

# 6 REASONS TO UPGRADE YOUR SUCKER ROD GUIDE TECHNOLOGY.

New Sucker Rod Guide Technology, when used in artificial lift well completion designs, should be considered as an asset to be invested in.

Why? Sucker Rod Guide technology has advanced... and we've outlined 6 different cost-saving and value-added developments below, and the combined impact of these advances alone has made "legacy" sucker rod guides more expensive to use in comparison.

One of the biggest challenges for oil and gas companies is the unexpected and often overlooked costs of abrasion and corrosion prevention. This not only includes costs associated with expensive and unscheduled well servicing, but also the lost revenue from non-producing wells.

## THE 6 PROBLEMS A SUCKER ROD GUIDE MUST SOLVE IN YOUR WELL COMPLETION

Below we've summarised the 6 major problems that have made premium sucker rod guides the new standard. Read on to find out...

- Why abrasion in the field is different from abrasion in the lab.
- Where lubrication is really needed and how to get it there.
- The hidden cause of accelerated corrosion.
- How to detect sucker rod wear and prevent tubing wear.
- How to get the absolute most out of every single sucker rod.
- Optimized Sucker Rod placement

We've taken responsibility for each problem and built the following solutions into Cobalt® Sucker Rod Guides.

### PROBLEM 1: ABRASION IN EXTREME OPERATING CONDITIONS

When tubing wear occurs in a corrosive environment or in the presence of abrasive solids (sand or coal fines), it can cause the production tubing to fail in a matter of weeks due to rapid deterioration and premature wear of "generic" sucker rod guide polymers, resulting in direct steel to steel contact (i.e. sucker rod coupling to tubing).

Although sucker rod guide materials have previously been built for "toughness", it is now known that many of the materials used perform poorly in extreme conditions.

**The effect of abrasive solids on wear:** It has been discovered that formation silica particles (and frac sands) become embedded into nylon-based rod guides, which significantly accelerates tubing wear compared to “lab” testing and “stated” durability.

**Glass fibres accelerate tubing wear:** Rod guide materials containing glass fibers further add to accelerated tubing wear. It is well known globally that rod guides containing glass fibers in the resin materials are NOT tubing friendly, especially in well completions with abrasive production fluids and limited lubrication.

**Unsuitability of resin/glass fiber composite materials:** Fiber-reinforced composites (thermoset and hygroscopic resins) have been found to be a poor material selection for Sucker Rod Guides. They all contain glass fiber content to varying percentages, and while they claim hardness, it’s how fast they wear the actual tubing that is critical to a reliable well completion.

PA (Nylon) and PPA (AF or AU) are “hygroscopic” resins, meaning they absorb and hold moisture. Hygroscopic resins in submerged operating environments have weakened molecular bonds within the chemistry of the resin, thus, the mechanical properties of these plastics may degrade rapidly. In the presence of moisture, hygroscopic and thermoset resins will weaken (a process known as hydrolysis).

## **SOLVED WITH COBALT® SUCKER ROD GUIDES**

We’ve developed ARPMAX® high performance polymers, a range of low friction “self-lubricating” polymers that are proven to have a low co-efficient of friction, retain improved mechanical, thermal, and chemical properties when subjected to extreme operating environments.

These cross-linked materials were developed in response to the knowledge that other materials perform poorly in extreme operating conditions. Sucker Rod Guides must be rigid yet flexible – Cobalt Sucker Rod Guides are "Resiliently Deformable".

Cobalt Sucker Rod Guides will not crack, are chemical resistant, non-hygroscopic, impact resistant, abrasion resistant and also dimensionally stable in a wide range of operating temperatures.

## **PROBLEM 2: LACK OF LUBRICATION AT POINT OF FRICTION**

One of the limits to reducing the friction coefficient of materials has been a lack of lubrication at the critical moment when needed in extreme downhole operating environments.

It is well known globally that rod guides containing glass fibers in the resin materials are NOT tubing friendly, especially in well completions with abrasive production fluids and limited lubrication.

## **SOLVED WITH COBALT® SUCKER ROD GUIDES**

At Cobalt, we have re-engineered the sucker rod system, using 21<sup>st</sup> Century innovations in polymer technology and the formulation of ARPMAX, a chemically cross-linked polymer material, developed to combat the problems of downhole tubing wear.

Cobalt “Self-Lubricating” (Low Friction) Sucker Rod Guides are infused with a unique lubricant additive within the ARPMAX® cross-linked polymer matrix that migrates to the surface as the polymer surface is abraded during operation. The release of the micro-encapsulated lubricant lowers the coefficient of friction and further improves the wear-resistance of the polymer.

The lubricant infused into the ARPMAX® polymer cannot be released under external pressure or impact forces. The unique additive (not a coating) is only released during axial and/or rotational wear.

Note: The lubricant is embedded as microscopic particles in millions of tiny chambers within the cross-linked ARPMAX® polymer.

## PROBLEM 3: PREVENTING ACCELERATED CORROSION

It's long been observed that sucker rods corrode faster in operation than anticipated. Why? In a reciprocating well completion, turbulent fluid flow on the downstroke has been known to wash away the corrosion inhibitor, which results in premature corrosion.

Chemical inhibitor injected into oilwells is cost prohibitive, not precise to deploy to targeted depths, and inconvenient to implement and maintain.

### SOLVED WITH COBALT® SUCKER ROD GUIDES

Cobalt® Sucker Rod Guides look different, because they are different.... in many ways.

The Turbulence Stabilization innovation is a unique sucker rod guide design with radial flutes combined with "asymmetrical sine wave" tapered ends. Engineered to reduce the fluid eddies by producing its own fluid wave, out of phase with the incoming production fluid flowpath.

