CTruk 20T MPC.

Created for Vessel

Vessel No. 014

Principle Particulars (approx)

Length Overall	18.5m
Beam Overall	6.1m
Draft Light ship	0.86m
Draft Carrying 20T	1.25m
Total Fuel Capacity	16,000ltr
Displacement	24,000Kg
Complement (total)	<14pax
Cargo capacity	20,000Kg
Range	1,200nm

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INTRODUCTION

The CTruk 20T MPC is to be built by CTruk Boats Limited.

This design has been especially prepared to suit the requirements for a large sea kindly Wind farm vessel to not only carry maintenance technicians out to wind farm sites but by use of its patent applied deck pod attachment system, reconfigure, to apply itself as:

- Fuelling vessel – 16 Tonnes fuel capacity.
- Rescue vessel - using the 'Argo cat' amphibious rescue craft
- Mammal watching and research – raised viewing pod
- Survey with moon pool attachment
- Large lift HIAB Pod and Carry up to 20 tonnes on deck (enough deck space for 20' container)
- Dive support vessel.
- 12 person passenger pod with work shop pod or accommodation pod for 24hour operations.

The design utilises the flexibility proven on CTruk Advance.

The design 'drivers' have been:-

- Minimise risks when transferring personnel to the towers
- Increase fuel efficiency saving substantial operators costs
- 12 passenger seats + 2 crew

- Increase versatility to satisfy the multiple demands for wind farm construction.
- 25 to 28 knots sea speed
- Main structure designed to meet DNV 1A1 HSLC R2 B Crew boat
- Designed to meet SCV Cat 2
- Designed to meet DNV 1A1 HSLC R2 Wind Farm Service MCA Category 2
- Designed with the proven wheelhouse passenger pod arrangements as on CTruk Advance
- Using the proven propulsion package as on CTruk Advance and CWind Asherah
- Designed to take the ground
- Composite hulls and Bridge deck
- Intact stability to meet SCV Cat 2 carrying 20 tonne deck cargo, wheelhouse and 2 crew mode. Cargo distributed at 1 tonne per sq m.

SECTION A - GENERAL DESCRIPTION

GENERAL DESCRIPTION AND CLASSIFICATION

Dimensions

Length overall	18.5m
Length waterline	15.8m
Beam overall	6.1m
Draught (approx.)	0.86m
Displacement	23 tonne approximately lightship

Speeds

At a full load displacement on trials with clean hull on a GPS measured distance in deep calm water and wind speeds of less than Beaufort Force 4 with twin Cummins diesels each 610mhp at 2300 RPM :-

Speed at 100% MCR	28 Knots
Speed at 75% MCR	25 Knots

Full load displacement defined as the boat fully fitted out to this Specification together with 1.5 tonne fuel, Wheelhouse pod, and full water 2 crew and passenger pod with 12 passengers/baggage each at 100kg plus 100kg stores.

Endurance

Fuel capacity	Total 16,000 litres in two tanks
FW Capacity	345 litres in one tank in passenger pod
Main engines max fuel consumption	232 litres/hour

Stability

DNV 1A1 HSLC R2 Wind Farm Service MCA Category 2

Noise

Measures to reduce the noise level in all accommodation and operational spaces include:

Resiliently mounted main engines.

Water injection on the main engine exhausts.

Patent applied deck/wheelhouse joining system.

Noise levels in the pods at cruising speed are anticipated to be less than those of the HSC Code 65 dbA .

Variations

In order to overcome any unavoidable shortages or delays, variations in material or method may be made to this specification provided that the substituted material or method is of at least equivalent quality, fulfils all other requirements of this specification and that no extra charge is made. Any changes specification must first be approved by the Owner's representative.

SECTION B – STRUCTURAL ARRANGEMENT

HULL FABRICATION

General Description

The hulls and bulkheads from composite construction using resin infusion. Using composite topsides and single laminate Kevlar reinforced stem for collision robustness.
Bridge deck and bulwarks are from composite construction
Bulwarks are of composite construction. . The hulls and deck are bonded together.

The highly efficient hull design is the result of in-depth research, development and tank testing. Benefits include fine entry and smooth lines for efficiency, high bridge deck clearance for comfort, increase volume forward to minimise bow diving and large spray rail for better visibility and ride in heavy weather.

The hulls are to be finish with a high grade iso/neo Gel coat and two coats of Antifoul below the waterline

All materials used in construction have DNV approval

Adequate limber holes are included throughout the hulls to bilge water to drain.

