



MATE
MARINE
ADVANCED
TECHNOLOGY
EDUCATION
CENTER

2010 MATE International ROV Competition

www.marinetech.org/rov_competition/index.php



ROVs in Treacherous Terrain: Science Erupts on Loihi, Hawaii's Undersea Volcano

June 24 – 26, 2010
University of Hawaii at Hilo
The Big Island of Hawaii



UNIVERSITY
OF HAWAII
HILO



GENERAL INFORMATION

Eligibility requirements, regional contests, financial assistance, and more

OVERVIEW

The **MATE Center** and the **Marine Technology Society's ROV Committee** are organizing the 9th annual MATE International ROV Competition. The event is being hosted by the University of Hawaii at Hilo, which is located on Hawaii's Big Island. The competition theme focuses on the Loihi seamount, an active undersea volcano that rises more than 3,000 meters above the seafloor. The mission tasks challenge teams to deploy instruments, take sensor readings, plot data, and collect samples of geologic features as well as organisms that inhabit the volcano's flanks.

Employers (industry, businesses, government agencies, and research organizations) and working professionals are contributing to the event by donating funds, building materials, equipment, and facilities in support of the competing teams. Working professionals are also volunteering their time and technical expertise as mentors, technical assistants, and competition judges.

GOALS

- To increase the awareness and visibility of marine technical fields, educational and career opportunities, and potential employers.
- To help students develop the skills necessary to enter careers in technical fields. These skills include the ability to work as a team, problem solve, think critically, troubleshoot, communicate effectively, and manage projects.
- To 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 students are learning in the classroom. Employers have the opportunity to evaluate students as potential employees. Students have the opportunity to explore potential careers.
- To increase students understanding of undersea volcanoes and the role that ROVs play in their science and exploration.

COMPETITION 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.

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

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

Information about the underwater missions can be found within the [Competition Missions](#) document, while the [Engineering & Communication](#) document contains information about the report, presentation, and display. The [Design & Building Specifications and Competition Rules](#) document contains information about ROV specifications and competition rules.

ELIGIBILITY – GENERAL

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

- Open to middle school, high school, college, and university students.* Home-schooled students of comparable grade levels are also welcome.
- 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 design and build the vehicles as an entire class project or school group activity. The group must be affiliated with a school or a home-school network and/or demonstrate that 1) the participating students are currently enrolled in a high school, college, university, or home-school network and 2) the students are working under the supervision of an adult mentor.
- Teams must have at least three students with at least one faculty member or adult advisor involved in the process. One student should be designated as the team spokesperson.
- 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 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 effort to discourage the use of these systems. See the general rules section of the [Design & Building Specifications and Competition Rules](#) document for specific information.
- All team members are required to register or update their information on the MATE AlumniWeb site (www.marinetech.org/alumni) as a condition of participating in the competition. AlumniWeb helps the MATE Center to keep track of students who have participated in its ROV competitions and to demonstrate the impact of the competition program to its funding agencies. The information entered is kept strictly confidential. See the **Technical Report** section within the [Engineering and Communication](#) document for more information.

*Middle schools are eligible to compete in the RANGER class and, if it exists at the regional nearest them, the SCOUT class ONLY. Middle schools are not eligible to participate in the EXPLORER class. See below for further details.

The competition organizers will review the registration forms and make the final decisions about participation. Students and/or instructors may be asked to verify that students are registered at a school, college, or university, or that the team is working under the supervision of an adult mentor.

COMPETITION CLASSES

There are two classes in which teams can compete – **EXPLORER** and **RANGER**. Teams can register to compete in **one** (but not both) competition class. (A third class – SCOUT – is also available at the MATE Monterey Bay, Pacific Northwest, and Big Island Regional ROV Contests.) Instructors interested in entering two teams in one competition class will be considered as long as one team represents a high school or home school and the other a college or university OR one team represents a middle school and the other a high school, home school, college, or university. Institutions/instructors interested in entering one team per competition class will also be considered provided that they meet the eligibility requirements for both classes listed below.