The asymmetrical sine wave taper results in a destructive interference of the flow eddies generated across the rod guide surface and a resultant "turbulence stabilization effect" (patented by Cobalt®).

This Turbulence Stabilization innovation is not available from any other Sucker Rod Guide manufacturer.

## PROBLEM 4: NO WAY TO MONITOR ROD GUIDE WEAR.

For many decades, operators have been searching for a reliable and accurate way to monitor or detect rod guide wear and reduce well servicing costs per well.

In all PCP and SRP well completions, the only existing method of determining rod guide wear is "predictive", based on well failure history - or just a guess - or just waiting until a hole-in-tubing failure occurs.

### SOLVED WITH CobaltSENSOR™ SYSTEM

CobaltSENSOR (Patented by Cobalt) takes away the guesswork and allows operators to schedule well servicing operations, rather than be at the mercy of "unscheduled" (and expensive) workover rig call-outs. It detects rod guide wear and helps operators to anticipate, prevent, and manage premature rod-to-tubing or coupling-to-tubing wear.

The CobaltSENSOR technology is an extremely robust advanced wear detection system incorporating the latest technology in Sensing While Pumping (SWP) technology, for wells with high (or low) flow, extreme abrasion, high side loading, and high rotation speeds.

The system will detect a predetermined wear factor and signal surface pump monitoring equipment to either shut-down or reduce pump speed. This technology can be applied in both PCP and Reciprocating pump systems. This technology does not require any downhole electronics or electrical isolation of well components.

## **PROBLEM 5: OPTIMIZED SUCKER ROD PLACEMENT**

The cost of working over well completions runs into the millions of dollars per year. Therefore, there is a definite financial need to mitigate workovers as much as possible.

Traditionally, sucker rod guides are deployed to prevent sucker rods from bending and maintain their centralized position in the production tubing. However, optimized Sucker Rod Guide placement is also critical to prevent rod coupling to tubing wear.

Deviated wells can also pose particular challenges, whether in unconventional or conventional applications. In the deviated or 'bent' section, an area is created, where the coupling and the tubing are subjected to increased contact, causing accelerated wear on both materials.

### **SOLVED WITH COBALT® SUCKER ROD GUIDES**

The Cobalt Sucker Rod System with optimized rod guide placement was developed to reduce downhole tubing wear.

Sliding, torque loading, abrasive fluids and side impact forces between the sucker rod, sucker rod couplings and the production tubing has been a common cause of coupling wear and hole-in-tubing (HIT) failures.

Cobalt Sucker Rod Guides enable a more-than-fourfold extension in abrasion resistance, thereby reducing well workover frequency, eliminating significant workover costs and facilitating improved production.

With the Cobalt Sucker Rod System (High Quality Sucker Rods and Premium Rod Guide package), you no longer have to accept that fatigue, wear and fretting are an inevitable consequence of the repetitive nature of sucker rod sliding and/or impact loading.

Upgrade to a Cobalt Sucker Rod System and reduce well workover frequency, and consequently reduce well workover costs. Proven Performance... for maximum rod-to-tubing protection ... tried, tested and trusted.

## **PROBLEM 6: MAXIMIZING WELL COMPLETION LIFECYCLE**

The large capital expense of replacing sucker rod and tubing strings means that extending their lifecycle and extending their performance at optimum levels is high on the radar of all operators.

Sucker Rod and Tubing Lifecycle Management is the key to lowering your well servicing costs, while at the same time eliminating risks from downhole rod failures and rod-to-tubing wear.

The installation of Premium Sucker Rod Guides to prevent downhole tubing wear... and preventative NDT Inspection is the key to extending the lifecycle of Sucker Rods and Tubing.

## SOLVED WITH COBALT® INSPECTION AND REFURBISHMENT PROGRAM

Cobalt offers NDT Inspection and Refurbishment, and program that includes preparing, cleaning, inspecting and restoring “used” Sucker Rods and Tubing following a well workover. This process is the key to extending the well completion equipment lifecycle and ultimately reduce well servicing frequency and asset replacement costs.

Services include:

- NDT Inspection of Sucker Rod and Tubing to ensure well completions are running according to manufacturer guidelines.
- Reconditioning of used Sucker Rods and Tubing to maintain them in optimal, like-new condition.
- Removal of worn Sucker Rod Guides and overmolding sucker rods with NEW Cobalt Rod Guides.
- Careful inspection of Used Sucker Rod and Tubing inventories and grading according to API Specifications.

Benefits of inspection, reuse and refurbishment:

- Cobalt Refurbishment extends the serviceability of your used sucker rods and tubing.
- Ensure sucker rod and tubing stock availability and save on unnecessary replacement costs.
- Increase well completion reliability, reduce workover frequency and reduce well operating costs.
- Proven Cobalt Sucker Rod Guide Performance.

## HOW CAN WE HELP?

When you’ve decided to review and upgrade your Sucker Rod Guide technology, but you’re still uncertain about exactly what you need... it’s vital to find a technical partner that understands well completion downhole challenges, and has a reputation for developing innovative solutions for reducing costs and production benefits, not just the technology itself.

Cobalt has over 30 years’ experience with well completions. If you are thinking about upgrading your sucker rod string with the latest technology, contact us today [technical@cobaltextreme.com](mailto:technical@cobaltextreme.com)

When implemented properly, advanced sucker rod guide technology from Cobalt will result in a measurable return on investment (ROI).

Cobalt® can deliver proven performance and add value through new product and service innovations, enabling our clients to achieve better results, faster.

*Turning Downhole Challenges into Solutions™*

Note: Some uses or applications of Cobalt technology may be covered by one or more patents, patents pending and/or trademarks.