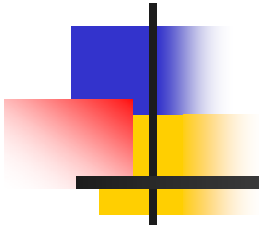


Discussion on the Standardization of Blue Elephant



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- **Necessity and Practical Significance of the Standardization of Blue Elephant**
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Application Effect of Representative Blue Elephant

- **1 Blue Elephant possessing Mechanical Reversing Mechanism**
- **(1) ROTAFLEX Long-stroke Pumping Units**
 - **Characteristics:** It can realize reversing direction by chain and sprocket wheel; Adopting load of composite rubber belt; Gravity balance.
 - **Disadvantage:** The distance between the pumping housing and the wellhead is too near; Its stroke fixing cannot be adjusted.
 - **Application Effect:** There are more than 1,000 pumping units in good operation in oilfields. The pumping units have exported to many other countries.

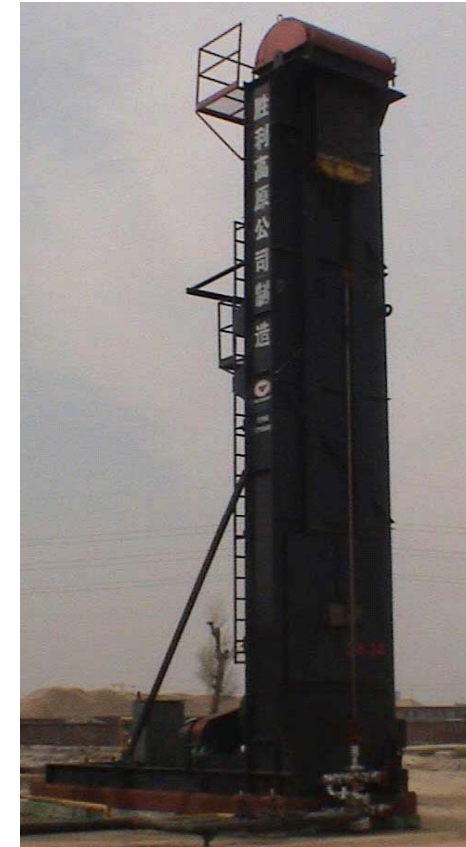


Fig. 1

Application Effect of Representative Blue Elephant

- **(2) CCJ Series Pumping Units**
 - ❑ **Characteristics:** It can realize reversing direction by using two independent circulating ring chain; Adopting load of the steel wire rope; Gravity balance.
 - ❑ **Product:** Maximum polished rod load: 220kN; Maximum stroke:8m
 - ❑ **Disadvantage :** The fatigue life of the steel wire rope is limited; Its stroke fixing cannot be adjusted.
 - ❑ **Application Effect :** It is mainly used in the exploration of heavy oil wells.



Fig. 2

Application Effect of Representative Blue Elephant

- 2 Blue Elephant possessing Motor Reversing Mechanism
- (1) Blue Elephant driven by Linear Motor
 - **Characteristics** : The secondary (rotor) of the linear motor can direct execute a linear motion; Gravity balance; It can realize reversing direction by the industrial control elements; The mechanical efficiency is the highest; The stroke and the pumping speed can realize stipples adjustment .
 - **Disadvantage** : Relatively speaking, it has higher manufacturing costs; Because of the unilateral lifting power limiting, it is difficult to implement the design and manufacture of the economic heavy load pumping unit .
 - **Application Effect** : Over the past 10 years, it is still in the probationary period.



