, plug-and-play systems.** Teams will not be disqualified from competing for using these types of systems, but the engineering evaluation and technical report score sheets will reflect MATE's efforts to discourage their use.

The competition organizers will review the registration forms. Students and/or instructors may be asked to verify that students are of eligible grade level and, if minors are participating, that the team is working under the supervision of a responsible adult mentor who understands the liability that he/she is taking on by overseeing the project.

EXPLORER

Grade level

- Participation in the EXPLORER class is open to students in community and technical colleges and four-year universities.
- High school students (and students of comparable grade levels) participating in the MATE ROV competition for the first time are **NOT** eligible to compete in the EXPLORER class.
- High school students (and students of comparable grade levels) who have previously competed in the EXPLORER **will be considered** provided that they:
 - Placed within the top 50% at last year's international event
 - Can demonstrate that at least 50% of the students on last year's team are participating on the team this year
- High school students (and students of comparable grade levels) who have previously competed in the RANGER **will be considered** provided that they:
 - Placed within the top three at last year's international event
 - Placed within the top three at their regional event the past two years
 - Can demonstrate that at least 50% of the students on last year's team are participating on the team this year

NOTE: High school teams interested in competing in the EXPLORER class must contact the [MATE Center](#) by December 31st 2013. Teams must be prepared to demonstrate that they

meet the conditions described above. Decisions will be made and teams notified by January 8th, 2014. High school teams who have competed previously in EXPLORER class must also contact the [MATE Center](#) by December 31st 2013 to confirm continued compliance with eligibility rules.

- Elementary and middle school students are NOT eligible to compete in the EXPLORER class.

Number of teams

- Two teams per school are permitted provided that they come from different departments and/or campuses and that there are no common mentors or students (i.e., faculty can only mentor one team and students can only participate on one team).
- Schools with two (or more) teams that do not meet these criteria are encouraged to hold an in-school run-off to determine which team will represent their school at the competition.
- High schools are not permitted to enter more than one team per school even if they do meet the above criteria.

EXPLORER CLASS DEMONSTRATION REQUIREMENT

EXPLORER class teams are required to demonstrate that their vehicle:

- 1) can maneuver under its own power
- 2) can correctly “scan” the shipwreck at three target locations (see the [EXPLORER Competition Manual](#) document for details)
- 3) follows all EXPLORER class power specifications

Note: EXPLORER class teams will be demonstrating on RANGER class missions, but the scanning tasks are identical.

EXPLORER class teams must attend the regional contest geographically closest to them on the date of the event to demonstrate to the regional coordinator (or other designated competition official) that their vehicle can accomplish the tasks described above. If teams are located equidistant from two or more regionals, the MATE competition coordinator and the coordinators of those regionals will discuss with the team which regional is most appropriate.

Prior to the contest, the regional coordinator will contact the EXPLORER class teams within his or her region to arrange a time during the regional event for this demonstration to take place. The regional coordinator will then submit an e-mail to the MATE competition coordinator verifying that the team’s vehicle can (or cannot) accomplish the tasks listed above. If the team’s vehicle cannot accomplish these tasks, the team is not eligible to participate in the international competition. There are no second attempts for demonstrations.

International teams that are not located near a regional event are required to submit a video demonstrating that their vehicle can accomplish the required tasks. This video must be sent to

the [MATE Center](#) no later than the date of the last regional contest.

Other requirements and information:

- **Two weeks prior to their demonstration, EXPLORER class teams must submit an electronic copy of their [Company Spec Sheet](#), system interconnection diagram (SID), and, if applicable, their fluid power schematic and laser safety specifications to the [MATE Center](#).** This information will be reviewed for any potential safety or design specifications violations. Teams will be notified within a week if there is a concern. (See the [EXPLORER Competition Manual](#) for more information about the [Company Spec Sheet](#) and SID.)
- Regardless of where the demonstration takes place, the water depth for the demonstration must be greater than 1.5 meters.
- Teams demonstrating at regional events may be required to provide their own power and should discuss this with their regional coordinators.
- Teams that modify their vehicles between the time of their demonstrations and the international competition must submit a list that describes the specific modifications along with their revised [Company Spec Sheet](#) (see the [Engineering & Communication](#) section of the [EXPLORER Competition Manual](#) for information about submitting). These teams must also be prepared to explain their modifications to the safety check officials and the judges presiding over their engineering presentation during the international event.

