



## 2007 MATE Center/MTS ROV Committee ROV Competition For High School & College Students

[www.marinetech.org/rov\\_competition/index.php](http://www.marinetech.org/rov_competition/index.php)

*Celebrating the International Polar Year:*

*Challenging Students to Design & Build ROVs for Operation in Polar Environments*



## GENERAL INFORMATION

### OVERVIEW

The **MATE Center** and the **Marine Technology Society's ROV Committee** are organizing the sixth annual international student ROV competition. The event will take place June 22–24, 2007 at **Memorial University** and the **Institute for Ocean Technology** in St. John's, Newfoundland and Labrador, Canada.

In recognition of the **International Polar Year (IPY)**, the 2007 competition focuses on polar science, ocean observing, and industry operations taking place in polar environments. The competition highlights our Polar Regions and reflects the challenges that scientists and engineers face when working in these environments.

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, while students have the opportunity to explore potential careers.
- To increase students' understanding of the science, history, and culture of Polar Regions and the impact that these regions have on global climate.

## 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.
- 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.
- 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.
- All team members are required to register or update their information on the MATE AlumniWeb site ([www.marinetech.org/alumni](http://www.marinetech.org/alumni)) as a condition of participating in the competition. See the *Technical Report* section within the [Engineering and Communication](#) document for more information.

\*Middle schools are eligible to compete in RANGER class only.

**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. Two teams per instructor will be considered as long as one team represents a high school or home school and the other a 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.
- High schools 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 on January 1<sup>st</sup>, 2007.
- High schools that have previously competed in the EXPLORER class need not apply, but should indicate that they have previously competed in the EXPLORER class on their registration form.

### **RANGER class eligibility**

- Participation in the RANGER class is open to high schools, middle schools, and home schools.
- 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 14 regional contests must 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 Scenarios & Mission Tasks](#) 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](http://www.marinetech.org/rov_competition/index.php).

### **VENUE**

The 2007 international competition is being held at Memorial University's Marine Institute (MI) and the Institute for Ocean Technology (IOT) located in St. John's, Newfoundland and Labrador, Canada.

Memorial University is Atlantic Canada's premiere comprehensive university and one of the region's most important research facilities. The university is home to the MI, which is Canada's leading center of fisheries and marine training. The IOT is a federal government research laboratory that conducts ocean engineering research through modeling of ocean environments, predicting and improving the performance of marine systems, and developing innovative technologies that bring benefits to the Canadian marine industry.

The competition missions will be staged in three of the state-of-the-art facilities available at the MI and the IOT:

- 1) The largest flume tank in the world, with a water capacity of 1.7 million liters, and water velocity ranging from 0–1 meters per second. The flume tank's viewing gallery has a 20 meter-by-2 meter viewing window and seats 150 people.

- 2) An ice tank where the water surface can be frozen and the air temperature maintained at a uniform –30 to 15 degrees Celsius to simulate the polar environment.
- 3) An engineering basin that is used to simulate the extreme ocean environment; waves, wind, and currents can be controlled to achieve various sea states.

For more information about the facilities at MI and IOT, visit the following web sites:

[www.mi.mun.ca/csar/flume\\_tank.htm](http://www.mi.mun.ca/csar/flume_tank.htm)

[http://iot-ito.nrc-cnrc.gc.ca/facilities/it\\_e.html](http://iot-ito.nrc-cnrc.gc.ca/facilities/it_e.html)

[http://iot-ito.nrc-cnrc.gc.ca/facilities/oeb\\_e.html](http://iot-ito.nrc-cnrc.gc.ca/facilities/oeb_e.html)

## **CITY OF ST. JOHN'S**

St. John's is the capital of the province of Newfoundland and Labrador and the province's economic and cultural center. The oldest city in North America, St. John's has been visited by European explorers, adventurers, soldiers, and pirates for more than 500 years.

First discovered in 1497 by John Cabot and later claimed as the first permanent settlement in North America for the British Empire by Sir Humphrey Gilbert, St. John's has a rich and colorful history. The city offers an enticing combination of old world charm, unique architectural, historic and natural attractions, top notch facilities and services, and is located in close proximity to spectacular coastlines, historic villages, and a diverse selection of wildlife.

Area highlights include Signal Hill, the site where Guglielmo Marconi received the first transatlantic wireless transmission, and Cape Spear, the easternmost point in North America. The Fluvarium is the only public facility in North America where one can view Brook and Brown Trout in their natural habitat. The exhibits in the Johnson GEO Centre will tell the remarkable story of the geological history of Newfoundland and Labrador, which extends back for an incredible 3.7 billion years.

A variety of whales, marine life, and icebergs in season can be seen from vantage points within the city and from tour boats operating out of St. John's harbor. Just outside the city limits a marine bird sanctuary comes alive with seabirds and other marine life during the summer months.

