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Chapter 1 Development History of Cranes

1.1 History of Cranes in the World

The cranes can be divided into three categories according to the structure and performance: crawler cranes, tower cranes, and wheeled cranes. The earliest crane products are two major categories: rail-type and crawler-type, and the wheeled crane was developed later. From the 1950s, after years of steady development, the crane products of all countries have formed series products, and can meet the demands of all walks of life.



1.2 SANY Cranes Development History

SANY Cranes started from scratch, from the initial imitation to now full series products independent research and development, from a unknown new comer to today's third place of the industry, many people of the SANY Cranes made unremitting effort for it.

Trial production of three 25T cranes was completed in October 2004, their serial numbers are 005,006, and 007 respectively.



- 1.Chassis: Dongyue Tian;
2. Boom: Made by Huajun;
3. Turntable: Self-made
4. Hydraulics: Rexroth
5. Based boom: 10.5M
6. Fully extended boom: 30.5M

In September 2004, the assembly of imported bending machine was completed, and made preparations for official production of the cranes.

Equipment model: OPTMA2200/12.7/10 (bending tool fillet R25-R70, R100-R142-R196-R242)

Manufacturer: Ust Viken Sweden

Equipment unit price: 1.86 million EURO (account to 18.40million CNY)

On November 15 and 16, 2004, the trial production of two 50T twin-engine cranes were completed;



1. Base boom: 10.8M
2. Fully extended boom: 40.2M
3. Fully extended boom + jib :55.1M
4. Outrigger span: 5550×7200MM
5. Chassis: HQC5420J



QY25 crane destructive test

Since December 2004, in order to verify the performance of crane, and provide basis for crane design in the future, through remote operating, Yang Zhi, the head of the commissioning team led his staff conduct destructive test for a period of 2 months. The test content include: performance test, 130% overload test, weather test with oil temperature higher than 90 , falling and slewing emergency stop limit test, and 24h continuous working reliability test.

In May 2005, the QY17A ton crane came off line



1. Base boom: 10M
2. Fully extended boom: 31M
3. Fully extended boom + jib:
39.6M
4. Outrigger span: 5550×7200MM
5. Chassis: HQC5420J

Notes: Due to complicated jib internal structure, the structural form was unified with the Y25C in June 2006, and was replaced by QY16C. The production quantity is only 20.

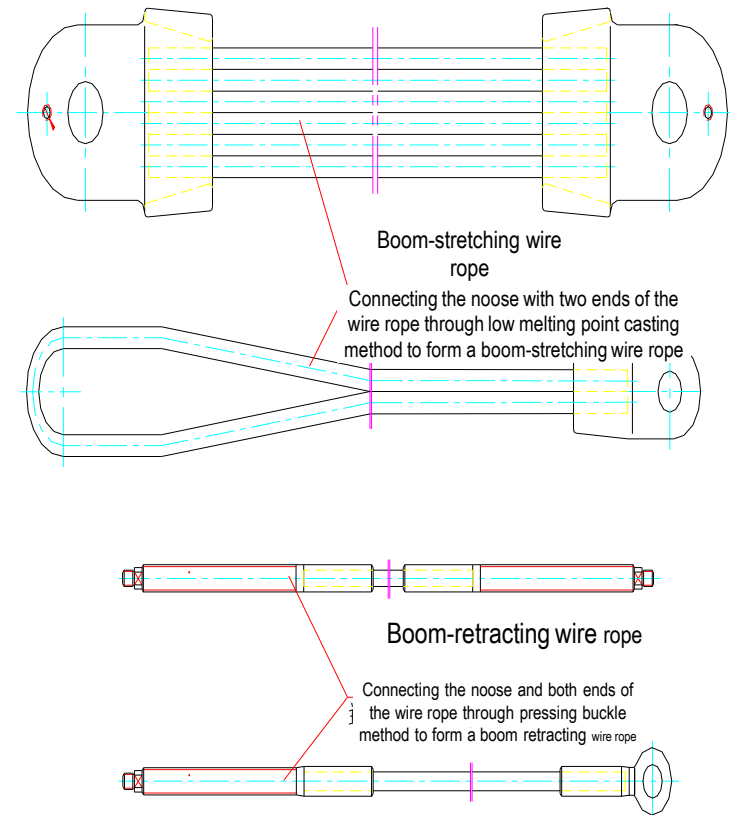
2006 is the crane product quality research year; it's the crane product batch production primary year; and it's also the year for crane products and technology gradually maturing.

Key quality problems:

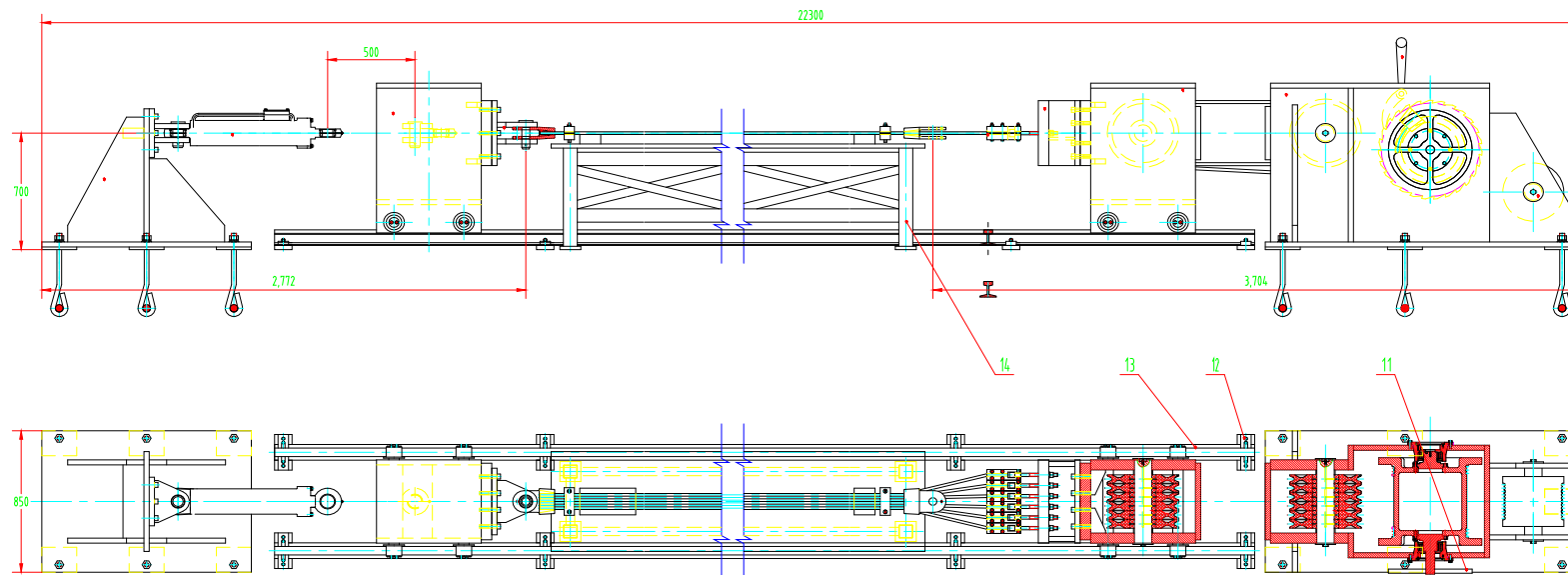
1. Telescopic boom wire rope is loose and stretched ;
2. Steel plate cutting deformation;
3. Cylindrical shell bending distortion;
4. Structural part welding deformation;
5. Crane boom shaking;



- Crane telescopic boom wire rope is self-production (the project is approved on August 30, 2005)
- 1. Supplier: Juli Group Shanghai Co., Ltd and Changde Puyuan Technology Company
- 2. Existed problems: wire rope detached from the noose, the wire rope is stretched
- 3. Feasibility program
- Through the site, equipment, personnel, and cost comprehensive analysis of noose casting alloy, the self-production of telescopic wire rope is feasible.
- 4. This project obtained third prize of science and technology in 2006



- The telescopic boom wire rope self-production is completed in February 2006, and below is the telescopic boom wire rope tensile test machine.



1. The fixed outrigger box is “日” Shaped rectangular body, the plate thickness is only 8mm, the length is about 2500mm, the width is 235mm, and the height is 350mm;
2. The required maximum size error is less than 2mm, the flatness, parallel degree, and verticality of all plates are no more than 1.5mm; the two box mouths diagonal difference is no more than 2mm;
3. The box body shall be welded with reinforcing plates of different shape and thickness all around.
4. By careful research, try to find out its deformation laws, repeat testing, work out mature welding technology; and the key control points such as the welding parameters, welding sequence, supporting points positions and so on are clearly defined;
5. Achieved the welding distortion control target.

April 2007, cranes realized batch production

No.	Y \ M	Production quantity	Remarks
1	2007.03	5	
2	2007.04	20	
3	2007.05	23	
4	2007.06	23	
5	2007.07	32	
6	2007.08	32	
7	2007.09	34	Two 52t repaired cranes
8	2007.10	36	26T and 52T repaired cranes one for each
9	2007.12	47	

U-Boom Technology

1. Because of technological limit, U-boom of the first 100T crane used imported (Belgium) bended upper and lower wing plates, the boom head and tail are self-made parts;
2. April 2007, in order to match up the trial production of 100T crane, we began to make trial production of the U-boom independently;
3. Through short-board test of the HG70, HG785, and WELDOX960, optimized the bending parameters, the first set of HG70 trial boom is successfully completed in November 2007, which laid solid foundation for development of later large-tonnage cranes.