Fig. 3



Application Effect of Representative Blue Elephant

- **2 Blue Elephant possessing Motor Changeover Mechanism**
- **(2) Tower Type Blue Elephant with Commutation Motor**
- **Characteristics:** This kind of pumping unit can realize the straight reciprocating motion of the sucker rod by controlling the reversible direction of the motor with the help of the industrial control elements. The intelligent control system can implement many functions.
- The motors implementing these functions: **variable frequency speed control motors, switch reluctance motors** and **external rotor motors.**

Application Effect of Representative Blue Elephant

Typical products: cluster well pumping units, friction pumping units, W type towing pumping units



Fig. 4



Fig. 5



Fig. 6



Application Effect of Representative Blue Elephant

- **Disadvantage :** Insufficiency of the stability of the electronic control system; The fatigue life of the flexible parts bearing the load needs to be improved.
- **Application Effect :** More than 1000 pumping units, with 240kN maximum polished rod load and 8m maximum stroke, have been applied in many oilfields.



Application Effect of Representative Blue Elephant

- **3 Long Stroke Blue Elephant possessing Hydraulic Reversing Mechanism**
- **Characteristics:** Hydraulic reversing system; the steel wire rope bearing load, hydraulic balance + the balance weight box
- **Products:** Maximum polished rod load: 120kN; Torque : 25000N.m; Motor Power: 34kW.
- **Disadvantage :** The reliability of hydraulic components cannot meet the environmental requirements
- **Application Effect :** This kind of pumping units cannot be popularized because of some technical reasons.



Necessity and Practical Significance of the Standardization of Blue Elephant

1、Needs for Rapid development of Technology of Blue Elephant

- products variety
- corresponding standards variety
- problems



Necessity and Practical Significance of the Standardization of Blue Elephant

- **Needs for Relevant Matching Technology**

- absence of national and industry standard of blue elephant
- product complexity



Necessity and Practical Significance of the Standardization of Blue Elephant

- **Needs for collaboration of Relevant Industries in oilfields**
 - products variety
 - absence of uniform specification
 - Specific problems



Necessity and Practical Significance of the Standardization of Blue Elephant

- **Needs for Management Standardization of Oilfield Equipment**
 - relevant management methods
 - uniform industrial standard



Several stressed problems in the confirmation of the Standardization of Blue Elephant

- **1、 Model compilation methods and the confirmation of basic parameters**
 - Blue elephant is showed with “WCYJ”
 - The arrangement of basic parameters :
rating horsehead load – maximum stroke of polished rod – rating torque



Several stressed problems in the confirmation of the Standardization of Blue Elephant

■ 2、 Key Technical indicators

a) Performance of the reversing mechanism

➤ **key technology**

➤ **problems**



Several stressed problems in the confirmation of the Standardization of Blue Elephant

b) **Reliability of Flexible Driving Components**

The commonly used transmission components :
chain, steel wire rope and composite rubber belt, etc.

considered factors



Several stressed problems in the confirmation of the Standardization of Blue Elephant

c) **Safety Protection Measures**

- Basically, blue elephant belongs to tower type. The tower type blue elephant has high safety stability and the accident of pumping unit overturning does not happen commonly. But.....
- **Safety Protection Measures**



Several stressed problems in the confirmation of the Standardization of Blue Elephant

d) **Unilateral Lifting Capacity**

- The index direct impacts whether the pumping unit links to external equipment or not. It also shows the suitability of the pumping unit.
- The unilateral lifting capacity should not less than 40% of the maximum polished rod load.



Several stressed problems in the confirmation of the Standardization of Blue Elephant

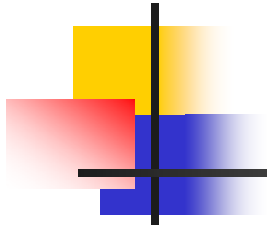
e) **Workover Space**

- There is enough space for escaping and free-barrier escaping route when hazard appears.
- the relevant operating norms of HSE



Conclusions

- There are many kinds of blue elephant in China at present. In the process of developing the standard, we should follow the rules:
 - **First, we should meet the needs of safety production;**
 - **Secondly, we should uniform terms, models and coordinate functional parameters;**
 - **Thirdly, the key components should have reliable indicators;**
 - **Fourthly, relevant technical standards should be harmonized and unified.**



- **Thank You!**

- **Questions?**

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