

QUALITY IN COMMAND - SINCE 1937

CAESAR PROPULSION, STEERING AND MOTION CONTROL



KWANT CONTROLS

s n e e k - h o l l a n d

CAESAR CONTROL SYSTEM

The CAESAR range of hardware and software modules are dedicated to the control of ship surge, sway and yaw motions, as well as roll and pitch damping. The modules are designed to interface with a broad range of devices and prime movers for propulsion, steering and motion damping.

The CAESAR modules are configured in accordance with the customer needs, ranging from a single device to the full integration of all devices across the entire vessel. This enables control of a wide range of vessels. The high degree of adaptability to the mechanical design of the devices makes the CAESAR system well suitable for both retrofits and new building. Basic configurations of modules are available for the following ship's devices:

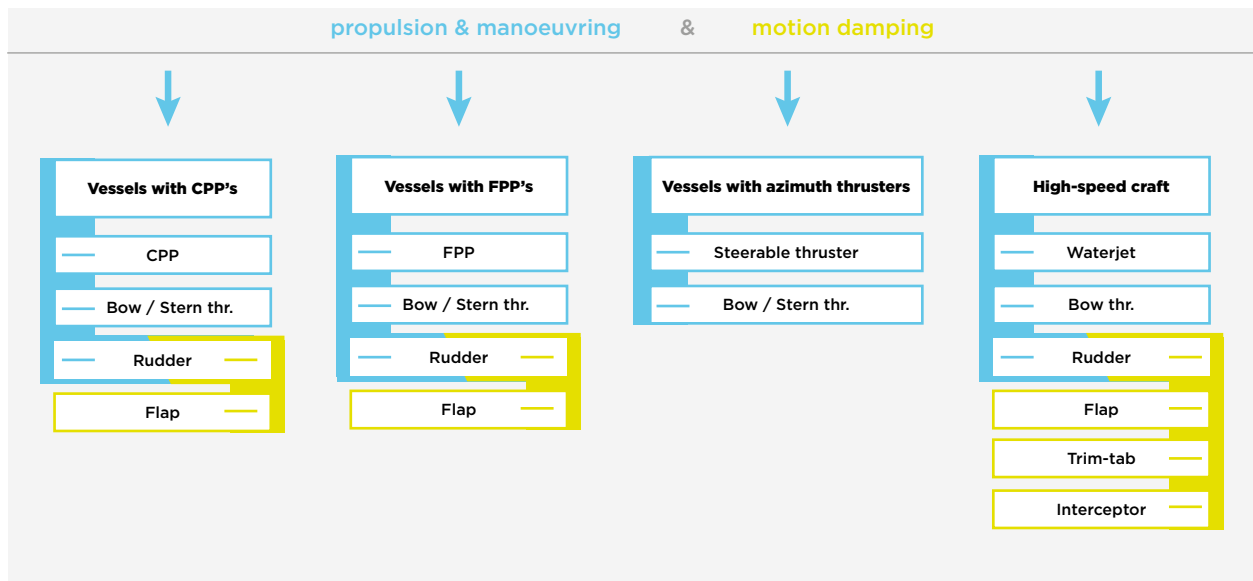
- CAESAR for typical CPP vessels propelled by controllable pitch propellers and steered by rudders with transverse thrust devices and flaps for roll damping.
- CAESAR for typical FPP vessels propelled by fixed pitch propellers and steered by rudders with transverse thrust devices and flaps for roll damping.

- CAESAR for Azimuth vessels propelled and steered by steerable thrusters with transverse thrust devices.
- CAESAR for high-speed crafts with waterjets and motion damping devices, such as T-foils and trim-tabs.

The vessel's propulsion drives may vary from diesel-engines to electric motors and can be extended with modules for battery hybrid and generator modes as well as for dual-fuel LNG diesel-engines.

The CAESAR design emphasises on:

- Achieving a high operational availability.
- Minimising the costs of fuel and emission.
- Ease of system adjustment and installation.
- Intuitive remote control, via displays and haptics, to ease the crew tasks.



