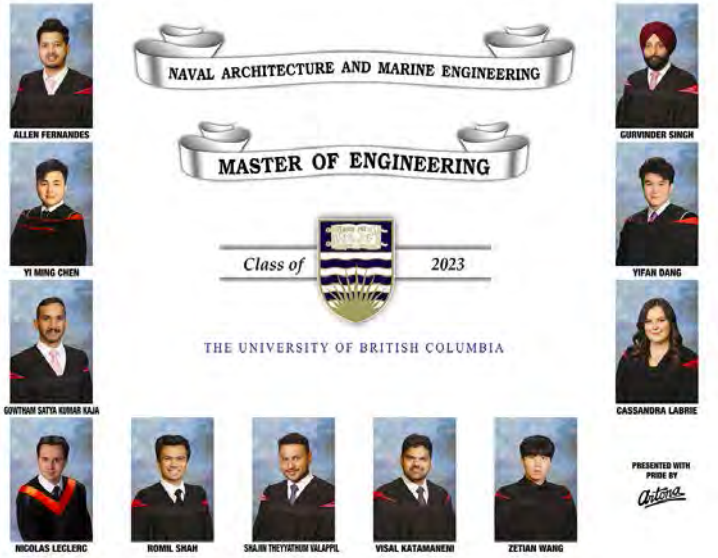
Overview of UBC Naval Architecture & Marine Engineering Program

Jon Mikkelsen, P.Eng.

Director, UBC NAME Program

Presentation to NSRP **August 20, 2024**



Mission & Vision

Teaching and research to advance the capabilities of the marine industry within a civil society, and for a sustainable future.

To this end, the program aspires to develop multidisciplinary, problem-solving engineering leaders in marine design and production.

Professional NAME Degrees (30 Credits)

Developed as an original Value Proposition for the Seaspan Shipyard NSS bid. Industry advisory committee established 2011 to provide input on program needs.

M.Eng – Master of Engineering (Launched 2013)

- Designed to prepare students with existing degrees for a career in the marine sector
- Degrees include MECH, CIVL, MATR, IGEN, Combat Systems,& Marine Engineering

M.E.L. – Master of Engineering Leadership (Launched 2016)

- Combines NAME Technical Program and Sauder Business School
- Requires minimum 3-years relevant Post-Bac experience

MEng Curriculum

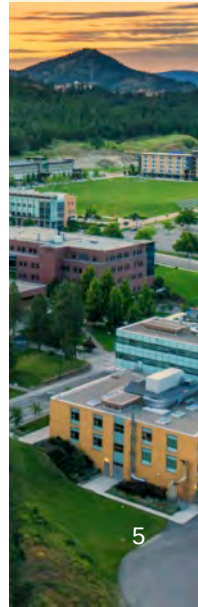
1. (3 cr) CIVL 437 - Ship Structures I
2. (2 cr) NAME 501 - Ship Structures II
3. (3 cr) MECH 488 – Intro. To Naval Arch. (Ship Hydrodynamics I)
4. (3 cr) NAME 502 - Ship Hydrodynamics II
5. (3 cr) NAME 566 - Ship Dynamics and Control
6. (3 cr) NAME 578 - Marine Engineering
7. (3 cr) NAME 522 - Ship Production & Industrial Engineering
8. (3 cr) NAME 524 - Shipbuilding Project Management
9. (3 cr) NAME 581 – Ship Design Process
10. (3 cr) NAME 591 - Capstone Ship Design Project
11. (2 cr) NAME 592 - Internship

NAME M. Eng. Curriculum

NAME PROGRAM SCHEDULE

FALL SEPTEMBER - DECEMBER	WINTER JANUARY - APRIL	SUMMER MAY - AUGUST
MECH 488 Introduction to Ship Hydrodynamics (3 CR)	**NAME 502** Advanced Ship Hydrodynamics (3 CR)	**NAME 592** Shipbuilding Internship or Project (2 CR)
CIVL 437 Introduction to Ship Structures (3 CR)	**NAME 501** Advanced Ship Structures (2 CR)	
NAME 524 Shipbuilding Project Management (3 CR)	**NAME 522** Ship Production and Industrial Engineering (3 CR)	
NAME 578 Marine Engineering (3 CR)	**NAME 566** Ship Dynamics and Control (3 CR)	
NAME 595 Computer-Aided Ship Design Project (2 CR/term)	**NAME 591** Computer-Aided Ship Design Project (2 CR/term)	

