

# **SUCKER ROD PUMP HANDLING AND RIG CREW SAFETY**

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## **ABSTRACT**

Presentation will cover care and handling best practices for a sucker rod pump from the pump shop to the well bore and introduce a new tool for safely lifting a sucker rod pump from horizontal to vertical at the well head. For years, long and heavy insert pumps have been lifted into the vertical position to be run into the well by various means, some causing damage to the pump and contributing to failures. In most cases this process places undo stress on the rig crew, as they have to support the entire weight of the pump while it is lifted and it places them under a suspended load. These safety concerns can be reduced with the use of this tool and recommended procedures.

## **SUCKER ROD PUMP HANDLING AT THE PUMP SHOP**

To ensure that the oil & gas producer receives a pump on location and in the well bore in good condition the pump must be handled properly; this starts at the pump shop and ends as the pump is lowered into the tubing. The API publication 11AR covers recommended practice for care and use of subsurface pumps. The pump technician must use proper tools, techniques and adequate support when assembling the pump in the shop to keep from damaging or bending the highly finished surfaces and components used in sucker rod pumps. When a pump is to be stored prior to installation in a well the openings of the pump must be sealed so no outside influence can affect the precise nature of pump components. Some examples would be blowing dirt or sand, rain, high humidity, even insects or small animals building nests. Pump storage racks should offer support at a maximum of eight-foot intervals to prevent bowing of the pump barrel. This applies to all pumps but is especially important for metal-to-metal pumps, otherwise the precision fit between the barrel and plunger or special plating like chrome or nickel carbide may be damaged. Pumps should be stored horizontally and in single layers.

## **SUCKER ROD PUMP TRANSPORTATION TO THE LOCATION**

When transporting a rod pump to a well location from the pump shop it is essential to prevent mechanical damage caused by bending, denting, dropping or contacting other hard objects. Rod pumps give the impression of being damage resistant like a joint of tubing but excessive flexing can result in permanent damage due to the relatively thin wall sections and internal coatings. When transporting pumps longer than sixteen feet on the side of a vehicle it is important to provide additional supports in no more than eight-foot increments. Excessive overhang of the pump ends should be avoided when transporting on the side of a vehicle. The maximum unsupported overhang length should not exceed three feet at each end. Pumps longer than twenty-four feet should be transported on a flat bed trailer so adequate support is maintained. Pumps should be secured to the transport vehicle or trailer with non-metallic straps to prevent compression damage or excessive bouncing and/or movement fore and aft, no chains and boomers. The traveling assembly of the pump should be tied with twine or other sufficiently strong material to the stationary assembly to prevent the pump from stroking out during acceleration or braking of the transport vehicle. When the pump is delivered to location it should be stored up off the ground supported at least every eight feet in a flat area away from traffic areas.

## **GETTING THE PUMP FROM HORIZONTAL TO VERTICAL**

In years past the act of getting a pump from laying on the rack to hanging in the elevator was a much easier task, pumping unit stroke lengths were shorter so the pumps were shorter, lighter and much easier to manage. Today with conventional pumping unit stroke lengths up to two hundred-sixteen inches and unconventional pumping unit stroke lengths of three hundred-sixty inches or more the pumps have grown in length and weight, thirty foot pumps that weigh three hundred pounds are not uncommon. The conventional process to get an insert rod pump picked up has been to snap a rod elevator on the valve rod of the traveling portion of an API RW, RX, RH top or bottom hold down insert pump and lift with the rig while one or two floor hands support the end of the stationary portion of the pump and walk it in to the well bore as it is being lifted. The entire weight of the pump must be supported until the floor hands sit the end of the pump on a board or the rod table then the rig can stroke out the pump and lift it into the

well. There are many opportunities for injury to employees and damage to the pump during this task that can be eliminated by engineering a solution to the issue, as described below.

### RIG CREW SAFETY

To most oil & gas companies their well service contractors Total Recordable Injury Rate (TRIR) and Lost Time Accident (LTA) record is just as important as the price charged per rig hour, in a competitive market the company with the better safety record will usually get the work. The USA well service industry has made great strides in TRIR and LTA frequencies in the past 16 years but the goal is always zero. Working on a well service rig is never going to be without risk but elimination of unnecessary risk can only help improve your safety statistics. The latest safety statistics published by the Association of Energy Service Companies (AESC) suggest that if you are a floor hand, thirty five years old with almost four years experience, working with your hands on the rig floor between the hours of midnight and noon on a Wednesday in January you are the most likely person on location to get hurt. A hazard assessment of the task of lifting a pump from the horizontal to vertical position shows there is potential injury from the following causal factors using traditional methods; slips trips and falls, pinch points, back strain, caught in-between and standing under a suspended load.

### SUCKER ROD PUMP DAMAGE

Damage to the sucker rod pump can be from slight to catastrophic during the lifting operation. Long, thin wall pump barrels can bow past the yield strength of the material and not allow the plunger to stroke freely. Further special handling is required for pumps over thirty feet in length, the use of a sling to support the middle of the pump should be considered. The most common damage is to the valve rod, picking up the pump from the horizontal position by placing an elevator on the rod places tremendous stress on it, potentially bending it and causing accelerated rod wear and rod thread fatigue breaks. The least understood damage is to the hard plating and coatings like chrome and nickel carbide. These surface treatments are very good for wear or corrosion resistance but due to their very thin, hard nature performance can suffer due to unnecessary bending, bowing and lack of support from poor handling in the pump shop, during transportation and on location.

### SUCKER ROD PUMP LIFTING CLAMP

Harbison-Fischer has developed a new tool that will help rig crews handle rod pumps on location and eliminate a significant portion of the risk associated with lifting pumps into the vertical position. It is a clamp that can be easily installed around the fishing neck portion of the valve rod guide on any API RW, RX, RH top or bottom hold down insert pump. This allows lifting the pump by the stationary portion instead of the valve rod of the traveling portion of the pump. The pump stays scoped in; the pump can be tailed into the wellhead by hand or with the use of a tag line to keep the floor hand from beneath a suspended load hazard. The clamp comes with a certified wire rope sling that can be attached to the rigs winch line to safely raise the rod pump into position to run in the well.

### CONCLUSION

1. Sucker rod pumps must be handled with care from the pump shop to the wellhead to prevent damage and get the most economical run times.
2. Well service rigs will always have a certain amount of risk, but through process review and hazard eliminations such as this tool provides, it can be made much safer.
3. The Harbison-Fischer sucker rod pump lifting clamp is a tool designed to make the task of lifting a sucker rod pump into a vertical position much safer.

### LITERATURE

1. API Recommended Practice 11AR fourth edition, June 2000
2. AESC 2008 Safety Statistics