SANYI

Support Series Product Catalogue

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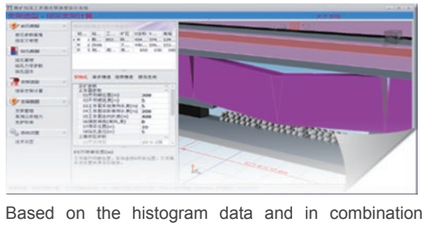
Introduction of Support Series Product

Sany Heavy Equipment Co., Ltd. always undertakes the R&D and manufacture of coal machinery and its supporting products as own mission and its industry senior R&D and service teams offer complete solutions, including mine mining design, equipment selection and customization, supporting product R&D, production installation, and after-sales maintenances, to the customers. While continuously improving the technologies of traditional coal machinery, Sany pays more attention to the product R&D and put forward 5 manufacturing requirements for the support products, namely light weight, less failures, long reliable life, high adaptability, and one-time zero-defect design, to bring about real benefits to the coal mine users (Low failure and operation and maintenance costs and guaranteed high-efficiency coal mining).
Sany Heavy Equipment Co., Ltd. is already competent to become reality the automated and intelligent green mines.

Design and manufacture of supports

Scientific model selection

1. “Working resistance” model selection

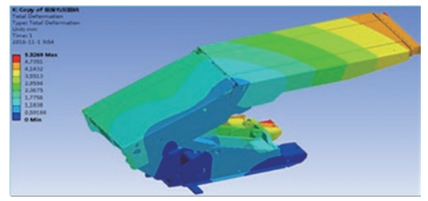


Based on the histogram data and in combination with the actual local operation experiences, the scientific model selection utilized the “transmission rock beam” mechanics theory of the academician Song Zhenqi and reasonably determined the working resistance of supports to guarantee the appropriate working resistance and prevent the adverse events such as waste of investment and occurrence of roof accident or damage of mass supports.

2. “Anti-corrosion and anti-contamination” model selection

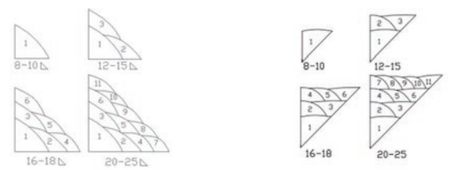
The water of working face was collected for water quality analysis. Based on the water quality report, the anti-corrosion and anti-contamination model selection was fulfilled to determine the plating anti-corrosion technology of hydraulic cylinder, ensure that the “anti-corrosion and anti-contamination” performance of supports meets the requirements, and reduce the failure rate and operation and maintenance costs of hydraulic system parts.

Targeted design optimization



Based on the working conditions (Approximately horizontal face, large inclination, face-up/face-down mining, fault structure, tight roof, three-soft problem, and highly corrosive working face) of the working face, the targeted design was fulfilled to guarantee the excellent working condition adaptability of the supports. The mechanical structure of the machine was optimized by finite element analysis to eliminate common design defects (Concentrated stress, insufficient rigidity, and unreasonable partial structure) and guarantee no-defect structure design.

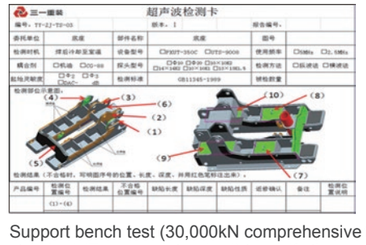
Manufacturing processes



High-strength steel plate welded parts: The manufacturing quality of structural parts is guaranteed by removing the oxide skin from groove surfaces, reasonably controlling the welding parameters (Such as current and welding speed) and equal-strength welding wires, and using multi-layer and multi-bead welding process, residual stress relief, and shot blasting.

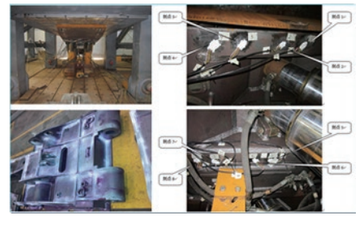
Machining: The 100% interchangeability of the structural parts is guaranteed by main reamed holes and integral boring process.

Inspection and testing



Quality control of structural parts: The supersonic flaw detection was taken for main structural parts to verify the welding quality.

