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Designed and made by R&D Institute of SANY Marine Heavy Industry in May 2016

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SANY[®]

SANY Technology, World Quality

**RUBBER TYRE CONTAINER
GANTRY CRANE**

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ENTERPRISE OVERVIEW

Sany Marine Heavy Industry Co., Ltd is the subsidiary of Sany International. It is now located on the west shore of Zhujiang River with a manufacturing base of 6000 acres and a 3.5km offshore line with many berths. Sany Marine aims at building a modern transportation and marine equipment industrial park with estimated sales turnover of 30 billion RMB.

The first phase with an area of 800 acres had been finished and started to manufacture since May 2015 and the products include port machinery, engineering ships and ocean equipment. Currently we have reach stacker, container handler, forklift truck, port tyred crane, STS, RMG, RTG, portal slewing crane, MHC and so on, altogether 16 series and 150 types of products. In the future, a lot of national big strategic equipment will be manufactured here. Sany Marine will insist on persistent innovation, focusing more on green energy, digitalization and intelligence. Sany Marine will keep the pace, focus on energy saving and automation, and promote "automation technology in harbor and port, engineering equipment on deck and energy equipment over ocean". It is our mission to provide the best quality products and service so as to contribute greater to the mankind.

Driven by the enterprise mission of "quality changes the world", SANY Marine Heavy Industry Co., Ltd attaches great importance to process, punctuality and automation. We monitor dynamic display of all the production process, logistics, value flow and pattern; we keep improving in quality manufacturing and won many awards both from home and abroad. Now we are cooperating with a batch of top terminal operators globally.



INTELLIGENT & EFFICIENT



1

New torque anti-sway system(1)

Through proper arrangement of guide pulleys in the horizontal and vertical direction, the movement of the four wire ropes can effectively prevent the swing of the spreader, greatly improving container hoisting efficiency.

2

New torque anti-sway system(2)

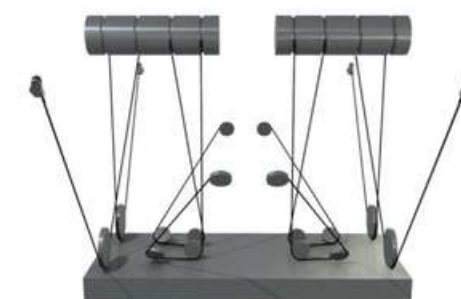
The new-developed four rope anti-sway system (Patent number: ZL201220568248.4) effectively achieve bidirectional anti-sway of the spreader. This system allows a $\pm 250\text{mm}$ movement of spreader in the gantry or trolley direction, greatly improving container hoisting efficiency.

3

Container Auto-tracking and auto-hoisting system

Based on the data stored from the mechanism positions and the containers on the yard as well as database management, automatic tracking operation and the most optimized tracking control of the mechanisms can be realized, increasing the working efficiency and ensuring safety.

New torque anti-sway system (2)



SAFE AND RELIABLE



1 Soft landing of spreader onto the container

Software intelligent deceleration technology and hardware inspection protection device are applied to adjust the time and position of deceleration dynamically. This helps decrease crush and wheel load, thus increasing service life and stability of the crane.