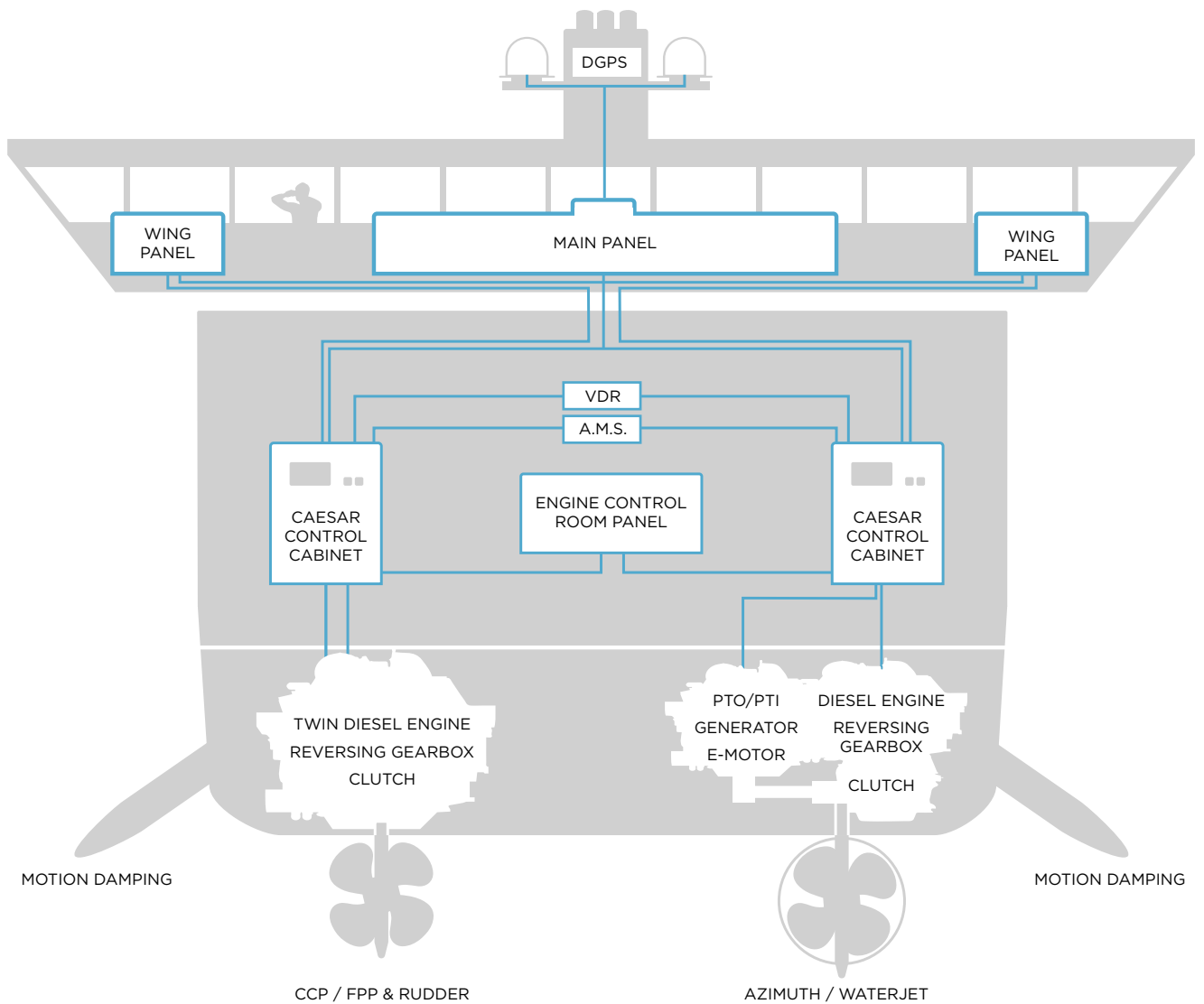
THE CAESAR CONTROL CONSISTS OF:

A typical CAESAR control cabinet contains two digital controllers: a main and back-up (NFU) controller. The main controller is used for lever follow-up (FU) control and supports various modes of operation, depending on the vessel's mission and device's machinery configuration. The backup controller contains basic backup control of the machinery to ensure control as long as possible under all circumstances. The CAESAR cabinet interfaces with machinery sensors and actuators.