Support bench test (30,000kN comprehensive test bench) was completed as per national standard (European standard) to verify the overall performance.




Support production workshop
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Standard configuration

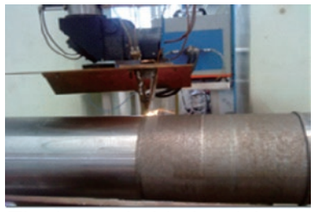
Critical item	Configuration description
Structural parts	High strength steel plate
Cylinder anti-corrosion protection	Milky white chrome + hard chrome
Valve	Stainless steel valve core
Seal	Cut by imported material
Hose	35MPa (Fluid inlet)
Filtration precision	40 μ
Mine pressure monitoring	Mechanical pressure gauge
Control mode	Manual control

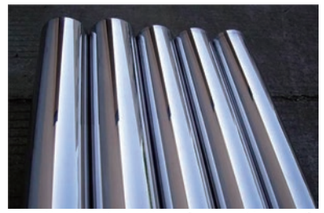
Enhanced configuration

Critical item	Configuration description	Applicable conditions
Cylinder anti-corrosion protection	Sany anti-corrosion technology	Highly corrosive water
Valve	Stainless steel	Highly corrosive water
Working medium management	1. Emulsified liquid management system 2. Sany pure water support system	High failure rate of hydraulic system due to highly corrosive water and dirt
Electrohydraulic control system	Sany patented technology: Remote control and video monitoring	High-efficiency working face with less manpower, such as high mining height and thin seam.

Technical Features

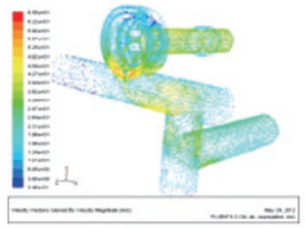
Sany adopts innovative anti-corrosion laser cladding technology.
The salt fog test for the electroplating performance is up to 1,800h, longer by 400~500h than that specified by national standard.

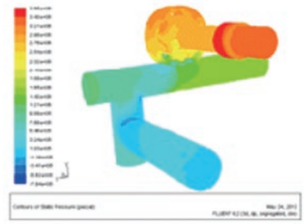


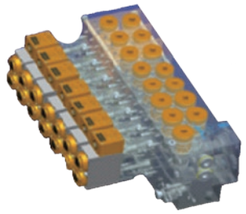


1,000h salt fog test

The laser cladded stainless steel eliminates the formation of porosity cracking to thus isolate the contact between water and base material and achieve permanent anti-corrosion performance for the piston rod. (After 1,000h salt fog test, the one with Sany anti-corrosion technology almost has no change and the double chrome plating is already corroded)







The valve internal flow field and dynamic characteristics of the supports are analyzed by CFD computational fluid mechanics to realize the optimized matching between valve internal channel structure and flow speed and differential pressure.

Working medium management

Emulsified liquid management system

For fully mechanized mining equipment, the traditional emulsified liquid supply system is actively managed to guarantee the concentration and cleanliness of emulsified liquid to reduce the failure rate of hydraulic system.

Pure-water support test and water making device

The ultra-pure water is used as medium in place of emulsified liquid. Compared with traditional emulsified liquid system, this system is simplified more to realize lower failure rate and high economy and environmental-friendliness.

Technical Features

The high cost-performance electrohydraulic control system developed independently by Sany Heavy Industry Co., Ltd. innovated the wireless remote control device and video monitoring system to drive the intelligent development of supports and lay a foundation for the realization of automated underground fully mechanized mining working face with less manpower in the industry.

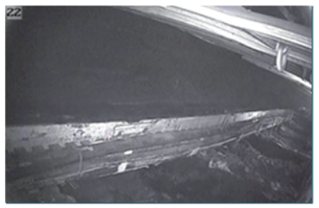
Experience of remotely operated supports by experts of China National Coal Association in 2012

Industry's pioneering remotely operated supports

With IP67 protection grade, the control system parts can be immersed in the water for long-time energized working to adapt to the severe mine environments.