EXPLORER class eligibility

- Participation in the EXPLORER class is open to community colleges, technical colleges, and universities. Middle schools are NOT eligible to compete in the EXPLORER class.
- High schools participating in the MATE ROV competition for the first time are NOT eligible to compete in the EXPLORER class.
- High schools that have previously competed in the MATE ROV competition can apply to compete in the EXPLORER class. See the competition registration form for details. The registration form will be posted to the competition web site by December 1st, 2010.
- High schools that have previously competed in the EXPLORER class must also apply, making sure to indicate the total number of returning team members. See the competition registration form for details.

EXPLORER class demonstration requirement

EXPLORER class teams are required to demonstrate that their vehicle can 1) maneuver under its own power; 2) enter and exit through an 80cm x 80cm opening; and 3) remove the pin to release the high rate hydrophone (see [Competition Missions](#), Task #1) prior to the international competition.

The demonstration can be accomplished in one of two ways:

1. EXPLORER class teams within a reasonable driving distance* to a regional contest must attend that regional contest on the date of the event to demonstrate to the regional coordinator (or other designated competition official) that their vehicle can accomplish the items listed above.

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 items listed above. If the team's vehicle cannot accomplish these items, the team is not eligible to participate in the international competition.

2. EXPLORER class teams that feel that they are beyond a reasonable driving distance* to a regional contest must contact the MATE competition coordinator so that an alternative verification plan can be arranged. For example, the MATE competition coordinator will seek out an impartial individual, such as a member of the Marine Technology Society or the Institute for Electrical and Electronics Engineers Oceanic Engineering Society, and make arrangements with him or her to visit the team at their school or practice location for the demonstration. The demonstration must be completed by the date of the final regional contest of the 2010 competition season. This exact date is TBD but will be confirmed in February 2010.

Regardless of where the demonstration takes place, water depth for the demonstration must be between 1 and 4 meters.

*To be determined on a case-by-case basis through discussions with the MATE competition coordinator.

RANGER class eligibility

- Participation in the RANGER class is open to high schools, middle schools, home schools, and elementary schools. Elementary schools interested in the MATE ROV competition should contact the regional competition coordinator in their area to discuss their participation.
- Community colleges, technical colleges, and universities competing for the first time are also eligible to participate in the RANGER class.
- Schools in the vicinity of one of the 15 regional contests are required to participate in the regional in their area before moving on to the international competition. (See below for information about the regional contests.)

Please see the [Competition Missions](#) and [Design & Building Specifications and Competition Rules](#) documents for detailed information about the competition classes. You can also visit the competition's web site at www.marinetech.org/rov_competition/index.php.

INTERNATIONAL COMPETITION VENUE

The 2010 international competition is being hosted by the University of Hawaii at Hilo.

With approximately 4,000 students, the **University of Hawaii (UH) at Hilo** is located on the island of Hawaii. One of ten branches of the state-supported University of Hawaii System, UH Hilo offers 36 undergraduate, six master's and two doctoral degree programs. With the finest astronomical viewing site in the world, 266 miles of coastline, 11 of the world's 13 climate zones, abundant agricultural lands in diverse growing areas, active volcanoes, and unique species, the island of Hawaii serves as a natural learning laboratory for such programs as marine studies, astronomy, biology, environmental studies, geology, and Hawaiian studies. For more information about UH Hilo visit www.uhh.hawaii.edu.

Detailed information about room and board as well as transportation, shipping, local resources (such as hardware and electronics stores), and more will be posted to the competition web site at www.marinetech.org/rov_competition/2010/participant.php as it becomes available.

RANGER REGIONAL CONTESTS

In 2010, the MATE Center is supporting and helping to organize 19 regional contests in the U.S., Canada, Hong Kong, and Scotland. These regionals serve as feeders into the international competition's **RANGER** class, with the top one or two teams from each regional contest advancing to the international competition.

