Integrated Ballast & Trim Control System

You are not moving water. You are moving the centre of gravity.

ATTITUDE, NOT VOLUME

A ballast system exists to put the hull where it has to be - the draught it floats at, the trim fore and aft, the heel side to side. Every one of those is a statement about where the mass sits, not about how much water is aboard. The output is a stability condition, so the system is sized by how fast attitude must change and how precisely it must be held, not by litres per hour. Controllability at small flows is a requirement, not an accident.

THE HALF-FULL TANK IS THE DANGEROUS ONE

A full tank is stable and an empty tank is stable, because the mass is fixed where it is. A part-filled tank is neither: as the vessel heels the water runs to the low side, carrying the centre of gravity with it and reducing the righting effect just when it is needed. The free-surface loss depends on the shape of the surface rather than the weight of the water, and scales with its width cubed - so subdivision beats capacity. Centreline and swash bulkheads do more for stability than pumping power.

THE CONSOLE CONSTRAINS THE VALVES

Vessels are lost to mis-ballasting far more often than to mechanical failure, usually through a sequence of individually reasonable valve operations that leaves tanks in free communication. So the control layer holds the stability model, checks a commanded state against limits before anything opens, refuses those cross-connections, and fails to a safe state on loss of power or control air. In service the failure points are valves and level sensing, not pumps - so feedback must report what a valve IS, not what it was told to do.

THE SYSTEM

- Pumps, piping and sea connections - mains, branches, eductors, valve arrangement
- Valve actuation and feedback - measured position, manual override
- Level, draught and attitude sensing - with an independent check
- Control, stability and safety - console, model, limits, interlocks, fail-safe

VARIANTS

Surface vessel ballast control · Variable ballast for a submersible · Retrofit and re-control · Console and stability integration only

SCOPE

Ours: system design and integration, pump and piping arrangement, valve selection and remote actuation with position feedback, level, draught and attitude sensing, console and stability model with limits and interlocks, fail-safe behaviour, installation, commissioning, harbour and sea trials support, documentation, training, spares and AMC - including build to the customer's specification. Bought-in certified: ballast pumps, valves and actuators, level and draught transmitters, any treatment package. The customer's: the vessel, its tank arrangement, its loading conditions and its classification requirements.

STATUS

Engineered to order. Equipment of this class has been quoted across ballast and trim control requirements for a shipyard and an ocean technology institute; no delivered ballast control system is claimed.