Fuel is contained at midships in integral tanks in the hulls to reduced trim/ fuel load changes

DECKHOUSE PODS

Composite construction in resin infused GRP / HD foam core, supported by our proven, patent applied deck configuration.

The aluminium deck attachments locate the alloy box frame web which is separated by high density rubber for acoustic sound and vibration proofing. Each pod is then fastened to the deck by up to 16 M16 Stainless bolts which locate the extrusion inserts which are load tested to 1 tonnes each.

The Pods are design to be able to be moved and located to any of the 12 positions on deck.

Boarding gates

Double opening boarding gateways are provided at ship side port and starboard with sufficient space for SB rescue system.

Mast

The main mast is of aluminium extrusion supported by angled supports. The mast is bolted and hinged at its base to enable it to be lowered and taken away for purposes of refits in sheds.

Windows and Port lights

Windows are fitted in the wheelhouse as shown on the GA including aft facing windows. All windows are of fixed pattern and constructed in clear toughened glass bonded to the superstructure.

Pantograph wipers and fresh water washers are fitted to all forward windows.

Window demisting is fitted on windows via electrically heated windows.

VENTILATION AND HEATING

Machinery Rooms

Inlets fitted with suitable filters to remove salt water spray are provided for the machinery rooms. The inlets are fitted with stainless steel fire flaps. 24v Engine room fans are fitted

Heating & Ventilation

Warm air heating via glycol/ heat exchange from the main engines. 240 volt of air conditioning. Heated forward windows.

WEATHERTIGHT DOORS, HATCHES AND LADDERS

Doors

Weather tight doors in pods are of double skin construction with three securing clips and manufactured from Carbon composite. The ship is capable of being secured from outside to prevent unlawful entry.

- 1 Extra Door to be put in forward wheelhouse on this vessel

Deck Hatches

Flush (Seatite) watertight aluminium hatches are fitted on the main deck.

ACCOMMODATION LININGS AND INSULATION

Thermal Insulation

Insulation in the pods is provided by the sandwich construction.

ACCOMMODATION OUTFIT

General

As shown on the GA. Seating for the passengers comprises upholstered suspension seats with arm rests and lap belts.

Lighting will be proved for day and night operations using Soft white and Red LED lighting throughout the boat.

8 x2 240v outlets will be provided throughout the accommodation.

2 x DVD/Digital TV will be provided with inputs from on board nav plotters and CCTV to allow passengers to see onboard operations.

Internet via WIFI throughout the vessel

The WC is fitted with waterproof lighting and switches to allow easy washing out.

Floor coverings comprise non-slip vinyl sheeting covered by foam floor for added sound insulation and safety.

Wheelhouse

The Wheelhouse houses a crew changing area with settee and storages compartment that will double up as an emergency stretcher area. In the centre is the raised helms position which centres the control systems and air suspension seat. To port fwd is a galley area fitted with sink with fresh water tap, 240vdc (Quooker) hot water boiler, micro wave oven/grill, fridge and stowage drawers. Forward on the stb side is the air suspension crew seat which faces desk and shelving / storage units with access to deck alongside.

The helm benefits' from 360 degree views with windows above for tower and lifting operations. Top windows tinted

WC

The WC with hand wash basin and access from aft of wheelhouse deck. The WC is gel finished with electric flush Leesan toilet and holding tank. The WC floor is drained to deck for easy cleaning.

Deck Locker.

In front of toilet is a Deck locker with access from port side. The Deck locker covers the loom access area below. Power and water outlet situated here.

ENGINE ROOM OUTFIT

Soles

Fibre glass grating provides easier access. All hull areas flow coated

Insulation

The fire insulation over the ER hull surfaces meets MCA requirements

INTERNAL FIRE PROTECTION SYSTEM

Fire Fighting

Single shot FM200 fixed gas drenching fire extinguishing equipment is fitted for each engine room for extinguishing fires. Manual release control is provided on deck. The bottles are fitted in the ERs.

The vessel is also fitted with an electric portable bilge pump, portable fire extinguishers are also found in the wheel house lobby and passenger pods

Fire Detection

Detection by means of smoke and heat probes are provided in the machinery rooms and displayed on Skipper's control panel and audible alarm in engine room.

FRESH WATER SYSTEM

Pressurised cold and hot fresh water is supplied to WC, galley and cold water to deck fitting by means of an automatic 24 volt pressure set with accumulator and heat exchange on port main engine..

