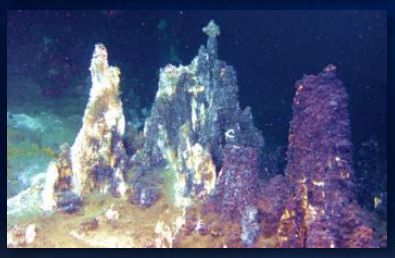
Owner's Engineer for Deep Sea Mineral Exploration & Collection

With roots dating back 50 years, Deep Reach Technology, Inc. (DRT) stands as the industry's only dedicated deep-sea minerals and collection (DSMC) specialty consulting firm. As an **Owner's Engineer** (OE), DRT serves as the asset owner's **technical guardian and independent advisor** across the full project lifecycle from permitting and concept development through operations. In DSMC applications – polymetallic nodules, seafloor massive sulfides, cobalt crusts, and rare-earth rich sediments - this role is critical given the **novel technology, environmental scrutiny, evolving regulatory framework, and offshore execution risks**. DRT's OE services are tailored to each client's specific project objectives, resource, and risk profile, providing the appropriate level of technical oversight and support at every stage.



DRT's DSMC OE work is critical to any project owner. **DSMC presents unique challenges.** Operations typically require a complex, fully integrated system-of-systems - including the seabed collector, riser system, production vessel, and ship-to-ship material handling - under **extreme deepwater conditions** (up to 6,000 meters), **limited operating precedent**, **evolving regulatory frameworks,** and **heightened environmental scrutiny**. DRT's unique experience and core competencies provide an invaluable advantage.

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DRT Owner's Engineering Services

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Strategy, Concept Development & Feasibility

DRT helps project owners define how the collection system should be built.

Key Responsibilities:

- Develop and validate collection system concepts (collector, riser, lifting system, surface vessel integration).
- Evaluate technology readiness levels (TRLs) of key subsystems.
- Perform trade-off studies:
  - Hydraulic vs mechanical collection
  - Airlift vs pump-based riser systems
  - Vessel vs subsea processing approaches
- Support resource evaluation integration (geology and mining method alignment).
- Prepare or validate:
  - Scoping studies
  - Pre-feasibility (PFS)
  - Bankable feasibility studies (BFS)

Deliverables:

- Concept selection reports
- CAPEX/OPEX estimates
- Risk-adjusted project economics

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Technical Specification & Engineering Oversight

DRT defines what "good" looks like technically.

Responsibilities:

- Develop Owner's Technical Requirements (OTR) and specifications.
- Define:
  - Functional performance criteria
  - Reliability/availability targets
  - Maintainability standards (critical offshore constraint)
- Establish interface definitions:
  - Subsea collector to riser system
  - Riser to surface vessel
  - Surface vessel to transport vessel
- Ensure compliance with:
  - International Seabed Authority regulations
  - Classification societies (e.g., DNV, ABS)

Deliverables:

- Technical specifications packages
- Design basis documents
- Interface control documents (ICD's)

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Contractor & OEM Management

DRT protects project owners from vendor risk.

Responsibilities:

- Support EPC / EPCM / OEM selection
- Definition of contract terms and conditions designed to mitigate project risk.
- Develop and manage:
  - RFQs / RFPs
  - Technical bid evaluations
- Perform due diligence on suppliers:
  - Collector manufacturers
  - Riser system providers
  - Offshore vessel contractors
- Ensure no overdesign or under-design
- Lead technical negotiations

Deliverables:

- Bid evaluation reports
- Vendor shortlists and recommendations
- Contract technical appendices

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Design Review & Assurance

DRT validates the technical feasibility of a design, ensuring it will work offshore.

Responsibilities:

- Conduct multi-stage design reviews; Concept to FEED to Detailed Design.
- Provide design inputs and design boundaries.
- Perform:
  - HAZID / HAZOP
  - FMECA (failure modes, effects, criticality analysis)
- Validate:
  - Hydrodynamics of riser systems
  - Sediment plume modeling assumptions
  - Structural integrity under deep-sea pressures
- Ensure system integration integrity (often the #1 failure point).

