

ROGER REVELLE MIDLIFE REFIT OVERHAUL

RVOC

19 APRIL 2018



Ship Check: 3D Scanning

For specialized project sites that either lack sufficiently detailed plans or require a high level of layout accuracy. Scans provide the basis for development of the virtual model for unparalleled accuracy.

Scanning

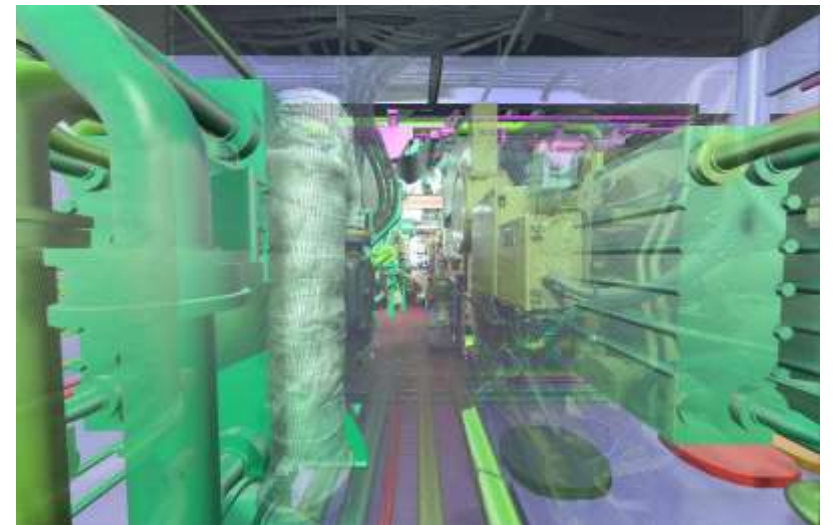


- Infrared laser scanner with 2mm accuracy at a range of 330m
- Multiple scans are combined creating encompassing scan of ship spaces

Modeling



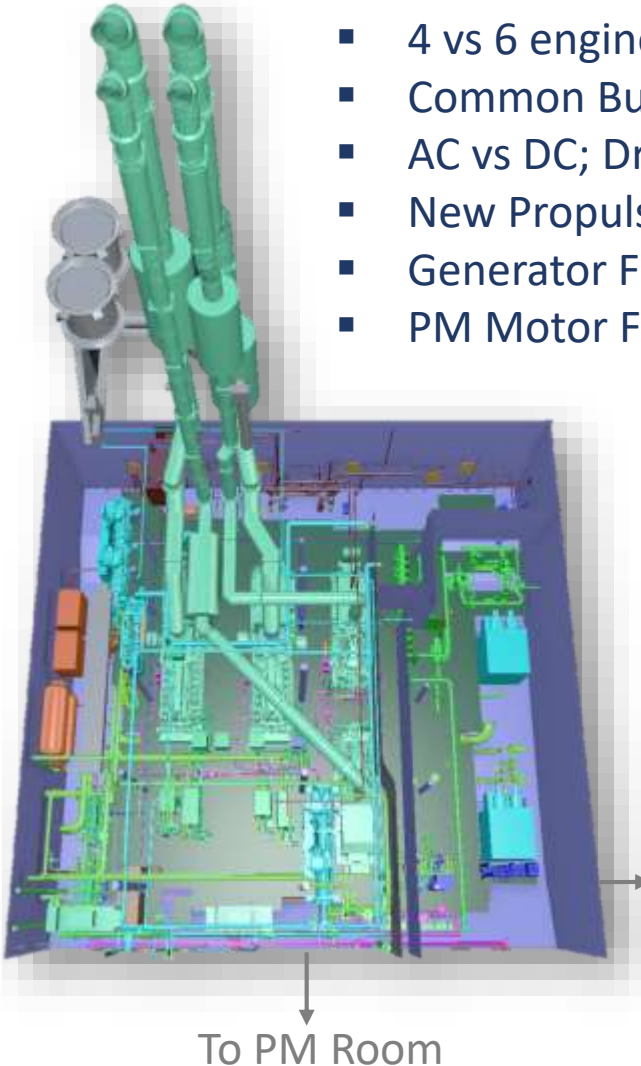
- 3D models reference scan data creating precise representations
- Actual scan data overlays 3D model data showing as-is and to-be conditions



