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N. 1 Mobile Straddle Transporter MST 60T

TECHNICAL SPECIFICATIONS



Drawings: ST.1705.00.1.MST
ST.1705.00.1.MST-A
ST.1705.00.1.MST-B

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All of fabrication will be done in Italy, which will ensure a careful and day-by-day control and verification that the fabrication material and level correspond to the highest quality standards.



1. GENERAL TECHNICAL CHARACTERISTICS

1.1. TECHNICAL CHARACTERISTICS

• Max capacity	:	60	ton
• Max capacity under 49,6 m spreader (included)	:	22 (11+11)	ton
• Clear inner width	:	approx.	16500 mm
• Track	:		18000 mm
• Max width at the base (with command cabin)	:	approx.	19900
• Gauge	:		18000 mm
• Max length at the base	:	approx.	20100 mm
• Lifting travel	:		14500 mm
• Clear spacing under spreader beam	:		14500 mm
• Total height	:		19500 mm
• Groups of steering wheels	:		n° 4
• Industrial tyres	:		n°8 - 18.00x25
• Inflation pressure	:	(10 BAR)	10 kg/cm ²
• Max load (reaction) on ground for each tire	:		22,5 ton
• Winches synchronized and independent	:		n° 2
• Lifting points	:		n° 2
• Max displacement of the trolleys along the upper beams	:		± 5400 mm
• Lifting speed (step less motion)	:	laden	0÷2,8 m/min.
	:	unladen	0÷5,6 m/min.
• Travelling speed (step less motion)	:	laden	0÷30 m/min.
	:	unladen	0÷60 m/min.
• Spreader beam with 2 trolleys	:		included
• Max capacity of each spreader's trolley	:		11,0 ton
• Max distance between the spreader trolleys	:		49000 mm
• Min distance between the spreader trolleys	:		29000 mm
• Max load eccentricity (under spreader) with max load 22 ton	:		± 3000 mm
• Max load eccentricity (under spreader) with load 18,5	:		± 4000 mm
• Max load eccentricity (under spreader) with load 17,1	:		± 5500 mm
• Affordable slope (at full load)	:		3%
• Diesel engine brand IVECO FTP (Italy) or similar, Tier 3 / Step IIIA	:		94 kW
	:		126 HP
• Sound-proofed thermic group	:		included
• Hydraulic pumps with variable cubic capacity	:		with piston
• Capacity of the fuel tank	:		250 litres
• Closed cabin with air conditioner and stairs (commands via the remote control)	:		included
• Remote control + emergency power strip (with wire) + emergency proportional hydraulic distributors brand DANFOSS	:		included
• Capacity of the hydraulic circuit oil tank	:		350 litres
• Operation temperature range	:		-10 to +40 °C
• Estimated weight of the MST with spreader	:		98 ton

Note: The powers detailed above may be subject to changes at final design stage.

2. DETAILED DESCRIPTION OF THE CONSTITUENT ELEMENTS

2.1. STRUCTURE

It consists of two upper transversal beams, two lower longitudinal beams - where the displacement components are mounted (wheel groups) – and four legs connecting the lower and the upper structure. The steel frame is made up of electric welded framework structures provided with diaphragms and longitudinal reinforcements in order to absorb and compensate the torsion and the support reactions made by the blocks.

Ultrasound tests (UT) and Radiographic tests (RT) will be made to guarantee that there is no risk of flake for the sheets of the various connection slabs.

The bolt connections are placed near the parts where there is the maximum stress.

The thermic power group is connected to the lower longitudinal beams.

The structures are made of steel grade S355.

The bolts for the non-structural connection are in galvanized steel, while the structural bolts are in non-galvanized steel. All will be carefully painted after tightening on site.



2.2. WHEEL GROUPS

The travelling system of the machine consists of n° 8 wheels, two wheels for each of the 4 corners. The wheels are mounted on hubs (free and powered hubs) with bearings made of double conical rollers that can support both the radial and the axial load.

The characteristics of the wheel groups are the following:

▪ tyres	:	18.00x25 (n° 8)	OTR brand new
▪ rims	:	25.13 / 2,5"	MAI SPA (Italy)
▪ bearings (free hubs) with conical and barrel rollers	:		SKF (Sweden) or ROLLWAY (Belgium)
▪ Inflation pressure	:	10	kg/cm ²

On each wheel group, there is a mushroom red button to stop the machine during emergency situations. Moreover, there are revolving lights and acoustic signals that are put into action when the machine is at work.

