QUALISYS
Motion Capture Systems

Marine Motion Capture

Tracking vessel motion under different wave, current and wind conditions is a fundamental task at a hydrodynamics lab or a naval test site. Qualisys technology makes it possible to track objects in large volumes, both above and underwater.

Above water camera systems consist of IP67 protected 7+ cameras with optional synchronized and calibrated Miqus Video cameras. Large volume underwater systems are made up of 7+u cameras while smaller volumes can be covered with Miqus M3u or M5u cameras. Synchronized and calibrated Miqus underwater video cameras can be added to both setups, or run as stand-alone reference video cameras to monitor your application.

ACCURATE POSITIONAL AND ORIENATIONAL TRACKING
Optical motion capture does not require wiring to the vessel during the experiment. Six-degrees of freedom (6DOF) position and orientation of the vessel is measured by cameras tracking light-weight markers attached to the vessel. Accuracy down to 1mm on position and 0.1° on rotation can be achieved, depending on the capture volume. Rigid bodies can be streamed in real-time and to external applications using the Qualisys real-time SDK.

FEATURES

- Above and underwater capabilities
- Integrated data logging and analysis
- Track several vessels simultaneously
- Real-time 6DOF tracking and streaming
- Wireless tracking for undisturbed model movement
- Underwater: IP68 housing pressure tested to 40m
- Above water: Water resistant industrial IP67 hardware[1]
- Real-time latency < 5ms
- Active and passive marker support

[1] Optional accessory/feature, not available for all camera models

REFERENCES
Marintek, Trondheim, Norway
Institute for Marine Dynamic, Canada

MARINE MOTION CAPTURE

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ABOVE WATER

Water resistant industrial IP67 cameras and cabling means that your motion capture system can be permanently mounted around the tank or basin without the fear of a detrimental splash.
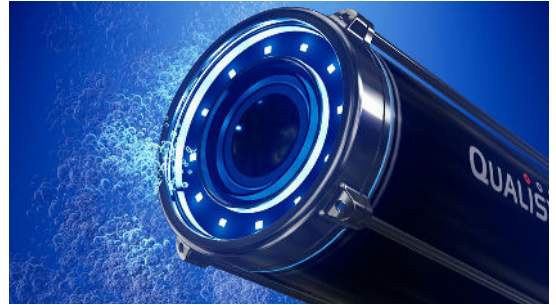
To enable coverage of large ocean basins while maintaining high accuracy, Qualisys has developed a special calibration procedure called fixed-camera calibration. Together with long range active markers, it is possible to track vessels over 100 meters away at frequencies up to 200 fps. The system is equally efficient for the smaller volumes in towing tanks, where the quick dynamic wand calibration is used.

UNDERWATER

The 7+ Underwater camera is a robust, high resolution camera for long-range measurements while the Miqus Underwater is a smaller, more light weight camera with a wide field-of-view, making it well-suited for smaller basins and towing tanks in short to medium measurement distances. A Qualisys underwater camera system can be used to track free-running AUVs, underwater objects towed in a towing tank, mooring lines, fish net trawl doors, or oil pipeline motions, just to mention a few.

COMBINING ABOVE WATER AND UNDERWATER

By combining Qualisys groundbreaking underwater cameras with an above water camera system in what is known as a 'Twin System' setup, above- and underwater motion can be merged together into a single capture.

SYNCHRONIZED VIDEO

Adding synchronized and calibrated video cameras to both above water and underwater tracking systems is an efficient way to visualize vessel movement by overlaying 3D and 6DOF data onto the image. Alternatively, you may use the video as a standalone reference to monitor applications.

Setup example from a large Ocean basins where 7+ cameras can cover distances beyond 100m (300 ft)

Miqus Underwater cameras are ideal to use in small to medium sized volumes, up to 15m (45ft) range.

7+ Underwater is a robust, high resolution camera suitable for medium to long-range measurements, up to 25m (75ft).

CAMERA SELECTION GUIDE FOR UNDERWATER TRACKING

Requirement	Miqus M3u	Miqus M5u	7+u	Miqus Video u
3D tracking capabilities	✅	✅	✅	❌
Syncronized color video	❌	❌	❌	✅
Distances longer than 15 m	❌	🟡	✅	❌
Fast movement, high frame rate	✅	🟡	✅	🟡
Wide FOV for narrow underwater spaces	✅	✅	❌	✅

Recommended ✅   *Possible* 🟡   *Not recommended* ❌   *More info at: https://www.qualisys.com/hardware/*