In December 2007, the first 100T crane came off line; from January to May 2008 all tests were completed and listed on state bulletin;



1. Base boom: 13.5M
2. Fully extended boom : 52M
3. Fully extended boom + jib: 70.5M
4. Outrigger span: 7650×7600MM

Advanced Chassis performance

Pioneered 3 axles drive, 4 axles steering structure

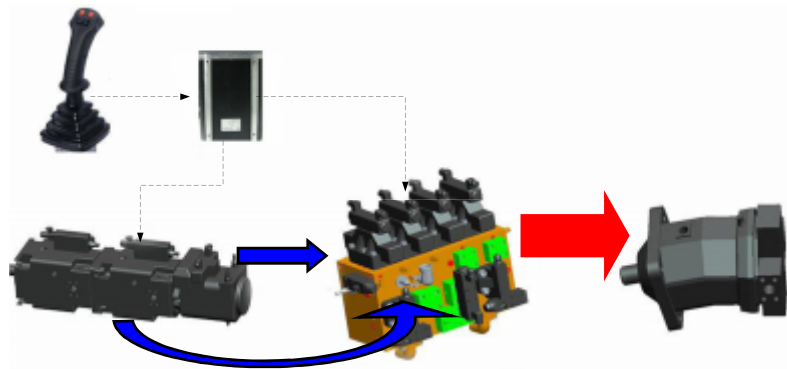
1/2/3/6 axles steering, 3/5/6 axles drive

High-grade chassis components

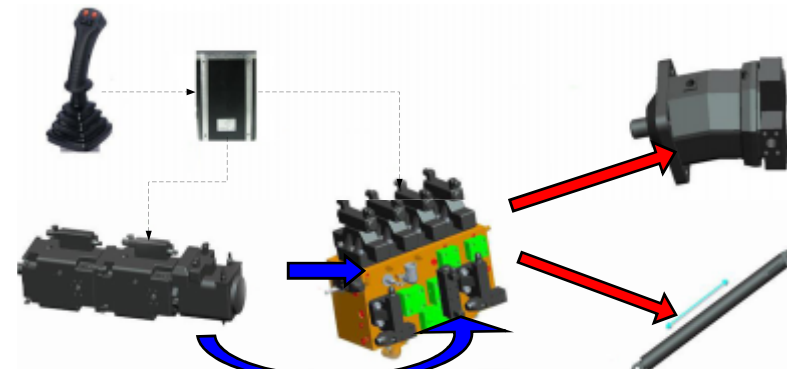
German Benz full electronic control engine, German ZF-12 gears automatic gear box ,ZF clutch and transfer case, German KESSLER drive axle



Patent technology: hydraulic system double-pump
converging and division flow technology



Double-pump converging and
dividing flow intelligent speed,
high efficiency



Good composite action fine
motion control during
dividing flow

Top-level Power Configuration

- 1.The lower and upper vehicles are respectively configured with 150KW/350KW imported Benz engines;
- 2.The controller make comprehensive monitoring of operation state, effectively prevent overload flameout,
- 3.The machine will be stopped automatically for protection when a failure happened and prohibit the crane operating;
- 4.Equipped with CAN bus controller, the power output can be optimized automatically according to the load, low fuel consumption;
5. Advanced muffling technology, reduce noise pollution, environmental protection.

In December 2007, the 220T test boom tooling trial production was completed, which laid foundation for 220T crane successfully coming off the production line





When the Wenchuan 8.2 earthquake occurred on May 12, 2008, the personnel of SANY Cranes rushed to the frontier of disaster area

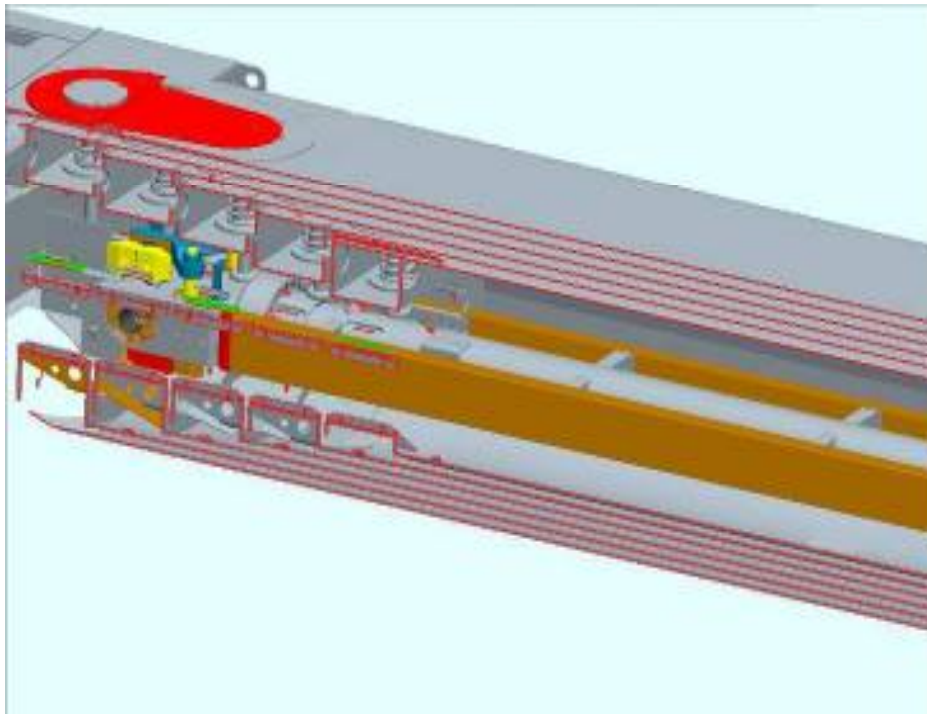


The 220T crane chassis assembly was completed on June 10, 2008; August 2008, China's first **5-axle 220T all terrain crane came off the production line**



1. Base : 13.5M
2. Fully extended boom : 62M
3. Fully extended boom + jib: 102M
4. Outrigger span: 9045×8500MM
5. Chassis: SYM5560J

Characteristics of the 220T crane: Single-cylinder cross pin boom



1. Single-cylinder cross pin automatic telescopic boom
2. Double-assurance extending and retracting control system

Characteristics of 220T crane: automatic derricking fly jib



1. Automatic luffing
2. Jib with infinitely luffing range 0-40 degrees

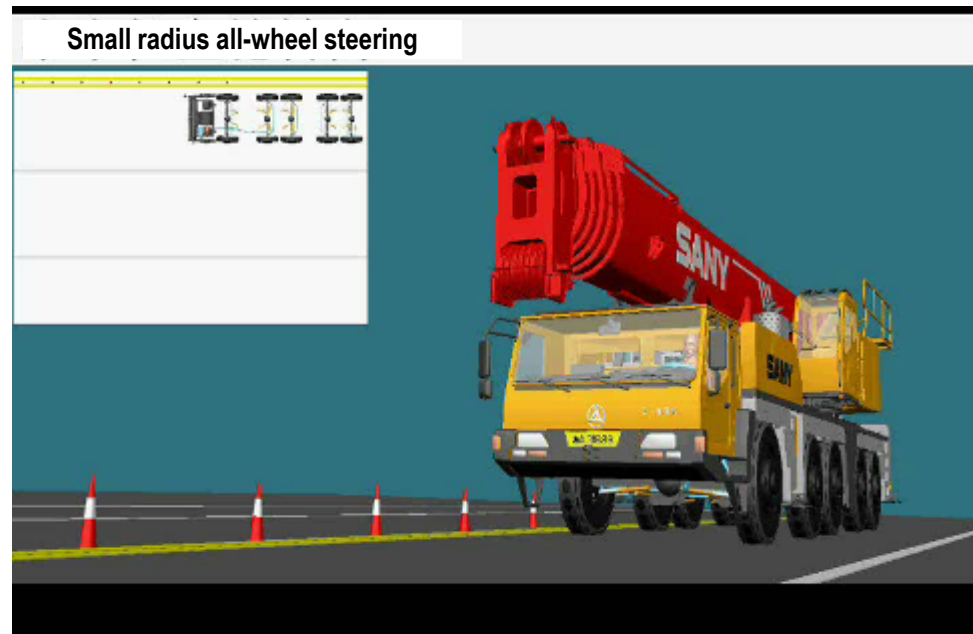
Characteristics of the 220T crane: Six models of oil and gas suspension system created strong driving and passing capacity

- **Suspension model**
- **Rigid locking**
- **Single point elevating**
- **Overall vehicle elevating**
- **Automatic leveling**
- **Three-axle elevating**



Characteristics of the 220T crane: **Six models** of all-wheel steering system;

- Highway driving
- All-wheel steering
- Crab walking
- Rear axle locking
- Separate rear axle steering
- No deflection steering



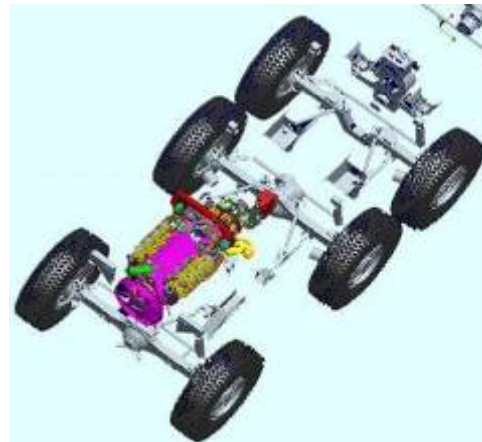
Super long boom, the first in China;
Boom length 62M, main boom +
auxiliary boom 105M;
the operating height reaches 105M. Top level configurations



BENZ engine

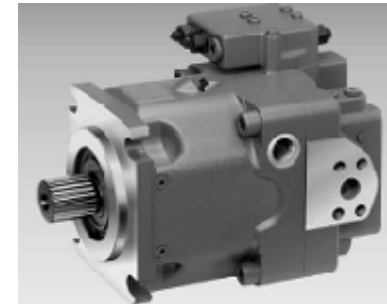
ZF gearbox

KESSLER transfer case

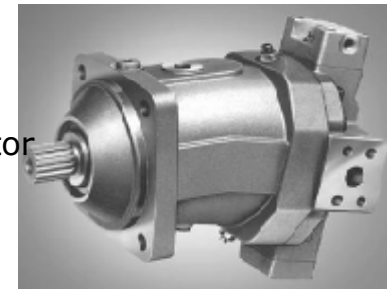


Imported KESSLER axle

Imported oil pump



Imported motor



Imported displayer



QAY220 Was Awarded the Honor of Top 50 Chinese Mechanical Products



The first five-axle 200T all terrain crane developed independently by Sany Group has completely independent intellectual property right. Its successful development filled the blank of 200T five-axle all terrain crane in China, it signified the Sany Cranes Company has completely controlled the world's most advanced wheeled crane R&D and manufacturing technology.





