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SHIP-TO-SHORE SANY STS CRANES

QUALITY CHANGES THE WORLD

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ABOUT SANY MARINE



Founded in 2011, SANY Marine Heavy Industry (SMHI) is a major subsidiary of SANY Heavy Equipment International Holdings Co., Ltd. (0631.HK: Hong Kong Stock Exchange) with manufacturing base in Zhuhai. The facility has been established as a modern logistics and marine equipment industrial park with a 3.5 km coastline.

SMHI currently offering STS, RTG, RMG, jib crane in large-size port machinery as well as the market-leading reach stacker, empty container handler, forklift truck, material handler and telehandler in small-size port machinery. Its mobile port machinery has been leading the national market for 13 consecutive years. It is aiming to provide a full product line in the global market and to be a leading brand in the marine industry.

HISTORY

2010
START OBTAINING STS
ORDERS

2012
START SELLING STS OVER-
SEAS

2011
THE FIRST BATCH OF
SANY STS DELIV-
ERED TO THE CLIENT

2013
OBTAINING ORDERS WITH
OVER THREE UNITS OF
STS FROM THE MAJOR
PORT OF THE WORLD.

2014
START SELLING 60T STS OVER-
SEAS

2015
THE PHASE ONE OF ZHUHAI
INDUSTRIAL PARK HAS BEEN
PUT INTO OPERATION

2016
OBTAINING STS ORDERS
FROM AMERICA

2017
RECEIVING BULK
ORDERS FROM
COUNTRIES IN
SOUTHEAST ASIA

2018
THE 70-TON SUPER-PANA-
MAX STS DELIVERED TO
HONG KONG SAR, CHINA.
TAKING THE LEAD IN THE
STS MARKET SHARE OF
DOMESTIC RIVER PORTS.

2019
THE FIRST BATCH OF 80T DOU-
BLE-LIFT, SEMI-AUTOMATIC STS WAS
DELIVERED FOR USE.

2020
RECEIVING ORDERS OF 10
LARGE STSS IN CHINA, CONTIN-
UALLY TAKING THE MARKET
LEAD IN THE DOMESTIC RIVER
PORTS.

2021
OBTAINING ORDERS WITH OVER
FIVE UNITS OF LARGE STS
FROM THE MAJOR PORT OF THE
WORLD.
THE PHASE TWO OF ZHUHAI
INDUSTRIAL PARK HAS BEEN
PUT INTO OPERATION.

R&D STRENGTH

01

THE STRONG R&D PLATFORM

SANY Group has been recognized as a national-level technology center and an international technology innovation demonstration enterprise, this has been supported by the world's most advanced R&D design process and the PLM full life cycle management system based on WIN11.

02

THE CUSTOMER-CENTRIC R&D TEAM

More than 500 R&D engineers have been engaged in the research of port equipment, unmanned driving and intelligent products that based on the application scenarios of the customers.



SPREADER SMASHING TEST



AUTONOMOUS TERMINAL TRUCK TEST



TWIN CONTAINER SPREADER FATIGUE TEST

03

MAIN ACHIEVEMENTS

Won two first prizes of provincial and ministerial level science and technology awards.
 Presided over and participated in the revision of more than 10 national standards.
 More than 300 patents have been applied, including over 200 invention patents.
 Won the Chinese Patent Excellence Award. (see below pictures)



STS FEATURES

ADVANCED TECHNOLOGY: Adopting TOPDOWN full three-dimensional parametric design, automatic finite element analysis based on shell elements, virtual simulation and virtual-real test fusion technology.

VERIFICATION TECHNOLOGY: SANY Marine has a strong test verification system, the in-house developed key components, control systems and automation subsystems has reached the industry-leading level.

ADVANCED TECHNOLOGIES

High Efficiency, High Reliability, High Safety & Durability

HIGH EFFICIENCY: SANY STS adopts a rigid and stable structure, the large-flow and efficient tilting system making the spreader operates accurately; The ergonomic cab design and shock-proof design enable the operator to obtain the best comfort while achieving efficient operation.

HIGH RELIABILITY: The spreader configured by SANY has been designed with special impact resistance and anti-loosening design, so that the spreader has a low failure rate; electrical components adopt standardized installation process to solve the problem of decreased sealing performance caused by on-site installation and improve the reliability of electrical components. The front and rear girder joints adopt enhanced design and high-precision manufacturing process to reduce vibration, impact and noise during the lintel, and improve the reliability of the STS.