Besides, on the front of each wheel protection there is, at man's height, a safety barrier with micro-switch that causes the machine to halt in case the barrier touches persons and/or other obstacles.



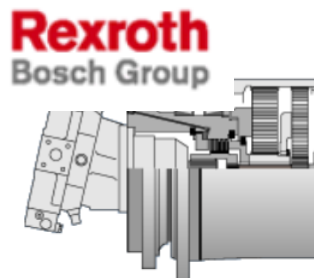
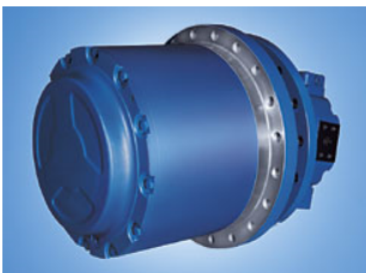
2.3. MACHINE'S TRAVELLING

The translation is made by n° 4 planetary reduction gears mounted on the four driving wheels (four wheels out of eight are motorized). Such motorization permits climbing a max slope up to 3% under the max load. On the gear axes it is assembled a piston axial engine, while between the reduction gear and the engine there is the negative parking brake.

This negative parking brake is actioned by the absence of pressure feeding in order to guarantee the maximum safety even when the engine is not at work

On the reduction gear output, in the axis, there is the connection with the rim and with the tyre.

Planetary Gearboxes for Mobile Equipment
Travel Drives HYDROTRAC GFT



For travel drives in tracked and wheeled vehicles
Also suitable for other applications, e.g. rotary motion sequences, drum drives, milling drum drives etc.

- Compact two-, three- or four-stage planetary gearboxes
- Cageless planetary gear bearing
- Robust main bearing
- Optimized seals
- Integr. multi-disc parking brake
- Low-noise operation

Motorization data		
- Hydraulic engine	:	BOSCH-REXROTH (Germany)
- Negative parking brake	:	BOSCH-REXROTH (Germany)
- Planetary reduction gear	:	GFT Series - BOSCH-REXROTH (Germany)

2.3.1. TRANSLATION - HYDRAULIC CIRCUIT

To make it possible the machine displacement there is a hydraulic system in closed circuit.

The circuit is kept under continuous pressure by a feeding pump, which is incorporated in the main pump and compensates the losses from the circuit.

Thanks to this system, the starting and the stopping can be properly adjusted by means of a joystick on the remote control that moves the pump plate, guaranteeing a slow and graduated variation of the displacement speed.

When the joystick is released by the operator it goes in the neutral position (the central one) and the machine gradually stops.

Displacement data		
- Pump with variable cubic capacity	:	BOSCH-REXROTH (Germany)
- Block of the max valves and oil change	:	incorporated in the main pumps
- Feeding pump	:	with gears, incorporated in the main pump
- Aspiration filter	:	by means of two elements in order to guarantee high filtering capacity (10 micron) on the feeding pump aspiration

2.3.2. TRANSLATION - BRAKING SYSTEM

The translation system is provided with two blocking systems:

a) **SERVICE BRAKE**

This kind of brake is included in the type of hydrostatic transmission that is used for the starting of hydraulic engines.

b) **PARKING BRAKE**

The parking brake is installed between the hydraulic engine and the reduction gear.

It is sized to make the machine stay in its position when it has to climb the maximum slope. Moreover, it is studied to compensate the wind stress on the machine during all the possible working conditions.

2.3.3. SPECIAL STEERING ON ALL 4 WHEELS GROUPS

The machine is provided with 4 steering wheel groups.

The rotation is achieved by special powered slew drivers, duly sized to support the various stresses along both the longitudinal and the horizontal direction.

Steering data		
- Powered slew drives	:	IMO (Germany)
Note: the special steering system installed in the machine guarantee an excellent manoeuvrability of the machine		

During the steering the rotation of the wheel is controlled by a position sensor and is then processed by a PLC microprocessor. The PLC microprocessor automatically commands the various steering degrees, always guaranteeing the most suitable working conditions and avoiding every possible sideslip.