1. September 2008, established the crane company material cutting Workshop;
2. September 2008, finished trial production of the first 130T crane; (based on the platform of 100T crane)
3. January 2009, finished trial production of the first 160T crane (purchased chassis, self-made upper part);
4. The number of cranes reached 120 by December 2008 .

SANY Mobile Cranes Co., Ltd Ningxiang Industry Park under construction



Along with the Cranes Company continuous development, the original site is far from able to meet the development demands of the Cranes Company, In November 2007, we decided to make land acquisition and construct the crane industry park in Ningxiang.

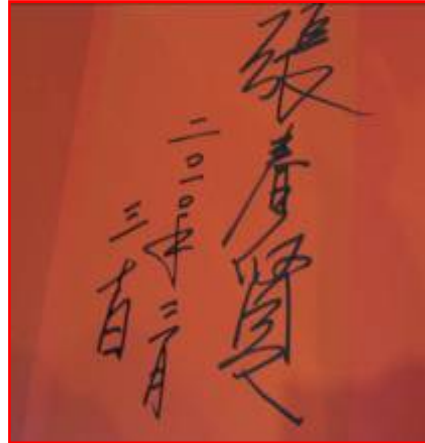
January 2008, began planning and design (Chengdu 3rd design institute)

July 2008, the Ningxiang project department was established for preparing construction of the industry park;

On November 6, 2009, the industry park construction is completed and put into production, which reflected the SANY speed once again.

On October 28, 2009, the Cranes Company started the second undertaking, and the entire Company was moved to the industry park in Ningxiang on November 6.





March 30, 2010 4:00 pm, in a fine drizzle, Hunan Provincial Party Committee Secretary Zhang Chunxian accompanied by the Changsha municipal arty committee secretary Chen Runer, Mayor Zhang Jianfei, and Ningxiang County party committee secretary Li Shiqiu etc made an inspection visit in Sany Cranes. Mr. Zhang Chunxian listened carefully to the report made by the Company Chairman Liang Wengen; he said: "high speed development of the Sany Group reflected the enterprises speed, governmental efficiency, and entrepreneurial spirit in Hunan Province.". Mr. Liang Wengen made particular report on the 1000T mobile crane relate situation to Mr. Zhang, and he pointed out: "It's the largest tonnage truck crane in Asia now", Mr. Zhang heardy this, noddod and said: "good, this is the miracle of our country".

SANY

Great Inspiration, and Kind Care

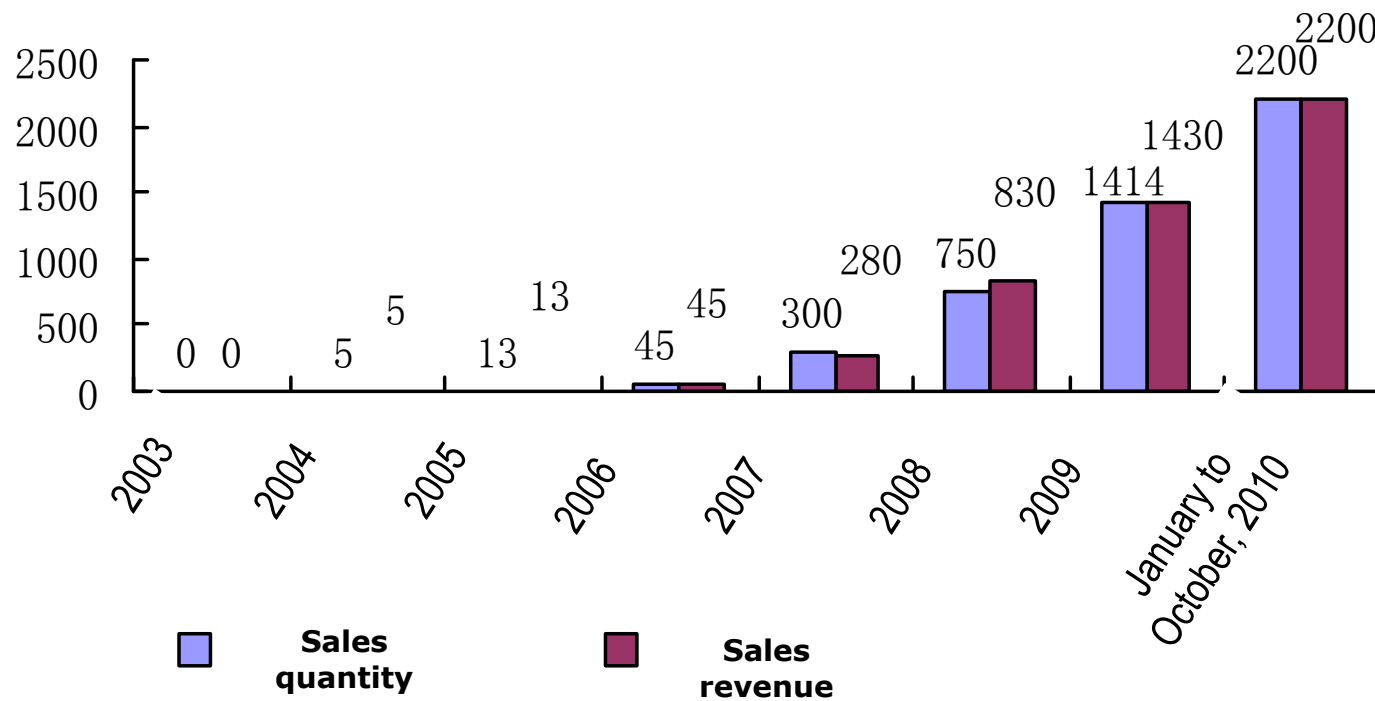
July 2, 2010, Premier Wen Jiabao made a inspection visit in Sany Cranes Industry Park. Under gracious invitation of Mr. Liang Wengen, Chairman of the Company, Premier Wen and Hunan Provincial Party Committee Secretary Zhou Qiang jointly cut the ribbon for China's first thousand-tonnage all terrain crane SANY SAC 303; Mr. Wen also made a gracious speech to the Sany staff on site, and inspired all staffs to work hard and create SANY into a world level enterprise as early as possible.



品质改变世界

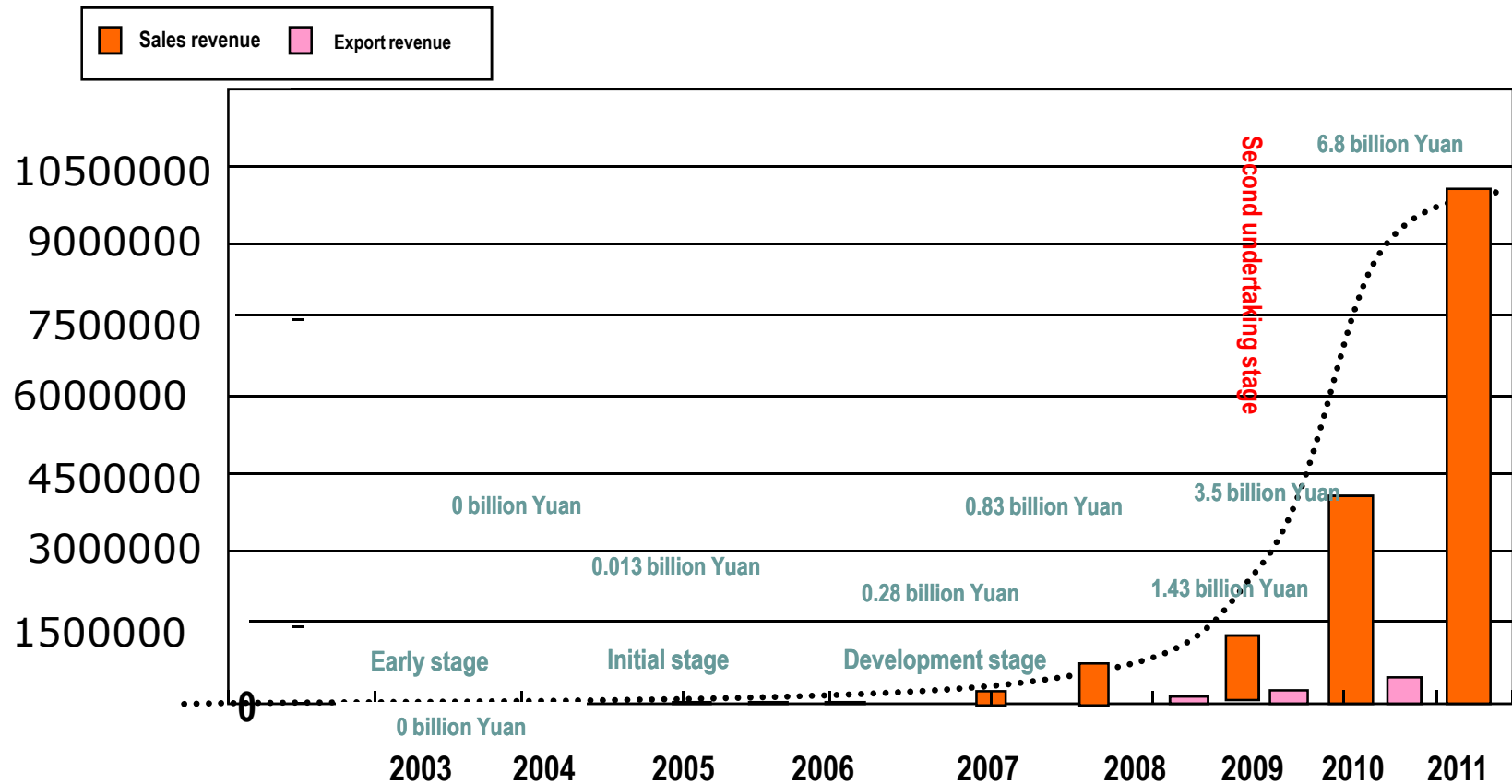


Video links of Premier Wen Jiabao's inspection visit in SANY Cranes on July 2, 2010





