SIMULATION CAPABILITIES AND FACILITIES GUIDE

Edition 2026

MITAGS

MARITIME INSTITUTE OF TECHNOLOGY AND GRADUATE STUDIES

MITAGS

MARITIME INSTITUTE OF TECHNOLOGY AND GRADUATE STUDIES

OUR VISION

We influence improvement through community relationships and chart the course of excellence in maritime education, training and simulation.

OUR MISSION

Driving excellence and safety to strengthen our communities.

VALUES AND GUIDING PRINCIPLES

People First

Be of service.
Listen and respond with compassion.
Create a safe space for all.
Your well-being is important to our mission.

Innovating to Excel

Take chances, be flexible and keep learning.
Embrace creativity and drive change.

Continuous Improvement

Be smarter every day.
Add value through initiative.

Integrity and Accountability

Be responsible for our impact.
Think critically and challenge respectfully.

MITAGS is the Primary Training Facility for the International Organization of Masters, Mates and Pilots (IOMM&P)

What's new at MITAGS?

Over the past two years, Maritime Institute of Technology & Graduate Studies has invested more than $2.3 million in advanced simulation technology and purpose-built instructional spaces — reinforcing our position as a global leader in maritime training and operational research.

As multiple maritime sectors expand and a significant portion of the workforce approaches retirement, the demand for high-fidelity training and operational validation has never been greater. MITAGS leverages decades of simulation expertise to prepare the next generation of mariners while supporting complex navigation feasibility studies across commercial, energy, and offshore sectors.

The LNG industry continues to grow rapidly to meet global energy demand, including the increased use of LNG as a marine fuel. At the same time, the cruise sector is experiencing record passenger volumes, and offshore wind continues emerging as a critical component of the global energy mix. Across all of these sectors, simulation plays a vital role in validating navigation safety, establishing best practices, defining environmental operating limits, and reducing operational risk — before vessels ever enter the water.

Recent Investments & Capability Enhancements
MITAGS has made targeted upgrades to ensure clients and students benefit from the highest levels of realism, flexibility, and analytical power available today:

Enhanced Full-Mission Bridge (FMB) Visual Systems
On the East Coast, Full-Mission Bridges #1 and #2 were upgraded with eight state-of-the-art 4K laser projectors (23,000 lumens), significantly enhancing visual clarity, depth perception, and realism. These bridges can now integrate up to **eleven distinct ownship bridges** within a single coordinated exercise — placing MITAGS among the most capable simulation centers in the world.

On the West Coast, the full-mission bridge projector systems were also upgraded, delivering sharper imagery, improved contrast, and increased visual reliability for shiphandling, tug escort, and complex multi-vessel training scenarios.

Expanded Multi-Purpose & Augmented Reality Simulation – East Coast
Six multi-purpose bridge simulators now offer **60° visuals in standard mode and 360° immersive augmented reality (AR/VR)**. These bridges support training for tugs, portable piloting units (PPUs), radar, ECDIS (NS400), Rose Point ECS, and Azipod operations. Students may choose between traditional bridge environments or fully immersive VR, depending on training objectives.

Upgraded ECDIS / ARPA / Radar Training Labs – West Coast
The MITAGS West Coast campus has completed a comprehensive upgrade of its ECDIS, ARPA, and Radar laboratory, modernizing both hardware and software to reflect current bridge configurations and industry standards. These enhancements provide mariners with hands-on experience using contemporary navigation systems in a structured classroom environment, strengthening proficiency and confidence before transitioning to full-mission simulation.

Expanded ECDIS & Systems Training Lab – East Coast
On the East Coast, a newly expanded computer lab now includes 16 dedicated training stations supporting ECDIS, GMDSS, and additional navigation and communications systems essential to modern bridge operations.

Dynamic Positioning (DP) Training Lab – East Coast
A purpose-built DP lab now includes **four Class B and eight Class C stations**, supporting pilot and crew training for offshore and specialized vessel operations.

Advanced Tug Simulation Enhancements – East Coast
Assist Tug Bridges #1 and #2 have been upgraded with **rotor tug controls** and enhanced hydrodynamic models, enabling high-fidelity escort studies and advanced tug handling training.

Waterjet Propulsion & Offshore Wind Vessel Training – East Coast
Waterjet control systems have been installed, along with newly developed curricula to support **Offshore Wind Crew Transfer Vessels (CTVs)** and other waterjet-equipped craft.

Expanded Vessel Model Library
New vessel types have been programmed to support both training and operational research, including:

- LNG Bunkering Vessels (LBVs)
- Ultra Large Container Vessels (ULCVs)
- Crew Transfer Vessels (CTVs)
- Floating offshore wind turbines
- Wind Turbine Installation Vessels (WTIVs)

Enhanced Remote Access & Client Engagement
MITAGS has significantly expanded its **remote streaming and collaboration capabilities** for operational research and simulation-based studies. Clients and stakeholders can now securely observe live simulations from anywhere in the world, with the ability to select and view specific bridge, chart, radar, ECDIS, or camera screens in real time. Enhanced audio and communication tools allow remote participants to interact directly with the MITAGS simulation team during exercises — asking questions, requesting scenario adjustments, and contributing to decision-making as the simulation unfolds. This capability enables broader stakeholder participation, reduces travel requirements, accelerates project timelines, and ensures that operational insights are shared clearly, efficiently, and in real time.

GWO Basic Training Facilities – East Coast
Dedicated Global Wind Organization (GWO) Basic Training labs support safety and operational readiness for the offshore wind workforce.

Whether supporting mariner training, validating new port infrastructure, or conducting complex operational research, MITAGS remains committed to delivering **the highest standard of maritime simulation available**. We look forward to welcoming you to one of our campuses and partnering with you on the future of safe, efficient maritime operations.

Warmest Regards,
Eric Friend
Executive Director, MMP-MATES, MITAGS, Inc.

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ABOUT MITAGS

MITAGS, Inc. is a 501(c) 3 non-profit subsidiary of The MM&P Maritime Advancement, Training, Education, and Safety Program "MM&P MATES Program," DBA the Maritime Institute of Technology & Graduate Studies (MITAGS).

The MM&P Mates Program is a 501(c)3 Trusteeship. The International Organizations of Masters, Mates and Pilots and the leading U.S. Flag ship operators in 1968, founded the "MATES Program".

MITAGS serves to enhance safety and professionalism in the maritime industry through internationally-recognized leadership, education, and operational research programs.

MITAGS East and West Coast Campuses are the primary training and simulation centers for the MMP professional deck officers and pilots.

STATEMENT OF NON-DISCRIMINATION

MITAGS admits students of any race, color, national origin, and ethnic origin to all the rights, privileges, programs, and activities generally accorded or made available to students at the school. It does not discriminate on the basis of race, color national origin, and ethnic origin in the administration of its educational policies, admission policies, scholarship and loan programs and athletic and other school-administered programs. In addition, it does not discriminate against students on the basis of religion (creed), sex, sexual orientation, gender identity or expression, age, marital status, veteran/military status, genetic information, political ideology, citizenship or immigration status, disability (sensory, mental, physical or pregnancy-related) or the use of a trained dog guide or service animal by a person with a disability, or any other characteristic protected by federal, state or local law. MITAGS extends these principles of non-discrimination to all of its activities and operations and to all staff, interns, volunteers, contractors, vendors, and clients.

MITAGS Campuses: East & West

The Maritime Institute of Technology & Graduate Studies (MITAGS) operates two campuses — one on the East Coast and one on the West Coast. Both locations are non-profit training and research centers dedicated to developing professional mariners throughout their careers.

MITAGS supports the maritime industry by:

- Helping mariners maintain, upgrade, and advance their credentials
- Preparing individuals entering the maritime profession
- Providing simulation and operational research services to support safer, smarter maritime operations

Experience & Innovation

For over 50 years, MITAGS has trained state pilots, captains, and deck officers, earning a reputation as a national leader in simulation-integrated maritime education.

Many of MITAGS' courses helped shape **STCW**-95 training standards, and the Institute pioneered simulator training for the towing industry — earning the U.S. Department of Labor's "21st Century Innovator" Award for its apprenticeship program.

MITAGS also developed the **Navigation Skills Assessment Program (NSAP®)**, a benchmark for objective bridge team performance evaluation.

MITAGS
Maritime Institute of Technology and Graduate Studies

Accreditation & Recognition

MITAGS maintains multiple national and international approvals, including:

- U.S. Maritime Administration Center of Excellence (CoE) designation
- DNV certification for maritime training and simulation quality
- Oversight from MHEC and the Washington State Workforce Training and Education Board

Many courses — from OICNW to Chief Mate/Master and Workboat Mate — are U.S. Coast Guard approved and qualified for Veterans Affairs benefits.

Programs are also recognized by the American Pilots' Association and Military Sealift Command.

MITAGS is the only accredited Vessel Traffic Service (VTS) Training Institute in the U.S. to hold:

- IALA V-104/1 certification for VTS operator training, and
- IALA V-103/4 certification for VTS instructor requirements

MITAGS East Campus Overview

The MITAGS East campus spans 40 acres and features 300,000 square feet of purpose-built training and conference space. The campus includes a 232-room on-site hotel, making it ideal for extended training, conferences, and visiting professionals.

Amenities & Facilities

Guests and students enjoy a wide range of conveniences, including:

- 500-seat dining facility
- Fitness room and indoor swimming pool
- Lobby lounge
- Jogging and walking trails
- Maritime museum
- 230-seat auditorium
- 55 conference and meeting rooms

Location

MITAGS East is located less than five miles from Baltimore–Washington International Airport (BWI) and within easy reach of Baltimore, Annapolis, and Washington, D.C., making it highly accessible for regional, national, and international visitors.

Training & Research Capabilities

MITAGS East supports advanced simulation, research, and learning with:

- Full-time IT and modeling staff
- Two DNV Class A 360° full-mission ship bridge simulators, plus three dedicated assist tug simulators and six multi-purpose bridge simulators — allowing up to 11 bridges to operate in the same exercise
- Radar, ARPA, electronic charting, vessel traffic, and communication simulators
- GMDSS communications lab
- Vessel Traffic Services (VTS) training lab
- ECDIS, stability, and LNG training software
- Wärtsilä ERS 5000 engine room simulator
- Emergency medical laboratory
- 16-station networked computer lab
- Cryogenic control room simulator (LNG/LPG/NH3)
- Classrooms equipped for hybrid/remote learning, allowing virtual participation alongside in-person training

MITAGS West Campus Overview

MITAGS West, the West Coast branch of the Maritime Institute of Technology & Graduate Studies, is located in **Seattle, Washington,** just **20 minutes** from **Seattle–Tacoma International Airport (SEA-TAC)**. The campus provides convenient access to major transportation routes and serves mariners from regional, national, and international fleets.

Training & Facility Highlights

MITAGS West supports hands-on learning and simulation-based research with:

- 240° DNV Class A full-mission bridge simulator
- 300° full-mission tug and workboat bridge simulators
- A computer lab with 12 ARPA/Radar/ECDIS training stations
- Live firefighting training aboard the 125-foot ship mock-up M/V Fire Dragon
- GMDSS communications lab
- Two simulation debriefing rooms
- Twelve classrooms and conference spaces
- Complimentary on-site parking

MITAGS West Simulation Facilities — Seattle, WA

240° Full-Mission Shiphandling Simulator (SHS 1)

The SHS 1 simulator provides a 240-degree field of view, including visibility 30 degrees abaft the beam on both sides. Operators can shift between port and starboard bridge wing perspectives, and the visual system adjusts vertically so assist tugs, vessel sides, and dock structures are clearly visible — a valuable feature during tug assist and docking operations.