The possible steering combination options are:

- On all four groups
- On the front wheels groups
- On the rear wheels groups
- “Carousel” steering (360° all around steering)
- At 90° directional $\pm 10^\circ$
- “Slanting” (crab steering) from 0° to 90°



Picture 1 - Steering on all four groups



Picture 2 - At 90° directional $\pm 10^\circ$



Picture 3 - “Carousel steering”



Picture 4 - “Crab” steering

As there are no rollers but completely closed slew drives, there is minimum breakings and very few maintenance needs.

This specific kind of slew drivers does not require any manual alignment of the wheel because the wheel zero position (alignment) is automatically done thanks to the supervision system.

This system, that has been properly tested and arranged by Cimolai Technology, gives the machine an excellent manoeuvrability, even when there are small working areas available.

The slew drives consist of a ring gear with n° 2 special endless screws that are activated by hydraulic engines.



The whole system is supported by special bearings with high resistance and is completely housed. All the elements work in grease bath. All the components have been studied to guarantee the correct operation in the long run.

This system, that is being used in our machines for a long time, has been further implemented by electro-hydraulic systems that make it possible to verify, in real time, the working of the components and check the stress on each slew drive during the steering (also when the machine is completed loaded), protecting the slew drives in case of anomalous stresses.

The supervision system developed by Cimolai Technology is controlled by a micro-processor, which automatically controls the working pressure of the hydraulic motors that activates the slew drives and, if necessary, adjusts the parameters of the steering kinematics making it possible to achieve the optimal working conditions for the machine. Such a continuous check provides the machine with a smooth steering in each condition, guaranteeing the maintenance of the components during the time.



2.4. LIFTING

2.4.1. WINCH

The winch consists of a grooved drum around which the cables are spooled.

The drum is supported by a turning axis on which there are the bearings for the rotation.

On the same drum axes, there is not only the hydraulic engine but also an epicyclical reduction gear with cylindrical gears in oil bath.

Between the engine and the reduction gear there is a negative type friction disc. A screw limit switch enables to stop the movements in the extreme points of the hoist.

There two winches placed along the lower longitudinal beam. The winches are easily accessible by means of stairs. Around the big drums of the winches there are no more than 2 layers of cable in order to ensure an always correct spooling of the cable and avoid any anomalous overlapping or dangerous damage.

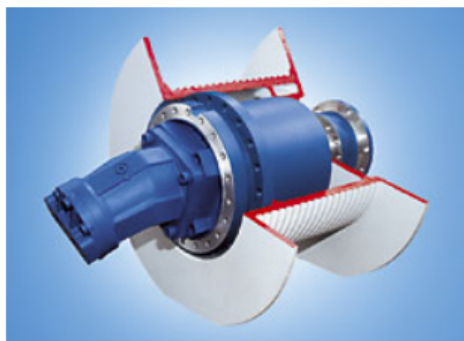
From the winch depart one rope, which is returned to the lifting block trolley/s.



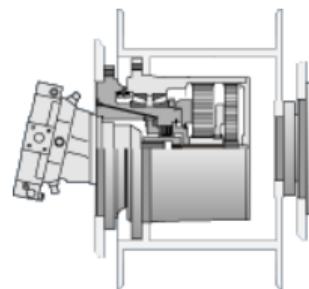
Winches data

- Cable with 277 wires with high resistance	: TREFILEUROPE ARCELOR (France) or similar
- Diameter	: 20 mm
- Type	: Complast 9 – 358 wires, 9x26 WSRP - FW with parallel metallic core – compacted strands
- Number of cable bearing parts	: 4
- Guaranteed breaking load	: R=37940 kg.
- Safety factor	: > 5
- Number of winding layers on the grooved drum	: Max. 2
- Epicyclical reduction gear	: LOHMANN-REXROTH (Germany)
- Hydraulic engine	: REXROTH (Germany)
- Built-in friction disc brake	: LOHMANN-REXROTH (Germany)
- Limit switch	: STROMAG (Germany)

Planetary Gearboxes for Mobile Equipment
Winch Drives MOBILEX GFT-W



Rexroth
Bosch Group



For installation in the winch drum of all kinds of hoisting gear, e.g. in mobile and crawler cranes, in railway cranes, in deck-, harbor and container cranes.

