Engineering AI Assistant

Structural, Offshore & Maritime Legal Teams

Date: February 2026

Author: ACE Engineer

Confidential

Engineering AI Assistant

Structural, Offshore & Maritime Legal Teams

Powered by large language model technology with deep offshore structural and maritime consulting context

---

Page 1 — What It Does

Engineering Areas Covered

Diffraction & Hydrodynamic Analysis

- Panel model setup — AQWA / WAMIT mesh conventions, symmetry planes, free surface
- RAO interpretation — peak periods, governing headings, cancellation frequencies
- QTF second-order loads — difference-frequency (mooring low-freq), sum-frequency (TLP springing)
- Newman's approximation guidance — when full QTF is required vs simplified approach
- Wave-to-structural load chain — governing sea state → combined load → structural utilisation flag

Fitness for Service — Plates & Shells (API 579-1 / ASME FFS-1)

- **General metal loss (Part 4/5)** — plate remaining strength: limit load vs pipe burst distinction
- **Shell distortions (Part 8)** — peaking, angular misalignment, out-of-roundness; buckling check
- **Crack-like flaws (Part 9)** — FAD approach (K_r vs L_r); BS 7910 Level 2B; fracture toughness
- **Remaining life** — Paris law crack growth, corrosion projection, re-inspection scheduling

Gulf of Alaska (GoA) Structural Analysis

- Seismic design — API RP 2EQ: platform period, base shear, OLE/CLE/ALE limit states
- Extreme metocean — 100-yr GoA wave/current/wind; Arctic ice loading (API RP 2N)
- GoA vs GoM comparison — seismic zones, ice constraints, environmental sensitivity
- BSEE GoA data — Cook Inlet lease activity, environmental study requirements, regulations

Maritime Legal & Casualty Consulting

- **Casualty investigation** — MAIB / NTSB / USCG report analysis; ISM Code non-conformity identification; root-cause taxonomy (equipment · human factors · weather · SMS)
- **Expert witness support** — structured technical report for admiralty proceedings; standard of care analysis; Daubert-compliant engineering opinion framing
- **Admiralty law interface** — COLREGs, Jones Act, Limitation of Liability, P&I Club process, Hague-Visby Rules, MLC 2006
- **Incident precedents** — statistical context from MAIB/NTSB incident databases: comparable casualties by vessel type, failure mode, operation phase

Sample Conversations

QUESTION	TIME: MANUAL	TIME: AI
"Assess RAO peak and governing heading for a 200m semi in 1,500m WD"	1–2 hr	10 min
"API 579-1 Part 9 crack assessment — 5mm crack in a plate butt weld"	4–8 hr	30 min
"What are GoA 100-yr wave conditions and how do they affect jacket design?"	2–4 hr	5 min
"Analyse this MAIB report — identify ISM Code failures and root causes"	3–6 hr	20 min
"Draft expert witness technical summary for a collision incident"	1–2 days	2–4 hr

Page 2 — Roadmap & Next Steps

Phased Deployment

```
┌──────────────────────────────────────────────────────────────┐
│  PHASE 1 — Desktop Q&A Demo          Week 1                  │
│  Live demo: diffraction · plate FFS · GoA · maritime legal   │
│  Cost: $0 additional · uses existing AI subscriptions        │
├──────────────────────────────────────────────────────────────┤
│  PHASE 2 — Microsoft Teams Chatbot   Weeks 2–4               │
│  Two bots: Structural/Offshore + Maritime Legal Consultant   │
│  In your existing Teams channels · conversation threading    │
│  Cost: ~$20–200/month · Azure Bot Service + Claude API       │
├──────────────────────────────────────────────────────────────┤
│  PHASE 3 — Document Intelligence     Months 2–3              │
│  Index project reports, inspection records, incident databases  │
│  "Find comparable FFS cases from our past projects" → instant   │
│  Cost: ~$500–2,000/month · RAG backend + document index      │
├──────────────────────────────────────────────────────────────┤
│  PHASE 4 — Engineering Review & QC   Months 4–6              │
│  Automated consistency checks across analysis deliverables   │
│  Case file cross-referencing for legal matters               │
│  Grows with every project and case added                     │
└──────────────────────────────────────────────────────────────┘
```

Gets Smarter Over Time

Unlike a generic AI tool, this assistant is discipline-specific from day one — and compounds in value with every engagement:

- **Phase 1 → 2**: Each demo question that stretches the system becomes the next knowledge update; the assistant improves after every session
- **Phase 2 → 3**: Once your project reports and case files are indexed, answers are grounded in *your* analysis history — not just published standards
- **Phase 3 → 4**: Repeated use encodes your team's preferred methods and lessons learned — including legal case precedents and incident taxonomy built from your own portfolio
- The longer it runs, the more precise it becomes: *"Find comparable ISM Code violations across our last five casualty cases"* becomes instantly answerable

What the AI Does Not Do

- Does not replace the structural engineer or maritime attorney

- Does not execute AQWA, SACS, or other engineering software directly
- Maritime legal outputs are engineering technical analysis only — not legal advice
- All engineering outputs carry a disclaimer: *preliminary/informational, requires qualified engineer verification*
- No proprietary project or case data stored without explicit setup

Expected Returns

METRIC	CURRENT	WITH AI	SAVING
Diffraction model setup review	2–4 hr	20–30 min	**85%**
Plate FFS Level 1 screening	2–4 hr	15–30 min	**85%**
MAIB/NTSB report analysis	3–6 hr	20–40 min	**88%**
Expert witness report draft	1–2 days	3–5 hr	**75%**
GoA regulatory data lookup	1–2 hr	5 min	**92%**

Pilot Proposal

1. **Week 1** — Live demo (30 min) with 3–5 real engineering + legal questions
2. **Week 2–3** — Pilot: structural team + legal/consulting team, real project questions
3. **Week 4** — ROI review · decision on Teams chatbot (2 bots: structural + maritime legal)
4. **Month 2+** — Full team rollout · incident database integration for legal practice

---

Engineering judgment and legal-technical interface — encoded and scalable. Structural expertise + maritime law context: the combination that differentiates.