Bridge Systems & Capabilities

All bridge equipment responds in real time to operator inputs, creating realistic training conditions. **VHF radio** communication between simulators and instructors further enhances scenario realism.

The integrated bridge system includes:

- Two GPS units (Trimble & JRC) with SAAB AIS
- Two VHF radios
- Two Radar/ARPA systems with selectable radar configurations
- Steering console with autopilot and track control
- NaviSailor 3000/4000 ECDIS
- Speed indicators with optional water or ground (Doppler) reference

Additional instruments include rate-of-turn indicators, echo sounder, wind sensors, and other systems typical of modern merchant vessels.

300° Full-Mission Tug Bridge Simulator (SHS 2)

This simulator offers **300° horizontal and 42° vertica**l visibility and integrates with the Shiphandling Simulator and OSV Bridge Simulator for coordinated multi-vessel exercises.

It is used for:

- Ship assist operations
- Escort and navigation skills assessments
- New-hire evaluations
- Bridge resource management training

Exercises model both direct and indirect towing forces.

Additional tug-specific systems include:

- Kobelt telegraph and NFU steering controls
- Lilaas Z-drive controls
- Render/recovery towing winch
- Voith Schneider controls
- Dedicated towing winch panel
- Furuno/JRC radar systems

300° OSV (Offshore Support Vessel) Bridge Simulator (SHS 3)

The OSV Bridge Simulator provides 300° visibility with adjustable viewpoints. It is designed to simulate a second assist vessel during berthing and escort operations, and integrates with SHS 1 and SHS 2 for multi-vessel scenarios.

Note: MITAGS-West previously operated two smaller simulators, which have since been retired.

MITAGS East Simulation Facilities
Baltimore–Washington Area, Maryland

The MITAGS East training center operates eleven bridge simulators, including:

- Two DNV Class A Full-Mission Bridges (SHS 1 & 2)
- Three purpose-built assist tug bridges
- Six multi-purpose bridge simulators

Full-Mission Simulation Capabilities

Full-Mission Bridges 1 and 2 feature 360° curved projection screens, measuring 80 feet in diameter and 40 feet in height.
Bridges 1, 2, and 3 provide a 300° horizontal and 42° vertical field of view for realistic maneuvering and assessment.

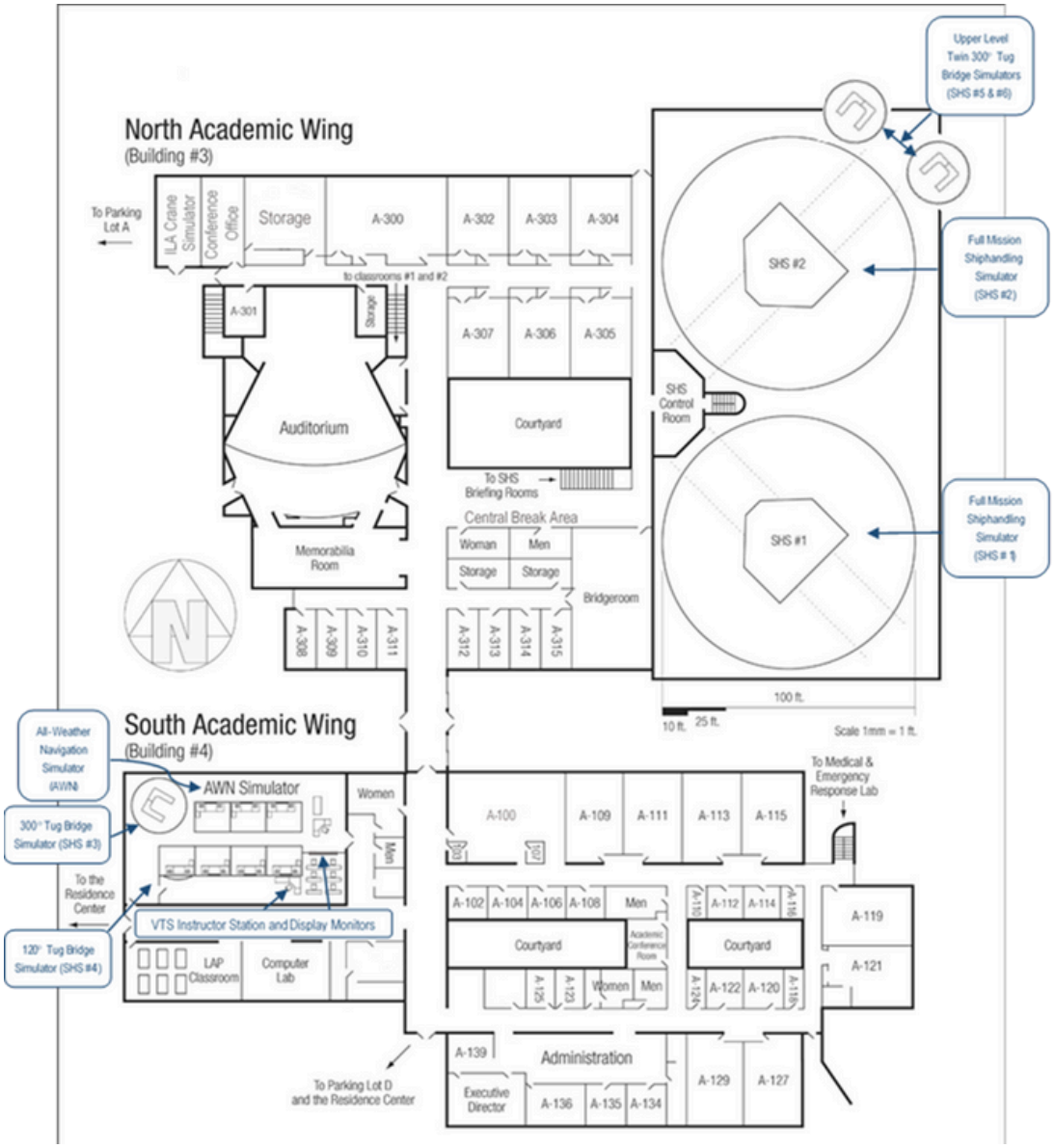
Multi-Purpose Simulation Systems

The six multi-purpose bridges offer **60° visuals in standard mode and a 360° Augmented Reality (AR) mode**.

They share the **same hydrodynamic modeling fidelity** as the full-mission simulators, ensuring consistent performance and response characteristics.

Integrated Training Environment

All east-campus simulators can be **networked into a single exercise**, supporting complex multi-vessel training and coordinated operations.



360° Full-Mission Bridge Simulators (SHS 1 and 2)

The Wärtsilä® Full-Mission 360° Shiphandling Simulators (SHS 1 and 2) can operate independently or be fully integrated with each other and up to nine additional bridge simulators.
At MITAGS East:

- Three tug simulators provide 300° visual environments, and
- Six additional simulators offer 60° visuals

All simulators use next-generation visual technology and advanced hydrodynamic ship modeling, enabling highly realistic training and research scenarios.

The system is purpose-built to support:

- Pilot and Tug Master training
- Tug escort operations
- Operational research
- High-speed vessel maneuvering
- Underway replenishment and
- Lightering exercises

Simulator Control & Monitoring Systems

MITAGS simulators include a comprehensive suite of control and monitoring capabilities, such as:

- Selective visual station viewing and live monitoring
- VHF and Digital Selective Calling (DSC) communications with intercom
- Printer, CCTV recording/display equipment
- Debriefing playback software with projection systems
- AIS functionality, tug and towing tools
- Environmental control systems

Engine Control Systems

Engine control features include:

- Engine and indicator panels
- Dual throttles
- Bow and stern thrusters
- RPM and pitch analogue indicators
- Sound and lighting controls
- Azipod and Z-drive interfaces

Steering Systems

Steering functions available across simulators include:

- Autopilot
- Rudder and NFU steering units
- Steering gear and wheel
- Gyro repeater
- Z-drive, Voith Schneider, and Azipod control systems

Navigation & Communication Systems

Navigation and communication systems include:

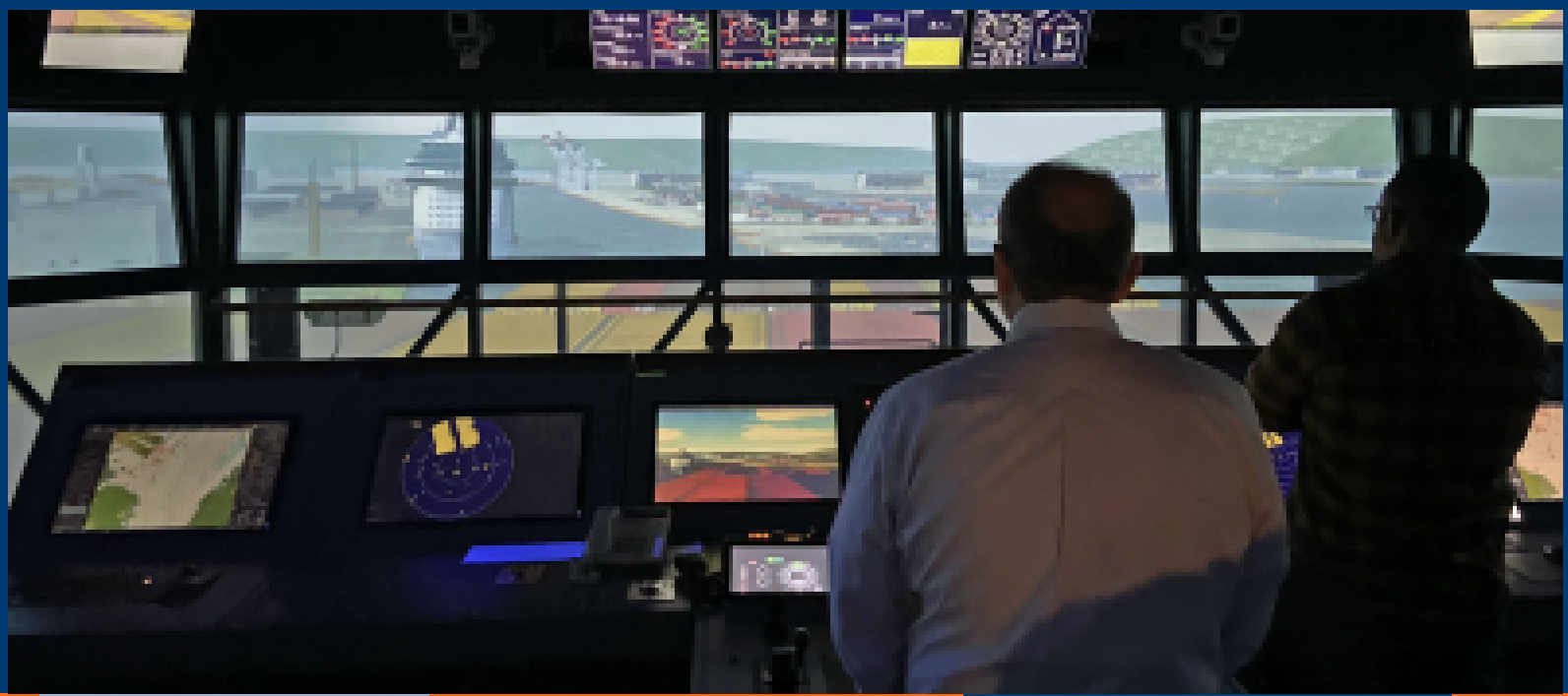
- ARPA/Radar and ECDIS — with both integrated and stand-alone display options
- NMEA GPS and UAIS data ports for portable piloting units
- DGPS capability
- Direction Finder (DF), Universal AIS, and Ship Security Alert System (SSAS)
- GMDSS systems
- VHF and DSC communications
- Sound system with intercom

The Full Mission Bridge Simulators deliver **high-fidelity visual graphics** paired with precise hydrodynamic modeling, allowing vessels to respond with smooth, realistic motion. Exercise data is captured for playback and debriefing, supporting training evaluation and research.