Sany Cranes Development Curve



Crane History

2003, set up the Shanghai Sany crane research institute ;

2004, crane division is established, started official production of cranes;

2005, products performance verification, developed A series products, and product bulletin application;

2006 A series products were put on the market;

2007 batch production, C series products were put on the market, and established status in this industry;

2008 introduced lean production ideas, and got involved in R & D of large tonnage products;

2009 S series products were developed and manufactured, perfected the product model chart;

2010 Built plant in Brazil, established research institute in Germany, started internationalization.

1.3 Main Crane Manufacturers

Europe and America have become the world's main production base and sales market

Main crane manufacturers: Liebherr, Manitowoc, Grove, and Terex

- Asian cranes are represented by China and Japan
- Japan mainly engaged in production of truck cranes, crawler cranes, rough terrain cranes, and all terrain cranes
- The rough terrain crane has greatest output;
- Followed by the output of truck crane;
- All terrain crane has least output;
- Manufacturers: Tadano, KATO

1.4 Main domestic truck crane manufactures

At present, domestic crane manufacturers mainly include

- Xuzhou Heavy Machinery Co., Ltd.
- Puyuan Branch Company of Changsha Zoomlion Heavy Industry Science & Technology Development Co., Ltd.
- Sany mobile Cranes Co., Ltd.
- Yangtz-Terex Engineering Crane Co., Ltd
- BQ-TADANO Crane Co., Ltd.
- Other manufacturers: Taiqi, Jinqi, Bengbu, Shaoguan

Chapter 2 Brief introduction of crane products

Description of SANY crane product series





Category	Type
All terrain crane	SAC303
	QAY220
	QAY160
Large tonnage truck crane	STC1300
	STC1000C
	QY100
Middle/small tonnage truck crane	STC750
	QY50C(09type)
	STC500
	STC350
	QY50C(09type)
	STC250
	STC250H
	QY20C
	STC200
Rough terrain crane	STC160
	SRC55
Special purpose crane	SSC920/SSC1180

I .SANY truck crane
Main features and competitive advantages
Main performance parameters and comparison
Main configuration and comparison

II. SANY all terrain crane
Main features and competitive advantages
Main performance parameters and comparison



Main features and competitive advantages of SANY truck crane I

— Super-long boom, strong and powerful





Main features and competitive advantages of SANY truck crane I

Length of lifting boom and lifting height are first in domestic

QY130:

Whole elongation of main boom is **60m**, leader in industry; length of main boom adding length of auxiliary boom reaches 78m, secondary boom can lengthen according to demand of user; main boom applies advanced single-cylinder cross pin telescopic technology, which can be set according to operation conditions and automatically expanded to demanded length.

Material of boom frame:

Sweden SSAB company WELDOX960 high strength steel plate

QY100:

Fully stretched length of U shape main boom is **52m**, length of main boom adding length of auxiliary boom reaches **70m**, maximum lifting height is **70m**.

STC750:

Fully stretched length of main boom is **45m**, maximum lifting height can reach **45.5m**, length of main boom + fully stretched length of auxiliary boom is **61m**, maximum lifting height is **61.5m**;

Material of boom frame: Japan imported WELTEN-950PE high strength steel plate



Length of lifting boom and lifting height are first in domestic

QY50C:

Full length of main boom is 42.5m, length of main boom + full length of auxiliary boom is 58.5m, maximum lifting height is **58.8m**.

STC250H:

Full length of main boom is 39.5m, length of main boom + full length of auxiliary boom is 47.5m, maximum lifting height can reach **48m**.

QY25C:

Full length of main boom is 33.5m, length of main boom + full length of auxiliary boom is 41.5m, maximum lifting height can reach 42m.

QY20C:

Full length of main boom is 32.55m, length of main boom + full length of auxiliary boom is 40.55m, maximum lifting height is 41.2m.

Main features and competitive advantages of SANY truck crane II

——High performance chassis





Maximum running speed, maximum climbable gradient, domestic leading in component configuration

QY100/QY130:

Maximum running speed is 80km/h, maximum climbable gradient is 40%; three- axle driving, four- axle steering;

High-grade chassis components: Germany Benz fully electronically controlled engine, Germany ZF-12 shift automatic transmission, ZF clutch, ZF transfer case and Germany kessler driving bridge, driving efficiency is high.

STC750:

Maximum running speed is 80km/h, maximum climbable gradient is 37.5%;

High efficiency and energy saving automobile chassis: select Weichai engine, with three modes power output function, select running and operation power output mode through WP multi-function oil saving switch, select optimum working mode of engine according to road conditions, reduce additional power consumption.

Excellent steering system: Germany ZF steering technology, equipped hydraulic power assisted steering system with overload protection, operation is light and reliable;

USA EATON Company double medium axle 9 shift transmission, single H double soft axle operation, high and low shift switching, shift position is clear and shifting is light and convenient.

Main features and competitive advantages of truck crane III

**———Brand new hydraulic
system**



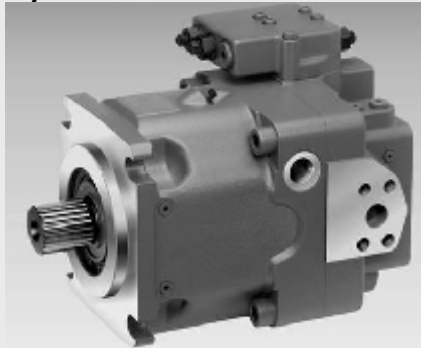
Brand newly designed hydraulic system— Energy saving, high efficiency and high-grade configuration

QY100/QY130:

SANY unique double-pump converging and dividing flow intelligent speed regulation **patent** technology, pump controlled speed regulation, fine motion is good, operation is stable; several flow distribution control, operation efficiency is high;

High-end hydraulic configuration: Hydraulic pump, motor and valve etc main hydraulic elements apply Rexroth, Vickers etc international famous brand, system is stable and reliable.

Rexroth oil pump



Rexroth motor

Brand newly designed hydraulic system— Energy saving, high efficiency and high-grade configuration

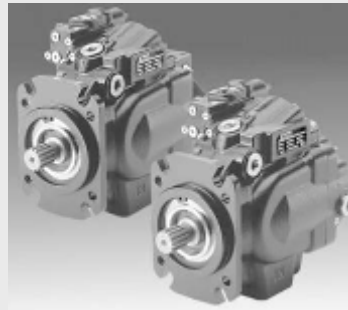
STC750/QY50C:

Pump controlled variable hydraulic system: apply imported variable pump, load sensor+constant power control, proportional regulation of working speed, automatically regulate displacement of oil pump according to load conditions, automatically match power; apply two shift variable hydraulic motor, realize heavy load at low speed, light load at high speed, energy saving and high efficiency.

Orinially imported key elements: Japan Kawasaki, USA Parker main oil pump, USA Husco main valve; Rexroth, Parker balance valve, hydraulic lock, Vickers solenoid, HYDAC high pressure filter etc.



Japan Kawasaki oil pump



Parker oil pump



Vickers solenoid



Husco main valve

Main features and competitive advantages of truck crane IV ———Advanced control system

Advanced control system

QY100/QY130:

Apply CAN bus full digital network control technology, control signal is stable, harness is simple and reliability is high; With complete displayed device parameters and operation parameters, operation ability is good; comprehensive fault diagnosis and alarm function, maintenance ability is good; comprehensive torque protection and alarm function for lifting heavy object; complete logic and inter-lock control, operation is more safe. **SYMC high accuracy force limiter:** Self-developed SYMC torque limitation system, apply modulating method which combines theoretical modulating with module modification of prototype, modulating is more practical and control is more accurate. Interface display is more rich, display interface can be customized and modified according to demand of the user.

