



# Wind Farm Service Vessel - SeaStream\* DP Special Functions

GE, a global leader in the delivery of wind farm projects and infrastructure, has first-hand experience of the wind farm power generation and maintenance business. GE's latest generation of SeaStream\* Dynamic Positioning (DP) brings that experience to life to maximise efficiency and operational effectiveness within the challenging environment of the offshore wind farm.

GE's SeaStream\* DP functions for wind farm service vessels enables:

- **Efficient and rapid movement** between individual wind turbines
- **Effective planning of moves/transitions** from turbine to turbine
- **Clear and unambiguous information exchange** between marine crew and planning crew
- **Planning station integrated** into the DP display (option for standalone planning station)
- **Early gangway deployment**
- **Rapid establishment of stable DP control** at each new destination. Minimum time taken to become fully operational with gangway deployed
- **Effective Dynamic Position control** throughout the process of gangway deployment, use and recovery.

## Efficient and reliable

Overall operational efficiency is supported by reducing the time taken to move between individual wind turbines and to establish full stable DP control at the new location:

### PLANNING

- The location of each wind turbine is pre-entered in the DP system software on the planning page. The DP operator can select/de-select a view of the entire wind farm turbine array on the DP screen for planning and operations.
- If preferred a separate, stand -alone, planning station can be provided.
- The DP operator interacts with the touch screen to select individual waypoints and their sequence. The selected waypoint sequence defines the route (vessel track) for the transit move.

### POSITION MOVES – FAST AND EFFICIENT

- Transit waypoints are permanently held (in their inactive state unless selected by the DP operator) and displayed at a diagonal mid-point between each 'set' of 4 wind turbines.



- The vessel is moved through an operator selected series of transit waypoints.
- On arrival at the selected transit waypoint point the vessel is smoothly moved to the destination waypoint alongside the chosen wind turbine
- Progression through transit waypoints and to the destination waypoint uses the DP functionality to accelerate the vessel along the track within a range of pre-set speeds. Where possible the DP tracking process employs all available thrusters such that the vessel progress is controlled as a fully 3 axis move (equivalent to Auto Track). Where vessel speed exceeds a predetermined speed at which bow tunnel thrusters become ineffective the DP system controls vessel progress along the track using main propulsion thrusters (equivalent to Auto Sail).
- At a predetermined distance from the new location the vessel speed is ramped down and the bow thrusters are again used to establish full 3 axis control prior to arrival at the waypoint.
- Transitions between control philosophies are, wherever reasonable, managed automatically without additional operator intervention.

#### EFFECTIVE DP - GANGWAY CONNECTED

- At a pre-selected distance from the selected destination waypoint the DP system initiates a command to the gangway operator signalling that early deployment of the gangway can begin.
- On arrival at the new location the GE's Fast Learn function is activated to assist with the rapid settling into a stationary DP state (position and heading). Fast Learn significantly reduces time taken to establish stable DP control.
- The gangway movements (elevation, azimuth and extension) are monitored and input to the DP controller for position keeping.

### Gangway Interface

Analogue Interface (4-20 mA):

- Gangway azimuth (horizontal plane)
- Gangway Elevation (vertical plane)
- Gangway Extension
- Gangway force

Digital Interface:

- Gangway connected

### Position Measuring Equipment

Position measuring systems choices significantly impact vessel operational effectiveness and efficiency as well as system capital costs.

Examples of position measuring systems that can be considered are:

- GNSS/DGNSS
- Laser (multiple target, single target and zero target variants)
- Radar (target versions and zero target variants)
- Doppler velocity log

## Wind Farm Service Vessel SeaStream<sup>®</sup> Dynamic Positioning Special Features

#### GENERAL

- Latest SeaStream<sup>®</sup> model
- Mariner friendly for efficient operations

#### PLANNING FUNCTIONS

- Wind farm set up manually or via serial data
- Operator view of the entire wind farm
- Predetermined waypoints
- Operator selection of waypoint transit sequence
- Integrated planning station (option for standalone planning station)

#### POSITION MOVES

- Smooth transition between waypoints
- Ramped acceleration and slow down

#### GANGWAY CONNECTED

- Gangway interfaced to DP (elevation, azimuth, extension and force)
- Fast Learn function for rapid establishment of stable DP control



To find out more about GE's Wind Farm Service Vessel - SeaStream<sup>®</sup> DP Special Functions, please contact:

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