581
Intro. Ship Design



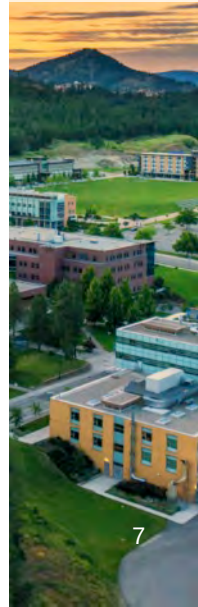

NAVAL
ARCHITECTURE
& MARINE
ENGINEERING
MEL
Master of
Engineering
Leadership
UBC Applied Science
SAUDER
School of Business

NAME MEL Curriculum

COURSE OVERVIEW

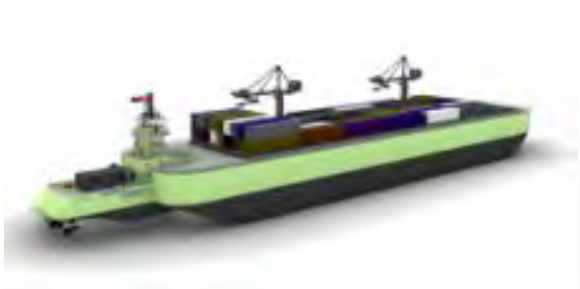
	WINTER JANUARY—APRIL	SUMMER MAY—AUGUST	FALL SEPTEMBER—DECEMBER
TECHNICAL COURSES (18 CR)	NAME 522: Ship Production & Industrial Engineering (3 CR)	NAME 592: Ship Building Internship	NAME 578: Marine Engineering (3 CR)
	NAME 566: Ship Dynamics & Control (3 CR)		NAME 581: Ship Design (3 CR)
			MECH 488: Intro to Ship Hydrodynamics (3 CR)
			CIVIL 435: Advanced Structural Analysis (3 CR)
LEADERSHIP COURSES (12 CR)	APPP 503: Organizational Leadership (1.5 CR)	APPP 504: Business Acumen for Technical Leaders 4 weeks (3 CR)	SAUDER BUSINESS COURSE (1.5 CR)
	BAEN 540: Strategy & Innovation (1.5 CR)		APPP 502: Sustainability & Leadership (1.5 CR)
	APPP 505: Analytics & Interpretation for Applied Sciences (3 CR)		

Schedule is subject to change - courses may be taught in different semesters.



Design Focus

- UBC NAME Program has a strong foundation on ship design
- Design program led by “Professor Practitioners” and supported by Industrial Mentors



Professional Program Impact

- Approx. 170 graduates since program inception
- Graduates employed widely throughout maritime sector
  - Design
  - Ship Building
  - Operation
  - Governance

