

# Centurion SSD stabilized severe duty pump

## Extend ESP system run life

### Features and benefits

- Wider vane openings
  - Reduces pump plugging and abrasive wear for enhanced run life
  - Extends ESP application range in viscous fluids
- Higher lift per stage
  - Maximum fluid draw down in wells with high gas content increases productivity and revenue per well
  - Enhances overall ESP system run life by minimizing system shut downs
- Patented proven hardened bearing design; particle swirl suppression ribs
  - Best-in-class abrasives handling extends pump run life, lowers total cost of ownership
  - Improves operating range for changing in-flow characteristics
- Higher pressure design
  - Expands deep set capabilities, which extends ESP application range
- Extended operating range
  - Enhanced run life in changing well conditions, minimizing system change-outs

The **Centurion pump line** offers industry leading technology for severe service pumping applications, providing operators the lowest total cost of ownership by extending electrical submersible pumping (ESP) system run life.

- A range of abrasion resistant Centurion pump designs provide customers the ideal level of protection for any application
- The Centurion design provides the highest lift per pump stage of any pump line in the industry
- Centurion pumps offer superior efficiency, which increases the operating range and reduces the mechanical complexity of the ESP system, thus improving overall equipment run life and lowering operating expenses

The Centurion pump design maximizes vane openings, optimizes flow paths and includes particle swirl suppression technology as the first line of defense against abrasive down-hole environments. Wider vane openings in the radial flow stages help prevent plugging from

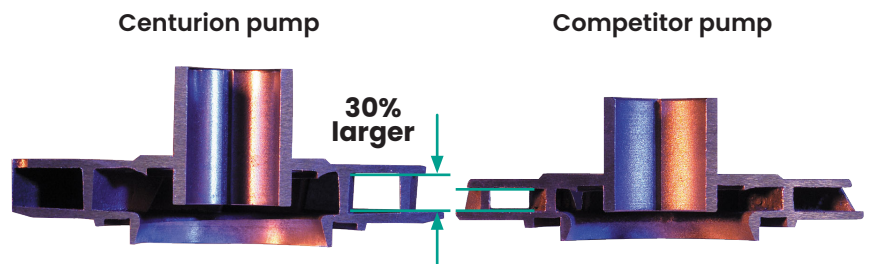
sand as well as lower erosional velocities of abrasive fluids.

The particle swirl suppression ribs in the diffusers reduce sand cutting damage in the stages and reduce the potential for housing perforations and loss of the ESP system down hole.

The **Centurion stabilized severe duty (SSD) pump** design is ideal for wells with highly abrasive down-hole conditions, requiring radial stabilization and downthrust protection. The radial flow SSD design incorporates patented Tungsten Carbide flanged sleeves and bushings mounted in a support module and spaced throughout the pump, based on an engineered length to diameter (L/D) ratio.

The mixed flow SSD stage design includes a patented Tungsten Carbide flanged sleeve and pedestal configuration with spacing based either on an engineered L/D ratio or thrust capacity. The Tungsten Carbide inserts handle downthrust and radial shaft support, decreasing radial and thrust wear.

There are several advantages of the fixed thrust module Centurion SSD vs.



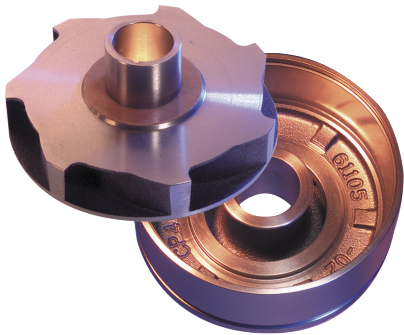
compression designs.

- Reduced load on the pump shaft and the seal bearing, extending ESP system run life
- Simplified pump construction
- Increased thrust due to wear in the pump being carried in each stage set vs. the seal bearing

The longest length of unsupported shaft is located in the topmost area, requiring the top bearing to carry more radial load. The top bearing also is subject to abrasives that fall back into the pump on shut down. The bottom of the pump also has a long unsupported length of shaft and solids tend to accumulate in this intake area. The additional Tungsten Carbide bearings in top, bottom and throughout the pump stack provide enhanced radial stabilization, reducing the tendency for vibration.

The added thrust support of the Tungsten Carbide bearings provide several benefits:

- Downthrust wear protection extends the operating range of the pump and enhances ESP system run life in changing well conditions
- Prevents pump thrust and radial bearing wear due to abrasives in the fluid
- Resists scale accumulation on bearing surfaces



The Centurion pump design maximizes vane openings, optimizes flow paths and includes particular swirl suppression technology.

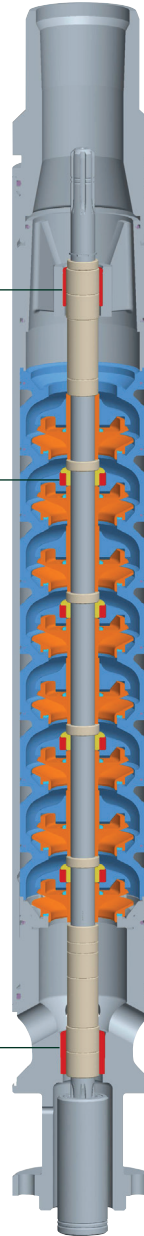
**For wells where highly abrasive conditions and high flow rates are present, requiring downthrust protection**

Tungsten Carbide discharge bearing

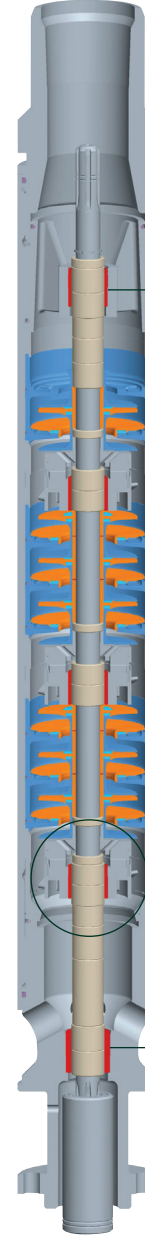
Patented Tungsten Carbide flanged sleeve and pedestal decrease rotational wear. Spacing is based either on L/D ratio or thrust capacity.

Tungsten Carbide intake bearing

## MIXED FLOW



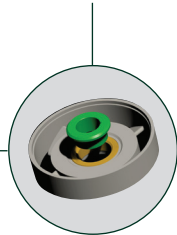
## RADIAL FLOW



**For wells where highly abrasive conditions are present, requiring downthrust protection**

Tungsten Carbide discharge bearing

Patented Tungsten Carbide flanged sleeve and bushing mounted in a support module decreases rotational wear. Spacing is based either on L/D ratio or thrust capacity.



Tungsten Carbide intake bearing

**Baker Hughes** 