RANGER

Grade level

- Participation in the RANGER class is open to students in middle (grades 5-8) and high (grades 9-12) schools as well as students in home schools, afterschool programs, clubs, and community organizations of comparable grade levels.
- Students attending community and technical colleges and four-year universities competing for the first time are also eligible to participate in the RANGER class. Note that “first time” is defined as students AND instructors/mentors who have not participated previously.

Number of teams

- Two (or more) teams per school/instructor are permitted provided that the regional contest in which these teams are participating has the resources to host more than one team AND that there are no common students (i.e., students can only participate on one team).
- Where the regional event cannot host more than one team per school/instructor, teams are encouraged to hold an in-school run-off to determine which team will represent their school/instructor at the competition.

ALL RANGER TEAMS MUST PARTICIPATE IN A REGIONAL

All teams participating in the RANGER class are required to take part in a regional event.

Teams that win their regional event can move on to compete in the RANGER class at the international competition.

Teams will be assigned to the regional that is geographically closest to their location. If teams are located equidistant from two or more regionals, the MATE competition coordinator and the coordinators of those regionals will discuss with the team which regional is most appropriate. International teams competing in the RANGER class that are not located near a regional event must participate in a demonstration requirement similar to the EXPLORER class.

RANGER CLASS DEMONSTRATION REQUIREMENT

RANGER class teams that are prohibitively far from a regional event are required to submit a video demonstrating that their vehicle:

- 1) can maneuver under its own power
- 2) can correctly “scan” the ship at three target locations (see the [RANGER Competition Manual](#) document for details)
- 3) follows all RANGER class power specifications

This video must be sent to the [MATE Center](#) no later than the date of the last regional contest. If the team’s vehicle cannot accomplish the required tasks, the team is not eligible to participate in the international competition. There are no second attempts for demonstrations.

Other requirements and information:

- **Two weeks prior to their demonstration, RANGER class teams must submit an electronic copy of their [Company Spec Sheet](#), system interconnection diagram (SID), and, if applicable, their fluid power schematic and laser safety specifications to the [MATE Center](#).** This information will be reviewed for any potential safety or design specifications violations. Teams will be notified within a week if there is a concern. (See the [RANGER Competition Manual](#) for more information about the [Company Spec Sheet](#) and SID.)
- Regardless of where the demonstration takes place, the water depth for the demonstration must be greater than 1.5 meters.
- Teams that modify their vehicles between the time of their demonstrations and the international competition must submit a list that describes the specific modifications along with their revised [Company Spec Sheet](#) (see the [Engineering & Communication](#) section of the [EXPLORER Competition Manual](#) for information about submitting). These teams must also be prepared to explain their modifications to the safety check officials and the judges presiding over their engineering presentation during the international event.

NAVIGATOR

Grade level

- Participation in the NAVIGATOR class is open to students in middle (grades 5-8) and high (grades 9-12) schools as well as students in home schools, afterschool programs, clubs, and community organizations of comparable grade levels.

- In regions that have different school grade configurations, the NAVIGATOR class age requirement may vary. Contact the regional coordinator in your area for more information.

Number of teams

- Two (or more) teams per school/instructor are permitted provided that the regional contest in which these teams are participating has the resources to host more than one team AND that there are no common students (i.e., students can only participate on one team).
- Where the regional event cannot host more than one team per school/instructor, teams are encouraged to hold an in-school run-off to determine which team will represent their school/instructor at the competition.

SCOUT

Grade level

- Participation in the SCOUT class is open to students in elementary (grades K-4), middle (grades 5-8), and high (grades 9-12) schools as well as students in home schools, afterschool programs, clubs, and community organizations of comparable grade levels.
- Note that elementary school students may only participate if their respective regional coordinator approves their registration. Also, in regions that have different school grade configurations, the SCOUT class age requirement may vary. Contact the regional coordinator in your area for more information.