Deliverables:

- Design review reports
- Risk registers
- Independent verification statements

All DRT Owner's Engineer services are tailored to each client's specific resource and project needs. Depending on project scope and complexity, DRT can expand its role to provide full program management and prime contracting services.

DRT Owner's Engineering Services

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Environmental & Regulatory Support

As uniquely critical function in deep-sea mining, DRT helps navigate regulatory dynamics.

Responsibilities:

- Support Environmental Impact Assessments.
- Ensure alignment with regulatory (i.e. ISA, NOAA, BOEM, etc.) code requirements.
- Review:
  - Sediment plume dispersion models
  - Biodiversity baseline studies
  - Environmental baseline basis.
- Help design environmental monitoring systems:
  - Benthic sensors
  - Water column monitoring

Deliverables:

- Technical inputs to EIA
- Environmental risk mitigation strategies
- Compliance documentation

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Project Controls & Cost Oversight

DRT keeps the project financially grounded.

Responsibilities:

- Develop / Validate CAPEX and OPEX estimates and models.
- Economic ROIC model development.
- Monitor:
  - Schedule adherence
  - Cost escalation risks
  - Macro-economic factors
  - Commodity value fluctuations
- Benchmark against:
  - Offshore oil & gas analogs
  - Mining equipment cost curves
- Perform change order review and challenge.

Deliverables:

- Independent cost estimates
- Schedule risk assessments
- Project dashboards

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Construction, Fabrication & Testing Oversight

DRT ensures what is built matches what was designed.

Responsibilities:

- Preparation / Organization of Factory Acceptance Testing Protocols.
- Witness and approve:
  - Factory Acceptance Tests (FAT)
  - System Integration Tests (SIT)
- Inspect:
  - Fabrication
  - Integration
  - Prototype Testing
- Oversee integration of subsea and topside systems.
- Ensure quality assurance / quality control (QA/QC) compliance.

Deliverables:

- Inspection reports
- Test certifications
- Readiness assessments

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Offshore Commissioning & Trial Mining Support

Where most deep-sea mining projects succeed or fail.

Responsibilities:

- Oversee:
  - Dry-dock integration
  - Offshore installation
  - Commissioning procedures
- Validate:
  - Equipment performance
  - Actual throughput vs. design throughput
  - Vessel integration
  - Material handling and ship-to-ship dynamics.
- Support trial mining campaigns
- Ensure data acquisition systems are functioning for performance validation.

Deliverables:

- Commissioning reports
- Performance validation metrics
- Operational readiness certification

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DRT Owner's Engineering Services

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Operational Readiness & Optimization

DRT transitions from project to production mindset.

Responsibilities:

- Develop:
  - Maintenance strategies
  - Spare parts philosophy (critical offshore constraint)
  - Life-cycle management
- Optimize:
  - Throughput rates
  - Equipment uptime
  - Total cost of ownership
- Implement digital monitoring / predictive maintenance frameworks.
- Benchmark performance vs design assumptions.

Deliverables:

- Operations manuals
- Reliability improvement plans
- KPI frameworks

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Risk Management & Independent Advisory

DRT is the owner's technical conscience.

Responsibilities:

- Maintain independent risk register.
- Identify:
  - Integration risks
  - Technology immaturity risks
  - Environmental/regulatory risks
- Provide go / no-go recommendations at key stage gates.
- Advise board/executives with unbiased technical opinions.
- Economic advisory

As a full-service specialty DSMC consulting firm, DRT provides a comprehensive suite of complementary services in support of emerging maritime markets, including floating offshore wind, offshore energy and offshore thermal energy conversion.

- Computational Fluid Dynamics, Finite Element Analysis, Fatigue Analysis, and Computational Modelling Analysis
- Lab Scale Testing and Prototyping
- Geotechnical, Marine, and Mechanical Design Services
- Permit and Application Preparation Services

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