青岛极致创新科技有限公司
QINGDAO ACME INNOVATION TECHNOLOGY CO., LTD.

Unloading Buffer Hydro-cylinder

High-pressure buffer cylinder with soft impact

Company Introduction

Qingdao acme Innovation Technology Co., Ltd. was established in March 2018, dedicated to hydraulic and transmission core.Development and promotion of technology and related products. The unloading buffer hydraulic cylinder innovatively developed by the company has been applied in relevant fieldsThe trial installation and application of the product by the host factory have obvious technical performance advantages, effectively solving customer pain points,Widely concerned by customers in the field of OEMs and new energy vehicles.

We have a professional technical research and development team, all of whom have a bachelor's degree or above. The technical team members mainly come from well-known enterprises such as Caterpillar, AVIC Research Institute, Parker O'Hare, China Aerospace Research Institute, CRRC Sifang Institute, and Meichen Group, with rich experience in research and development, design, process, and production technology development.

The company has been approved to enter the database of technology-based small and medium-sized enterprises and the database of new economic potential enterprises in Qingdao in 2022. It has built the "Qingdao One Axis Drive Dynamics Research Expert Workstation" and is listed on the Qingdao Blue Ocean Equity Trading Center. It has won the "Maker China" (Qingdao Division) Competition Excellence Award and the second prize in Chengyang District, as well as the "Most Valuable Investment Award" in the China (Qingdao) International Elite Entrepreneurship and Innovation Competition. In 2019 and 2022, it received tens of millions of equity investments led by the Qingdao Municipal Government's "Talent Fund".

Financing situation

The company has completed tens of millions of yuan in angel round and Pre-A round financing, and has received support from professional investment institutions led by Qingdao Qingchuang Caifu Equity Investment Partnership Enterprise (Limited Partnership), a talent fund under the Qingdao Municipal Government. The extremely innovative technology, products, and market prospects have been given high expectations by investors!

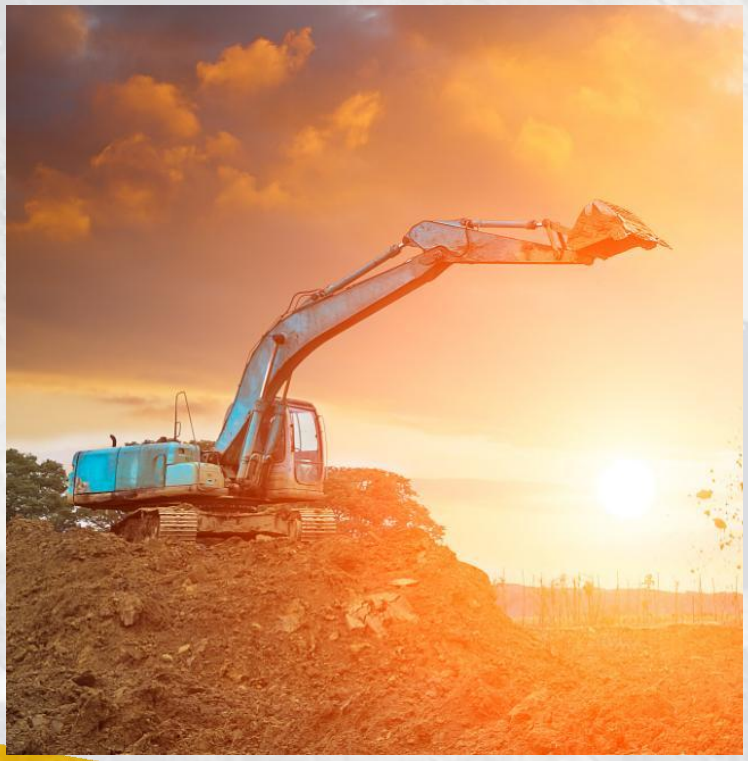
Key technology

The company adheres to the main line of innovation in "Made in China 2025", with the aim of strengthening the basic capabilities of the industry's "core basic components", focusing on "key common technologies" in the hydraulic and transmission industries, and taking a new approach to achieve technological breakthroughs through "structural principle innovation". 11 international patents, 5 domestic invention patents, and 8 utility model patents have been granted for related technologies. In the future, we will continue to devote ourselves to the research and development and production of hydraulic and transmission core components, based on disruptive innovation, breaking foreign technological monopolies, achieving domestic substitution and technological surpassing, and becoming a leader in the domestic high-end hydraulic and transmission product market!