Visual environments and vessel models are developed using **ECDIS S-57 chart data**, sea trial performance records, and **photographic references** from actual port areas—ensuring accurate and familiar operating conditions.

Each simulated bridge is housed within one of **two theater-style facilities**, among the largest of their kind in the world. The simulators feature **360° curved projection screens**, approximately **40 feet high and 80 feet in diameter**, to create immersive operational views.

The system is built to **Det Norske Veritas (DNV) Class A simulator standards** and is configured to support **one-man bridge operations**, consistent with **DNV Watch-1 certification requirements**.



ASSIST TUG BRIDGES #1 AND #2

320° Visual Tug Simulation

Assist Tug Bridges 1 and 2 are purpose-built to replicate modern tug bridge layouts. Each features 320° horizontal visuals, extending nearly floor to ceiling, with the ability to switch viewpoints from forward to aft at the touch of a button.

Control & System Capabilities

The tug bridges include:

- Steering and propulsion control configurations for Conventional, ASD, Rotor, Voith, and Azipod systems
- Towing winch hardware panel, including constant-tension capability
- Display systems for conning information, pod positioning, and Radar/ECDIS

Integrated Training Environment

These tug bridges can be fully networked with full-mission bridge simulators, making them ideal for ship assist and escort training scenarios.

300° BRIDGE SIMULATOR 3

Bridge Simulator 3 is a full-mission towing system featuring a 300° horizontal field of view and 42° vertical visibility. It can operate independently or in coordinated exercises with the Full-Mission Shiphandling Simulators (1 and 2) to support:

- Ship assist and escort training
- Navigational skills assessment
- Research involving both direct and indirect towing forces

Additional Tug-Specific Controls

Along with the standard equipment found on MITAGS' Full-Mission Shiphandling Simulators, Bridge Simulator 3 includes:

- Kobelt telegraph and NFU steering controls
- Lilaas Z-drive controls
- Voith Schneider controls
- Dedicated towing winch hardware panel

ALL-WEATHER NAVIGATION (AWN) MULTI-PURPOSE SIMULATORS

The AWN bridges are advanced ship-interactive simulators. The six bridges can be operated individually or linked together. Tug Bridge 3 is specially equipped to support Navigation Skills Assessment (NSAP®), with all performance data transmitted to a remote assessor/VTS station for live monitoring of the simulated transit.

Visual System

All six bridges provide:

- 60° visuals in standard mode, and
- 360° Augmented Reality (AR) mode

Students may select either display environment.

Equipment & Capability

Each AWN bridge includes:

- Furuno VHF radio
- Sound signaling system (manual and automatic activation)
- Bow and stern thrusters

Radar/ARPA units can display AIS information and support the following radar systems:

- Furuno
- BridgeMaster E
- Nucleus

Portable Piloting Interface

Connections for portable piloting units include:

- NMEA GPS data plug
- NMEA UAIS data plug

Steering Systems

Available steering configurations include:

- NFU tiller
- Follow-up wheel
- Autopilot
- Azipod
- ASD
- Conventional propulsion steering

Electronic Charting Systems

Each bridge is equipped with ECDIS, capable of displaying AIS and radar overlays. Rose Point® ECS is also available as an optional system.

Conning & Visual Display (Split-Screen Mode)

Displays may include:

- Pilot card
- SAR signals
- Course recorder
- GPS
- Alarm panel
- UAIS-MKD
- Doppler log
- Flags
- Echo sounder
- Navigation signal indicators

VESSEL TRAFFIC SERVICES (VTS) SIMULATOR

VTS systems enhance navigational **safety, traffic efficiency, environmental protection, and maritime security.**

The MITAGS VTS Simulator mirrors the layout and equipment of a modern Vessel Traffic Center (VTC), providing realistic training and performance evaluation for VTS watchstanders and supervisors.

Key capabilities include:

- VTS equipment stations
- Custom traffic management software
- AIS target monitoring
- Radar overlay
- Furuno VHF radio

Visual Control Functions

The simulators allow operators to adjust visual perspective in multiple ways, including:

- Shifting the viewpoint to either bridge wing
- Tilting or rotating the visual scene
- Moving the viewpoint to alternate locations—such as the bow or stern
- Activating a binocular view mode at the press of a button

Alarm Simulation

Instructors can trigger alarms to replicate engine, steering, and navigation system failures, enabling realistic emergency response and troubleshooting scenarios.

Mooring Line Simulation

All vessel models include multiple line attachment points and support a range of line types—polypropylene, wire, nylon, and Dyneema®.
Each line has an independent breaking strength limit that can be controlled from the instructor station.

Anchor Handling Response

Vessel models react appropriately to standard and dredging anchor maneuvers.
Anchor location and loading forces are recorded in the log file for debriefing and analysis.

Tug Operations

The simulator suite includes tug models featuring:

- Conventional single/twin screw propulsion
- Z-drive
- Rotor tug
- Voith Schneider propulsion configurations

Tugs may be operated as ownships within exercises or controlled as target vessels from the instructor station.

Bollard pull parameters range from 26 to 150 tons, and virtual forces can be applied to simulate any pull capacity or direction.

Additional Tug Capabilities

MITAGS maintains a fleet of validated tractor tug hydrodynamic models, with enhanced features including:

- Rotor, Z-drive, and Voith Schneider tugs capable of indirect mode operations, generating up to twice the bollard pull of direct mode
- A Wärtsilä® tug model with high-end escort functionality including render/recovery winch logic and interaction based on vessel speed and proximity

STANDARD SIMULATION FEATURES

MITAGS simulators operate on the Wärtsilä® system, known for its high-quality visual rendering, advanced hydrodynamic modeling, and strong responsiveness to user feedback. This platform underpins all MITAGS simulation environments.

Fast-Time Simulation

MITAGS also employs a portable Fast-Time Simulator that uses the same hydrodynamic models and visual databases as the full-mission systems.
Key differences include:

- Fast-time control inputs are emulated rather than physically handled
- The system replicates an Anschutz Pilot Star D autopilot, fully functional for research
- It follows programmed track lines that reflect vessel hydrodynamics

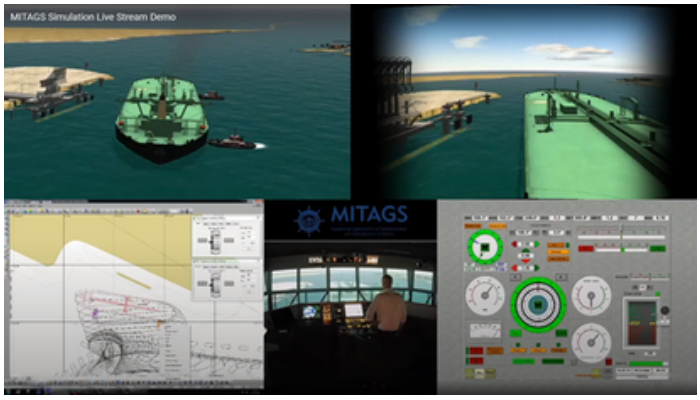
Simulations can run at up to 20:1 speed and be replayed—or even transferred into a Full-Mission Bridge Simulator. Files may also be exported in Windows Media® format for external playback.

Remote Viewing

MITAGS offers private live remote viewing for stakeholders unable to attend in person.
Features include:

- No special software required—just internet access
- A four-panel viewing layout
- Support for livestream observation and review

https://www.youtube.com/watch?v=1l7pdmaNd4U



Visual Graphics

Wärtsilä® graphics are regarded among the best in maritime simulation.
MITAGS visuals are generated using:

- ECDIS data to build base environments
- AutoCAD® overlays for depth and structural fidelity

This approach produces highly realistic radar, chart, and visual displays.

Environmental Modeling

The Wärtsilä® system provides:

- Realistic weather, atmospheric, visibility, light, reflection, and glare effects
- Dynamic tide and current changes—including buoy current feathering
- Custom environmental zones simulating fog banks, localized winds, currents, and wave conditions

These features allow MITAGS to create accurate, adaptable, and immersive training and research environments.

REPORTING & PLAYBACK CAPABILITIES

MITAGS ship and tug simulators include integrated video and audio recording systems with digital screen capture. These tools document training, testing, and evaluation exercises, and allow actions to be replayed in real time or fast time, or exported for reporting.

Recorded Performance Data Includes:

- Swept path and drift angle
- Underkeel clearance and squat
- Tug positioning, use, and applied forces
- Engine and rudder use
- Interactive force effects
- Vessel position
- Speed (forward and sideways)
- Distance from navigational hazards

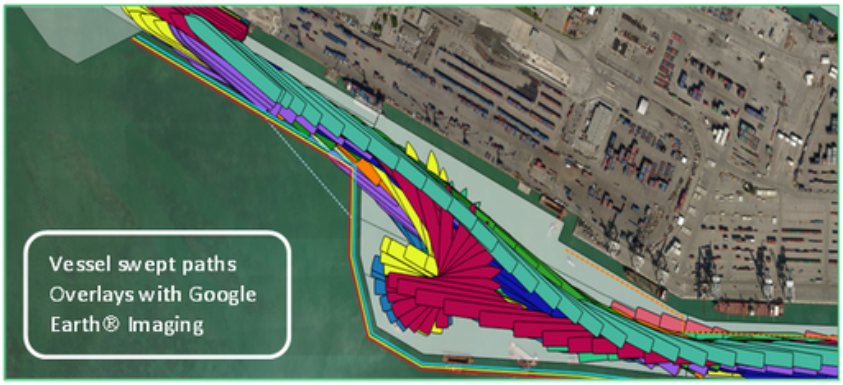


Chart View Playback

The chart-view playback function displays multiple data layers simultaneously, including:

- Engine use
- Rudder commands
- Vessel position, speed, and course over ground
- Heading and swept-path tracking

Camera View Playback

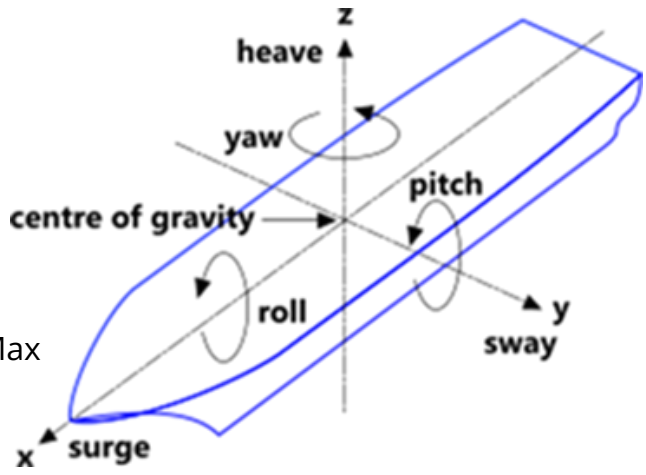
A signature capability of the Wärtsilä® simulation platform is the dynamic camera-view tool. During playback, users can:

- “Fly” the camera to observe the scenario from any angle or height
- View operations beneath the water surface to assess bottom clearance

This feature enables unlimited screen capture and video generation, supporting visual analysis, lessons learned, and presentation needs.
MITAGS uses these tools to produce cost-effective technical videos for clients and internal research.
https://www.youtube.com/MaritimeInstitute

VESSEL MODELING

MITAGS develops hydrodynamic ship models using Wärtsilä® Virtual Shipyard II® Software, a highly capable platform for vessel behavior modeling.