A packet of information about St. John's and the province of Newfoundland and Labrador will be sent to teams once their registration has been accepted. In the meantime, visit the following web sites for more information:

[www.stjohns.ca/visitors/cruise/desthighlights.jsp](http://www.stjohns.ca/visitors/cruise/desthighlights.jsp)

[www.stjohns.ca/visitors/links.jsp](http://www.stjohns.ca/visitors/links.jsp)

[www.fluvarium.ca](http://www.fluvarium.ca)

[www.geocentre.ca](http://www.geocentre.ca)

## **RANGER REGIONAL CONTESTS**

In 2007, the MATE Center is supporting and helping to organize 14 regional contests across the U.S., Canada, and Hong Kong. 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 will take place in 2007:

- ▼ **Big Island**
- ▼ **Florida**
- ▼ **Great Lakes**
- ▼ **Hawaii Underwater Robot Challenge**
- ▼ **Hong Kong**
- ▼ **Mid-Atlantic**
- ▼ **Monterey Bay**
- ▼ **New England**
- ▼ **Newfoundland & Labrador**
- ▼ **Northern California**
- ▼ **Pacific Northwest**
- ▼ **Southern California Fly-Off**
- ▼ **Southeast**
- ▼ **Texas**

Schools within the vicinity of a regional contest must 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's Competition Coordinator, at [jzande@marinetech.org](mailto:jzande@marinetech.org) or (831) 646-3082.

For more information about the **RANGER** regional contest nearest you, visit [www.marinetech.org/rov\\_competition/2007/regional\\_contests.php](http://www.marinetech.org/rov_competition/2007/regional_contests.php).

## **KEY MILESTONES AND SCHEDULE OF EVENTS**

### **Key milestones:\***

- December 1<sup>st</sup> – design specs, competition rules, and general information posted
- December 15<sup>th</sup> – mission tasks posted
- January 2<sup>nd</sup> – on-line registration form posted
- January – passport information/application for financial assistance posted
- **February 1<sup>st</sup> – on-line registration deadline**
- June 1<sup>st</sup> – technical reports
- June 22<sup>nd</sup> – 24<sup>th</sup> – international competition held at Memorial University and the Institute for Ocean Technology
  - Engineering & poster presentations due

\*Note: These are milestones that apply to the international only. Regional contests will be held prior to the international event and may have their own sets of key milestones.

### **Schedule of events:**

#### **\*\*\*\*\*Example\*\*\*\*\***

- Thursday – teams arrive & check-in
  - Vehicles shipped or hand-carried to competition venue
- Friday – 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)
- Saturday – engineering presentations & underwater missions
  - Engineering evaluation interviews
  - Underwater mission challenges begin
    - Teams have scheduled time slots
  - Free time and optional facility tours when not competing
- Sunday – underwater missions & awards
  - Underwater mission challenges continue
    - Teams have scheduled time slots
  - Free time and optional facility tours when not competing
  - Evening awards ceremony
- Monday – 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 **WILL NOT** provide teams with funds for building supplies and materials. The MATE Center **WILL** provide each team with the following support:

- **Travel stipends (up to \$1,500).**

Teams competing in the international competition outside of driving distance will receive a travel stipend of up to \$1,500. Teams competing in the international competition and within driving distance (~300 miles) to the event venue will receive roundtrip mileage reimbursement funds based on \$0.445 per mile. Travel stipends may be available for teams competing in regional events; teams should contact the regional contest coordinator in their area for more information.

**Note:** Depending on your city of origin, airfare to St. John's, Newfoundland is typically more expensive than flying a comparable distance within the U.S. Teams should be prepared for this.

- **Financial assistance with passport expenses.**

Teams participating in the international competition can apply for funds to help offset the cost of passports for STUDENT team members. Limited funds are available.

**Note:** According to the U.S. State Department, beginning on January 23, 2007, ALL persons traveling by air between the United States and Canada, Mexico, Central and South America, the Caribbean, and Bermuda will be required to present a valid passport, Air NEXUS card, or U.S. Coast Guard Merchant Mariner Document.

Further information about passports and the application for financial assistance will be posted to the competition web site in January 2007.

- **Housing stipends (up to \$500), PROVIDED THAT FUNDS ARE AVAILABLE.**  
If FUNDS ARE AVAILABLE, each team competing in the international competition will receive a housing stipend of up to \$500. Teams are responsible for covering the cost of any additional housing needs. If funds are not available, teams are responsible for covering the cost of their total housing needs. Housing may be available for teams competing in regional events; regional 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 each 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. 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. Igus, Inc., offers a range of its products at no-cost, while both VANTEC and Lights Camera Action LLC 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 on 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](http://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 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. **Note:** The MATE Center is pursuing discounted shipping rates. Stay tuned for more information.
- Costs associated with fundraising or presentations to community.
- Miscellaneous expenses for photocopying, phone calls, shipping costs associated with ordering ROV components, mailings, courier, etc.