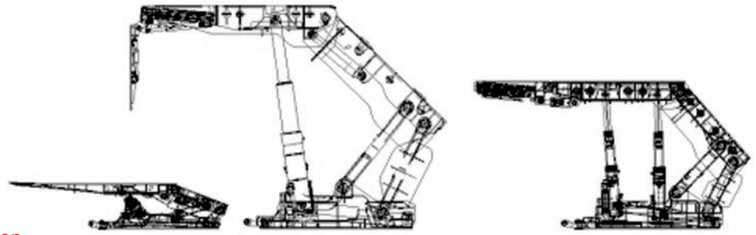
Intrinsically safe micro-camera

Real-time upload of underground video to monitoring center



Working face field video on gate road centralized control system

Full mining height support



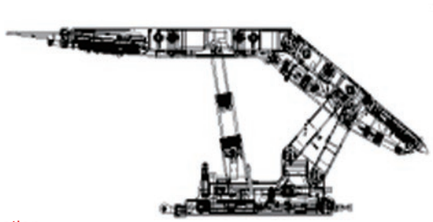
Technical Spaecification

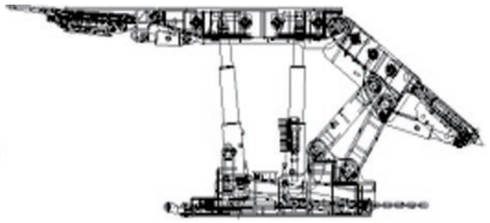
Parameter		Two-pillar shield type	Four-pillar shield type
Working resistance (kN)		2400 ~ 20000	3500 ~ 18000
Maximum height (m) Minimum height (m)		1.4 ~ 7 0.7 ~ 3.2	1.3–4.5 0.65 ~ 2.5
Conventional center distance (m)		1.5 (≤8000kN working resistance) 1.75(≤12000 kN working resistance) 2.05 (≤20000kN working resistance)	1.5 (≤14400kN working resistance) 1.75(≤18000kN working resistance)
Height adjustment combinations	Thin seam	07–14；07–17；08–18	6.5–13； 07–14； 08–16； 09–18
	Medium-thickness seam	09–20；10–23；12–26；13–28；14–30；16–32；17–35	12–24； 14–26； 16–30； 17–32； 18–35
	Thick seam	18–38；20–40；22–45；23–48；24–50；26–55；28–63；32–70；35–80	19–38； 20–40； 23–42； 25–45

Operation cases

Model	Working location
ZY3000/07/17	Beixulou Coal Mine, Shandong Fengyuan Yuanhang Coal Co., Ltd.
ZY3200/07/17	Shanxi Tongzhou Ansheng Coal Mine
ZZ3540/6.6/13	The Donbas coal mine, west of Pavlogorod, Ukraine
ZY3600/08/18D	Tucheng mine, Guizhou Panjiang Clean Coal Co., Ltd.
ZY4000/08/18D	Shanxi Coal Group Zuoyun Caiduogou Coal Co., Ltd.
ZY4800/13/28	Guizhou Pan County Dashan Town Xiaohebian Coal Mine
ZZ6000/17/34	Shanxi Xinfei Xiashanmao Coal Co., Ltd.
ZY6800/17/35	Inner Mongolia Wulaxu Coal Mine
ZZ8000/18/35	Datong Queshan Clean Coal Co., Ltd.
ZY9000/25/50	Shanxi Linzhida Coal Mine
ZY9000/26/55	Xinjiang Shajihai Coal Co., Ltd.

Sublevel carving support





Technical Spaecification

Parameter	Two-pillar shield type	Four-pillar shield type
Working resistance (kN)	5000 ~ 12000	4000 ~ 18000
Maximum height (m)	3 ~ 4.5	2.6 ~ 4.5
Minimum height (m)	1.6 ~ 2.3	1.6 ~ 2.3
Conventional center distance (m)	1.5 (≤7200kN working resistance) 1.75(≤12000kN working resistance)	1.5 (≤14400kN working resistance) 1.75(≤18000kN working resistance)
Height adjustment combinations	16–30；18–35；19–38；20–40；21–43；23–45	16–26；17–28；19–32；20–35；22–38；24–43；25–45