The MITAGS model library includes:

- Cruise ships (including Azipod propulsion)
- ULCV container vessels up to 24,000 TEU
- Ro/Ro and LMSR vessels
- Bulk carriers up to Chinamax class
- Shuttle tankers to VLCCs
- LNG carriers — spherical, membrane, Q-Flex, and Q-Max
- Naval and research ships
- Ferries (single and double-ended)
- LNG bunkering vessels
- Fishing and research vessels
- Tugs — conventional, twin-screw, ASD, Rotor, and Voith
- Offshore support vessels (OSVs)
- Offshore wind crew transfer vessels (in development)
- *Floating wind turbines

Ownship Modeling Approach

The Wärtsilä® simulator uses a six-degree-of-freedom (6 DOF) ownship mathematical model. Hydrodynamic forces and moments are calculated as coefficients, and each contributes differently to vessel behavior across the six motion planes.

Wind Forces

Modeled as X, Y, K, and N components (4 DOF) with constant, gusting, and time-varying elements. They become 6 DOF if heave and pitch motions occur, though these vertical wind effects are typically negligible relative to hydrostatic motion forces.

Wave Forces

Wave and swell forces are computed across all 6 DOF, critical for scenarios such as dynamic positioning, where accurate environmental force representation matters.

Current Forces

Currents are modeled using:

- Vessel underwater profile
- Empirical test-derived coefficients

Specialized 2D and 3D current models can be implemented for advanced research.

VESSEL MODELING

Bottom Interaction

Bottom effects are calculated using empirical coefficients tied to the depth-to-draft ratio, scaled from deep-water reference values. Bottom type can be defined and changed.

Bank & Ship Interaction

Bank and ship-to-ship interaction forces are modeled using 12 or more pressure vectors along the hull that adjust dynamically as channel geometry changes — one of the most advanced simulation techniques available.

Channel slopes and toe lines can be incorporated.

Other Force Models

The system models:

- Anchor and chain forces
- Mooring and fender reaction forces
- Towing and pushing forces
- Vessel collision interactions

All are computed as 6 DOF effects with position-based force influence.

Multiple ownships allow simulation of lightering or tug assist operations.

Hydrodynamic Vessel Behavior Features

Simulated responses include:

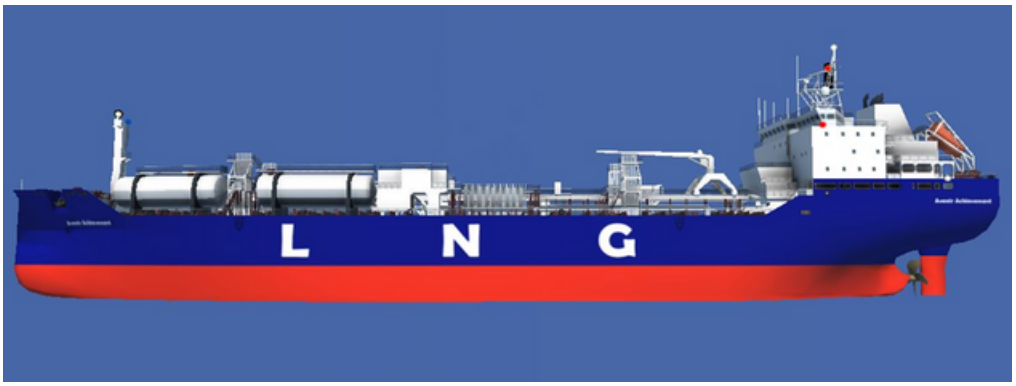
- Swept path and drift angle
- General maneuvering
- Acceleration and deceleration
- Squat and bank interaction
- Shallow and deep-water turning circles

Propeller Characteristics

Propulsion modeling includes:

- Ahead/astern RPM settings
- Run-up time from stop to full ahead
- Run-down response from full ahead to stop or full astern

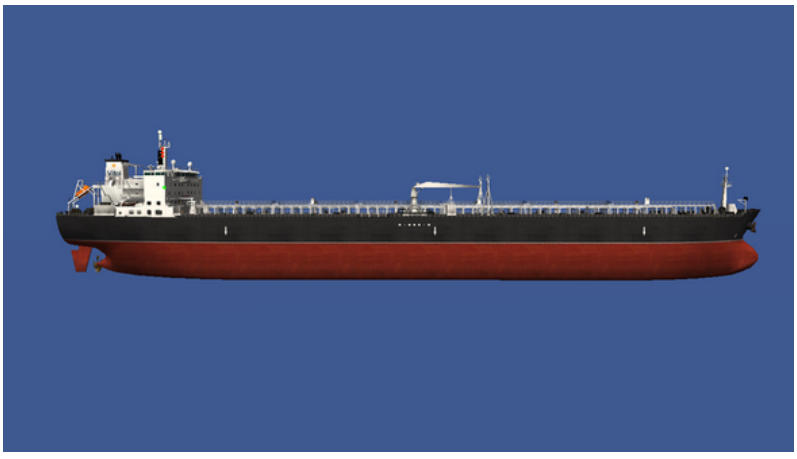
VISUAL IMAGES OF SELECT MODELS



LBV

LNGC - Membrane

22k ULCV



Oil Tanker

VISUAL IMAGES OF SELECT MODELS

DATABASE DEVELOPMENT

In-House Modeling Team

MITAGS' Modeling Department uses a specialized visual modeling tool to create and update integrated visual, radar, and ECDIS databases for the Navi-Trainer simulators.

Applications

This capability supports:

- Planning and evaluating port construction projects
- Comparing channel, turning basin, and terminal designs

With onsite modelers at both campuses, databases and ship models can be adjusted quickly, minimizing downtime during training and research.

Model Wizard

The Model Wizard tool allows efficient creation of custom database elements, including:

- Magnetic deviation reconstructions
- Lighthouses
- Buoys with top marks
- Templates for models and objects

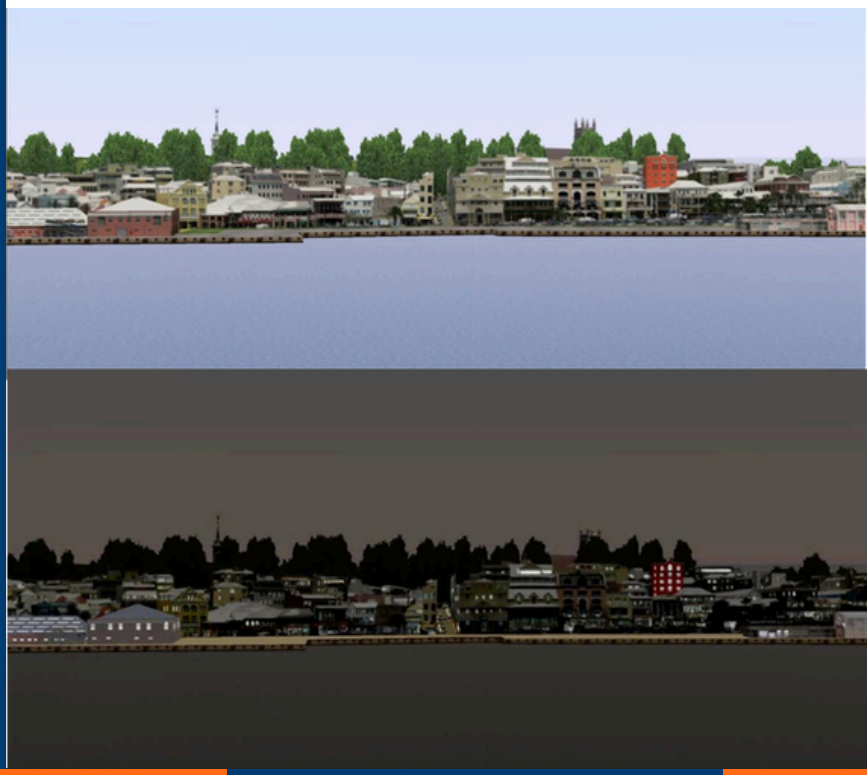
Visual Database Examples

- *City of Victoria, B.C. — modeled bridge*
- *Bermuda — modeled day and night scenes*

In the first stage of database creation, the user selects a specific chart area and defines the coastline configuration—such as **mooring walls, embankments, and shoreline features**. From this information, a **polygonal terrain model** is automatically generated.

The scene can then be enhanced with **3D models** pulled from the Object Library or created in **AutoCAD®** using textured photographs. Users can also set **illumination and environmental** effects, including time of day and weather.

The Model Wizard includes a built-in editor that allows for the **creation and modification of 3D coastal objects**, as well as updates to visual and motion ship models.



DATABASE DEVELOPMENT PROCESS

Planning the Database

The Project Manager defines the scope and objectives of each modeling project, including:

- Overall project goals
- Geographical areas to be modeled
- Required Levels of Detail (LOD) for high-, medium-, and low-focus zones
- Natural and man-made features to be included in the final environment

Data Acquisition Process

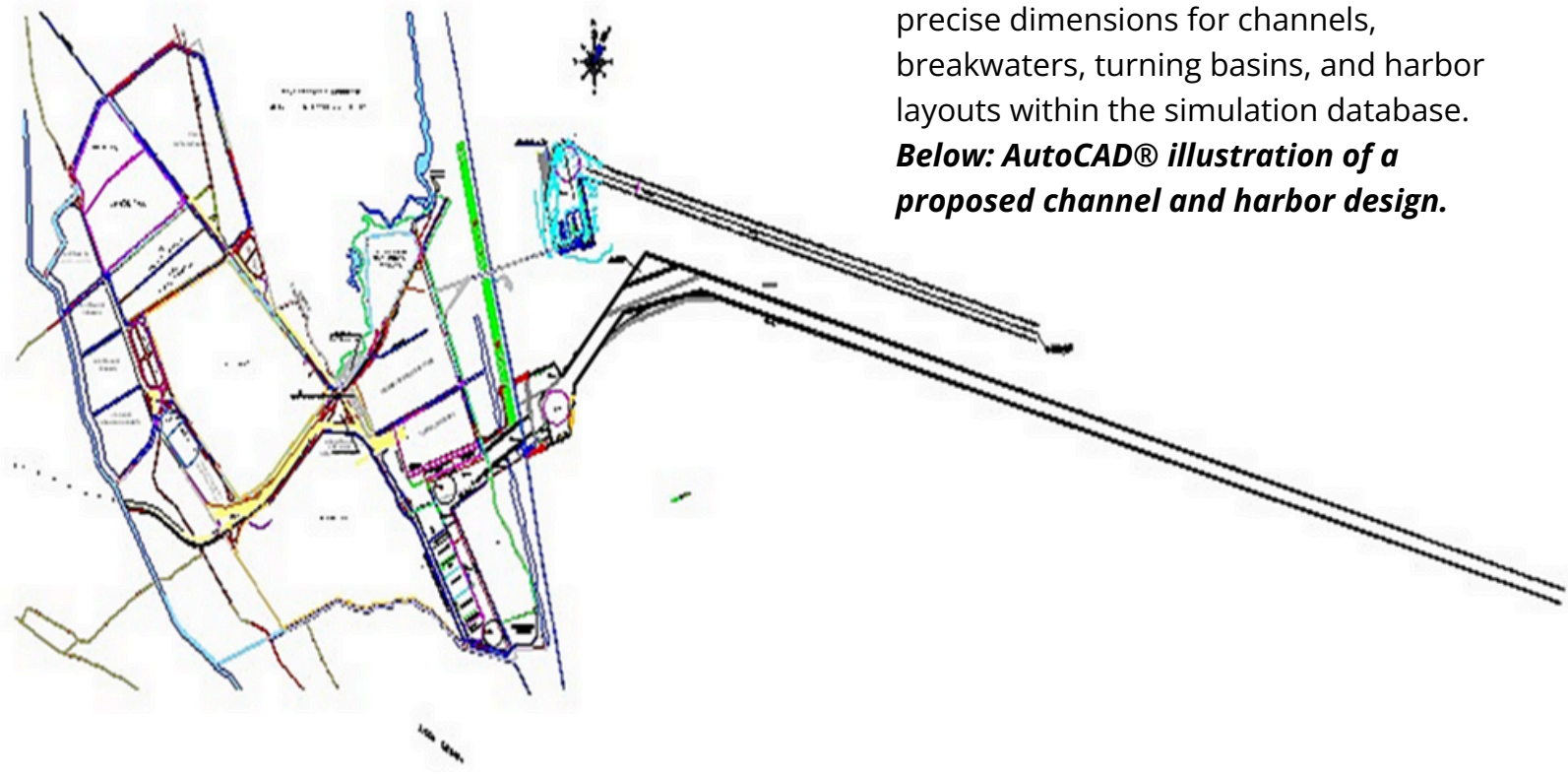
To build an accurate simulation database, a wide range of source material is collected, including:

- Electronic Navigation Charts (ENC)
- Digital Elevation Models (DEM)
- Corrected navigational publications
- Terrestrial photographs and/or video
- Site surveys
- Topographic and contour maps
- Climatological reports
- AutoCAD® drawings
- Soundings and bottom contours for navigation channels

AutoCAD® Drawings

AutoCAD® files are used to program precise dimensions for channels, breakwaters, turning basins, and harbor layouts within the simulation database.