Roger Revelle Three Major Changes

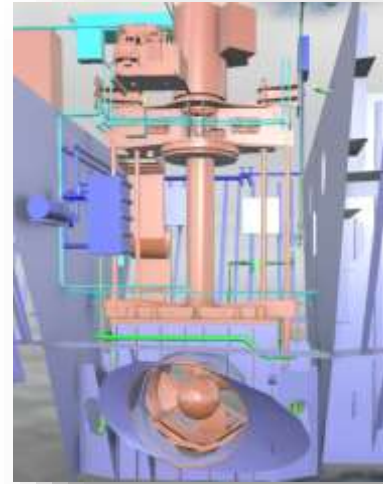
Repower

- 4 vs 6 engines
- Common Bus vs. Split Bus
- AC vs DC; Drives and Motors
- New Propulsion Transformers
- Generator Freshwater Cooling
- PM Motor Freshwater Cooling

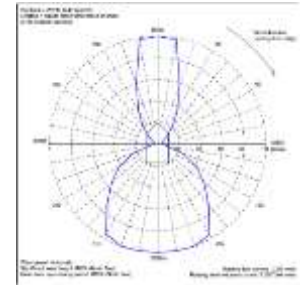


Bow Thruster Replacement

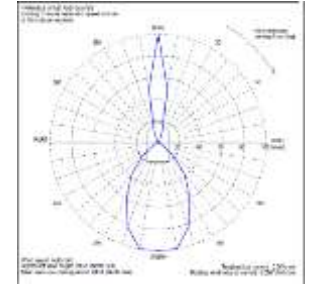
- ZF Marine vs Tees White Gill



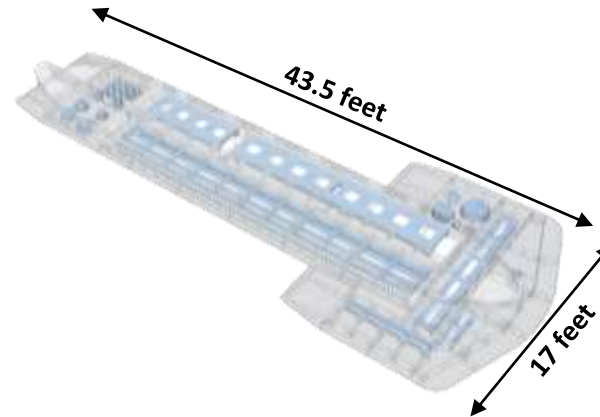
to this...



...from this



Gondola



Suspended sensor housing vs hull mounted. Improved performance via reduced bubble over arrays.

Scope of Work

15 WPs. Criteria:

1. Considered critical to extending life
2. Or required to facilitate work that is critical
3. Or directly traceable to “green” goals

9 WPs. Criteria:

1. Considered a major contributor life-extension
2. And best completed while other invasive work is ongoing

4 WPs. Criteria:

1. Reduces inspection risk
2. Or improves science capability

11 WPs. Criteria:

1. Considered a non-major contributor to life extension
2. And more easily completed during future maintenance windows

Priority	WP	Name
1	1	Repower
1	2	Bow Thruster Replacement
1	5	Z-Drive Inspection and Maintenance
1	6	Ballast System Piping
1	7	Ballast Treatment System Installation
1	8	Firemain System Piping Replacement
1	9	Potable Water System Modifications
1	12	Chiller Replacement
1	13	Sewage System and Drain Replacement
1	14	Ship Stores Refrigeration Equipment Replace
1	23	Ship Service Transformer Upgrades
1	30	Oily Water Separator (OWS) Replacement
1	34	Overhead Lighting Upgrades
1	36	Drydocking
1	38	Multibeam Gondola
2	16	Uncontaminated Seawater System Modifications
2	35	Steel Replacement
2	37	General Maintenance
2	10A	A/C Spaces General
2	10B	A/C Controls Upgrades
2	10C	AHU-5 Zone Redesign
2	10E	AHU-2 Makeup Air Upgrades
2	11A	HVAC Makeup Air Upgrades
2	32	Crane Replacement
3	15	Science Refrigeration System Modifications
3	27	Bridge Wing Console Maintenance
3	28	Exterior Ballast and Fuel Tank Vent Modifications
3	11C	Laundry Room Dryer Vent Modifications
4	17	Public Address System Modifications
4	18	Dial Telephone System Modifications
4	20	Navigation Lighting System Modifications
4	21	Fire Detection System Modifications
4	24	Aft Control Station Console Removal
4	25	Computer Lab Console Modifications
4	29	Hydraulic Oil Transfer Pump Installation
4	31	Bosun Stores Access Modifications
4	33	Anchor and Chain Maintenance
4	10D	Bow Thruster Room Air Conditioning
4	11B	Generator Room Supply Fan Noise Mitigation

Not shown in table is the Contract Technical Specification, S-01 (different from a Work Package).