- Compact two- or three-stage planetary gearboxes
- Robust bearing to accommodate the rope pull force
- Cageless planetary gear bearing
- Optimized seals
- Low-noise operation

2.4.2. HYDRAULIC PLANT FOR WINCHES FEEDING

The lifting winches are fed by a hydraulic pump with variable cubic capacity that works on the compensated distributors. The distributors guarantee a perfect synchronism of the winches.

Each winch is provided with an independent distributor with its own max pressure valve.

The commands are processed by the remote control and are executed by “alive man” joysticks.

The winches can be simultaneously or singularly commanded: it enables the perfect balancing of the spreader.

The descent movement is controlled by a counter-balance which is commanded by the oil pressure that will feed the engine during the descent operations.

Data of the hydraulic plant for winches feeding

- Piston pumps	: SAUER (USA) REXROTH (Germany)
- Hydraulic piston motors	: REXROTH (Germany)
- Distributors	: DANFOSS (Denmark)
- Electro-valves	: BOSCH-REXROTH (Germany)

2.4.3. LIFTING BRAKE SYSTEMS

Each winch is provided with a service brake installed between the hydraulic engine and the reduction gear (the brake type is a negative one).

2.4.4. SAFETY INSTALLATIONS ON LIFTING

- i. An upper limit switch that immediately blocks the movement when the spreader reaches the maximum allowable height controls the lifting movement. A low limit switch guarantees the same function in order to prevent the spreader from going further the maximum allowable lowering point.
- ii. When the load reaches a total capacity bigger than the allowed maximum load (which corresponds to 110% of the rated load) a load limit switch will stop the lifting travel and switch on a sound alarm (claxon).
- iii. The load controlled descent is guaranteed by balancing valves.
- iv. Upper and low extra-travel work on a general counter (redundancy system)
- v. Emergency stop button with key lock.
- vi. The following critical situations due to breakdown situations are already controlled by our basic hydraulic design:
 - Longitudinal load holding
 - Horizontal displacement braking

2.4.5. SPREADER

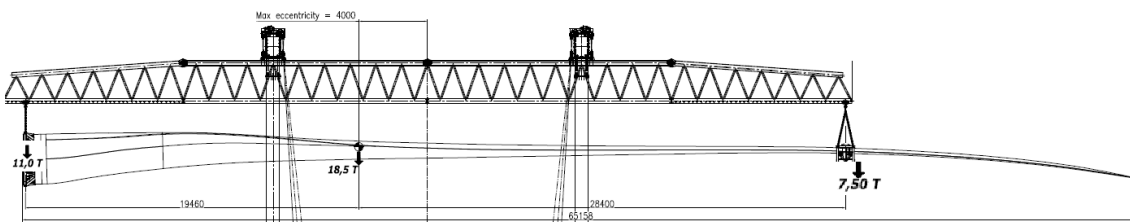
The straddle carrier foresees a spreader for the lifting of the blades. The spreader will have an all-out length of approx 49600 mm. The spreader is manually operated and is equipped with two trolleys having hooking points for the chains/slings that will handle the blade's tips. The maximum load eccentricity of the COG (at full load 22 tons) of the lifted blade is ± 3000 mm **

The minimum distance between the trolleys will be 29000 mm, while the maximum distance will be 49000 mm. The capacity of the trolleys is 11,0 ton/each.

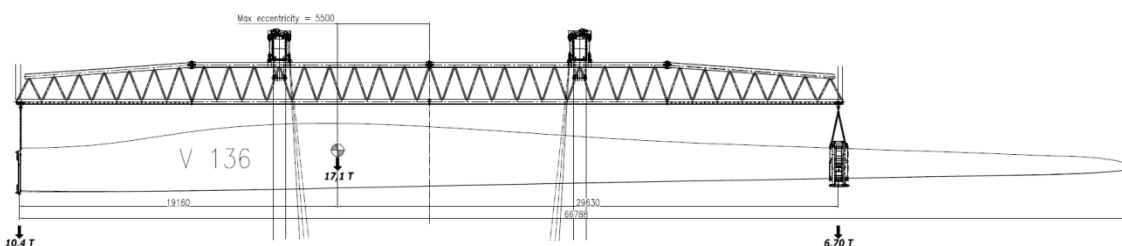
An electronic system will control the position of the trolleys 1 and 2 in order to avoid any excessive "slanting" of the spreader beam.