Below: AutoCAD® illustration of a proposed channel and harbor design.



Local Knowledge

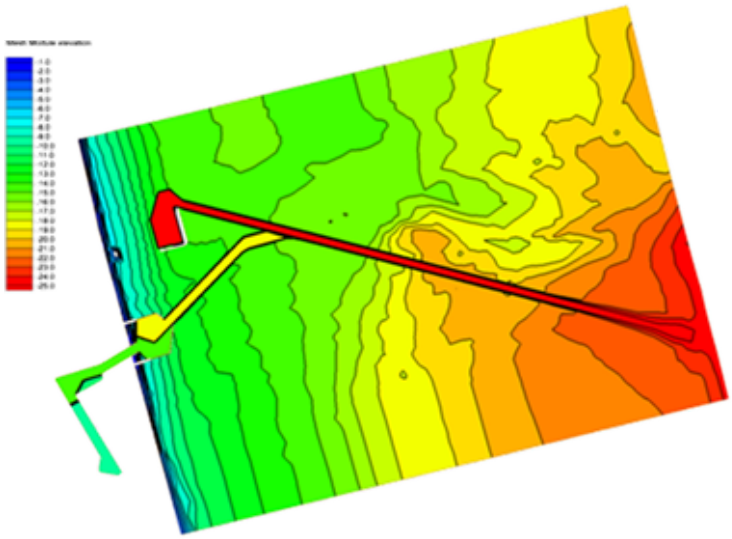
Local subject matter experts provide essential input and validation throughout the modeling process to ensure accuracy, realism, and operational relevance.

Depth Contours

Depth contours are programmed to represent the underwater contours of the proposed channel and surrounding area.

Initial Area Creation & Review

A preliminary test area is generated to verify data integrity.
The Development Team reviews this area using latitude/longitude coordinates referenced to WGS-84.



Area Revisions & Regeneration

The model is revised and regenerated as needed to meet project specifications and correct any discrepancies identified during review.

Actual Photograph VS Simulated 3D Rendering

Detailed Editing

High-detail areas receive additional refinement. This includes:

Defining High-LOD Boundaries

- Identify geographic limits for high-detail zones
- Determine natural and man-made features requiring enhanced accuracy

Testing

All modeled areas undergo continuous testing throughout development to ensure correctness and performance before final deployment.

Natural Features

- Depths: Ensure depths < 40 meters are correctly represented
- Terrain: Verify accurate elevation data
- Coastline: Confirm shoreline accuracy
- Currents
- Navigational hazard

Man-Made Features

- Terminal-adjacent areas
- Specific structures identified by the customer
- Navigation aids (standard and custom)

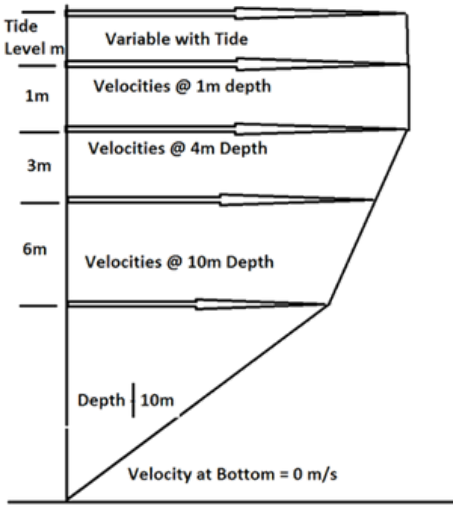
Current Modeling

Some training scenarios and navigation studies require high-fidelity current modeling. MITAGS can generate:

- Two-dimensional, depth-averaged current models for specific tidal conditions (e.g., spring ebb, spring flood)
- Three-dimensional current models for projects where time-varying tides and currents are critical

Model Flow Boundary Integration

Field measurements taken at multiple depths are used to build a sophisticated 2D current model that produces weighted-average current velocities and directions for realistic simulation.

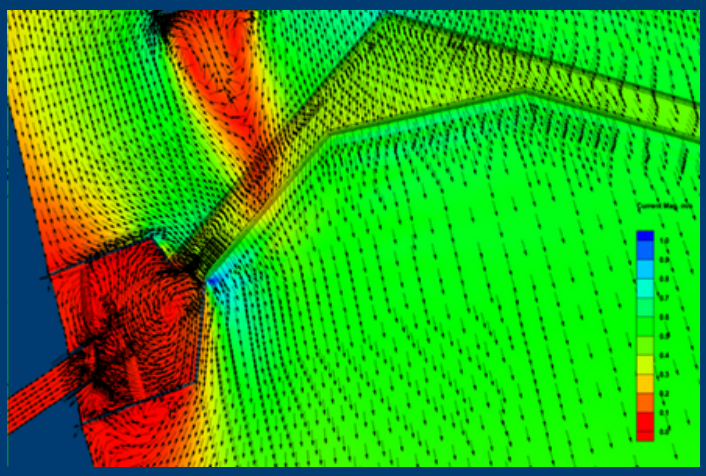


Sea & Swell Parameters

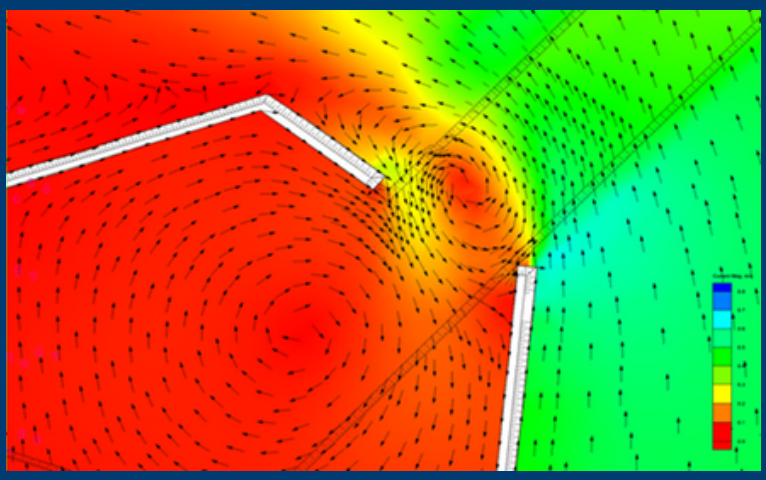
The simulator can model a wide range of wind- and swell-generated waves. Wind waves may be entered manually—by specifying height, period, and direction—or created using built-in spectral models, including:

- **JONSWAP**
- **Pierson–Moskowitz**
- **Shallow Water**
- **Custom spectrum options**
- **Beaufort scale–based wave generation**

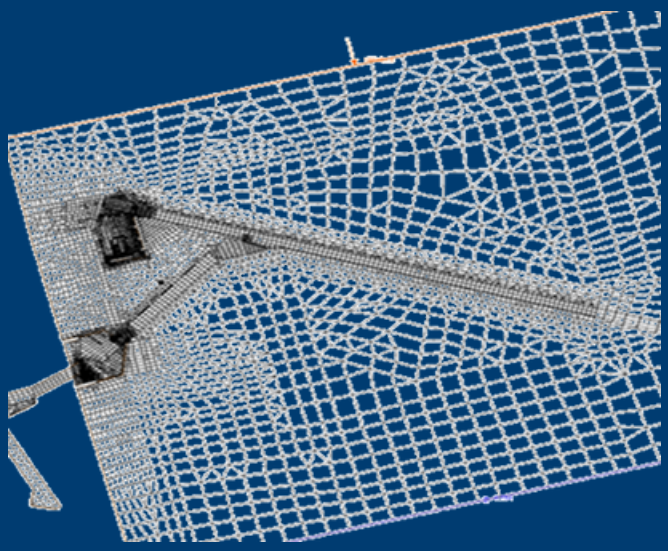
Swell can also be overlaid and programmed as regular waves with defined height, period, and direction.



The current models account for changes in water velocity and direction caused by obstructions such as breakwaters and channel configurations, ensuring accurate and realistic flow patterns within the simulated environment.



Note the changes in current flow due to the breakwater entrance. This data greatly enhances the accuracy of the predicted motion of large, deep-draft vessels.



Example of a grid pattern for calculating the depth-average current directions and velocities across the project area.

EXAMPLES OF CUSTOM SIMULATION AND TRAINING PROGRAMS

Navigation Skills Assessment Program (NSAP®)

NSAP® provides objective assessments of deck officer watchstanding skills. Assessment criteria can be tailored to meet individual company or pilot organization requirements. It is recommended for new hires, promotions, and refresher evaluations.

Since 2006, mariners from a wide range of vessel types have completed the program at both operational and management levels. NSAP® focuses on:

- Shiphandling
- Bridge Resource Management, COLREGS application, and communications
- Use of navigation tools (Radar, ARPA, ECDIS, GPS/DGPS)

MITAGS received the 2017 Professional Mariner Plimsoll Award for this innovative program.

LNG Navigation Skills Assessment Program

A specialized version of NSAP®, this program is designed for masters and chief officers operating LNG carriers in global trade. The two-day assessment is also licensed to select international training institutions.

Pilot Applicant Evaluation – Washington State Pilotage Commission

This simulation-based evaluation is part of the State Pilotage Commission's selection process for pilot applicants. Scenarios use Puget Sound geographic models and vessel types to assess fundamental shiphandling and pilotage skills.
A similar program has been developed for the Oregon Pilotage Commission.

Pilots' Integrated Bridge Navigation Systems Course

This comprehensive five-day course addresses the capabilities, limitations, and cautions associated with modern electronic navigation systems, including:

- DGPS/GPS
- ECDIS
- Integrated Bridge Systems (IBS)
- Integrated Navigation Systems (INS)
- Integrated Control Systems (ICS)
- AIS
- RADAR

EXAMPLES OF CUSTOM SIMULATION AND TRAINING PROGRAMS

Ship-to-Ship Lightering Operations

MITAGS' integrated bridge network supports realistic training for lightering masters and underway replenishment exercises.

Courses typically run three to five days, with multiple bridges integrated as required by the customer.