HIGH SAFETY: The SANY STS is designed and manufactured according to the highest safety requirements of the industry. The front girder aisle grille adopts embedded anti-fall design, and the floodlights are equipped with anti-fall chains, which is convenient for maintenance personnel to maintain and inspect, and greatly reduces the accident of falling objects.

HIGH DURABILITY: The SANY STS is made of high-quality steel from world-renowned brands, the steel structure adopts the finite analysis of the shell element, while the local structure adopts the solid element for the refined calculation to reduce the stress concentration.





REMOTE CONTROL OVERVIEW

- **FULL OPERATING MODES:** remote manual/semi-automatic/landside full-automatic three operating modes to achieve the same or even better operating performance as the local mode
- **HIGH OVERALL EFFICIENCY:** the comprehensive operation efficiency of the seaport can reach 28–30MOV/H, and the inland water terminal can be running at 24–26MOV/H
- **STABLE AUTOMATIC LOADING :** the land-side horizontal transport equipment can achieve a one-button automatic loading with success rate of $\geq 95\%$
- **EXCELLENT PATH CONTROL:** remote manual operation can be activated below the seaside safety height, normal operation can run automatically on the optimal path

AUTOMATION FEATURES

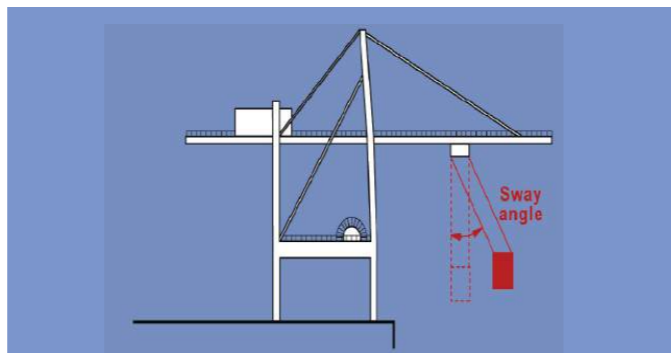
- **FAST RUNNING SPEED:** the maximum steady-state speed of automatic anti-sway exceeds 90% of the full speed of the trolley, and the automatic anti-twist land-side automatic container setting time is within 25 seconds
- **ACCURATE TERMINAL TRUCK POSITIONING:** multi-lane concurrent operation, can accurately detect the distance between multi-lane double container locks
- **MODULAR DESIGN:** TCS system adopts modular design, the coupling degree of each functional module is low, making it stable and easy to expand
- **ULTRA-HIGH RELIABILITY:** key systems adopt redundant technology and de-escalate emergency use to ensure the safety and effectiveness of the control system

ADVANTAGES OF STS AUTOMATION SUBSYSTEM

01

Spreader Automatic Anti-Sway System

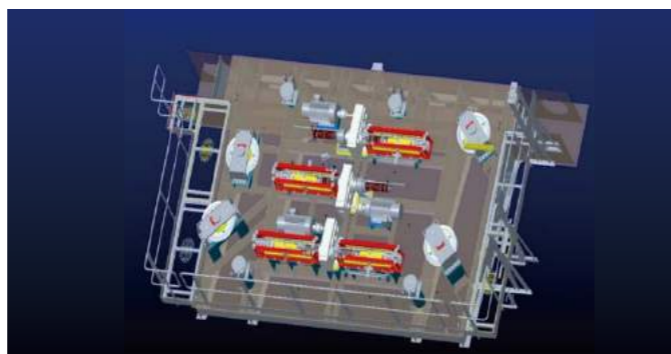
- Non-linear optimization method to achieve fast anti-sway operation, the maximum speed is close to 100% rated speed
- Optimal safe running path
- Swing angle of the spreader $< 0.5^\circ$



02

Spreader Automatic Anti-Twist System

- Anti-twist control success rate $\geq 95\%$
- Rotation angle convergence time $\leq 25s$
- Steady-state error of rotation angle $\pm 0.3^\circ$