Number of teams

- Two (or more) teams per school/instructor are permitted provided that the regional contest in which these teams are participating has the resources to host more than one team AND that there are no common students (i.e., students can only participate on one team).
- Where the regional event cannot host more than one team per school/instructor, teams are encouraged to hold an in-school run-off to determine which team will represent their school/instructor at the competition.

INTERNATIONAL COMPETITION

2014 marks the 13th year of the international competition. This event is being held at the [Thunder Bay National Marine Sanctuary](#) in Alpena, Michigan, USA June 26-28, 2014. Only the **EXPLORER** and **RANGER** classes participate in the international competition.

Detailed information about room and board as well as transportation, shipping, local resources (such as hardware and electronics stores), and more will be posted [here](#) as it becomes available.

KEY MILESTONES & SCHEDULE OF EVENTS

Key milestones:

- November 1st – general information, design specs, and competition rules posted
- December 1st – registration for ALL competitions opens
- March – May – regional contests take place

- April 1st – application for travel assistance posted
- May 23rd – deadline for submitting application for travel assistance
- May 26th – travel assistance awards announced
- May 29th – technical reports due to MATE competition coordinator
- June 26th – 28th – international competition held in Alpena, MI
 - Engineering & poster presentations due

NOTE: These are milestones that apply to the international competition **only**. Regional contests are held prior to the international event and may have their own sets of key milestones, including registration deadlines. See [Regional Events](#) for information specific to the regional contests.

*******Example***** schedule of international competition events:**

- Wednesday – teams arrive & check-in
 - Vehicles shipped or hand-carried to competition venue
- Thursday – set-up & pool practice day
 - Welcome & introductions in morning
 - Set-up team workstations & posters, competition arena, and repair station
 - Practice time available
 - Evening social mixer/reception (**attendance required**)
- Friday – engineering presentations & underwater missions
 - Engineering evaluation interviews
 - Teams have scheduled time slots
 - Underwater mission challenges begin
 - Teams have scheduled time slots
 - Free time and optional facility tours when not competing
- Saturday – underwater missions & awards
 - Underwater mission challenges continue
 - Teams have scheduled time slots
 - Free time and optional facility tours when not competing
 - Evening awards ceremony
- Sunday – teams depart

AWARD CATEGORIES

In addition to the awards based on point scoring (e.g. missions, technical report, engineering presentations, and poster), at the international competition the MATE Center presents awards in the following categories:

- Sharkpedo award
- Biggest Bang for the Buck
- Design Elegance
- Safety Conscious
- Aloha Team Spirit

- Guts & Glory
- Engineering MVP awards
- Flying Fish award
- gROVer award
- Martin Bowen Memorial Inspiration for Future Engineers award

For a description of each of these award categories and a listing of the 2013 award winners, visit [2013 Competition Scoring](#).

REGIONAL CONTESTS

The MATE Center supports and helps to organize regional contests in the U.S., Canada, Hong Kong, Scotland, Japan, and Egypt. These regionals serve as feeders into the international competition's **RANGER** class, with the top one or two teams from each regional contest "winning" the opportunity to advance to the international competition. Regional contests may or may not offer the **SCOUT** and **NAVIGATOR** classes. The SCOUT and NAVIGATOR class winners do NOT advance to the international competition.

The number of RANGER teams that advance from each regional depends on the number of teams participating in that regional. For example, the top ONE team from regionals with 10 or less individual SCHOOLS PARTICIPATING ON CONTEST DAY can advance to the international competition, while the top TWO teams from regionals with more than 10 individual SCHOOLS PARTICIPATING ON CONTEST DAY can advance to the international competition.

The regional contest hosting the international competition can send one additional team to the international competition. For example, if the regional has less than 10 individual schools participating, they would send one plus one additional team, for a total of two, to the international event.