Pilot Refresher Training

This seven-day custom program integrates **Emergency Shiphandling, Bridge Resource Management for Pilots (BRMP), and Azipod** operations. It covers:

- Emergency shiphandling in close quarters combined with BRMP principles
- Advances in electronic navigation (ECS/ECDIS, IBS, AIS, VHF, DSC)
- Emergency medical response: First Aid, CPR, and AED use
- Azipod control systems training
- Fatigue, sleep, and medication awareness per **NTSB Recommendations M-97-44 and M-97-45**
- Regulatory review for pilots

Tug Escort Training

A three-day Team Escort Training and Bridge Resource Management program delivered to:

- Alaska Tanker Company
- Puget Sound Pilots
- Crowley Marine Services

United States Coast Guard Vessel Traffic Services (VTS) Program

This program provides USCG VTS Operators with knowledge and practical experience related to:

- Government-operated Vessel Traffic Centers (VTS)
- Commercial Vessel Traffic Information Systems (VTIS)

It also allows operators to exchange perspectives with licensed state pilots who serve as **Pilot Advisors**.

**STCW Deck Officer Competencies

(Operational and Management Levels)**

MITAGS extensively uses simulation to assess electronic navigation, shiphandling, and BRM competencies required under the **STCW Code (as amended)**.

These assessments help ensure deck officers demonstrate the required **Knowledge, Understanding,** and **Proficiencies (KUPs)** outlined in the Code and company safety management systems.

EXAMPLES OF CUSTOM SIMULATION AND TRAINING PROGRAMS

Maritime Apprenticeship Program (MAP)

MAP is a structured 24-month apprenticeship that prepares graduates to sit for:

- Unlimited Oceans
- Unlimited Near-Coastal
- Unlimited Inland licenses

MITAGS also offers the Workboat Academy, leading to:

- 500/1600 GRT Near-Coastal or Oceans licenses
- 500 GT OICNW credential

The program received the Lloyd's List North American Maritime Award (2015), is U.S. Coast Guard–approved, and is VA-benefits eligible—making it an excellent fast-track option for transitioning veterans.

ATB Escort Team Training

A comprehensive team-training seminar focused on improving Master/Pilot exchange during critical ATB operations. Training uses the combined simulator suite—full-mission ship bridge plus two full-mission tug bridges—and includes participants from:

- Crowley's ATB fleet
- Escort tug operators from multiple regions
- Pilots from Los Angeles/Long Beach, San Francisco, the Columbia Bar and Columbia River, and Puget Sound

The objective is to strengthen bridge-team coordination and clarify the roles of Master and Pilot during high-risk maneuvers.

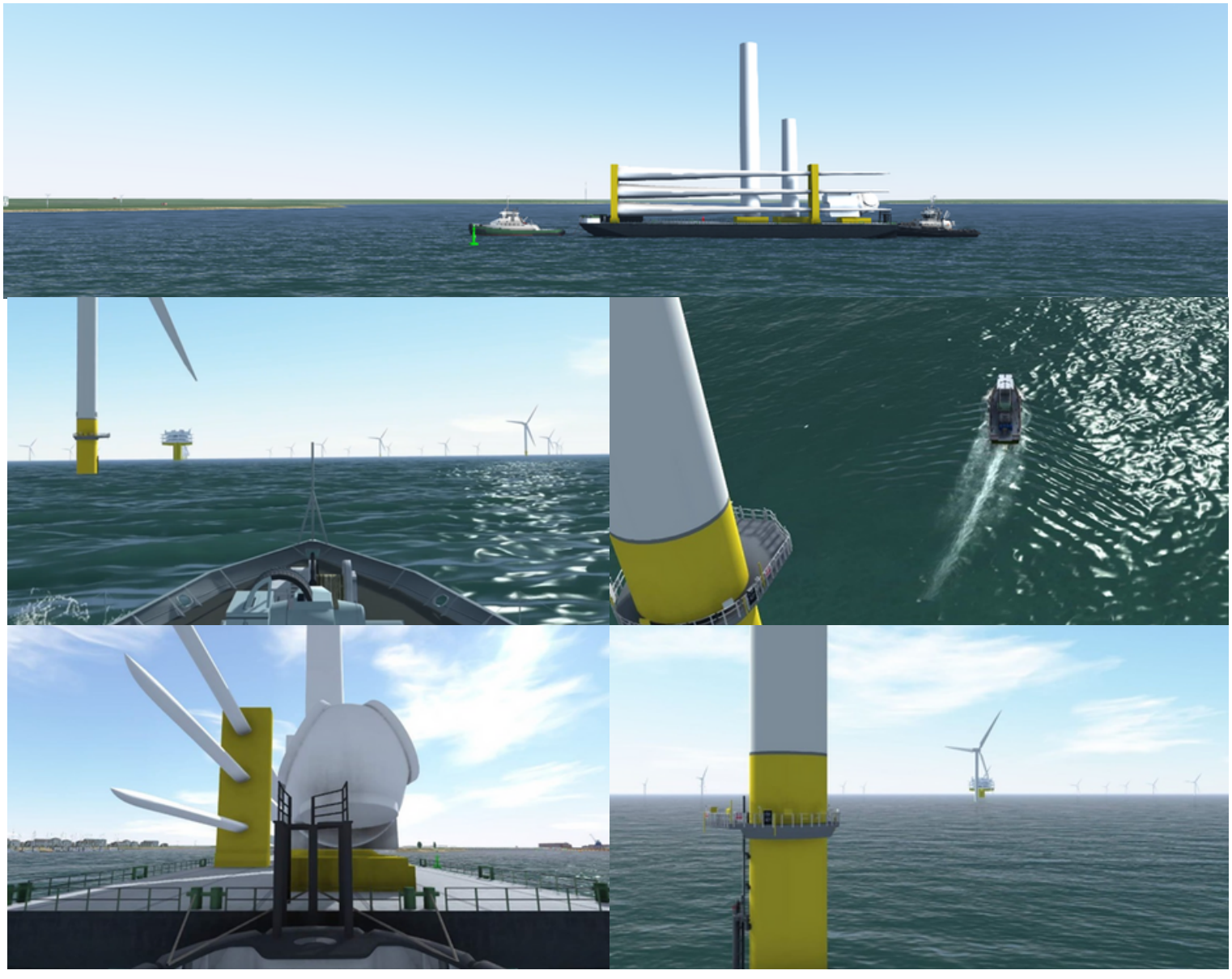
SELECTED OPERATIONAL RESEARCH STUDIES

Offshore Wind Industry

MITAGS delivers advanced simulation and training support to the emerging Offshore Wind sector. Recent clients include **Ørsted Wind®, Vineyard Wind®, Crowley Wind®**, and others.

Services include:

- Virtual offshore wind navigation simulations that allow mariners and stakeholders to pilot through a commercial-scale wind farm environment
- Validation simulations supporting design selection during feasibility stages
- Transit planning for vessel movements between construction staging areas and wind farm sites
- Berthing evolutions alongside offshore structures and support rigs
- Mariner familiarization training, including waterjet control handling
- Construction crew safety training such as GWO-BST



SELECTED OPERATIONAL RESEARCH STUDIES

The top two images are simulated transits with tugs towing large construction barges loaded with offshore wind turbine equipment. The barges had twenty-five feet of clearance on either side of the hurricane barrier. This maneuver has been successfully completed more than twenty times in real-world operations.

The lower image is latest addition to MITAGS offshore wind simulation programming capabilities. It is a floating wind turbine. The models are used for evaluating the number, type, and configuration of the tugs needed to tow the floating turbines from port to their offshore wind farm. This will become increasing important as the wind farms move into deeper water.

New Fortress Energy (NFE) – FLNG / FSRU Operations

New Fortress Energy is a leading operator of **floating LNG storage and regasification units (FLNG/FSRU)**, a strategy that significantly shortens the timeline from construction to full operation. NFE employs **full-mission bridge simulators integrated with live tug bridges** at MITAGS to develop and refine operational best practices, including:

- Mooring and unmooring of FLNG/FSRU units
- LNG carrier (LNGC) shuttle vessel operations

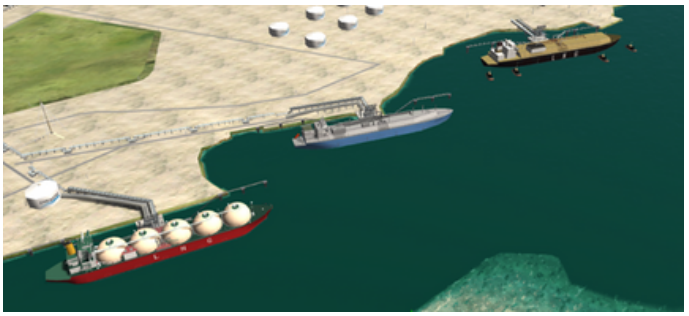
Recorded simulation exercises also support crew training and ongoing refinement of standard operating procedures.

Cheniere LNG – Corpus Christi, Texas

Over a five-year period, MITAGS conducted a series of advanced navigation studies for Cheniere LNG, focused on evaluating the feasibility and safety of LNG carrier transits into Corpus Christi, Texas.

The work progressed from preliminary design validation through the development of standard and emergency transit plans.

Simulation programming included:



- Visual databases from the sea buoy to terminal berths
- Multiple navigation channel design options
- Depth-averaged current models
- Hydrodynamic ship and tug models with six degrees of freedom

Study objectives included:

- Validation of preliminary and final designs for approach channels, turning basins, and terminal berths
- Development of tug packages—types, numbers, and configurations—for LNGCs up to Q-Max (266,000 m^3) class
- Feasibility of routine night transits
- Feasibility of LNGCs meeting within navigation channels (multiple LNGC and tanker classes)
- Validation of proposed channel improvements to support vessel passing
- Development of preliminary transit plans and familiarization training for pilots and tug captains

Sabine River LNG Terminal

MITAGS has supported multiple multi-year projects for Cheniere LNG at the Sabine River Terminal, including recent studies evaluating the feasibility of adding a third berth.

The project involved:

- Programming seven hydrodynamic LNG models and one tractor tug model
- Building a detailed simulation of the Sabine River from the Sea Buoy (R/W "SB") to the terminal
- Incorporating all navigationally relevant NOAA chart features
- Adding enhanced visual elements for increased realism, including:
  - West Shore near the terminal
  - East Shore near the terminal
  - Terminal piers
  - Island near the terminal
  - West–North shore features
  - Pilot station

One of MITAGS' most advanced operational research efforts, this project included participation from more than nineteen different terminal and ship operators.
Advanced bottom and current models were also developed and integrated. **ExxonMobil served as the project leader.**

Excelerate – FSRU to LNGC Transfer and Tug Study

MITAGS conducted simulations to evaluate the feasibility of proposed **FSRU-to-LNGC transfer operations** and to define **safe environmental operating limits.**
The study also examined tug design requirements for holdback and general assist roles.
Simulation efforts used **one full-mission bridge integrated with two live tug bridges** to replicate berthing maneuvers alongside a moored FSRU.

Excelerate – Brazil LNG Terminal Studies

MITAGS programmed three LNG terminals for Excelerate Energy located in:

- **Rio de Janeiro**
- **Pecém**
- **Bahia de Todos os Santos**

The project included modeling a **173,000 m³ FSRU**, assessing environmental operating limits, and determining assist-tug requirements for each site.

Ridley Island LNG Terminal Simulation (BG Group)

BG Group selected MITAGS to validate the proposed LNG export terminal at Ridley Island, British Columbia.

The study evaluated conditions necessary for the safe berthing of heavy-lift vessels and barges at the Marine Offloading Facility (MOF).

Participants included:

- BG Group Marine Advisors
- BC Coast Pilots
- Port Authority of Prince Rupert
- Towing Solutions
- Crowley Marine Services

Rio Grande LNG – Brownsville, Texas

(Moffatt & Nichol for NextDecade, LLC)

MITAGS conducted a simulation study to support validation of proposed navigational improvements —including channel widening, deepening, and bend easing—and to inform Front End Engineering Design (FEED) for:

- Turning basin layout
- Dredged berth basin
- LNGC berth configurations

A secondary objective was to help establish initial LNGC transit operations, assist-tug requirements, and environmental operating limits (wind, sea, and current).