** The admissible eccentricity of the COG with a NR65.6 blade (having a weight of 18,5 tn) is ± 4000 mm.



** The admissible eccentricity of the COG with a V136 blade (having a weight of 17,1 tn) is ± 5500 mm.



2.5. THERMO-HYDRAULIC SOUNDPROOF PROPELLED GROUP

The straddle carrier is fed by n° 1 thermo-hydraulic sound-proof propelled group. The power group is placed under one of the lower longitudinal beams, and is at men's height in order to enable easy inspection and maintenance operations.



Power groups data

- Sound-proof power group covered by a sound absorbing sponge
- The thermic group has big dimension and is provided both with front and rear hinge doors

Diesel engine data

- Cooling	: water-cooled
- Brand	: IVECO (Italy)
- Type	: N45
- Maximum rpm	: 2100 rpm
- Power	: 94 KW (126 HP) at 2200 rpm (as per 70020 DIN norm)
- The engine complies with	: Tier 3 / Step IIIA - antipollution norms
- <i>The estimated consumption of the engine is 220 g/kWh</i>	
- <i>Consumption: 220g/kWh*94kW*50%:1000 = 10,34 kg/h ~ 12 l/h → at 50% of the max rate</i>	

2.6. GENERAL DESCRIPTION OF THE HYDRAULIC PLANT

Every tube that feeds the engines and the hydraulic processors come from the power group. The diameter and thickness of the hoses change accordingly the hose's specific use.

The painting cycle is given when the tubes are disassembled in order to guarantee as much efficiency as possible (total thickness of the paint dry film will be at least 160µ. for reference see chapter ANTI-CORROSION PROTECTION).

After the preassembly on workshop on the straddle carrier structure (see picture 1), all hydraulic hoses (rigid pipes + fittings) are removed from the structure (see picture 2), undergo an internal cleansing, are carefully tapped and then painted in compliance with the paint cycle as described under chapter ANTI-CORROSION PROTECTION and then properly stripped and packed for delivery (see picture 3).

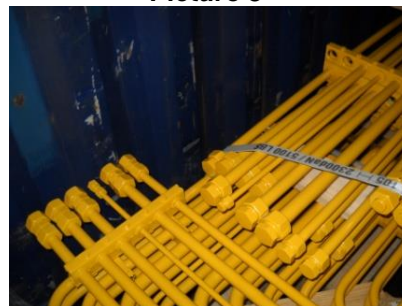
Picture 1



Picture 2



Picture 3



The hoses are connected to the structure by means of connection elements provided with rubber rings that are also used to insulate the hoses.

The connections between the engines and the winches on the wheel groups are achieved by means of flexible hoses made of various metallic bands covered by rubber.

The rigid connections are special components that are manufactured by Voss or Stauff.

They are provided with a special treatment made of Zink Nickel that guarantees high protection against Salt Spray Chambers.



Hydraulic installation data

- Rigid hoses : MARCEGAGLIA (Italy) or similar
- Rubber hoses : ALFA GOMMA (Italy)
- Zink – nickel connection : VOSS – STAUFF (Germany)



2.7. ELECTRICAL INSTALLATION AND CONTROL SYSTEM

2.7.1. GENERAL DESCRIPTION

Electrical systems and components comply with the standard CEI EN 60204.1– ed. September 2009.

All the electrical devices (PLC, contactors, relays, switches, safety devices etc.) are designed for satisfactory operation under the environmental conditions required by the Customer’s specification, and the conditions associated with normal operation of the Equipment.

The electrical equipment is enclosed in robust steel closed cabinets / casings (minimum IP55 protection grade), so as to prevent accidental contact to the parts under voltage. The electrical closed cabinets / casings are supply in painted steel.

Moreover, the electrical cabinets / casings and the remaining electrical equipment are located such that they will be easily accessible for maintenance and repair.

All the channels for the electrical wires are in cold dip-galvanized steel and have removable covers for easy inspection.