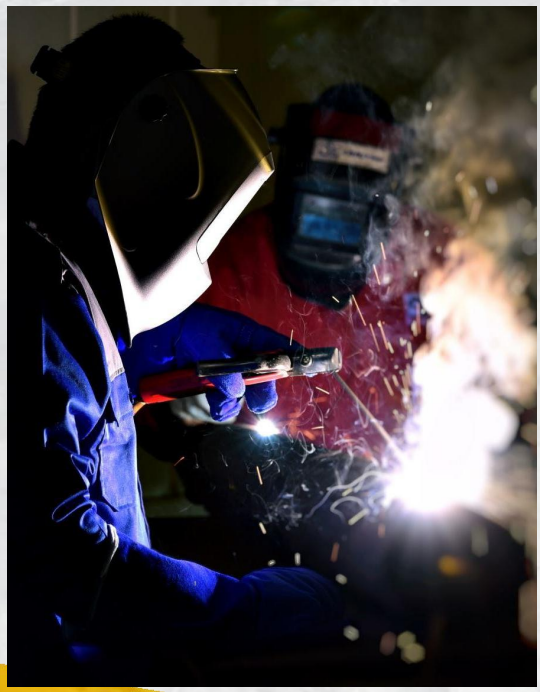
Preface

As one of the important actuating components in hydraulic systems, hydraulic cylinders are widely used in excavators and loaders, among others in the field of engineering machinery.

During the operation of the main equipment, when the piston of the hydraulic cylinder moves to both ends of the cylinder body, it will collide with the bottom of the cylinder. Therefore, all high-pressure hydraulic cylinders are designed with buffering devices. The current mainstream technology is to use hydraulic oil throttling at the end of the piston stroke to complete the buffering function.



To achieve a good buffering effect, the buffering pressure needs to exceed 100Mpa, which requires high pressure resistance of the cylinder head and piston. Special manufacturing processes and materials are required to ensure this, and the hydraulic system is in an overflow state during the buffering process, resulting in high energy consumption. The temperature rises. Sometimes only a palliative solution that reduces the buffering pressure and sacrifices the buffering effect is a pain point for hydraulic cylinder manufacturers and users.

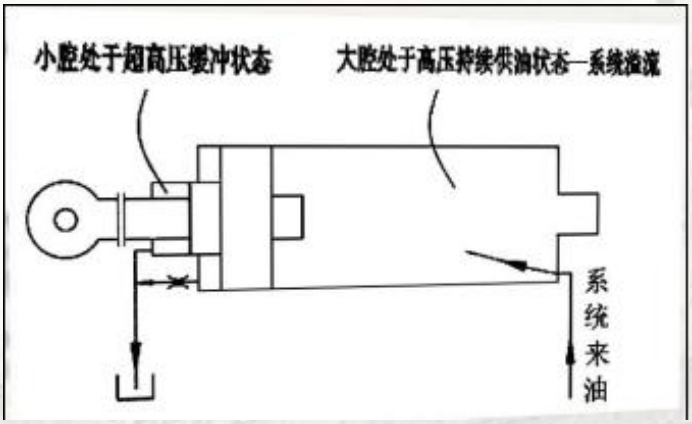


The unloading buffer hydraulic cylinder (invention patent number: 2016104197501) perfectly solves this pain point. The basic principle is to install an oil pressure sampling tube in the buffer chamber. When the set pressure value is reached, the driving valve block will directly return hydraulic oil from the inlet chamber to the oil tank. Quickly relieve pressure and throttle the buffer chamber in the oil inlet chamber.Under dual action, complete the buffering function.

Principle of traditional buffer hydraulic cylinder

During the buffering process:

- Buffer chamber throttling

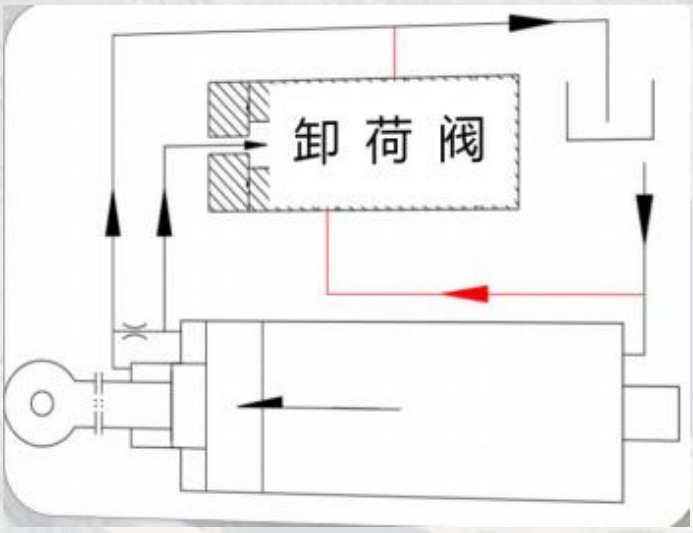


- The oil inlet chamber continuously supplies high-pressure oil until the system overflows

Principle of new buffer hydraulic cylinder structure

During the buffering process:

- Buffer chamber throttling
- Pressure relief in the oil inlet chamber



The oil chamber pressure drops directly from 100Mpa to 30MPa

Product advantages

Innovation of the new buffer hydraulic cylinder

The test data fully indicates that the addition of a new type of buffer valve on the original basis significantly improves the buffering effect,The buffering pressure and system pressure during the cylinder buffering stage are also significantly reduced, which not only protects the entire hydraulic system from high-pressure impacts, but also enhances the reliability of the hydraulic system and extends its service life.