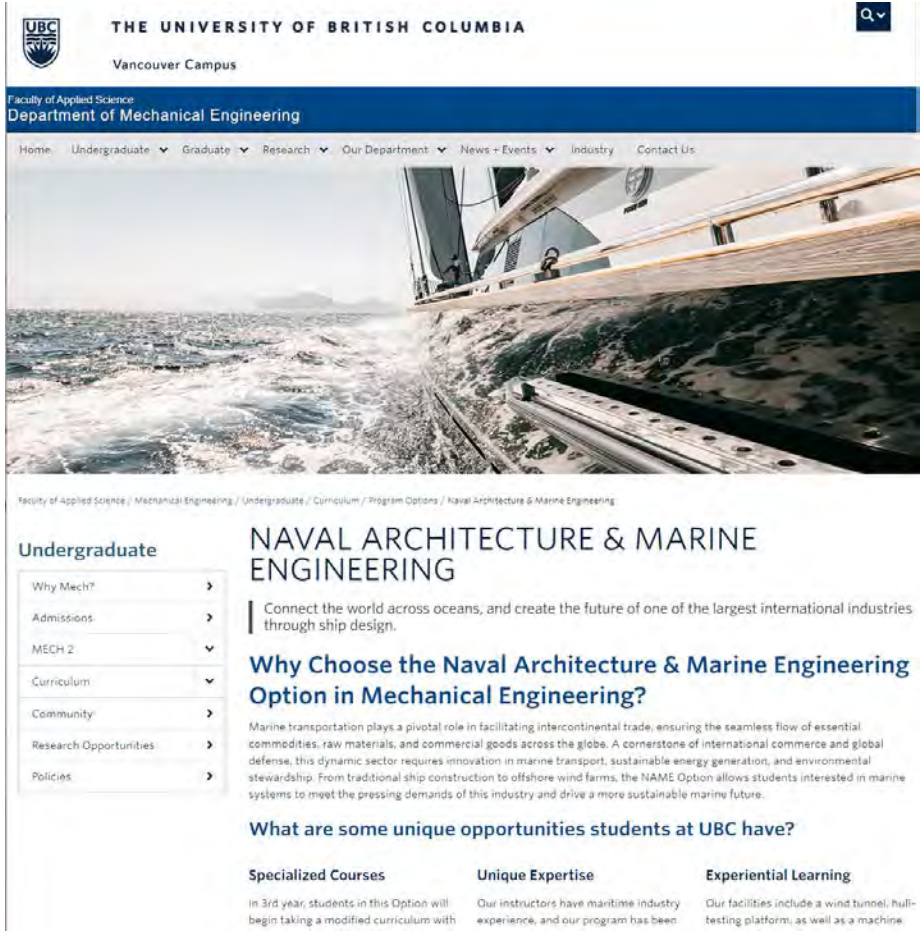
Research Program (Chairs & Professorships)

- In 2016 UBC NAME Program re-configured original Seaspan Value Proposition to expand into research-based degrees (PhD & MASc)
- July 2024 we welcome the Seaspan Chair Seaspan Chair in Robotics for Marine Vessels at UBC
- December 2024 we welcome the Rosenblatt Professorship in Marine Engineering at UBC

Researchers Jasmin Jelovica and Rajeev Jaiman are studying solutions like adding wavy and serrated edges to propellers to break up flow patterns that cause noise. Photo: Devan Power/UBC Faculty of Applied Science.

NAME Option in Mechanical Eng. Undergraduate Program

Name option website:



Undergraduate NAME Option

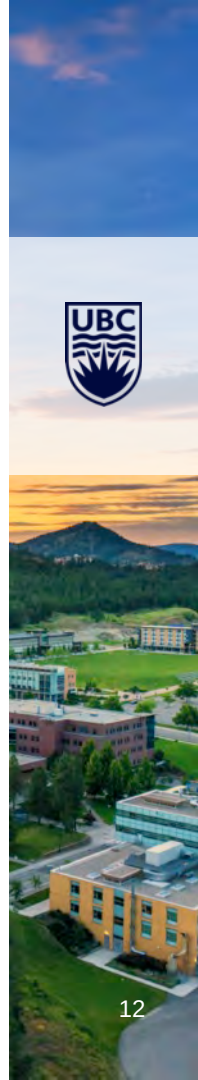
- NAME option is now available for students enrolled in the Mechanical Engineering program (first batch enrolling into third year)
- Students would be expected to complete the Option at the same time as students in the flex Mechanical Engineering BASc stream.