2 Intelligent rectification technology of gantry

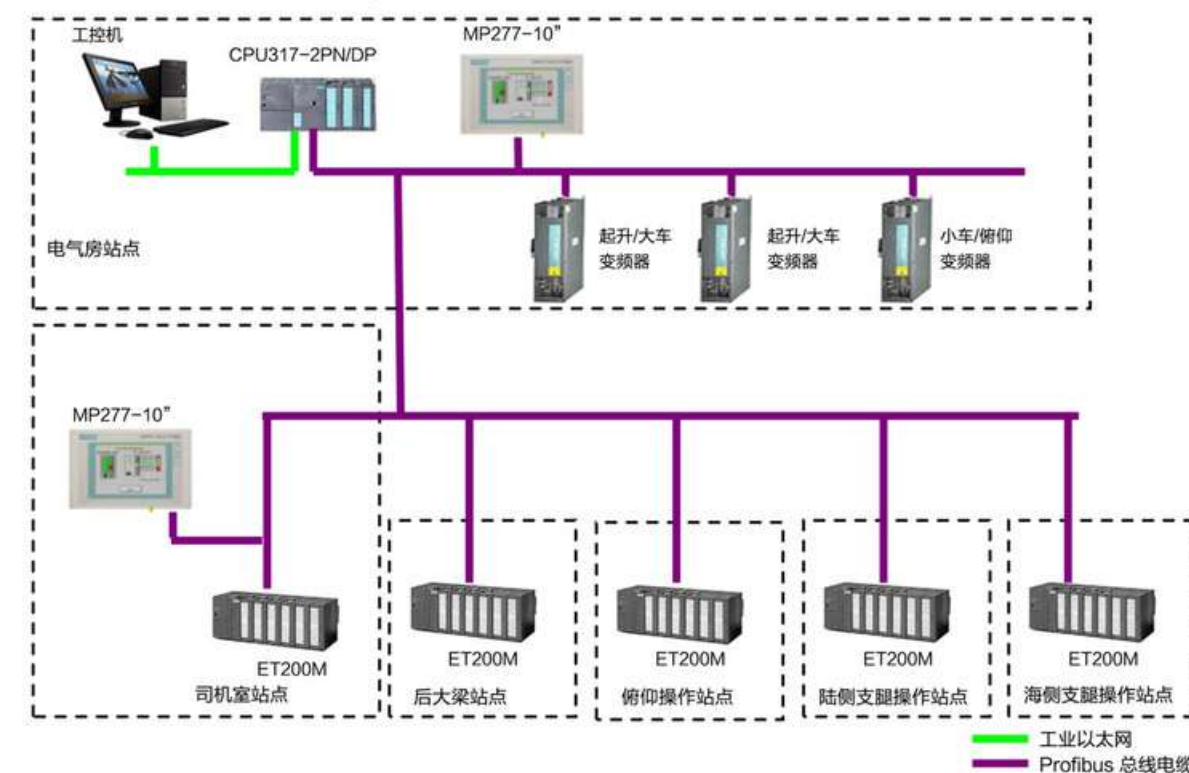
Deflection of bogie relative to the rail is detected in real-time as the control signal for the transducer to control motor speed. The bogie deflection can be corrected manually (or automatically) to prevent rail gnawing, thus ensuring safe operation, reducing wearing between wheel and rail, and span service life of crane.

3 Intelligent control technology

Distributed bus control system is applied, which is clear in structure and easy to maintain. Perfect crane information management system monitors the operation status in real time; Full security devices collect the position, limit, anti-collision protection, interlock protection, overload protection, grounding protection, and lightning protection of all mechanisms.



Control system diagram



ENERGY-SAVING & ENVIRONMENTALLY FRIENDLY

Power factor reached more than
the amount of harmonics has greatly decreased,
and energy saving effect is obvious.

0.9

1

Intelligent low voltage capacitor compensation

Full automatic resonance eliminating reactive power compensation device is configured to achieve the average power factor above 0.9 or more, which improves electricity efficiency and reduces wire consumption.

2

Hybrid drive and energy recovery system

The new RTG uses lithium battery as the power supply of the crane, and potential energy can be recycled automatically when the weight drops. It saves over 65% energy comparing with the full diesel engine power supply. And low emissions, low noise, low maintenance time and cost can be achieved. Energy storage equipment of lithium iron phosphate battery pack is configured for RTG to ensure the stability of power supply and reduce its fluctuation.