03

Terminal Truck Positioning System

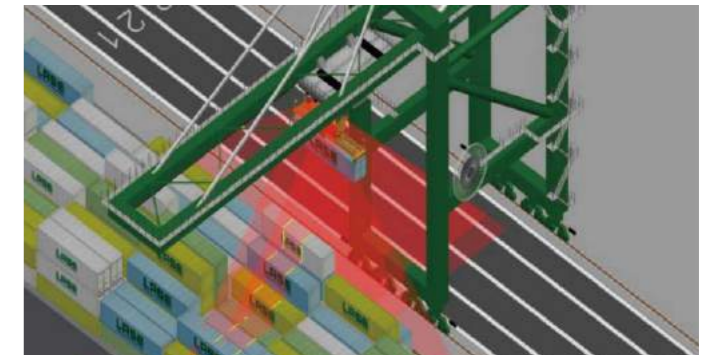
- The positioning accuracy of the cart
- Direction is better than $\pm 50mm$
The positioning accuracy of the trolley
- Direction is better than $\pm 50mm$
Yaw angle measurement accuracy
- Better than $\pm 0.2^\circ$
Measurement time $\leq 2s$



04

Ship Scanning System

- Detection accuracy is not less than $\pm 80mm$
- Realize obstacle avoidance and optimize container operation path



05

Landside Automatic Landing Technology

- Optimal control method
Spreader positioning $< \pm 50mm$
- Positioning adjustment time $< 10s$
- Dynamic pairing of terminal trucks, safe protection of the containers



06

Intelligent Tally System

- Container number recognition rate $\geq 98\%$
- Container door direction recognition rate $\geq 98\%$
- Recognition rate of truck number $\geq 98\%$
- The capture rate of the damaged picture of the container is $\geq 99\%$
- Hatch cover recognition rate $\geq 99\%$



MANUFACTURING STRENGTH



01

Blanking Machine Capacity

Equipped with 2 automatic sorting lines, slitting robot workstation, edge milling machine, bending machine and other 100+ sets of high-precision equipment, with a monthly production capacity of 8,000 tons of steel plate preparation.



02

Welding and Coating Capabilities

Equipped with multiple automatic welding stations/lines; it can realize the internalization of large pieces of splicing, the internalization of large pieces of paint, and the automation and baking of small pieces of paint to ensure the welding and paint quality of steel structures.



03

Assembly and Debugging

Covering an area of 2.67 km², it has built 10+ large-scale workshops, with a workshop area of 500,000+ sqm and an outfield of 800,000+ sqm. It has an annual output of 50+ sets of STS and 200+ units of RTG/RMG.



UPGRADES AND REFURBISHMENT

SANY Marine has been actively participating in the upgrading and transformation of container terminals. Relying on SANY Group's strong technical and manufacturing capabilities, SANY Marine has carried out services such as heightening and lengthening STS, automatic transformation, relocation and maintenance.

- **STS HEIGHTENING AND LENGTHENING**

Applicable to modern ships (super Panamax ships), improve container turnover efficiency and save costs

- **PORT EQUIPMENT RELOCATION AND DISMANTLING**

Meet the layout and planning of the terminal, increase terminal work efficiency, recycle used parts

- For large-scale renovation projects in South China and even in Southeast Asia, the equipment can be transported away from the customer's site and carried out at the Zhuhai base of SANY Marine without occupying the space at customer's berth and site, minimizing the impact on the customer's terminal operation and reducing the customer's operation risk.

- **EQUIPMENT AUTOMATION TRANSFORMATION**

The intelligence of the terminal or equipment facilitates terminal management, reduces costs, increases equipment operation efficiency and reduces the failure rate

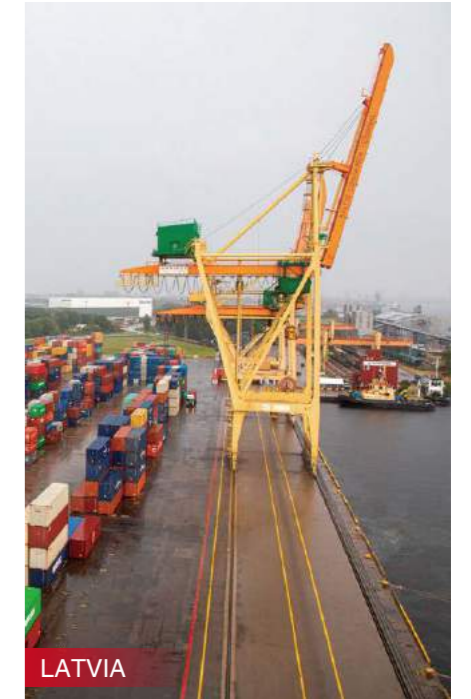
- **PORT EQUIPMENT UPGRADES AND REFURBISHMENT**

Assess equipment life and provide professional advice, restore equipment functions, extend equipment life, reduce equipment failure rates, and reduce equipment maintenance costs