Originally imported key elements:

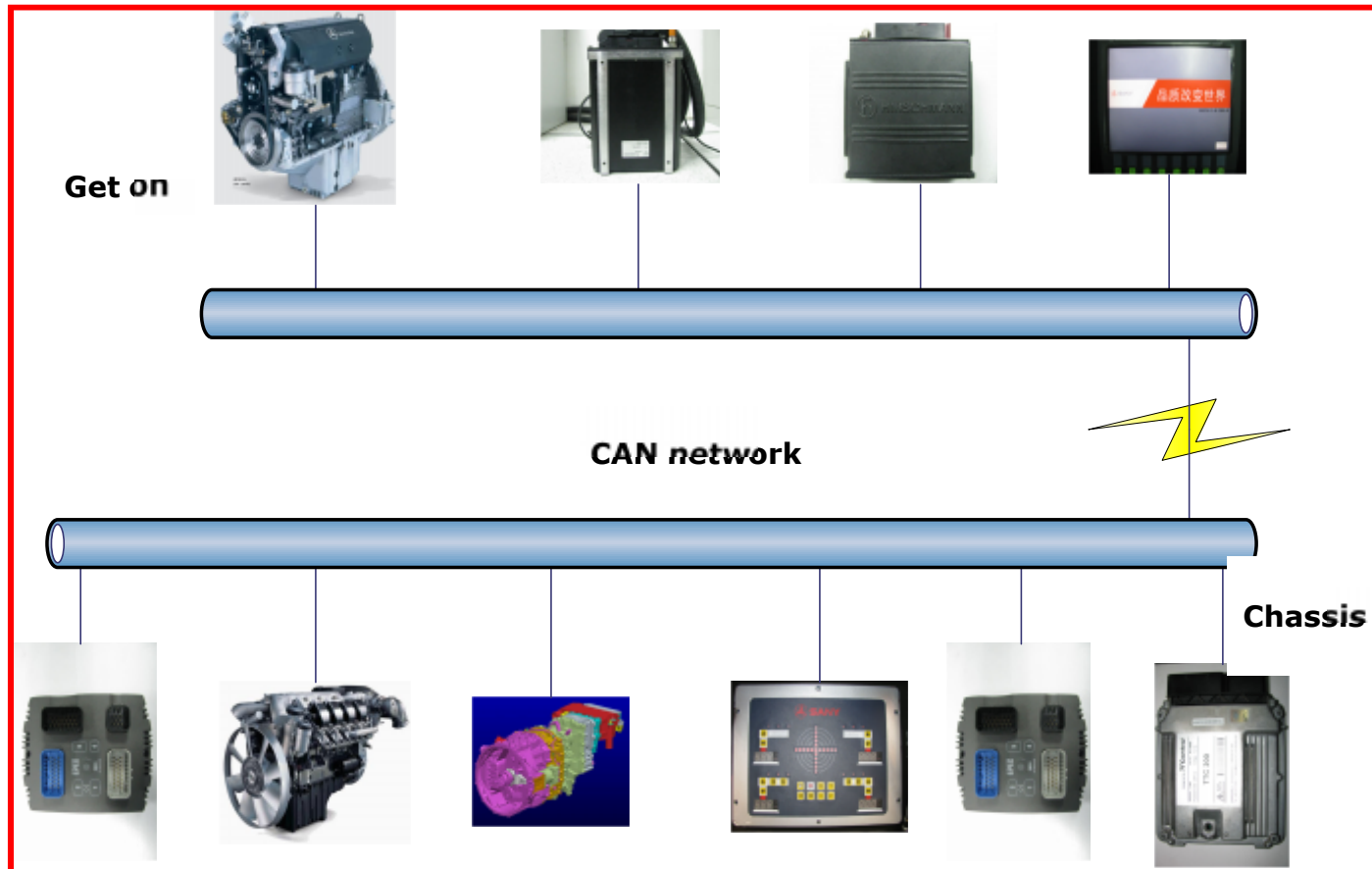
Finland EPEC high performance controller, Sweden SCC high definition large screen colorful display and whole set control elements of international famous brand.

SCC large
screen
colorful display



EPEC controller

Intelligent control system



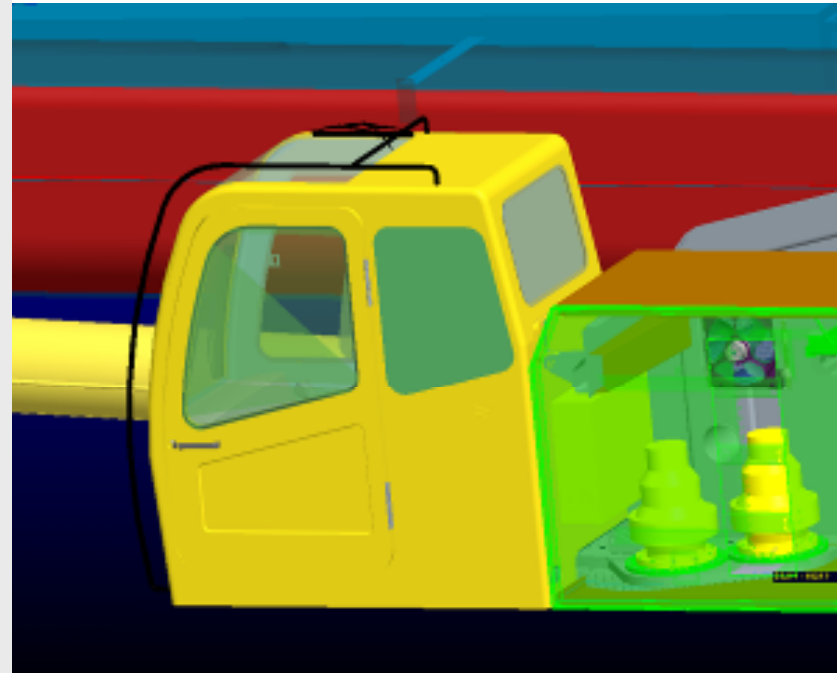
Main features and competitive advantages of truck crane V

———Closed double rotatory mechanism

Unique advantages of QY130:

Closed double rotatory mechanism

QY130 applies double rotatory mechanism, speed regulation performance is good, motion is more stable, which is a unique domestic truck crane applying double rotatory mechanism.



Product features of SANY STC250H crane

- **Five section boom and external engaging gear type 25T class automobile newly developed by SANY Crane product**
- **Outrigger span is 5.3m×6.2m, stability of the whole vehicle is good**
- **Maximum single wire speed of main and auxiliary winch is 130m/min, operation efficiency is high**
- **Hydraulic system not only heritages advantages of 25C but also is imported product HUSCO main valve, system is more stable, fine motion is good, operation is more accurate**



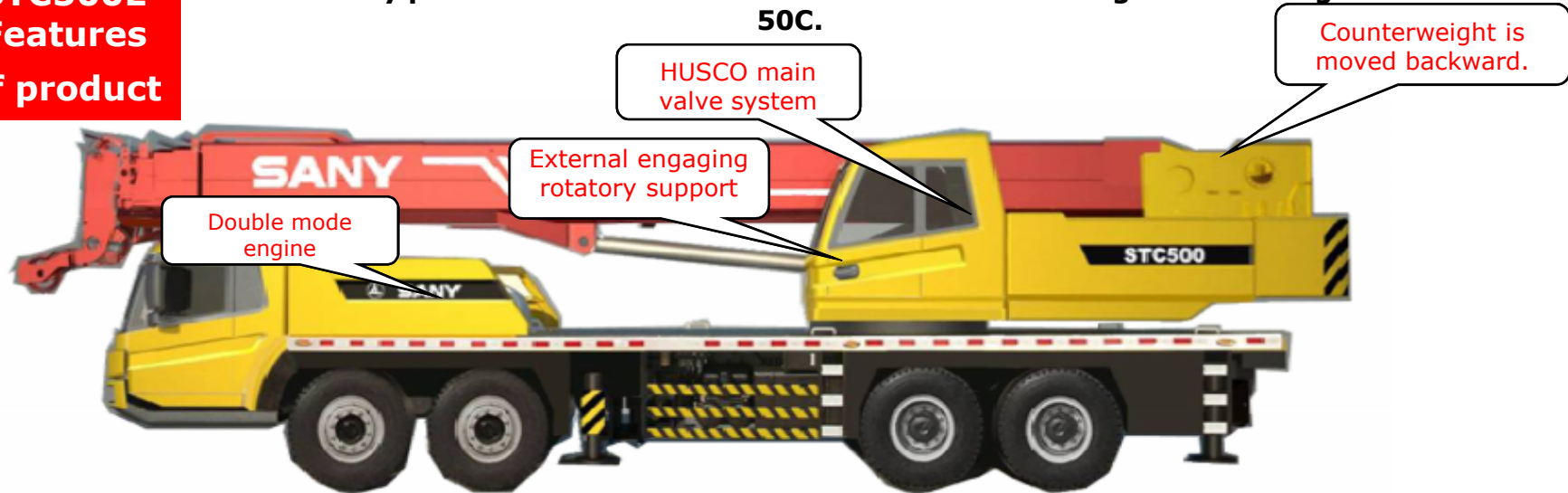


STC500 Features of product

- Apply imported HUSCO main valve, system is more stable, fine motion is good, operation is more accurate
- Internal engaging rotatory support is changed to external engaging type, maintenance and servicing are more convenient, which greatly reduces rotatory sloshing.
- Counterweight is moved backward, three hinge points optimization, stability of whole automobile is improved.
- Apply double mode engine, power is strong, running speed is improved to 85km/h, climbable gradient is improved to 40%, carry out switching of operation condition and running through mode selection switch, realize energy saving and consumption reduction
- Engine which displacement reaches Euro IV standard is optional

STC500E Features of product

- **SANY newly produces 50T class semi-cab truck crane on original advantage of 50C.**