It directs the contractor on general administrative, technical and testing requirements related to the project.

California-based Intermediate Class & smaller ships

Research vessels able to carry out California's local research and education needs have decreased from 3 to 1, with the last remaining ship approaching the end of its service life. **A new vessel is needed.**



INTERMEDIATE

R/V New Horizon
170 feet / 40-day endurance
12 crew / 19 scientists



REGIONAL

R/V Pt Sur
135 feet / 21-day endurance
8 crew / 12 scientists



LOCAL / COASTAL

R/V Robert Gordon Sproul
125 feet / 14-day endurance
5 crew / 12 scientists



Needed
2020 onward

Collaborating on a shared research vessel

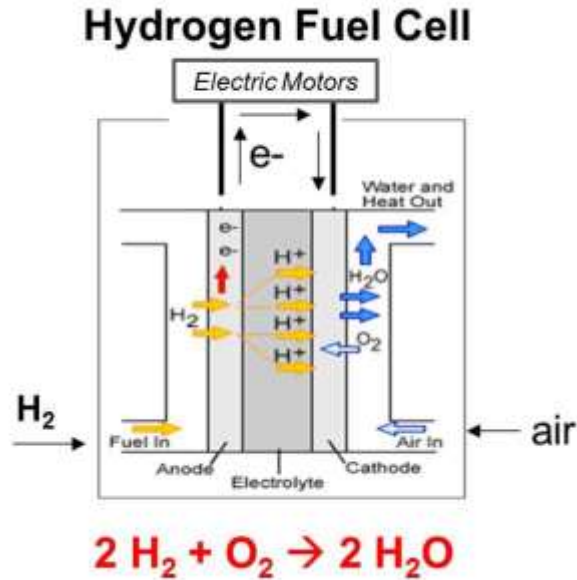


Vision: establish a new kind of partnership within California, involving public and private universities, research institutions, state agencies and non-governmental organizations to support a new **California Coastal Research Vessel (CCRV)** for seagoing education and research.

Efforts to date:

- **Moss Landing Marine Laboratories** (California State University) and the **Scripps Institution of Oceanography** (University of California) have agreed to collaborate jointly on this effort.
- Committed significant seed funding from each institution
- Assembled Scripps *Small Ship Task Force* to define institutional needs
- Sent *Dear Colleague* letter to 100+ ship users statewide to solicit input
- Scripps began a DOT-sponsored feasibility study (with Sandia National Labs) of a zero-emission research vessel (ZERo/V), including conceptual design