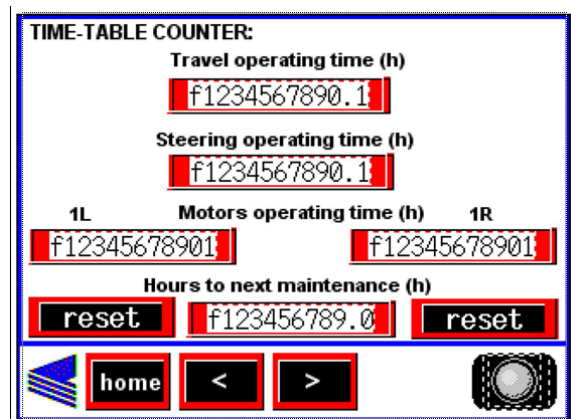
The painting cycle is applied to the channels in order to guarantee as much efficiency as possible (total thickness of the paint dry film will be the same applied to the structure; for reference see chapter ANTI-CORROSION PROTECTION).

Each electrical component is labelled with a code that bears the same reference as in the electrical drawings supplied with the equipment. It will enable an easy and comfortable maintenance of the whole electrical installation.

2.7.2. AUTOMATION, ON-BOARD CONTROL and REMOTE SUPERVISION SYSTEM

A programmable controller (PLC) will be used to control and supervise the machine; it is designed to facilitate the installation, programming and maintenance.

The PLC will be used to program the logic of the various functions and operations of the crane (process signals, controls, malfunction alarms and calls for maintenance). The PLC can furthermore store, in its memory, a set of operation parameters for the equipment, generating a “history” of the events. Along with the Client, a decision will be made as to the most efficient way (either profibus or other similar means) to have a transfer, at regular intervals, of these stored data to the installation management database.



Besides, via identification codes the machine can couple the detected data (events) to the operator who was, at that time, operating the equipment.

An additional tele-control and remote supervision system will be installed. It consists of a GSM line (or Wi-Fi) that makes it possible to supervise the machine status from a work-station installed in our offices.

In this way it will be possible for us to control the equipment functioning status in real time and immediately assist your operators if the machine should fail.



2.8. COMMANDS

The machine can be commanded from:

- Remote control with electro-proportional commands. All movements can be commanded and controlled from the remote control.
- Pendant button strip
- Emergency proportional hydraulic distributors (manual)

2.8.1. (ELECTRICAL) REMOTE CONTROL WITH ELECTRO-PROPORTIONAL COMMANDS

The remote control, in portable arrangement, is fabricated in plastic material (ABS), very light and ergonomic. It is supplied along with a batteries and a battery-charger.



On the remote control, a horn push-button will be accounted for; this can be pushed by the operator whenever necessary. The remote control is bi-directional: it sends the input data to the machine and receives the output data sent by the machine. The commands in the remote control will be in Turkish language.

2.8.2. PENDANT BUTTON STRIP

This is to be used in direct commutation with (i.e. alternatively to) the remote control.

It consists of a cable-fed button strip (with a cable 8 m long) with which all main operations of the machine can be commanded.

The pendant button strip is meant to be used in emergency cases, i.e. if the remote control should fail.



2.8.3. EMERGENCY PROPORTIONAL HYDRAULIC DISTRIBUTOR (MANUAL)

In the event of emergency, the load can be put in a safe condition by using the levers of the Danfoss hydraulic distributors that are installed in the thermic unit.



2.8.4. COMMAND CABIN

A command cabin will be accounted for: this will be positioned on one of the lower longitudinal elements and will be easily reachable via a ladder and an access platform complete with handrails.

The cabin will consist of a strong structure in painted steel and, on the four sides, with glasses to give the operator a 360° visual.

In the cabin, the following will be included: an ergonomic seat (this will be 330° pivoting), an air-conditioning and heating system, a touch-screen panel, controls and tell-tales / manometers to permit the control and the verification of the diagnostic of the machine.

Command of the machine from the cabin will be performed using the remote control (which is part of the supply) or via the emergency wired button-strip.



2.8.5. COLOUR CAMERA

The crane will be equipped with n° 4 video cameras to facilitate the operator in visualizing particularly important area and details. N° 2 video cameras will be installed on the sides opposite to the cabin and will be faced towards the tyre runway. The other n° 2 video cameras will be placed on the under-spreader trolleys.