For example, the top ONE team from regionals with 10 or less individual SCHOOLS participating will advance to the international competition, while the top TWO teams from regionals with more than 10 individual SCHOOLS participating will advance to the international competition.

The following regional events are currently schedule to take place in 2010:

- ▼ **Big Island** (Hilo, Hawaii)
- ▼ **Carolina** (Myrtle Beach, South Carolina)
- ▼ **Florida** (Cocoa, Florida)
- ▼ **Great Lakes** (Alpena, Michigan)
- ▼ **Hawaii Underwater Robot Challenge** (Oahu, 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)
- ▼ **Nova Scotia** (Halifax, Nova Scotia)
- ▼ **Pacific Northwest** (Seattle, Washington)
- ▼ **Philadelphia** (Philadelphia, Pennsylvania)
- ▼ **Scotland** (Aberdeen, Scotland)
- ▼ **Shedd Aquarium-Midwest** (Chicago, Illinois)

- ▼ **Southern California Fly-Off** (San Diego, California)
- ▼ **Southeast** (Savannah, Georgia)
- ▼ **Texas** (Houston, Texas)
- ▼ **Wisconsin** (Milwaukee, Wisconsin)

Schools within the vicinity of a regional contest are required to participate **in the regional in their area** in order to move on to the international competition. If you are uncertain about which, if any, regional your school should participate in, contact Jill Zande, MATE Competition Coordinator, at jzande@marinetech.org or (831) 646-3082.

For more information about the **RANGER** regional contest nearest you, visit www.marinetechnology.org/rov_competition/2010/regional_contests.php.

KEY MILESTONES AND SCHEDULE OF EVENTS

Key milestones:*

- November 25th – design specs, competition rules, and mission tasks posted
- December 1st – on-line registration form posted
- **February 1st – on-line registration deadline**
- April 1st – application for travel assistance posted
- May 20th – deadline for submitting application for travel assistance
- May 27th – technical reports due to MATE competition coordinator
- June 24th – 26th – international competition held at the University of Hawaii at Hilo on Hawaii's Big Island
 - 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 their own registration deadlines. See www.marinetechnology.org/rov_competition/2010/regional_contests.php for information specific to the regional contests.

Schedule of international competition events:

*****Example*****

- Wednesday – teams arrive & check-in
 - Vehicles shipped or hand-carried to competition venue
 - Facility tours for those interested
- 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

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 accomplish the mission tasks.

The MATE Center offers each team the following support:

- **Financial assistance (up to \$1,000) with travel and lodging expenses.**

Teams participating in the international competition can apply for funds (up to \$1,000) 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, 2010.

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 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.**

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 competition teams **only**. This on-line store offers discounts on cameras, tethers, and, possibly, thrusters, among other items. Carrillo Underwater Systems (CUS) offers a scholarship for free and/or discounted products, and 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. Igus, Inc., offers a range of its products at no-cost, while VANTEC, Lights Camera Action LLC, and Parallax offer discounts on certain products.

Information about these offers and others is included within the "teams' only" section of the competition web site (see the bullet below for more information about how to access this site).

- **Resources and "teams' only" sections of the ROV competition web site.**

The resources section of the ROV competition web site located at www.marinetech.org/rov_competition/resources.php contains information on where to purchase building materials, lists of helpful web site and books, and a "teams' only" password protected area, among other resources.

The URL for VideoRay's on-line store, CUS scholarship program, etc., and other information and support available only to MATE competition teams are posted within the "teams only" section. 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. Teams will receive the username and password to access the teams' only section once their registration has been accepted.

- **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 and travel, housing, and meal costs above and beyond what the MATE Center provides. The “teams’ only” section of the ROV competition web site includes a letter from MATE’s competition coordinator that teams can use to approach local businesses (e.g., Home Depot) for donations of funds, materials, equipment, etc.

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

- 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.
-