Operation cases

Model	Working location
ZF4800/17/28	Shanxi Xingguang Coal Co., Ltd.
ZF6400/16/30	Gansu Huating County Chedihe Xixiang United Coal Mine
ZF6800/18/35	Xinjiang Dabei mine
ZF7500/18/35	Shanxi Coal Group Zuoyun Hanjiagui Coal Co., Ltd.
ZF8000/18/35	Datong Queshan Gaojiayao Coal Mine
ZF8000/20/32	Shanxi Baoshanyaozai Coal Co., Ltd.
ZF9000/18/35	Datong Zengzifang
ZF10000/18/35	Datong Coal Group Shuozhou Shuomei Xiayu Coal Mine
ZF15000/24/43	Inner Mongolia Liliang Coal Co., Ltd.

Face-end supports

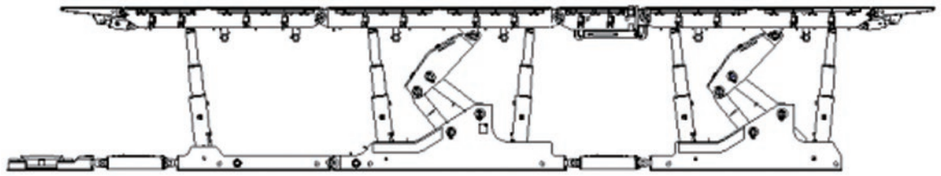
Technical Spaecification

Parameter	Two-support set middle type	Walking type
Working resistance (kN)	10000 ~ 30000	
Maximum height (m)	3.5 ~ 4.5	
Minimum height (m)	1.8 ~ 2.6	
Conventional center distance (m)	Adjust depending on the gate road width and supporting equipment	
Height adjustment combinations	18–35；22–35；24–38；26–38；22–40；23–42；25–45	

Operation cases

Model	Working location
ZFT10000/22/34	Shanxi Baoshanyaozai Coal Co., Ltd.
ZFT12000/22/35	Xinjiang Changji Fujiang Coal Mine
ZFT18000/26/40Z	Inner Mongolia Liliang Coal Co., Ltd.
ZFT20000/23/42	Datong Coal Group Shuozhou Shuomei Xiayu Coal Mine

Gate road support



Walking forepoling support

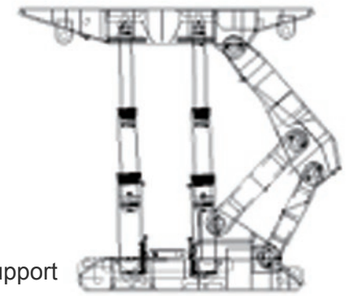
Technical Spaecification

Parameter	Walking forepoling
Working resistance (kN)	10000 ~ 30000
Maximum height (m)	3.5 ~ 4.5
Minimum height (m)	1.8 ~ 2.6
Conventional center distance (m)	Adjust depending on the gate road width and supporting equipment
Height adjustment combinations	18–35；22–35；24–38；26–38；22–40；23–42；25–45

Operation cases

Model	Working location
ZCZ24000/22/40	Haishiwan Coal Mine, Yaojie Coal and Electricity Group Co., Ltd.

Special application support



Working face retracement support

Technical Spaecification

Parameter	Special application support
Working resistance (kN)	Customized
Maximum height (m)	Customized
Minimum height (m)	Customized
Conventional center distance (m)	Customized
Height adjustment combinations	Customized

Operation cases

Model	Working location
ZZ13000/22/46	Inner Mongolia Datai Coal Co., Ltd.

Product configuration

Selection of items

Item	Conventional configuration	Enhanced configuration	
		Optional Equipment	Features
Control mode	Manual control	Electrohydraulic control system (Patented technologies: Remote control and video monitoring	High efficiency and less manpower
Cylinder anti-corrosion protection	Milky white chrome + chrome	Sany anti-corrosion technology	Severe working conditions
Valve	Carbon steel	Stainless steel	Severe working conditions

1. For thin seam or high mining height working face, the installation of electrohydraulic control system is recommended.
2. For manual control (with high failure rate of hydraulic system) or electrohydraulic control, the installation of our optional intelligent emulsified liquid guarantee system is recommended.
3. For highly corrosive working face, it’s recommended to select “anti-corrosion” enhanced configuration.