The video cameras will be provided with digital displays (7" coloured displays) placed in the command cabin – Brand Waeco, COBO or similar.



2.8.5.1. LIGHT LAMPS FOR NIGHT SHIFT-WORK

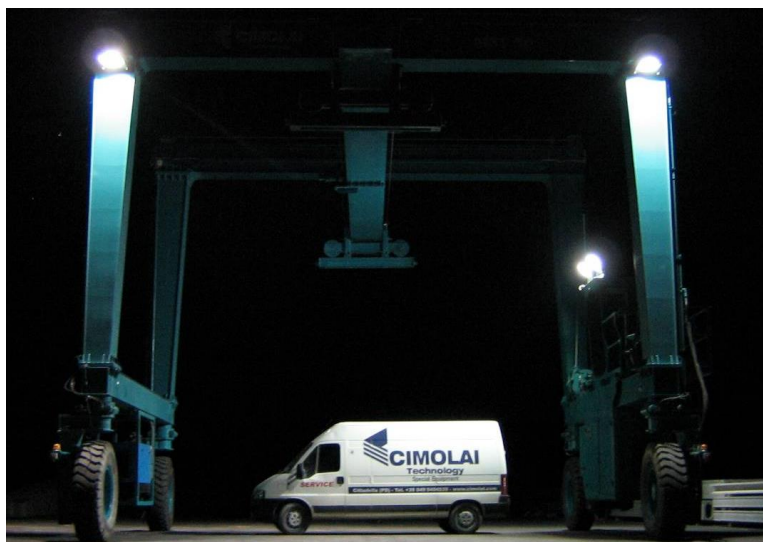
The machine will be provided with n° 8 LED lights for the night shifts.

N° 4 lights will be placed on the four corners of the machine, n° 2 lights will be installed above the cabin and n° 2 more lights will be placed on under-spreader trolleys

Each light is duly sized to guarantee up to 13500 lumen. Such lamp (Tyri model 1323 or similar) is usually installed in huge size machines that works in yards and in mining industry.

Such type of light gives a lumen /watt ratio bigger than the standard and is equipped with an high resistance chassis. It guarantees elevated performances and a long working life.

The working lights (LED type) are fed by the “oversized” diesel motor alternator.



2.8.5.2. WIND SPEED SYSTEM

The machine will be equipped with a wind speed system composed by an industrial wind speed meter, designed for heavy duty service on a crane, consisting of a cup pivoting rod with electric sensor and of an electronic gearcase for data elaboration. The electronic gear-case will manage two intervention thresholds, rateable for two different wind speeds, sent back to two outer contacts and used as follows:

- 1st threshold upon wind speed reaching a limit value of 45 km/h: acoustic warning signal
- 2nd threshold upon wind speed reaching a limit value of 60 km/h: portal travelling halted

The wind speed will be displayed on large-sized figure panels installed in the cabin.



3. SUMMARY LIST OF MAIN BOUGHT-IN COMPONENTS' SUPPLIERS

Component	Brand
Steel structures	CIMOLAI (Italy)
Pumps and hydraulic motors	BOSCH –REXROTH (Germany) SAUER (USA)
Proportional hydraulic distributors	DANFOSS (Denmark)
Diesel engine	IVECO FTP (Italy)
Mechanic couplers	TWIN DISC (Germany)
Epicyclical reducers on the lifting winches	LOHMANN-REXROTH (Germany)
Wheel groups	LOHMANN-REXROTH (Germany)
Tires	MRF, DRC, OTANI (brand new)
Steering Slew drives	IMO (Germany)
Lifting ropes	TREFILEUROPE – ARCELOR-MITTAL (France)
Electrical components	LEGRAND (France) TELEMECANIQUE (France) STROMAG (Germany) OMRON (Japan) SIEMENS (Germany)
Remote control	AUTEC (Italy)
Hydraulic Pipes	MARCEGAGLIA (Italy) ALFA GOMMA (Italy) VOSS (Germany) STAUFF (Germany)
Oil Filters	MP Filters (Italy) HYDAC (Germany)
Led lights	BERT (Slovene) TYRI (Sweden) or similar
Video Cameras and display	WAECO (Germany) COBO (Germany)

Note: Cimolai Technology Spa can choose alternative brands depending on technical reasons or on time or availability constraints, but always guaranteeing the same quality level as a minimum.