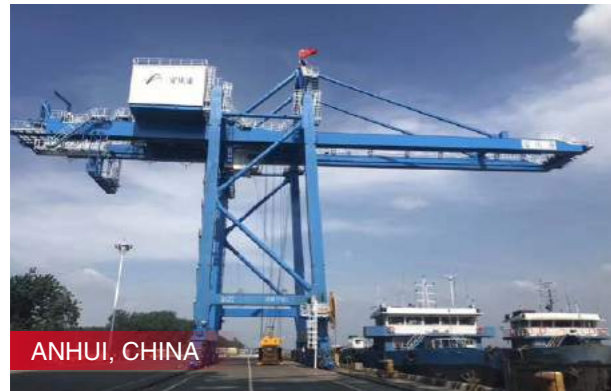
THE MAIN PARAMETERS

Model	STS8070	STS7065	STS6565	STS6540	STS6562	STS6128	STS6046	STS5048	STS5058	STS5039	STS5054
Cases	China	Hong Kong SAR, China	China/Indonesia/Thailand/EU	China/Indonesia/Thailand	Thailand/Indonesia/Philippines	China/Thailand	Hong Kong SAR, China	Costa Rica/South Korea	Philippines/Malaysia	South Korea	India
Rated lifting capacity under spreader (t)	80	70	65	65	65	61	60	50	50	50	50
Rated lifting capacity under hook beam (t)	100	70	75	76	75	/	70	57	60	75	55
Out reach (m)	70	65	65	40	62	28	48.5	48	58	39	54
Back reach (m)	22	12.05	18	12	15	8.5	11.65	15	15	12	15
Rail span (m)	35	24.384	30	16	24.4	16	24.384	19.5	16	30.5	18
Lifting height above rail (m)	52	46	46	35	46	15	42	33	33	30	36
Lifting height below rail (m)	22	17	20	14	15	20	17	14	18	18	20
Net Width between legs (m)	≥ 18.3	≥ 18.3	≥ 18.3	≥ 18	≥ 18.5	≥ 17	≥ 18.3	≥ 16.18	≥ 16	≥ 18.3	≥ 18
Overall width (m)	≤ 27	≤ 27	≤ 27	≤ 27	≤ 27	≤ 28	≤ 27	≤ 30	≤ 27	≤ 27	≤ 27
Lifting speed (full load) (m/min)	90	65	75	50	80	50	70	62.5	75	70	90
Lifting speed (empty load) (m/min)	180	150	170	120	160	120	150	125	150	170	180
Trolley speed (m/min)	240	240	210	180	240	150	210	180	210	110	240
Gantry speed (m/min)	45	50	45	45	45	30	45	45	45	45	45
Single boom lifting time (min)	≤ 5	≤ 6	≤ 6	≤ 5	≤ 6	/	≤ 6	≤ 5	≤ 5	≤ 5	≤ 5
Quantity of gantry wheels	4×10	4×8	4×10	4×12	4×12	4×12	4×8	4×12	4×12	4×8	4×14
Net Clearance of portal beam (m)	≥ 13.5	≥ 14	≥ 6	≥ 13	≥ 6	≥ 9.5	≥ 16.3	≥ 14	≥ 8	≥ 11	≥ 12.5

SUCCESSFUL CASES



SUCCESSFUL CASES



CAREFREE SERVICE



SERVICE HOTLINE: **400 887 8318**

Service Vision:

Exceed customer expectation and industry standards.

Service Mission:

All for client, create value for customer

Service Commitment in China:

- (1) Reply customer within 15 minutes.
- (2) Reach main service area within 2 hours.
- (3) Solve general problems and provide regular parts within one day.
- (4) Solve customer complaints with twodays.
- (5) Solve all issues within 7 days.

Service Value:

Innovation、Excellence、Clients、Cooperation、Respect、Passion、Honesty、Responsibility

Service Advantages:

“Professional service power” : SANY has offices in over 200 countries and regions, with 11 subsidiaries and 35 service points in domestic together. Setting up the parts warehouse can cover the world range, Forming the four in one of parts supply and guarantee system by headquarters warehouse, regional center warehouse, provincial and prefecture-level city, Accommodating 80000 kinds of parts to ensure fully customer service requirements in time.

“Professional operation and maintenance system” : SANY has invested tens of million of RMB to build “SANY Customer cloud APP” ,which enable customers to monitor the running status and parameters of the equipment in real time anywhere in the world. In addition, it provides online consultation, community communication, accessories mall, one-click repair, maintenance reservation, product knowledge learning and other value-added service. So the customer can easily enjoy the highest quality of service in any place of the world.