SANITARY SYSTEM

A marine Leesan toilet is fitted fresh water electric flushing to a 150 litre black tank with gauge and optional through hull fitting

The black water tank can be discharged to a deck shore connection point or overboard by a macerator pump of 22 L/min capacity.

The toilet spaces are fitted with hooks, mirror, paper holders etc as required.

PAINTING

General

All composites are finished in a high grade iso / neo gelcoat.

Hulls are finished in Two coats of antifoul

External decks are coated with heavy duty non-slip adhesive strips.

Markings

Draft marks on port and starboard at midships, forward and aft.

The name and registration port are painted to customer's instructions.

GROUND TACKLE

Anchor and Cable

One galvanised HHP anchor is stowed forward in a trough. A short length Galvanised short link chain cable is provided with nylon warp wound on an electrically powered drum. All to MCA requirements.

Kedge anchor also supplied to MCA requirements.

Anchor Winch

Situated on the foredeck, 24 volt windlass.

Fendering

100mm D section.

The Wind farm personnel transfer bow is the Patent applied 'VollKorf' design , made from aluminium structure protected with150mm 'd' section fendering

LIFESAVING EQUIPMENT

1 off Class A Transas AIS transponder and receiver interfaced with Simrad chart plotter

1 off Sea Marshall crew finder system with PLB for two crew

4 off Cameras in various areas providing output to wheelhouse monitor/recorder.

2 off Crew PPE including survival suit, hard hat, protective gloves/glasses and high vis - jacket.

2 off 30" Man over board quick release life buoy with light marked with ships name and port of registry.

1 off Medical kit category 'C'

1 off Table of distress signals

1 off Bridge pyrotechnics (12 rockets) complete in a container.

1 off Life jacket donning instructions

14 off Crew life jackets for >30kg with light and reflective tape

2 off Canopied Life raft 8 man with 'MCA' pack in GRP canister complete with stainless launching cradle and bowsing equipment.

1 off SB MOB system with davit and deck socket

1 off Hand held VHF

1 off Binoculars 7 x 50

LOOSE EQUIPMENT

Mooring & Towing Warps

- To MCA requirements.

SECTION C - MACHINERY ARRANGEMENT

MAIN ENGINES

General

The machinery is installed according to the manufacturer's requirements on resilient mounts supported by reinforced composite beams.

Main Engines

Twin Cummins marine diesels each rated at 610 mhp at 2300 RPM intermittent rating.

2 off 24 volts, AGM battery banks are fitted one per engine room for engine starting which are re-charged by 2 x engine driven alternators. Paralleling is available for flat battery situations. Battery link boxes complete with Isolating Switches and Indicator Lamps are provided for each bank of starting batteries.

Main Gearboxes

Flange mounted marine reduction gearboxes suited to jet drives.

A Centa carden prop shaft with rubber tied couplings connects gearbox to Jet

MAIN ENGINE COOLING SYSTEM

Main engine and gearboxes are heat exchange cooled taking sea water from individual sea inlet valves and strainers.

EXHAUST SYSTEMS

Propulsion engines – water injected, exhaust discharging through the inner hulls via Halyard silencers. Exhausts are fitted with temperature alarms for run dry early warning.

GENERATOR

1 X Beta marine 10 KW (1500rpm) 50 Hz with separate water inlet and secondary fuel filtration.

ENGINE FUEL SYSTEM

Fuel is drawn directly from the two fuel tanks. Emergency shut-off valves are operated from outside the engine room. All fuel lines are in seamless steel incorporating in-line, combined water separators/filters (Duplex) with water in fuel alarms.

Fittings/joints are flanged compression/screwed as appropriate.

All tank contents gauges read in the wheelhouse.

A deck supply pipe enables the fuelling pod to take fuel for wind farm uses.

MAIN ENGINE CONTROLS AND MONITORING

Rolls Royce joystick controls and monitoring is fitted at the helmsman's position. A remote control station is also fitted to assist a MOB operation. A wandering lead arrangement is used..

Standard Cummins engine start/stop and monitoring is also fitted.

The engine local control panels also contain all switches, gauges, instruments and control logic to allow stand-alone operation of their respective engine and gear box.

STERNGEAR

Twin Rolls Royce FF41 water jets are fitted

Back up control is fitted in the wheelhouse together with emergency control in the aft peak.

BILGE, FIRE & DECKWASH

Sea Water and Bilge Pumping System all to MCA Requirements

Individual electric bilge pumps are fitted, one for each watertight compartment all controlled from the wheelhouse. The ER pumps are arranged to discharge either to shore or overboard in an emergency.