Code	Title	Credits
Third Year		
MECH 305 T2	Data Analysis and Mechanical Engineering Laboratories	6
MECH 325 T1	Machine Design	4
MECH 328 T1	Mechanical Engineering Design Project	3
MECH 360 T2	Mechanics of Materials	3
MECH 358 T1	Engineering Measurements and Instrumentation	3
MECH 375 T1	Heat Transfer	3
MECH 380 T2	Fluid Dynamics	3
MECH 358 T2	Engineering Analysis	3
MECH 488 T1	Introduction to Ship Hydrodynamics	3
	Technical electives*	3
	Complementary Studies electives	6
Total Credits		40

Code	Title	Credits
Fourth Year		
MECH 400 T2	Professionalism and Ethics in Engineering	3
MECH 481 T1	Introduction to Ship Design	3
MECH 431 T2	Engineering Economics	3
MECH 455 T1&2	Naval Architecture and Marine Engineering Design Project	6
MECH 463 T1	Mechanical Vibrations	4
MECH 466 T2	Automatic Control	4
MECH 479 T1	Introduction to CFD	3
CIVL 435 T1	Advanced Structural Analysis	3
	Technical electives*	9
Total Credits		38

*Students will be required to choose all 12 credits of technical electives from a constrained list of courses.

- This model can be used to develop NAME options for other disciplines such as Electrical, Civil, Materials, Integrated, Engineering Physics



Future Initaitives:
Micro-Credential: Post-Baccalaureate Certificate in Marine Vessel Design (12 Credits)

- Certificate Program complements the existing MEng and MEL program
- Similar entrance requirements as MEng and MEL
- 12 Credit certificate can be completed in as little as one term
- Options for part time available
- Program designed for industry partners and visiting students

- Foundational Core Course: NAME 591 Computer Aided Ship Design
- Two courses from restricted list in NAME (6 credits)
- One complementary course (3 credits).

Future Initiatives: Submarine Engineering

- In July 2024, the federal government announced its plans to acquire up to 12 conventionally powered under-ice submarines. There are no educational programs in Canada related to Submarine and Submersible Engineering yet the demand for engineers possessing this specialization will be critical to support this sector
- UBC NAME Program and industry are exploring opportunity to establish a complimentary submarine engineering program at UBC
- The proposed Post-Baccalaureate Certificate in Marine Vessel Design can be the foundation for the complimentary Submarine Engineering Program

Open Water Testing Facility Update

The ASSET

- Donated by Estate of Chuck Robinson – Founder MSHIPCO
- Built ~2007
- Used 2007-2014
- Dormant for ~2 years

- Open-water / Natural Environment
- 2 Simultaneous models
- Tow force + 5 DOF motion

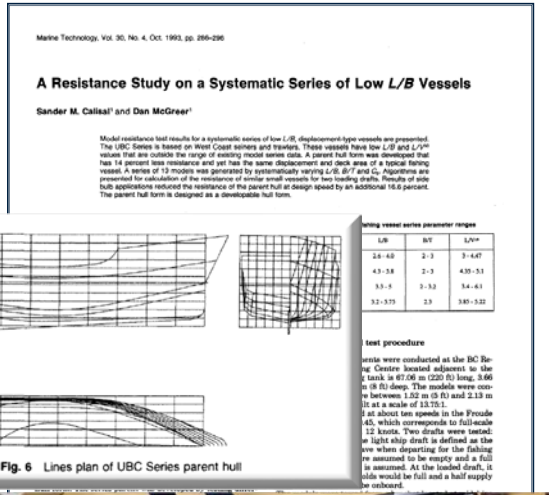
AS received

BENCHMARKING

UBC Trawler Series (1993 & 1997)

Resistance comparison:

- Original UBC Towing Tank results
- New Star-CCM+ CFD predictions
- Test Platform measurements with original model



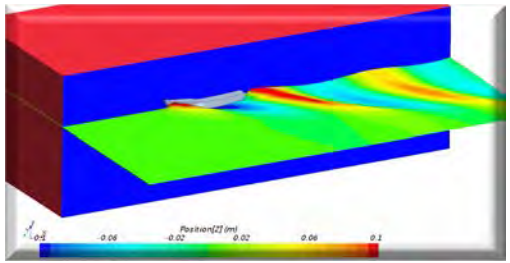
Marine Technology, Vol. 30, No. 4, Oct. 1993, pp. 266–296