Hydrogen Fuel Cell Use in Maritime Applications



Photos Courtesy Ryan Sookoo, Hydrogenics

Going In:
H₂ and air

Going Out:
Electricity
Waste Heat
Warm humidified air

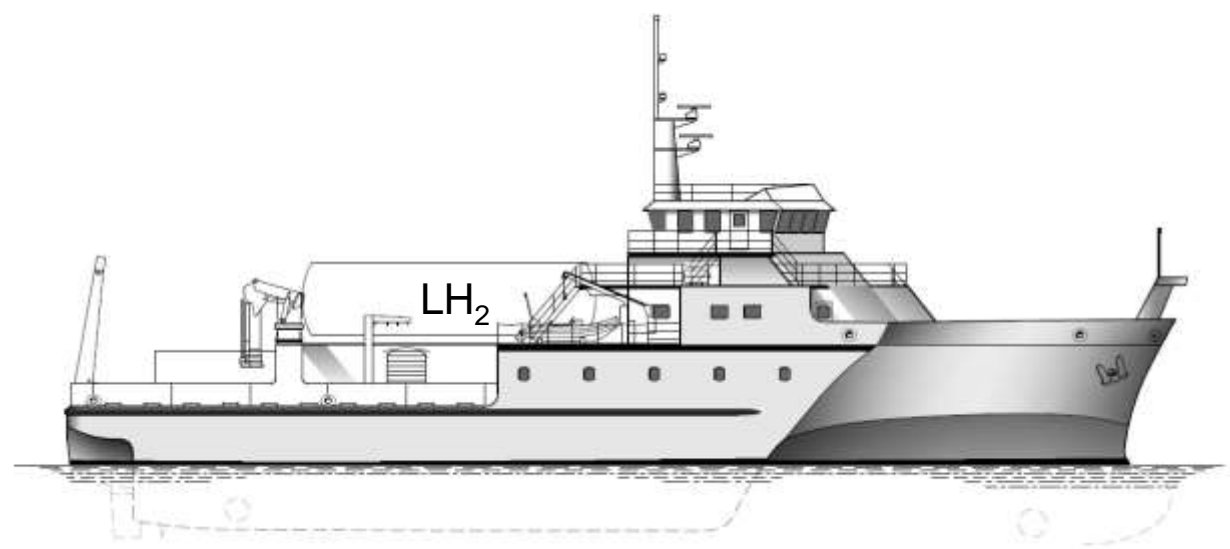
H₂ Fuel Cell Power Provides:

- ✓ Zero emissions
- ✓ No fuel Spills
- ✓ Quiet Operation



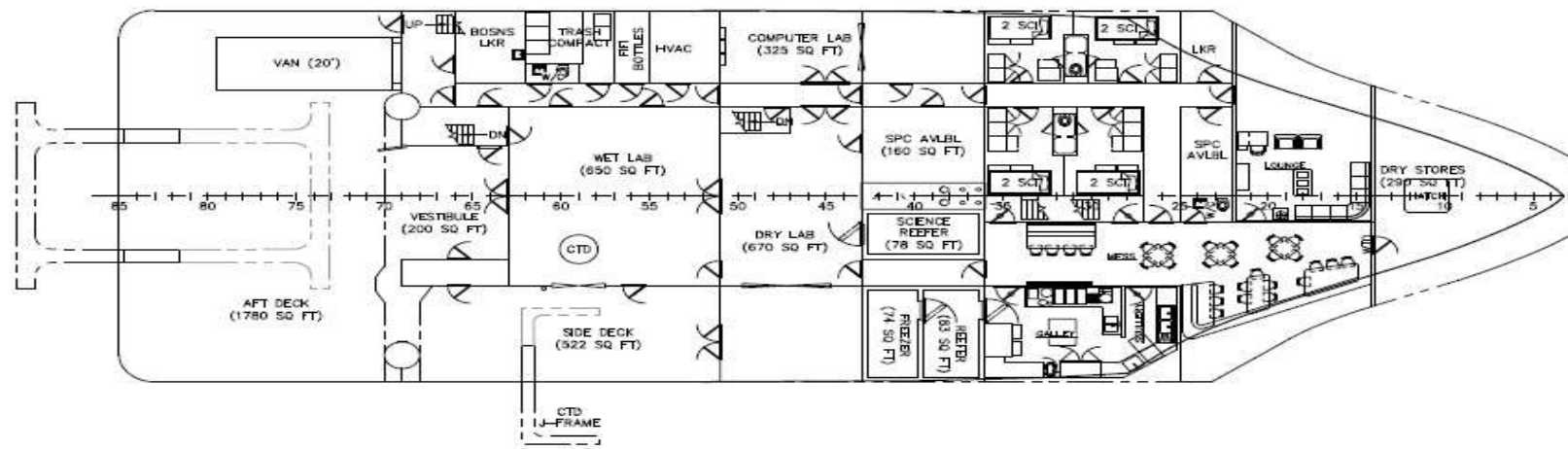
SF-BREEZE Optimization

ZERO-V: Trimaran DESIGN



Zero/V Mission

- Zero emissions
- General purpose R/V
- Coastal operations – CA
- 2500 nm range
- Dynamic positioning
- 18 scientists, 11 crew
- Large lab spaces
- Large working deck
- Substantial over-the-side handling systems
- Low underwater noise
- Capable hydro acoustic suite



Vessel Particulars

Length: 170'-0"
 Beam: 56'-0"
 Draft: 12'-0"
 Depth: 21'-0"

Fuel Cell Power: ~ 1.4 MW
 LH₂: ~ 8,000 kg