SECTION D - ELECTRICAL ARRANGEMENT

DC SYSTEM INCLUDING BATTERIES

The DC system comprises:

- 1 off 24 volt DC Victron Phoenix Chargers/Inverter 240v/3000W with wheelhouse control
- 1 off DC System Battery Bank in each engine room
- 1 off DC Switchboard in each ER
- DC Distribution Boards

Normal Operation

During normal operation DC services are maintained by the engine alternators.

General

AGM Batteries are of sufficient capacity to maintain essential DC services to MCA requirements.

Distribution to final sub-circuits is from conveniently positioned distribution boards (DB) in the wheelhouse. Each DB contains a combination of miniature circuit breakers (MCB's) individually rated to take the full load current of the total connected load.

The wheelhouse will be supplied with 240vac and the deck with 110vac via roaming transformer.

LIGHTING

Red lighting is provided in the wheelhouse and passenger area.

One 24 volt searchlight is fitted. Remote control facility in the wheelhouse is provided.

Floodlights are fitted for all deck areas.

Sockets

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The wheelhouse will each have 8 x 2 240v ac outlets and 1 x 24v dc outlets

Navigation Lights

Navigation lights compliant with the international Col Regs are fitted. The navigation lights are supplied by way of a navigation light control panel in the wheelhouse

Visual alarms are included for supply and lamp failures.

The control panel includes a simple line diagram of the navigation lights complete with dimmable indicators. In addition Lamp test, alarm accept, switches and individual protection for each circuit is supplied.

The scope of the navigation lights includes :

- Port Side Light
- Starboard Side Light
- Stern Light
- Masthead Light
- Anchor Light
- NUC Lights

SECTION E - NAVIGATIONAL & COMMUNICATIONS ARRANGEMENT

NAVIGATION AND COMMUNICATIONS ARRANGEMENTS

The navigation equipment installed complies with MCA Cat 2 requirements and consists of the following:

- Radio Battery Bank, 24 volt, 102 Ah
- Radar two off Simrad, one broadband and one pulse radar
- Colour echo sounder
- Fluxgate compass
- Autopilot

SECTION F - CABLES AND CATHODIC PROTECTION

GENERAL ELECTRICAL ITEMS

General

Ship's wiring is to MCA requirements.

Cables are rated and installed generally in accordance with MCA requirements.

CATHODIC PROTECTION

The jet units are fitted with anodes for their protection.

Main engines are fitted with anodes for their protection.

SECTION G - TRIALS

General

Two sets of trials are carried out; basin trials and sea trials. Before the trials are conducted a Trials Programme and Trial Requirement Forms are written by the designers laying down the procedure for each basin and sea trial.

Harbour Trials

These include:

1. Bilge system
2. Water hose leak test
3. Ventilation/ heating
4. Inclining Experiment (First of class only) Remaining craft lightship check.
5. Fresh water system
6. Electrical functioning trials
7. Alarms and indicators
8. Main engine, gearbox and jet functioning

Sea Trials

Sea Trials include.

1. Progressive speed trials including measurement of fuel consumption.
2. Maximum speed trial.
3. Anchor trial
4. Electronics functioning
5. Turning circles
6. Short progressive trial on one main engine.
7. Noise measurement - internal.
8. Navigational systems
9. Astern trial

SECTION H - DOCUMENTATION

BOOKS & MANUALS

Copies of operation & maintenance handbook, which includes all manufacturers' equipment handbooks.

Copy of Trial Book.

Stability book.

DRAWINGS

Three copies of the following as-fitted drawings and one version on CD are to be supplied upon delivery of the craft:

a) General Arrangement

b) Bilge Diagrammatics

c) Heating and Ventilation Details

d) Electrical Circuit Diagrams

e) Fuel System Diagrammatic

f) Fire Fighting Details

g) Skin Fittings

h) Engine Cooling System Diagrammatic

l) Machinery Seating Plan

Delivery

The vessel is to be handed over afloat at Brightlingsea with 500 litres of fuel, all compartments clean and dry and all defects reported prior to acceptance corrected.

Guarantee

CTruk Boats Ltd Guarantees the vessel for a period of 12 months from the date of acceptance of the vessel. The builder has to be responsible for:

Any weakness, deficiency, deterioration of materials or workmanship as set out in this specification.

The builder shall not be liable for damage resulting from misuse of machinery or equipment.