Operator station(s) consist of remote control panels with levers and steering wheels in conjunction with the required functionality. The remote control panels are

customized to the owner's requirements, such that these easily fit in the available space. They interface with the CAESAR PCS cabinet either hardwired or by fieldbus (e.g. CAN / ETHERNET). For a retrofit, existing (hard) wiring can be reused. Typical components are:

- Remote control lever(s) & tillers for setting the thrust and /or steering demands
- Pushbuttons / indication lamps or jog-switches, for station-in-control transfer, mode selection, clutch-control, hydraulic pump control or NFU back-up control.
- Displays for human-machine interfaces.



QUALITY IN FLEXIBILITY

The CAESAR platform is built for a high degree of flexibility. The hardware is of a commercial-off-the-shelf brand, with a high reliability, a guaranteed future provision of spares (no obsolescence) and the possibility for an easy software upgrade in case of future requirements and/or future performance improvements.

The system design and execution include focus on commonality in relation with other Kwant Controls control systems with apparent benefits in operation, maintenance and spare parts management.

TECHNICAL GENERIC

The CAESAR concept has been developed as an independent platform, suitable for all types and brands of machinery devices for propulsion, steering and motion damping. Our specialist engineers design each control system by starting at the ship with its machinery devices while thinking from the perspective of the crew. This way we ensure that the control of the machinery is perfectly tailored to the needs of the crew and owner.

MAINTENANCE AND SERVICE

High reliability gives a high Mean-Time-Between-Failures (MTBF). Logging of abnormalities with related machinery and system states support a low Mean-Time-To-Repair (MTTR). In the event the crew needs specialist support as well as for performance monitoring, the option of remote access and data logging are part of the possibilities. Furthermore, the availability of spare parts avoids delays. The CAESAR concept is designed such that the operator technicians can easily maintain and adjust the on-board systems.

AVAILABLE CAESAR SYSTEMS

OPTIONAL CAESAR FEATURES

The basic CAESAR system can be extended with additional functions, such as:

DYNAMIC COMBINATOR FOR CPP'S

The dynamic combinator automatically adjusts the combinators for the stationary transit mode of operation by keeping the propeller thrust of the vessel, while the consumed mass fuel flow of the diesel-engines is minimised. Besides saving fuel and reducing exhaust emissions, the dynamic combinator gives far less pitch changes due to load-control actions in seaway, resulting in reduced wear and tear of the CPP pitch actuating mechanism.

CONTROL LEVERS STEERING TILLERS/WHEELS & JOYSTICKS

- Haptic feedback on basis of the particular vessel operation and machinery modes
- Emergency telegraph
- Conning displays for machinery states under CAESAR control
- Electric-shaft for automatic lever or wheel line-up

PROPULSION MODE SELECTION

- Automatic transition between the allowed modes of operation
- Starting and stopping of auxiliary pumps and valves for lubrication and cooling
- Advisory module in conjunction with modes of operation at conning display

EFFICIENCY MONITORING

- Regulatory MRV reporting
- Route analysis
- Verification of combinator curve

INTEGRATED MOTION CONTROL

Coordinated control of roll, yaw and surge gives overall fuel-savings. The CAESAR system can be extended with various options:

- Asymmetric thrust control, in case of twin-propellor or twin waterjet propulsion, to assist the steering by rudders or waterjet nozzles during auto-pilot mode of operation
- Monitoring of Motion Sickness Incidence and advising on optimum use of motion damping devices, such as flaps and T-foils

COORDINATED JOYSTICK (DPO - DP1)

Coordinated control from an X/Y joystick and yaw moment knob of bow-thrust, stern-thrust, rudders and main propulsion devices.



At early stage of the project, by functional specification the scope and system functions are defined. This forms the basis for our engineering process towards full flush simulation tests at our in-house test-facility.

Available CAESAR Control Systems for:

- Fixed Pitch Propellers
- Controllable Pitch Propellers
- Waterjets
- Rudders
- Azimuth/Steerable thrusters
- Transverse thrusters
- Motion damping

Please ask us for possibilities.

OUR CERTIFICATES