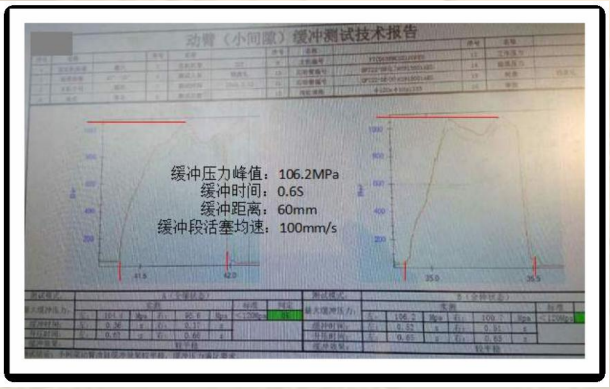
The host factory

- Reduce hydraulic system impact
- Reduce the temperature rise of hydraulic system
- Improving the overall stability of hydraulic systems
- Highlight the selling points of the product

The customers

- Significantly improve controllability
- Optimize and improve the handling feel
- Extend the service life of equipment
- Reduce loss and maintenance costs

Traditional cylinder testing data



Small cavity buffer (LOVOL test data)

- Testing location:

  LOVOL testing field

- Test items：

  Traditional hydraulic cylinder testing 2023/04/05

  New hydraulic cylinder testing 2023/04/10

testing data

- Peak buffering pressure:

  101.5Mpa/99.2Mpa/83.5Mpa

- Buffer time:

  0.47s/0,48s/0.55s

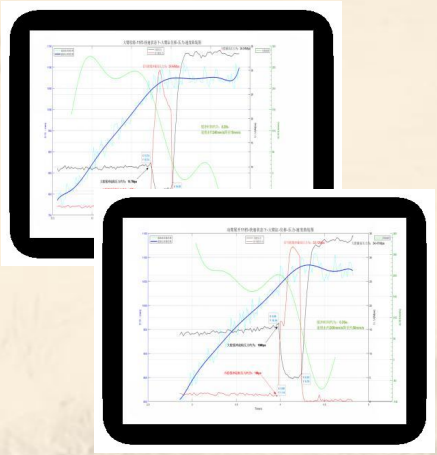
- Buffer distance:60mm

- Buffer section piston average speed:

  127.7mm/s,125mm/s,109mm/s

The buffer pressure of the excavator boom hydraulic cylinder reaches up to 106.2 MPa.
During buffering, the system is in a high-pressure overflow state, with an overflow pressure of approximately 31.7 MPa.

New hydraulic cylinder testing data

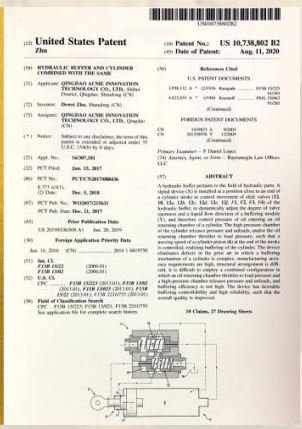


The testing data(20T)				Comparison effect
hydraulic cylinder model	Comparison project	Traditional hydraulic cylinder	New hydraulic cylinder	pressure reduction
Boom cylinder	Buffer pressure(Mpa)	87.4 (unfold) 81.9 (fold)	12.11 (unfold) 13.69 (fold)	**-86.1%** **-83.3%**
	system pressure(Mpa)	35 (unfold) 35 (fold)	8.29 (unfold) 6.62 (fold)	**-76.3%** **-81.1%**
	Buffer time(s)	0.34/0.34	0.44/0.44	
Stick cylinder	Buffer pressure(Mpa)	25.9 (Excavator boom to flat) 28.7 (Excavator boom to top)	14.83 (Excavator boom to flat) 15 (Excavator boom to top)	**-42.7%** **-47.7%**
	system pressure (Mpa)	35	35	
	Buffer time (s)	0.32	0.3/0.34	
Digging bucket cylinder	Buffer pressure (Mpa)	57.6 (unfold) 62.8 (Excavator boom to top)	34 (unfold)	**-41%**
	system pressure(Mpa)	35 (unfold)	23 (unfold)	**-34.3%**
	Buffer time (s)	0.18	0.26	

Parameter Summary

- When buffering to the end, the speed can be reduced by 50%
- Buffer pressure can be reduced by 71.6% (small cavity)
- When buffering, the system pressure decreases by 84% (large chamber)
- Energy savings (estimated at 5% -10%)
- The degree of hydraulic impact decreases, and the overflow of the buffer system disappears
- When the boom moves significantly, the body shakes slightly, enhancing the sense of control

Five international technology patent certifications



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Product pursuit of the ultimate, innovation leads the future

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