4. ANTI-CORROSION PROTECTION FOR STRADDLE CARRIER AND SPREADER

The following protective cycle is used:

- Painting: sandblasting according to SA 2.5
- Standard colours : yellow RAL 1007 (different colors upon request)
- Guaranteed min. thickness of dry enamel = 160 microns.

5. DESIGN STANDARDS

- Structures : FEM 1.001 ed. 1987 and 1998 Class A4
- Mechanisms : FEM 1.001 ed. 1987 and 1998 Class M4
- Electric installation : CEI-EN-60204-1 – ed. 09/2009
- Safety : The machine we are proposing will comply with the terms and provisions of the EEC Directive 2006/95/CE and will be **marked “CE”**.

6. ENVIRONMENT PROTECTION

A particular care and attention will be paid to the protection of the environment and to all sustainable development (with specific reference to the possibility of recycling, the CO₂ emissions, the noise level and so on). Also, special attentions will be paid to the materials used during the fabrication.

All this is further proved by the fact that Cimolai Technology SpA has obtained the certification of its environmental protection plan in compliance with the standards ISO 14001:2004.

It is also to be noted that the standard ISO 14001 is one of the three certifications, all of which have already been given to Cimolai Technology SpA, in terms of QUALITY / SAFETY / ENVIRONMENT (i.e. ISO 9001, ISO 14001 and OHSAS 18001) which lead to the company having a global politics in terms of risk assessment and management.



7. TESTS AND DOCUMENTS

7.1. MAIN COMPONENT BLANK TEST

The main components/parts of the straddle carrier will be assembled in Cimolai Technology's factory and a blank test will be done before the shipment.

Moreover, the following tests will be made on final installation site:

7.2. TESTS WITH STATIC OVERLOAD

The factor for the static load test corresponds to 1.25 of the rated load.

The tests aim at ascertaining the machine's stability and the brake's efficiency.

The test load will be applied in the most unfavourable position for a period of 30 minutes.

7.3. TESTS WITH DYNAMIC OVERLOAD

The factor for the dynamic load test corresponds to 1.1 of the rated load.

The tests aim at ascertaining the machine's overall operation and the efficiency of the various devices, particularly of the brakes and the limit switches.

7.4. MANUALS AND DOCUMENTATION

The machine will be supplied along with n° 1 copy of the Maintenance and Operation Manual – in compliance with the Machine Directive – as well as a complete set of documents comprising:

- Certificates of warranty from the manufacturers of the bought-in elements
- Certificates of the ropes
- N° 1 copy of the wiring diagram
- N° 1 copy of the assembly drawing
- Chart of lubricants and lubrication time-table
- N° 1 copy of the list of spare parts

Upon completion of the assembly, a functional test will be made as detailed in the Maintenance and Operation Manual; upon positive result of this test, n° 1 copy of the Declaration of Conformity with the Machine Directive prescriptions will be supplied.

Whenever possible, all documents will be in English.

The Maintenance and Operation manual will be in English.

The standard documents detailed above will be implemented, wherever possible, with those detailed in the tender specifications submitted by the Client.

8. STOCK OF SPARE PARTS (INCLUDED IN THE SUPPLY)

A stock of spare parts will be provided along with the machine.
Please refer to List 1 and List 2 attached (ANNEXE A-3).

9. TRAINING ON SITE

9.1. MAINTENANCE TRAINING

Maintenance training will include:

- Routine checks and preventive maintenance.
- Fault diagnosis.
- Removal, dismantling and replacement of parts and components.
- Basic electrical checks, safety routines and component replacement.
- Approach to hydraulic systems overhaul.
- Maintenance planning records and procedures.
- Health and Safety procedures, with particular attention to equipment / systems for monitoring of load, etc.
- Verification and calibration of overload devices.

Training will be done by technicians who will be fluent in English.

9.2. OPERATORS TRAINING

Operators training will include:

- Instruction, familiarization and practice in the overall operation of the equipment.
- Health and Safety procedures, with particular attention to distribution of the load to be lifted by the equipment, monitoring of centre of gravity, slinging, etc.
- Practice at the control and synchronization of the equipment motions.
- Start-up and shut-down procedures.

Training will be done by technicians who will be fluent in English.