Simulation scenarios included:

- Preliminary berthing and unberthing
- Emergency responses to loss of propulsion, rudder, and/or tug support
- Channel design enhancements
- Recommended placement of navigation aids

Lelu Island LNG Terminal (PNW LNG)

PNW LNG selected MITAGS to conduct a feasibility study for a proposed LNG export terminal at Lelu Island near Prince Rupert, British Columbia.

- Phase I evaluated the feasibility of bringing construction vessels and materials to this remote site.
- Phase II assessed the approach channel, turning basin, and terminal designs for the classes of LNG carriers expected to call at the facility.

The study also included the validation of assist-tug requirements for safe operations.

Kitimat Waterway LNG Transit Simulation

(Chevron Canada & LNG Canada)**

Chevron Canada and LNG Canada selected MITAGS to evaluate the feasibility of operating LNG facilities in the Kitimat region of British Columbia. The Chevron terminal is planned for Bish Cove, while LNG Canada's facility will be located at the former Eurocan dock in Kitimat's inner harbour. LNG carriers serving these terminals must transit the Douglas Channel, British Columbia's largest coastal fjord, stretching approximately 98 nautical miles.

The study focused on:

- The extended transit through the fjord
- Identification of potential navigational risk areas
- The feasibility of full-length escort operations

Tuck Inlet Ship Maneuvering Analysis (ExxonMobil)

ExxonMobil tasked MITAGS with assessing the engineering, environmental, and navigational factors associated with the proposed LNG Terminal at Tuck Inlet.

Study objectives included:

- Recommendations for vessel maneuvering between the Triple Island Pilot Station, the Port of Prince Rupert, and the Tuck Inlet LNG berths
- Development and validation of safe and efficient berthing strategies
- A detailed tug capacity analysis, essential for LNG carrier maneuvering

Energia del Pacifico (EDP) LNG Terminal – Port of Acajutla, El Salvador

(Moffatt & Nichol for Invenergy)**

Invenergy contracted Moffatt & Nichol to conduct Front End Engineering Design (FEED) for the EDP LNG import terminal in Acajutla.

M&N selected MITAGS to perform a navigation safety study, which evaluated:

- FSU and LNGC berthing and departure operations
- Potential interference with the El Paso multi-buoy mooring (MBM) to the northwest
- Safe coexistence with local port traffic transiting to Piers A, B, and C

LNG Bunker Operations

MITAGS also supports the emerging LNG bunkering industry through simulation-based modeling of specialized bunker vessels and their operational areas.

The MITAGS LNG bunkering model library includes Jones Act and international vessels with CPP and Azi-drive propulsion systems.

Sudeste Port Project, Brazil (MMX)

MMX selected MITAGS to model the Sudeste Port Project, an iron ore export terminal designed for some of the world's largest bulk carriers. The work included detailed underwater contour programming, high-fidelity current modeling, and testing with Rio de Janeiro Pilots.

Recent phases also simulated ship-to-ship oil transfer berths within the port.

Açu, TX1, Brazil (CH2M Hill)

MITAGS conducted confirmation simulations for the LLX-MR iron export terminal, including port modeling and programming of the Zhong Xing Hai cape-class bulk carrier for feasibility and maneuvering analysis.

Sudeste Port Project, Brazil – Follow-On Studies

This follow-on study supported two earlier projects and focused on:

- Preparing pilots for nighttime transits to enable 24-hour operations
- Evaluating whether assist tugs could be reduced to three while maintaining safety
- Assessing the adequacy of existing navigation aids
- Recommending wind and current limits for operations with fewer tugs

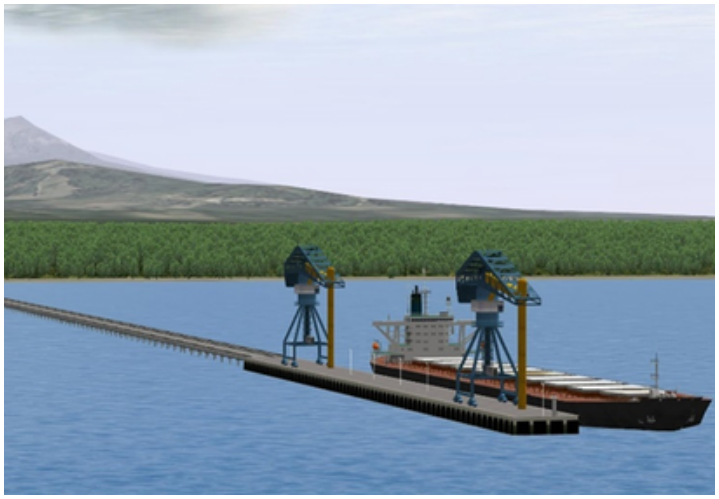
T1, Ferroport, SA, Brazil

MITAGS conducted tug-emergency simulations to determine whether pilots could maintain control of a vessel after the failure of one of four assist tugs, either returning to anchorage or completing the maneuver.

Results helped evaluate whether the Port could reduce overall tug requirements.

Port of Callao, Peru

This study assessed the placement of a new iron ore terminal and major modifications to the channel and breakwater entrance, supported by detailed current modeling for navigational safety.



Puerto Nuevo, Colombia (Moffatt & Nichol)

MITAGS simulated the proposed coal export terminal at Puerto Nuevo, including analysis of the channel, berthing layout, and turning basin for safe vessel operations.

Harbor Island VLCC Facilities – Corpus Christi, TX (AECON & WST)

MITAGS supported multi-year feasibility studies for approach channels, turning basins, and berthing for VLCC operations. Work included visual database development, current modeling, and hydrodynamic VLCC/tug modeling.

Key objectives:

- Determine tug package needs
- Compare rotor vs. ASD tug designs
- Establish preliminary environmental limits for VLCC transits

Port of Texas City, TX (LJA Engineering)

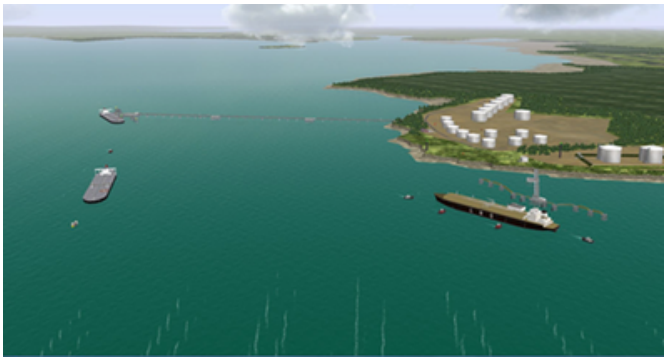
MITAGS conducted a feasibility study for a new pier serving Aframax and Suezmax tankers. Analyses addressed berthing/unberthing at multiple piers and required clearances.

Project used two assist-tug simulators integrated with the full-mission bridge, including Z-Tech® tug models.

Canaport East – Saint John's Harbor, Canada (Moffatt & Nichol)

Simulation studies evaluated a proposed oil terminal berth, assist-tug needs, channel design, and wind/wave limits.

Participants included TransCanada, Saint John Port Authority, Atlantic Pilotage Authority, Irving Oil, and Transport Canada.



South Riding Point – Grand Bahama (Statoil)

MITAGS assessed minimum bollard pull and tug requirements for safely berthing and unberthing VLCC and Suezmax tankers—loaded and in ballast—under varying wind and current conditions.

LLX Logística – Simulation of Terminal Sul (TX2) and Terminal Norte (TX1)

(Now Prumo Logística & Ferroport, SA)

LLX contracted MITAGS to validate the design of the proposed Açu Superport north of Rio de Janeiro. MITAGS programmed the new harbor layouts and approach channels into the full-mission simulator to evaluate shiphandling feasibility.

TX2 included:

- A new approach channel intersecting the existing Canal de Acesso
- An outer harbor for Capesize and Panamax coal carriers
- An inner harbor for general cargo, container, and RO/RO vessels

TX1 included:

- The Canal de Acesso approach channel
- Turning and maneuvering basin
- Seven berths protected by an L-shaped breakwater
- Capacity for VLCC, Suezmax, and Aframax tankers
- A shipyard for FPSO construction and offshore-support vessels

Pilots from Rio de Janeiro tested vessel models to assess port design impacts, maneuverability, and operational procedures. MITAGS' shiphandling experts contributed to the review.

Prumo Logística and Ferroport continue to use MITAGS for ongoing port updates.

Single Point Mooring Simulation – Quintero Bay, Chile

(Dilhan Consultants)**

MITAGS recreated a single point mooring casualty in Quintero Bay, programming the database, tanker model, and assist tugs. The simulation was used to analyze the incident, refine procedures, and reduce the likelihood and impact of future events.

Towing Solutions, Inc. collaborated on this project.

TUG HULL DESIGN

Tug Hull Design Selection

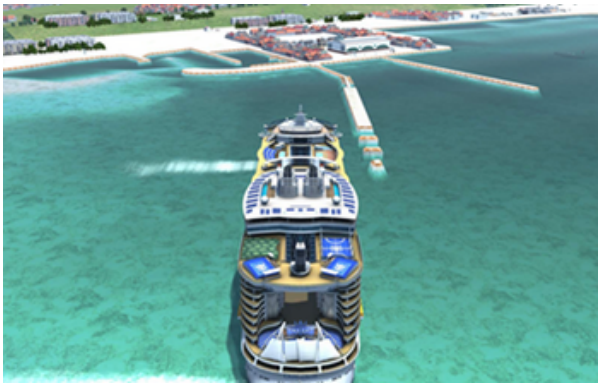
(Shaver Transportation)**

Shaver Transportation partnered with MITAGS to evaluate tug hull and propulsion configurations for newbuild designs serving the Columbia River. Using full-mission tug simulators, Shaver tested multiple hull and drive options to identify the optimal setup for river escort and assist operations—avoiding costly design missteps and ensuring the vessel met their unique operational requirements.

CRUISE SHIPS

Port Zante Navigation Study – Oasis Class (Saint Kitts & Nevis)

MITAGS simulated Oasis Class cruise ship transits into the Saint Christopher Air & Seaport Authority's new pier at Port Zante. The study provided recommendations on maximum environmental operating limits for routine cruise ship calls.



Port Jersey Simulation Study

Port Jersey serves cruise, container, and RoRo vessels. MITAGS evaluated the feasibility of simultaneously handling ULCVs (up to 22,000 TEU) and Oasis-class cruise ships. The study used the full-mission bridge integrated with multiple tug bridges and produced recommendations for channel and berth improvements to support safe transits.

Bermuda Cruise Ship Feasibility Studies

For more than 20 years, Bermuda's Department of Marine & Ports has used MITAGS to evaluate the feasibility of new cruise ship calls. Vessels programmed for these studies include:

- Oasis of the Seas
- Quantum of the Seas (RCI)
- Breakaway (NCL)
- Divina (MSC)
- Dream (Disney)
- Millennium (Celebrity)
- Queen Mary II (Princess)

Port of Vancouver, British Columbia – Centerm Project

MITAGS assessed whether DP World's Centerm Berth 6 dolphin extension could safely accommodate vessel traffic. Simulations reflected the BC Pilots' maximum and normal operating conditions and included several large cruise ship models and the broader Port of Vancouver environment.