A Resistance Study on a Systematic Series of Low *L/B* Vessels

Sander M. Calisal[1] and Dan McGreer[1]

Model resistance test results for a systematic series of low *L/B*, displacement-type vessels are presented. The UBC Series is based on West Coast seiners and trawlers. These vessels have low *L/B* and *L/V*$^{1/3}$ values that are outside the range of existing model series data. A parent hull form was developed that has 14 percent less resistance and yet has the same displacement and deck area of a typical fishing vessel. A series of 13 models was generated by systematically varying *L/B*, *B/T* and C_p. Algorithms are presented for calculation of the resistance of similar small vessels for two loading drafts. Results of side bulb applications reduced the resistance of the parent hull at design speed by an additional 16.6 percent. The parent hull form is designed as a developable hull form.

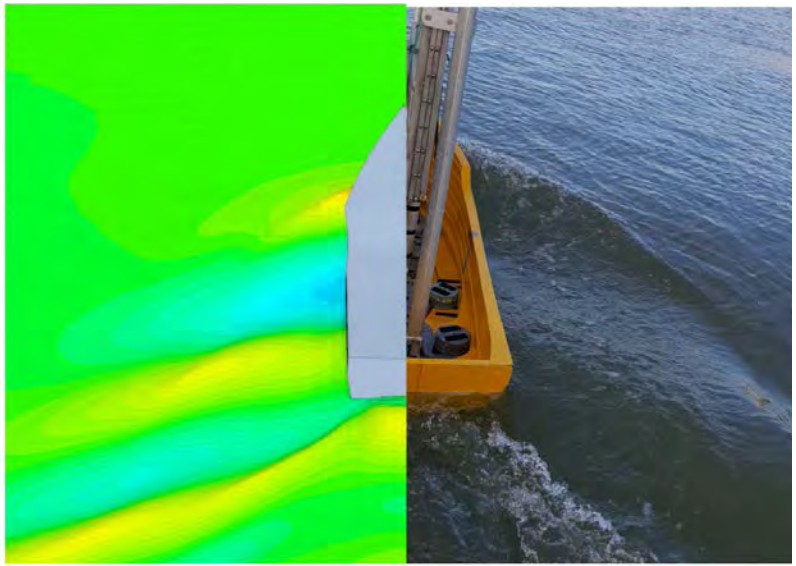
Fig. 6 Lines plan of UBC Series parent hull



TESTS AT SEA (FRASER RIVER)