No	Item	Configuration comparison of 25Tcrane		
		SANYSTC250H	Advanced product A with domestic same type	Advanced product B with domestic same type
1	Oil pump	USA parker	Xuzhou Keyuan	Xuzhou Keyuan
2	Main valve	USA HUSCO	Guzhou Fengyang	Zhejiang Shengbang
3	Winch motor	Guzhou Liyuan/Beijing Huade	Guzhou Liyuan/Beijing Huade	Guzhou Liyuan/Beijing Huade
4	Rotatory motor	Guzhou Liyuan/Beijing Huade	Guzhou Liyuan/Beijing Huade	Shanghai Wanhui/Jiangsu Qidong
5	Winch balance valve	Ningbo Yuzhou	Jiangsu Dingcheng	Ningbo Yuzhou
6	Flexible balance valve	USA Parker, Sant	Zhejiang Shengbang	Ningbo Yuzhou, Changde Xicheng
7	Derricking balance valve	Ningbo Yuzhou, oil controlled	Ningbo Yuzhou	Jiangsu Dingcheng
8	Rotatory cushion valve	Self-made (USA Vickers and Parker core insert)	Zhejiang Shengbang(XH10ZA)	Ningbo Yuzhou
9	Hydraulic lock	Sant	Jiangsu Dingcheng	Jiangsu Dingcheng
10	Filter	Germany Hydac	Domestic product	Domestic product
11	Rotatory support	Circulation011.45.1400	Xuzhou Rotatory Support011.45.1250	Fangyuan 013.45.1250Z12
12	Control cab	SANY automobile body	Xuzhong Sanchan	Qixing cab(jointly develop with Qixing)
13	Steel wire	Wuxi Safety	Fastern	Hubei Fuxing
14	Rotatory reducer	Xuzhou Keyuan	Xuzhou Deli	Xuzhou Keyuan



Main performance parameter table			SANYSTC250H	Advanced product A with domestic same type	Advanced product B with domestic same type
Dimension parameter	Outline dimension(length×width×height)	mm	12700×2500×3450	12000×2500×3380	12700×2500×3450
	Outrigger span	m	5.3×6.2	5.14×6	5.36×6.1
	Section number of lifting rig		5	5	5
	Length of main boom	m	39.5	38.5	39.2
	Longest main boom + auxiliary boom	m	47.5	46.8	47.2
Power parameter	Rated power of engine	kw/rpm	206/2200	206/2200	199/2200
	Rated output torque	N.m/rpm	1112/1400	1112/1400	1100/1300~1600
Working performance parameter	Maximum rated lifting weight	kg	25000	25000	25000
	Maximum lifting torque of primary boom	kN.m	980	961	980
	Maximum lifting height of main boom	m	40	38.6	39
	Maximum lifting height of auxiliary boom	m	48	47.6	47
Operation speed parameter	Maximum speed of main winch	m/min	≥130	≥120	120
	Maximum speed of auxiliary winch	m/min	≥130	≥120	70
	Maximum rotatory speed	r/min	2.5	2.5	2.2
	Time for full expansion of lifting boom	s	100	100	80
	Time for lifting of lifting boom	s	80	75	40
Running parameter	Maximum running speed	km/h	80	75	78
	Maximum climbable gradient	%	33%	30%	37%
	Approach angle	°	16	16	20
	Departure angle	°	11	13	12

I . SANY truck crane

Main features and competitive advantages

Main performance parameters and comparison (QY130、QY100)

**Main configuration and comparison of truck crane
(STC75, QY50C, QY25C)**



QY130 truck crane	Performance parameters and comparison		
	SANY QY130	Advanced product A with domestic same type	Advanced product B with domestic same type
Quality of whole unit t	57	62	69
Dimension of whole automobile length× width × height m	15.8×2.99×3.95 (including auxiliary winch)	14.95×3×3.95 (not including auxiliary winch)	16.2×3.1×3.9 (including auxiliary winch)
Outrigger span(horizontal direction×transversal direction, m)	7.7×7.8	7.56×7.6	7.04×8.5
Maximum rated lifting weight t	130	130	130
Maximum lifting torque of primary boom KN.m	5160	5003	4980
Maximum lifting torque of full expanded boom KN.m	2165	2087	1560
Primary boom length m	13.3	13	13
Length of full expansion boom m	60 (6 sections boom)	58 (6 sections boom)	48 (5 sections boom)
Length of main boom + auxiliary boom m	60+18	58+20	48+10+7+7
Maximum winch speed m/min	135	115	115
Maximum running speed km/h	80	75	68
Maximum climbable gradient %	40	40	22



QY100 truck crane	Performance parameters and comparison		
	SANY QY100	Advanced product A with domestic same type	Advanced product B with domestic same type
Quality of whole unit t	58	58	66
Dimension of whole automobile length× width × height m	15.97×3×3.81 (including auxiliary winch)	15.23×3×3.86 (not including auxiliary winch)	15.3×3×3.92 (not including auxiliary winch)
Maximum rated lifting weight t	100	100	100
Maximum lifting torque of primary boom KN.m	3600	3450	3528
Maximum lifting torque of full expanded boom KN.m	1920	1670	1876
Primary boom length m	13.5	12.8	13
Length of full expansion boom m	52	48	50.4
Length of main boom + auxiliary boom m	70	66	68
Maximum winch speed m/min	135	115	126
Maximum running speed km/h	80	75	71
Maximum climbable gradient %	40	35	30

I . SANY truck crane

Main features and competitive advantages

Main performance parameters and comparison (QY130、QY100)

**Main configuration and comparison of truck crane
(STC75, QY50C, QY25C)**

Item	Product configuration		
	SANY STC75	Advanced product A with domestic same type	Advanced product B with domestic same type
Material of lifting boom	Imported 90kg class	Imported 90kg class	Imported 90kg class
Engine	Weichai WP10.375	WD615.46	WD615.46
Transmission	Fast RT-11509C	Fast RT-11509C	Fast RT-11509C
Steering gear	Jiangmen ZJ120C Z/Y	Jiangmen GX110C	Jiangmen GX110C
Getting on multi-way valve	USA HUSCO	Ningbo Yuzhou	Changde Xincheng
Main pump	USA Parker, Japan Kawasaki	Hercules (HP051B678-20-20-10-02GA)	Xuzhou Keyuan (CB-KPR80/80 /40—B1/F2/JI)
Winch motor	Germany Rexroth	Sam (H2V108SL2RPE+P1 /1/100/80/108)	Guzhou Liyuan LY-A6V107HD1DFZ20700
Balance valve	Germany Rexroth - oil controlled	Oil controlled (import) + domestic	Domestic product
High pressure filter	Import: Hydac	Domestic: Shanghai Gaohang	Domestic: Shanghai Gaohang
Rotatory motor	Shanghai Yufeng	Guzhou Liyuan	Shanghai Wanhui/jiangsu Qidong (XM-F40)
Winch reducer	Xuzhou Keyuan	Xuzhou Keyuan	Xuzhou Keyuan
Rotatory reducer	Xuzhou Keyuan	Xuzhou Keyuan	Rexroth

Item	Product configuration		
	SANY QY50C	Advanced product A with domestic same type	Advanced product B with domestic same type
Engine	Shangchai SC9DK320Q3	Shangchai SC8DK280Q3	Steyr WD615.44
Transmission	Fast RT-11509C	Fast RT-11509C	Fast RT-11509C
Steering gear	Jiangmen ZJ120C Z/Y	Jiangmen GX110C	Jiangmen GX110C
Getting on multi-way valve	USA HUSCO	Zhejiang Shengbang	Changde Xincheng
Main pump	USA Paker, Japan Kawasaki	Xuzhou Keyuan CB-KPR80/80/40 (right rotatory)	Xuzhou Keyuan CB-KPR80/80/40 (right rotatory)
Winch motor	Germany Rexroth	Guzhou Liyuan LY-A6V107HD1DFZ20700	Guzhou Liyuan LY-A6V107HD1DFZ20700
Balance valve	Germany Rexroth - oil controlled	Oil controlled (import) + domestic	Domestic product
High pressure filter	Import: Hydac	Domestic: Shanghai Gaohang	Domestic: Shanghai Gaohang
Rotatory motor	Guizhou Liyuan LY-M1F40PL	Guizhou Liyuan XM-F40L	Guizhou Liyuan XM-F40L
Winch reducer	Xuzhou Keyuan	Xuzhou Keyuan	Xuzhou Keyuan
Rotatory reducer	Xuzhou Keyuan	Xuzhou Keyuan	Rexroth



Hydraulic configuration and comparison of 25Tcrane

Item	Manufacturer (type)				
	SANYQY25CS	SANYQY25CY	Advanced product A with domestic same type	Advanced product B with domestic same type	Advanced product C with domestic same type
Oil pump	Xuzhou Keyuan	USA parker	Xuzhou Keyuan	Xuzhou Keyuan	Xuzhou Keyuan
Main valve	Sichuan Yangtz	USA HUSCO	Zhejiang Shengbang	Guzhou Fengyang	Zhejiang Shengbang
Winch motor	Guzhou Liyuan/Beijing Huade	Guzhou Liyuan/Beijing Huade	Guzhou Liyuan/Beijing Huade	Guzhou Liyuan/Beijing Huade	Guzhou Liyuan/Beijing Huade
Rotatory motor	Guzhou Liyuan	Guzhou Liyuan	Shanghai Wanhui/Jiangsu Qidong	Guzhou Liyuan/Beijing Huade	Shanghai Wanhui/Jiangsu Qidong
Flexible balance valve	USA Paker, Sant	USA Paker, Sant	Zhejiang Shengbang	Zhejiang Shengbang	Ningbo Yuzhou, Changde Xicheng
Rotatory cushion valve	USA Vickers and Paker core insert	USA Vickers and Paker core insert	Zhejiang Shengbang	Zhejiang Shengbang	Ningbo Yuzhou
Hydraulic lock	Sant	Sant	Jiangsu Dingcheng	Jiangsu Dingcheng	Jiangsu Dingcheng
Filter	Germany Hydac	Germany Hydac	Domestic product	Domestic product	Domestic product
Rotatory support	Fangyuan, Olsson	Fangyuan, Olsson	Xuzhou Rotatory Support Factory	Xuzhou Rotatory Support Factory	Fangyuan