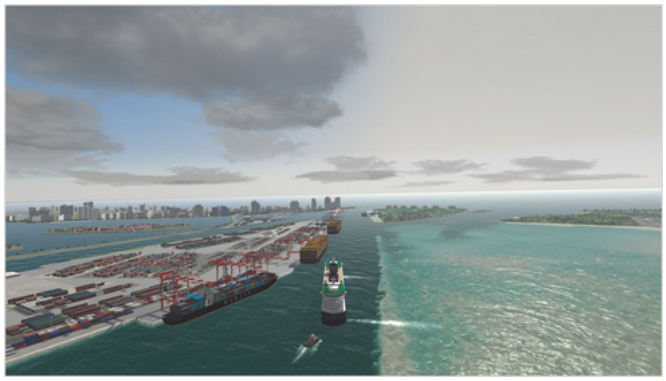
PortMiami, Florida

CH2M Hill engaged MITAGS to determine whether larger cruise ships could routinely transit past ULCV berths and operate safely within PortMiami.

Objectives included:

- Assessing whether cruise ships could turn in the Lummus turning basin and safely back into Terminal J
- Evaluating whether ULCVs with booms lowered would restrict cruise ship or containership movements
- Recommending environmental limits (wind, current) for berthing with and without tugs

The study used Waterway Simulation Technology (WST) current models developed for ULCV operations, incorporating 20 combinations of tidal and offshore conditions.



Ports of Alaska

MITAGS has conducted numerous simulation studies for Alaskan Ports. This include:

- Juneau
- Ketchikan
- Anchorage
- Dutch Harbor
- Kodiak
- Klawock Narrows

ULCV CONTAINER SHIPS

Port of NY/NJ – Howland Hook & Port Elizabeth

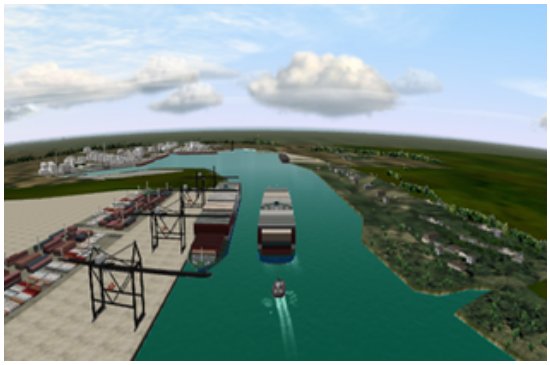
MITAGS conducted multi-year studies evaluating the feasibility of 16,000–18,000 TEU super-ULCVs transiting to Howland Hook and Port Elizabeth. The project used four integrated simulators—one SULCV bridge and three live tug bridges.

Port of New York & New Jersey – ULCV Best Practices

Through the Deep Draft Working Group, the Port Authority commissioned MITAGS to develop ULCV transit best practices for major container terminals, including Port Liberty Bayonne, Port Jersey, Port Elizabeth, and Port Newark.

Bayport Container Terminal – Houston Ship Channel (Maersk Lines)

Simulations were conducted to assess whether channel dimensions could safely accommodate Post-Panamax containerships (8,000–15,000 TEU) and to identify any operational limits and tug requirements for these vessels.

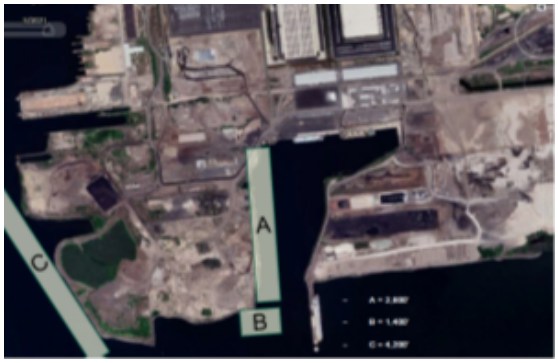


Seagirt Marine Terminal – Baltimore, MD (GBA)

MITAGS programmed approach channels and berths for the upgraded Seagirt Terminal, evaluating assist tug requirements, environmental limits, dredging needs, and navigation aid placement. Three classes of post-Panamax vessels were tested.

Tradepoint Atlantic – Coke Point Container Terminal (Moffatt & Nichol)

MITAGS modeled the proposed terminal and conducted simulations involving ULCVs up to 20,000 TEU, using multiple integrated bridges to assess maneuverability and operational feasibility.



Port of Charleston, South Carolina

MITAGS evaluated whether MSC Kalina-class ULCVs could safely transit to/from the Wando Welch Terminal.

Simulations included full transits, berthing/unberthing, and meeting situations, and established:

- Environmental limits (wind, currents, tides, visibility)
- Minimum tug requirements for safe operations

ULCV CONTAINER SHIPS

PortMiami, Florida

MITAGS updated best-practice transit requirements for A-Class Maersk ULCVs and evaluated handling needs for 14,000+ TEU vessels. Using a full-mission simulator with up to two tug bridges, the study:

- Revised A-Class handling procedures
- Outlined tentative requirements for larger ULCVs
- Assessed tug capability and recommended tug packages
- Identified wind and current operating limits

Port of Savannah, Georgia

MITAGS supported a study assessing safe navigation of ULCVs up to 22,000 TEU in existing Savannah River channel conditions using a 360° full-mission simulator integrated with two tug bridges.

ITB / BARGES / TUGS

Houston Ship Channel, Texas

Vopak North America engaged MITAGS to simulate operations at a proposed terminal in the confined Houston Ship Channel.

The study assessed meeting and passing interactions with moored vessels using multiple integrated full-mission bridges.

Scenarios also included ITBs, tugs, and barges operating between terminal berths and the shoreline. Participants included the Houston Pilots, Kirby Corporation, and WST.

ATB New Build / Operator Training

Harley Marine selected MITAGS to train crews on a new class of ATBs.

Accurate simulator models—refined with CFD data from naval architects—allowed operators to familiarize themselves with the new vessels and reduce the risks of introducing a new design to service.

ITB / BARGES / TUGS

City of Victoria, British Columbia

MITAGS conducted a bridge fendering and transit study for tug and barge movements through the Johnson Street Bridge waterway.
The study evaluated potential impact forces on bridge structures and established best-practice transit procedures to reduce risk.

Sakhalin Region, Russia

For Foss Teras Marine, MITAGS evaluated tug capacity requirements for safely maneuvering barge-mounted cargo to a Temporary Offload Facility under challenging swell and bar-crossing conditions.

The study supported the Piltun Bay/Odoptu Stage II project.

Navy Region Northwest – Submarine Base Bangor, Washington

MITAGS modeled the entire Bangor area, including piers, security zones, Hood Canal Bridge, and Trident submarine operations.

The simulation supports new tug/pilot training and submarine crew familiarization.

Robert Allan Ltd.

Using CFD data from Robert Allan Ltd., MITAGS developed and validated highly accurate tug simulation models, matching real-world vessel performance**.**

MITAGS KEY SIMULATION & TRAINING PERSONNEL

Mr. Pasha Amigud – Simulation Engineer
Over 20 years of experience in maritime simulation. Specializes in hydrodynamic and visual modeling of harbor tugs, heavy-lift vessels, and barge configurations, as well as hardware control system design.

Captain Henry F. Andersson – Shiphandling Consultant
Former Master for multiple cruise lines and former Manager of Marine Operations at Disney Cruise Line. Holds Swedish and Bahamian Unlimited Master licenses; multilingual with decades of operational expertise.

Captain Robert Becker – Business Development Consultant
Former MITAGS Director of Business Development (2004–2021). Sailed as Master for Sea-Land and U.S. Ship Management with experience on chemical tankers, Ro/Ros, containerships, and bulk carriers. Holds a USCG Master, Any Gross Tons.

Mr. Joshua DuPay – Naval Architect & Simulation Engineer
Leads the MITAGS East modeling department. Developed high-fidelity ship models for major clients including Shell LNG, NFE, Enbridge, M&N, Jacobs, Port of Baltimore, and others. Collaborates closely with Seattle-based modeling team.

Mr. Eric P. Friend – Executive Director, MITAGS & MMP MATES
Oversees all training and conference operations. Expert in advanced simulation systems and pilot training. Holds a 1,600-ton Master, Second Mate Unlimited, a USMMA degree, and a Master's in Organizational Leadership.

Ms. Catherine "Catie" Gianelloni – MITAGS East Academic Director
Oversees academics and previously led the Navigation Skills Assessment Program (NSAP®). USCG-approved instructor/assessor for 25+ courses. Holds a Second Mate Unlimited license and extensive sea service.

Captain (Walter) "Butch" Graf – Shiphandling Consultant
USMMA graduate and former Master Mariner. Longtime MITAGS instructor in advanced/emergency shiphandling and BRM. Former Naval Reserve lieutenant.

Captain Joe Harnett – Shiphandling Consultant
Senior pilot with 30 years' experience for the Association of Maryland Pilots. Holds USCG First Class Pilot and Unlimited Master licenses. Instructor in navigation and shiphandling.

Mr. Mark Hokenson – Simulation Engineer, MITAGS West
Manages simulator operations, maintenance, and research projects at MITAGS-West. Experienced project manager with a focus on creative technical solutions.

MITAGS KEY SIMULATION & TRAINING PERSONNEL

Ms. Emily Hopkins – MITAGS West Director
Oversees Seattle campus operations, staff, and simulation projects. With MITAGS since 2008; former cruise line operations manager. Holds bachelor's and master's degrees; SHRM-SCP certified.

Mr. Verne Justice – Shiphandling Consultant
Former Puget Sound Pilot with 26 years of experience handling tankers, cruise ships, car carriers, and bulkers. Instructor for emergency shiphandling and pilot exam preparation.

Captain Jonathan Kjaerulff – Director of Business Development
Responsible for academic marketing and strategic planning. Former Master Mariner and founder of Fremont Maritime, a leader in marine safety and firefighting training. Extensive tug, barge, and cruise industry experience.

Captain Richard S. Michael – Shiphandling Consultant
50+ years in maritime operations, including pilotage in the Caribbean and tanker handling up to 350,000 DWT. Consultant for over 100 MITAGS simulation studies.

Mr. Glen Paine – Business Development Consultant
Former Executive Director of MITAGS/MMP-MATES for 23 years. Now supports simulation engineering projects. Instrumental in establishing MITAGS as a national simulation leader.

Captain Douglas Pine – Instructor & NSAP® Consultant
USCG-approved instructor/assessor for 30+ courses. Over 30 years at sea across tugs, OSVs, ferries, and passenger vessels. Holds multiple master/mate licenses.

Ms. Colleen Schaffer, P.E. – Director of Simulation Engineering
Leads hydrodynamic and geographic database development, simulation accuracy, and project management. Licensed Professional Engineer with master's in coastal/ocean engineering.

Mr. Jeremiah Sheahen – Simulation Engineer
20 years of experience in projection systems, hardware integration, and simulator design. Former president of FTL Concepts and inventor of advanced optical masking systems.

Captain Jeff Slesinger – Tug Consultant
Marine safety expert, trainer, auditor, and author of two tug-handling books. Specialist in ASD and harbor/coastal towing operations.

Captain James Staples – Consultant
39 years at sea (23 as Master) with global experience, vessel construction oversight, and anti-piracy expertise. USCG-approved instructor in security and STCW programs.

MITAGS KEY SIMULATION & TRAINING PERSONNEL

Captain Jonathan A. Steinberg – Tug Consultant
Moran Towings Tractor Tug Master since 2008. Specialist in docking, escorting, and assist operations in Baltimore, the Delaware River, and Chesapeake Bay.

Captain Stephen P. Thalheimer – Tug Consultant
Former Moran Towing Master with decades of escort/assist experience. MITAGS instructor in seamanship, radar, and AB training.

Mr. Dennis Webb, P.E. – Simulation Project Manager
Licensed PE and former Chief of the U.S. Army Corps of Engineers Navigation Branch. Principal investigator on 60+ simulation studies.

Mr. Igor Filippov – Hydrodynamic Modeling Consultant
R&D expert for Wärtsilä Voyage with nearly 40 years in ship dynamics and simulation. Provides model development guidance and technical training to MITAGS modelers.

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