Figure 35: Picture of a test at sea

COMPARISON



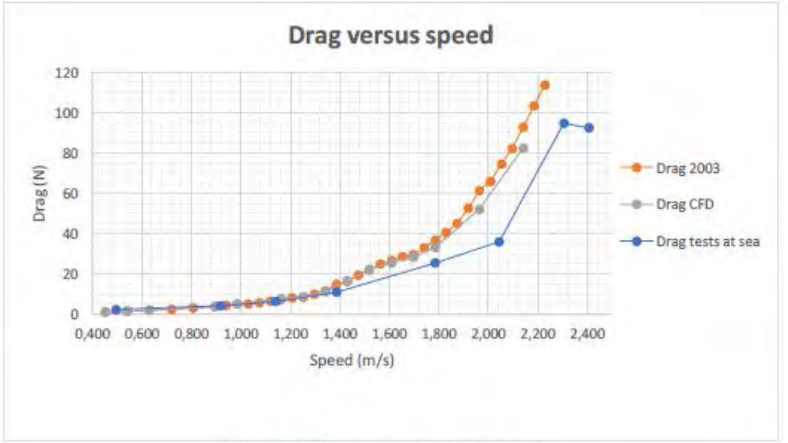


Figure 48: Three-way-comparison graph

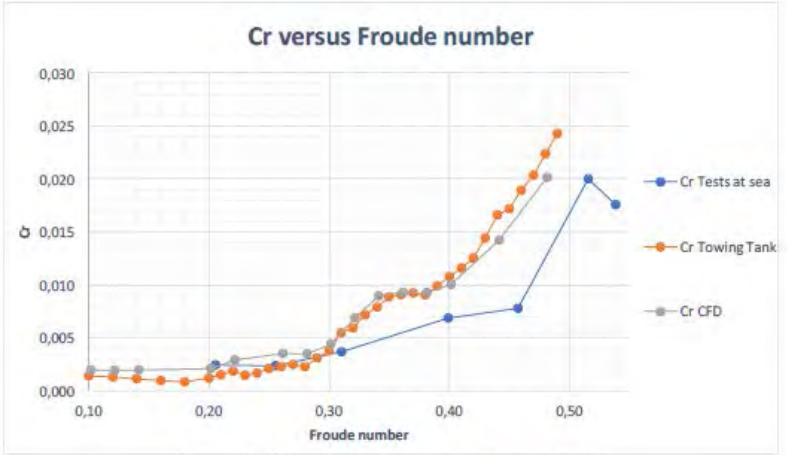


Figure 49: Dimensionless three-way-comparison graph

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Vancouver Campus

Naval Architecture and Marine Engineering

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HULL TESTING RETURNS TO UBC AFTER 12 YEARS

October 29, 2019

CONCLUSIONS AND PLANS

Asset is “Not ready for prime time”

May be a useful at present as a visualisation tool

We believe the speed sensor is a major source of the errors

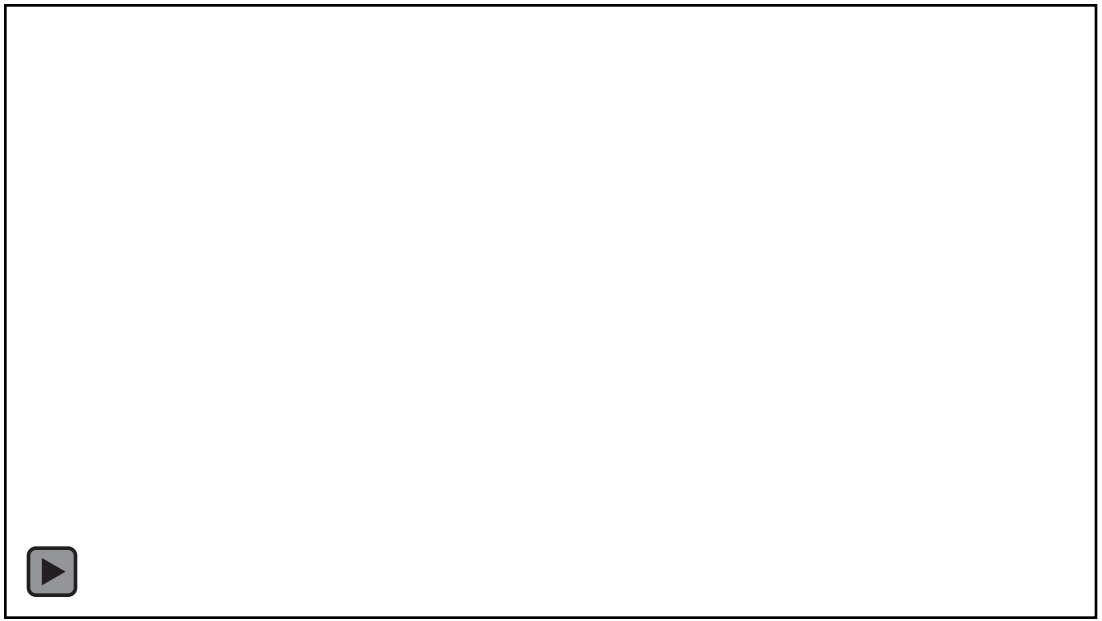
Planning a Phase II benchmarking exercise including redesign of speed sensor

Possible MECH Capstone project

Planning to use for Visualization in NAME 502 (Hydro II)

Planning more visiting international research students

Tow Tank Development

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