I . SANY truck crane

Main features and competitive advantages

Main performance parameters and comparison

Main configuration and comparison



II.SNAY all terrain crane
Main features and competitive advantages
Main performance parameters and comparison

Excellent operation performance

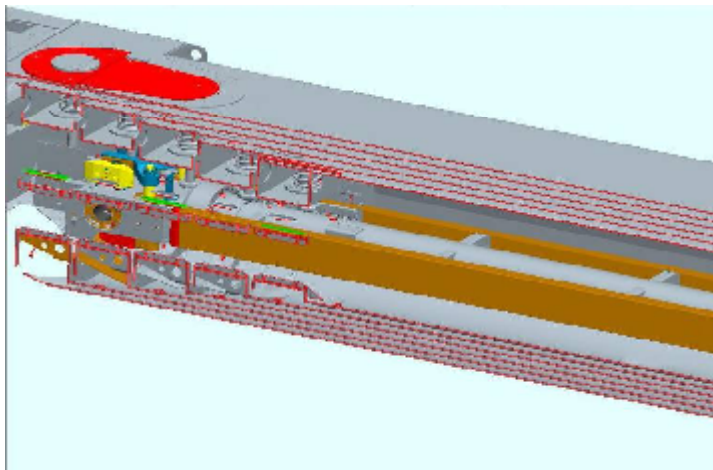
- a. Super-long boom, the first in domestic
- b. Single cylinder cross pin main boom+ automatic derricking auxiliary boom

Type	State height (M)		
	SAC303	QAY220	QAY160
Main boom	102	62	62
With length of auxiliary boom	228	105	84
Maximum operation height	220	102	81



Excellent operation performance

- a. Super-long boom, the first in domestic**
- b. Single-cylinder cross pin boom+ automatic derricking auxiliary boom**



**Single-cylinder cross pin automatic
telescopic boom
Double-assurance stretching and
retracting control system**



**Automatic derricking
Quick s continuous derricking within
the range 0-40 degrees**

**Powerful running pass
capability**

a. Six models of oil-gas suspension
system

Third axle elevating



**Suspension
model**

Rigid locking

**Single point
ascending and
descending**

**Ascending and
descending of
overall vehicle**

**Automatic
leveling**

**Three-axle
elevating**

Powerful running pass capability

b. Six models of all-wheel steering system

Small radius all-wheel steering



Highway driving

All-wheel steering

Crab walking

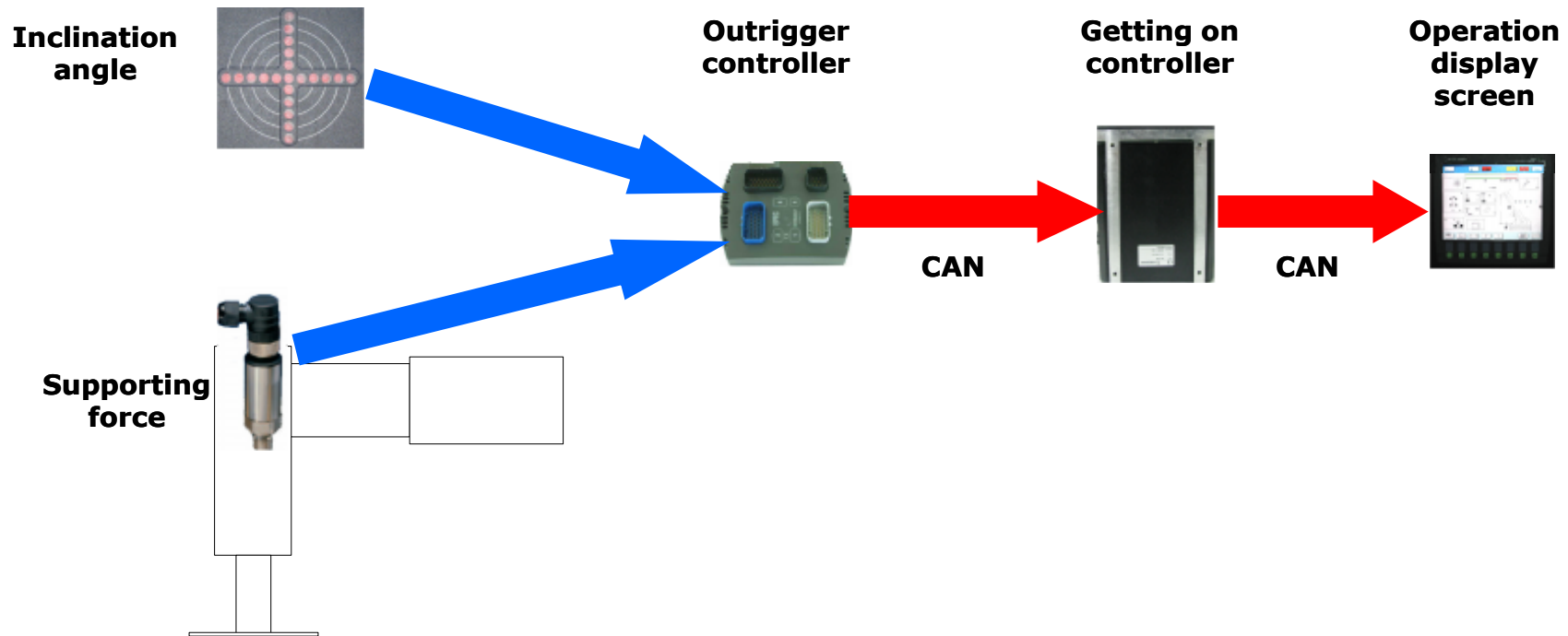
Rear axle locking

Separate rear axle steering

No deflection steering



Overturning precaution function



I . SANY truck crane

Main features and competitive advantages

Main performance parameters and comparison

Main configuration and comparison



II.SANY all terrain crane

Main features and competitive advantages

Main performance parameters and comparison



Category	Item		Unit	SANYSAC303	LIBHERR LTM11200
Main performance parameters	Maximum rated lifting weight		t	1,000t/3m	1200t/2.5m 1000t/3m
	Minimum rated working amplitude		m	3	2.5
	Rear rotatory radius of turntable(balance weight)		mm	/	9155
	Maximum lifting torque	Over lifting (32 m boom length adding over lifting)	KN.m	34000	33200
		Standard maximum lifting torque	KN.m	31000	30240
	Outrigger distance		m	13.8× 13.8	13.03×13.01
	Length of lifting boom	Primary boom	m	18.3 (T3) /19.9 (T7)	18.6 (T3) /20.1 (T7)
		Longest main boom	m	102	100
		Tower type auxiliary boom	m	126	126
Operation speed parameter	Derricking of lifting boom	Lifting boom	s	125	130
	Expansion of lifting boom	Full expansion /full shrinkage (T7)	s/s	800/800	770/770
	Maximum rotatory speed		r/min	1.0	0.8
	Expansion time of outrigger	Horizontal(expand at same time/shrink at same time)	S/s	50/40	/
		Vertical(expand at same time/shrink at same time)	S/S	50/40	/
	Lifting speed (single wire)	Main/auxiliary lifting mechanism(no-load)	S/S	130/130	125/125



Category	Item		Unit	SANYQAY220	LIBHERR LTM1220	Advanced product QAY200 with domestic same type
Main performance parameter	Maximum rated lifting weight		t	220	220	200
	Minimum rated working amplitude		m	3	3	3
	Rear rotatory radius of turntable(balance weight)		mm	4850	4850	5070
	Maximum lifting torque	Primary boom	KN.m	6900	6570	6774
		Longest boom	KN.m	/	/	2752
	Outrigger distance		m	9.045×8.5	8.9×8.3	9.625×8.7
	Lifting height	Primary boom	m	14	13.7	14.5
		Longest main boom	m	62.5	60.5	61.5
		Longest main boom + auxiliary boom	m	105	101	82.1
	Length of lifting boom	Primary boom	m	13.5	13.2	13.8
		Longest main boom	m	62	60	61
		Longest main boom+ auxiliary boom	m	102	102	81
Operation speed parameter	Derricking of lifting boom	Lifting boom	s	60	50	90
	Expansion of lifting boom	Full expansion /full shrinkage	s/s	550/550	360/360	550/550
	Maximum rotatory speed		r/min	1.8	1.8	1.9
	Expansion time of outrigger	Horizontal (expand at same time/shrink at same time)	S/s	50/40	/	50/40
		Vertical (expand at same time/shrink at same time)	S/S	50/40	/	50/45
	Lifting speed (single wire)	Main/auxiliary lifting mechanism (no-load)	S/S	130/130	130/130	120/110



Category	Item			Unit	SANY	Advanced product with domestic same type
Main performance	Maximum total rated lifting weight			t	160	160
	Minimum rated working amplitude			m	3	3
	Maximum lifting torque	Primary boom		kN.m	5340	5282
		Fully extended boom		kN.m	2150	
	Outrigger distance	Horizontal		m	8.118	9.625
		Transversal		m	8.5	8.7
	Lifting height	Primary boom		m	13.8	14.3
		Longest main boom		m	58.8	56.3
		Longest main boom + auxiliary boom		m	81	79
	Length of lifting boom	Primary boom		m	13.5	13.6
		Longest main boom		m	62	60
		Longest main boom+ auxiliary boom		m	84	80
Installation angle of auxiliary boom			°	0、 15、 30	0、 15、 30	
Working speed	Derricking time of lifting boom	Lifting boom		s	60	90
	Time for expansion of lifting boom	Full expansion		s	550	600
		Full shrinkage		s	550	600
	Maximum rotatory speed			r/min	1.8	2
	Lifting speed (single rope, forth floor)	Main lifting mechanism	No load	m/min	130	120
		Auxiliary lifting mechanism	No load	m/min	130	110