The following regional events are currently scheduled to take place in 2014:

- ▼ **Big Island** (Hilo, Hawaii)
- ▼ **Florida** (Cocoa, Florida)
- ▼ **Great Lakes** (Alpena, Michigan)
- ▼ **Oahu** (Honolulu, Hawaii)
- ▼ **Hong Kong** (Hong Kong)
- ▼ **Mid-Atlantic** (Hampton, Virginia)
- ▼ **Monterey Bay** (Monterey, California)
- ▼ **New England** (Buzzards Bay, Massachusetts)
- ▼ **Newfoundland & Labrador** (St. John's, Newfoundland and Labrador)
- ▼ **Northern Gulf Coast** (Dauphin Island, Alabama)
- ▼ **Nova Scotia** (Halifax, Nova Scotia)
- ▼ **Oregon** (Lincoln, Oregon)
- ▼ **Pacific Northwest** (Seattle, Washington)

- ▼ **Philadelphia** (Philadelphia, Pennsylvania)
- ▼ **Scotland** (Aberdeen, Scotland)
- ▼ **Shedd Aquarium-Midwest** (Chicago, Illinois)
- ▼ **Southern California** (Long Beach, California)
- ▼ **Southeast** (Savannah, Georgia)
- ▼ **Texas** (Houston, Texas)
- ▼ **Wisconsin** (Milwaukee, Wisconsin)
- ▼ **Egypt** (Cairo, Egypt)

Visit [Regional Contests](#) for more information about the contest nearest you.

FUNDING AND BUDGET

There is no limit to the amount of money, time, and technical expertise that can go into designing and building your team's vehicle. However, keep in mind that a costlier vehicle does not necessarily mean that the vehicle will perform better or will be better able to successfully complete the mission tasks.

The MATE Center offers each team the following support:

- **Opportunity to apply for financial assistance (up to \$500).**
Teams participating in the international competition can apply for funds (up to \$500) to help offset the cost of travel and lodging for STUDENT team members. The application for financial assistance will be posted to the competition web site by April 1st, 2014.

NOTE: Travel funds and/or lodging accommodations may be available for teams competing in regional events; teams should contact the regional contest coordinator in their area for more information.

- **Meals – kick-off reception, lunches, and awards banquet.**
A kick-off reception, lunches on two days (first and second day) of the event, and an awards banquet will be provided to student team members, instructors, and mentors attending the international competition. Parents, spouses, siblings, cheerleaders, etc. will be able to purchase tickets for the reception and awards banquet (but **NOT** lunches) in advance.

NOTE: Meals may be provided to teams competing in regional events; regional teams should contact the regional contest coordinator in their area for more information.

- **Special offers from competition sponsors and teams only area.**
Several companies offer their products, materials, supplies, and/or access to equipment and facilities to competition teams at no or reduced costs. For example, VideoRay's "MATE ROV Competition Store" is available to MATE competition teams only. This on-line store offers discounts on cameras, tethers, and, possibly, thrusters, among other items. Sound Ocean Systems, Inc. offers free umbilical cable provided teams cover shipping costs. SolidWorks

provides student edition versions of its software to ALL student members of MATE ROV teams at no cost. Lights Camera Action LLC offers discounts on certain products.

Information about these offers and others is included within the [teams' only](#) area of the MATE forum hub. Teams will receive the username and password to access the teams' only area once their registration has been accepted.

- **Resources and curriculum areas of the MATE web site.**

The [resources](#) area contains information on where to purchase building materials as well as lists of helpful web site and books, among other resources. Information on potential funding sources at both the international and regional level (e.g., local Rotary Clubs, American Association of University Women, etc.) is also included there. The [curriculum](#) area includes instructional materials, how-to videos, and much more.

- **Access to industry mentors.**

The MATE Center and the regional coordinators work to connect students with industry professionals willing to donate their time and technical expertise as team mentors. Several regionals have developed extensive mentor networks utilizing members of their local MTS section, for example. Contact the [MATE Center](#) or the [regional coordinator](#) in your area if you are interested in connecting with an industry mentor.

- **Additional costs.**

Teams are encouraged to organize their own fundraising activities to cover building materials, travel, housing, and meal costs above and beyond what the MATE Center provides. The [teams' only](#) area includes fundraising tips as well as “tools” (e.g. the MATE logo, a press release template, etc.) that teams can use to support their fundraising activities.

In addition, the following items are your team's responsibility:

- The participation fee.
- Shipping your ROV system and tools to competition venue.
- Costs associated with fundraising or presentations to community.
- Miscellaneous expenses for photocopying, phone calls, shipping costs associated with ordering ROV components, mailings, courier, etc.