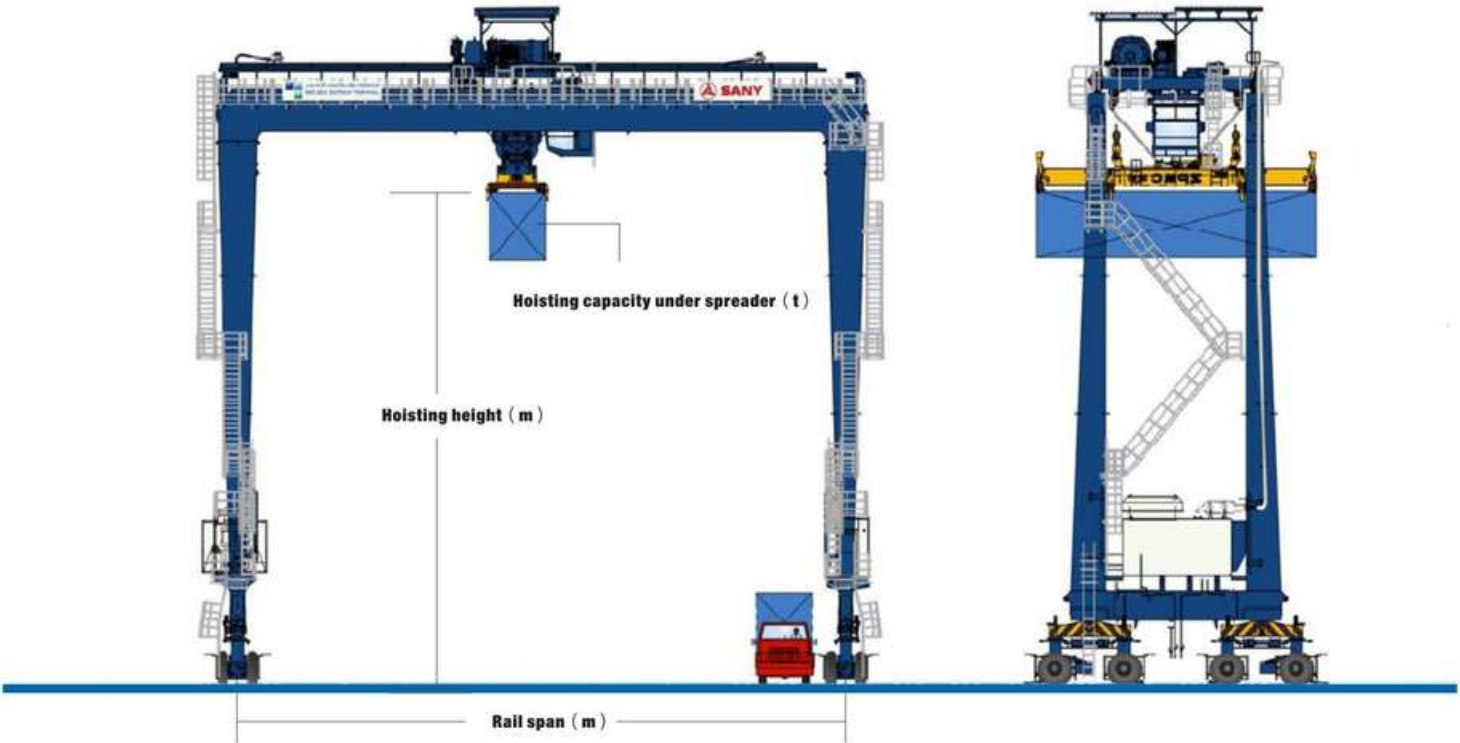
In normal operation, the crane is driven by electricity and energy from weight dropping and mechanism braking is recycled to the grid. In gantry turning, the crane is driven by small auxiliary diesel generating set for obvious energy saving, which saves operation cost and meet environmental requirements.



Cable reel power supply / diesel generator



TECHNICAL PARAMETERS



Parameters for standard models

Based on our study in lots of domestic and international terminals, analyzing the characteristics of new and old terminals, combining the handling process and demands, sorting out in the RTG, we developed four standard models with lifting height range from 18.2-21.47meter. The combination of standard model and modularization design greatly the span of design and manufacturing. We will develop the customized device for you in shortest time.