The fundamental principle of the truck crane

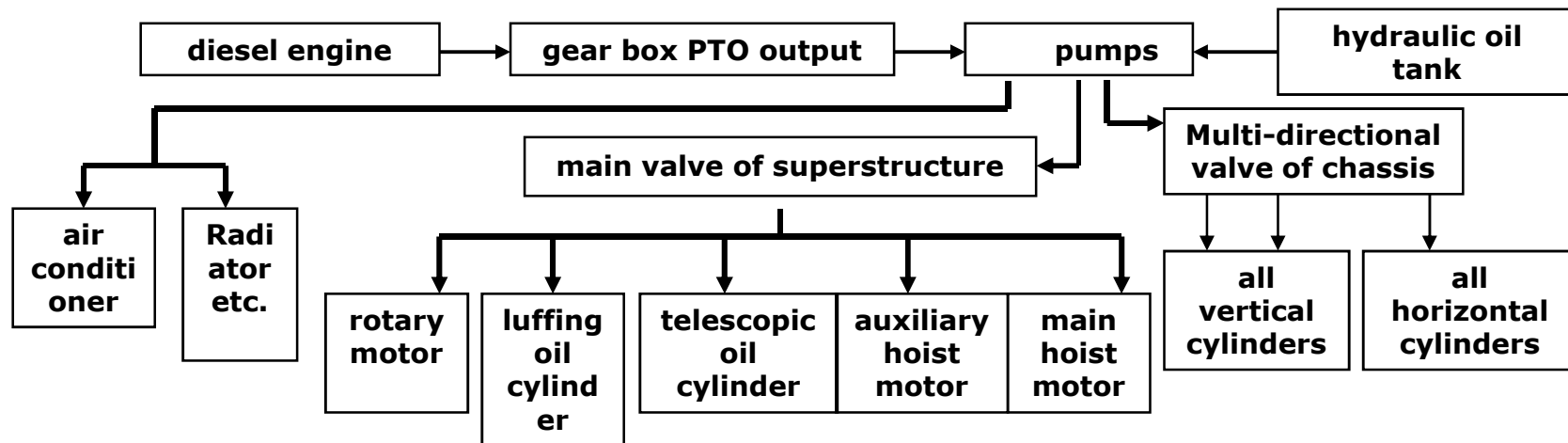


Under the strong support of the structure, the superstructure can realize 360° revolution, luffing, extending and retracting the boom, rolling up and down of the winch, etc. Thus the hook can be moved to different position as required.



Power transmission diagram

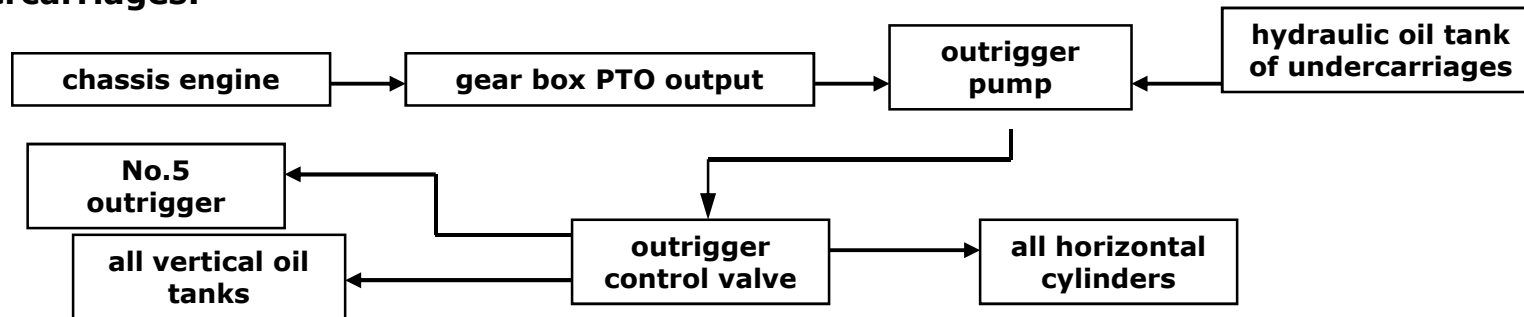
- ❑ The truck cranes are all hydraulic cranes, the power of which originates from the engine of the superstructure or chassis. The cranes with big lifting capacity use independent power.
- ❑ Power transmission diagram of cranes with small lifting capacity (single engine):



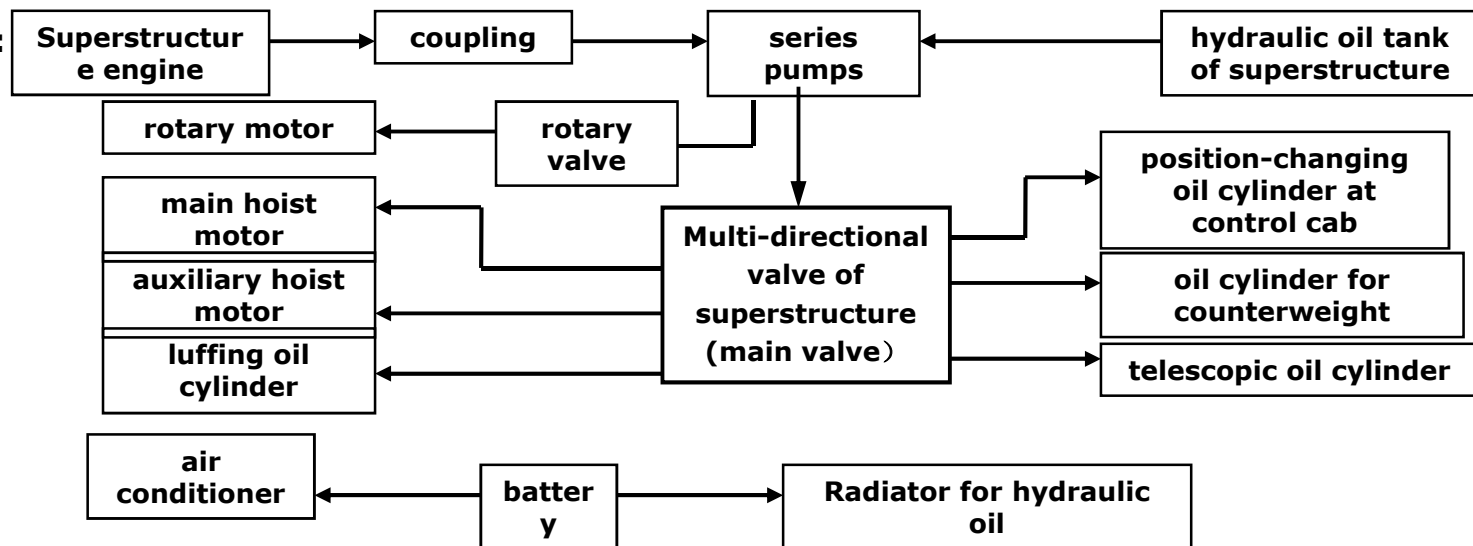


□Power transmission diagram of cranes with big lifting capacity (double engine):

Undercarriages:



Superstructure:



Definition of the Main performance parameter of crane

The main performance Parameter of truck crane include lifting capacity, hoisting height, amplitude, working speed and dead weight. These parameters indicate the working performance and technical index. It is the technical performance reference for choosing the crane for production.

Main performance parameter of crane-lifting capacity

- Lifting capacity refers to the mass of the object which can be lifted, normally it refer to the rated lifting capacity, it is the maximum value of lifting under different working condition and safety operation. It includes the weight of hook and other hoisting instruments.
- Max. rated lifting capacity refers to the max mass of the object that can be lifted in the minimum amplitude. It is the main technical parameter. The JB/T1375—92 standard uses it as the main parameter to establish the series standards. The truck crane products of our company meet this standard.



Main performance parameter of crane-working amplitude

- Working amplitude refers to the horizontal distance between the revolution central axle and the center of the hook when the crane is working under rated lifting capacity. When the length of the boom is the same, the bigger the amplitude is, the smaller the lifting capacity is.
- During operation, because of the elastic deformation, the amplitude will be increased at the beginning of the hoisting.



5.4 Main performance parameter of crane-lifting torque

- The working amplitude multiplying the lifting weight at this amplitude is the lifting torque. It reflects the lifting capacity of the crane properly and generally.
- The max. lifting torque should be the main index of the main performance parameter of the crane.

$$\text{Lifting torque} = G \times R$$



Main performance parameter of crane-hoisting height

- Hoisting height refers to the distance between supporting plane to hook center in vertical direction. The max. hoisting height refers to the distance between highest point reachable by the hook and the supporting plane, when the crane is full-loaded. The design of the height should take the whole design of the crane into consideration and should follow the hoisting height specification for various tonnage crane in JB/T1375—92 standard.

□ The hoisting height is decided by the length of the boom. It reflects the characteristic more directly.



Main performance parameter of crane-working speed

- The working speed includes the speed of hoisting, luffing, slewing and traveling speed, and it also includes the speed of the extending and retracting booms and outriggers.
- The hoisting speed is normally described as the single rope speed.
- The turning speed is rpm(revolutions per minute).
- The luffing and extending and retracting time refers to the time needed to achieve the maximum position.

■The working speed will affect the working efficiency.



Main performance parameter of crane-deadweight

- The deadweight of the crane refers to the full weight of the crane when it is under working condition. It is the all-around index for crane evaluation, it reflects the technical level of the design, manufacturing, materials, working process and so on.

■For the same tonnage and same performance products, the lighter crane is more advanced.