Project	RTG5223S	RTG5501	RTG5203	RTG5204	Recommended parameter	Optional range
Hoisting capacity under spreader(t)	41	41	40	40	35、41、50、65	10~65
Rail span(m)	23.47	23.47	23.47	26.5	23.47、26.5	20~30
Wheel quantity	8	8	16	16	8、16	8、16
Hoisting height(m)	18.2	18.2	21.2	21.47	18.2 (5 over 1) 、 21.1 (6 over 1)	16~21.5
Hoisting speed(m/min) full load	23	23	25	23	23、26	20~30
Hoisting speed(m/min) empty load	46	52	50	52	46、52	40~60
Gantry speed(m/min) full load	50	50	50	54	30、50	30~50
Gantry speed(m/min) empty load	130	120	130	135	130~135	100~135
Trolley speed(m/min)	70	70	70	70	70	70~90
Rotary angle of spreader(°)	± 5	± 5	± 5	± 5	-5~+5	-5~+5
Power supply	While diesel engine group	Cable reel power supply	diesel generator	diesel generator	While diesel engine group Wheel Cable+ auxiliary diesel engine group Sliding contact line+ diesel engine group Battery +auxiliary diesel engine group	according to the terminal condition

Remark: For the persistent upgrade of technology, partial parameter will be changed. Apart from the parameter above, accustomed parameters can be provided and welcome for visiting.

MANUFACTURING & DELIVERY

1 The preparation process

Complete processing equipment for steel pretreatment, cutting, bevel cutting, bending forming and other material processing are applied to provide a powerful guarantee on welding quality.

2 The welding process

As the launching of the first semi-automatic welding assembly line for heavy port machinery, the box beam welding cycle has been shortened by 15%. By applying semi-automatic car welding of H-beam, the welding cycle of stay bar system and M-house base has been shortened by over 30%. Large structures including boom and girder can be welded complete in the factory, and the UT qualification rate is over 99%.

3 The coating & preassembling

As the launching of new industrial park, super-large parts blasting, component painting, and assembling can be processed in the factory. We have ended the past era of outdoor processing to guarantee the production cycle and product quality.

4 Delivery cycle

The whole delivery cycle of RTG (from receiving order to delivery status) is above average in the industry. The manufacture cycle (from material preparation to delivery status) is currently shortened by 20 days than previously.

CONSTRUCTION CASES



1

RSQT RED SEA GATEWAY TERMINAL

4 RTGs were delivered in December 2014. Currently their annual processing volume reached 140 TEUs million, meeting the design standards stipulated in the tender. The cranes are now running in good condition and the client is very satisfied.

2

PORT OF IZMIR

Since the delivery in 2013, the 4 RTGs in the port work well and attained excellent recognition from customers. Turan, general manager from Izmir port lamented: "SANY equipment is stable, service in a timely manner, ensure the normal operation of the Izmir port. This proves that our choice is correct, and we hope we have more chance to cooperate in the future."

3

Dandong Port

This project is the first time for Dandong port to use RTGs. Since 2010, the site has four RTG from SANY in the field operations, the reliability of the equipment, safety and other requirements are very high. SANY equipment is with reliable performance and excellent service, ensuring the normal operation of the Dandong port, high evaluation has been given by customers.

SERVICE



Quality Changes the World Service Creates value



Service Concept

All for customers, creating value for customers.

Service Strategy

Build unparalleled service; realize "First Brand of Global Service" of Port Machinery.

Service Advantages

SANY has offices in over 200 countries and regions, with 30 agents in China, about 50 repair factories and 6S stores, over 3000 elite service engineers, 1000 offices and parts warehouse accommodating 100,000 kinds of parts worth more than RMB 600 million. We also have highly efficient logistics system by air, sea and land, which can transport genuine parts at any time.

Industry leading Enterprise Control Center (ECC): running for more than ten years, the ECC, as the industry initiative, is worth over RMB 30 million. It can realize real-time supervision and remote precision troubleshooting. With information promoting industrialization, it innovatively created SANY's service system of "Unity of man and heaven, synergy among 1st, 2nd and 3rd levels".

GCP, GPS and CSM system: customers can learn the working conditions & key work parameters through SANY's global portal and realize remote supervision. The system also supports parts and service search, providing convenient all-round equipment supervision.

