“bringing our downhole pump experience to the surface”

surface pumping systems
Wood Group is a leading international energy services company employing approximately 10,000 people worldwide and operating from bases in over 30 countries. Its businesses serve primarily the oil and gas, power generation and aviation industries. Wood Group is organized into two market-facing divisions: Wood Group Oil and Gas and Wood Group Power. Wood Group Oil and Gas comprises three operating businesses: Wood Group Well Support, Wood Group Engineering and Wood Group Production Facilities. Wood Group Power services the power generation and aviation industries. There are strong synergies among these four operating businesses. Focusing on the latest technology and solutions to enhance production, Wood Group Well Support businesses also provide customers with comprehensive aftermarket services. One of those three business units is Wood Group ESP, which is one of the world’s largest electric submersible pump manufacturer and service companies. Wood Group ESP offers a comprehensive range of electric submersible and surface pump solutions to the worldwide Oil and Gas, industrial and mining industries.

Wood Group ESP strives to be the Technology leader in Products and Service to our customers. We have invested heavily in R&D to ensure we remain “ahead of the curve.”

ISO 9001
DNV Certification, Inc.
REGISTERED FIRM
Wood Group ESP Technical Training Center provides a wide range of training courses to customers and employees, including: Health Safety and Environmental. SPS, Starter, Variable Speed Drives, CTI Pump Controllers as well as Downhole Equipment.

Corporate Office
Houston, Texas
Wood Group has corporate offices in both the UK and USA. We have combined our best practices to provide the most appropriate solution to our worldwide customer base.

Surface Pumping Systems are manufactured at Wood Group ESP’s, 10 acre 100,000+SqFt Factory in Oklahoma City. This facility has been ISO9001 certified since 1994. Other company locations are ISO9002 certified.
Wood Group ESP is headquartered in Oklahoma City USA. Over the past 4 decades the company has evolved from the premier service company, to the premier solutions company within our market segment. We have an on going commitment to being in the forefront of technology. We lead the way in developing innovations through our extensive Engineering Technology Center. Our manufacturing and service philosophy is to be as close to our customers as possible, as a result our distributive manufacturing, service, repair and pump test facilities continue to grow closer to our customer base throughout the world in over 20 locations.

Mission Statement

- To be the best service company in the industry relative to overall performance and attention to customer needs
- To provide a wide array of quality products that maximizes value to our customers
- To be recognized as an innovator in enhanced products and services that solves customer’s problems and reduces costs.

Surface Pumping Systems (SPS)

Are a relatively new technology compared with other pump types. SPS have nonetheless been proven with our existing Oilfield customer base on arduous continuous operation oil patch applications, for over 10 years. In addition SPS incorporate Wood Group ESP industry leading pumping elements, Vector III variable speed drives and CT pump controllers. Recognizing the potential for this innovative design the company has spent the past few years developing the products and support network, and in 2001 established a separate SPS group to promote the product to existing customers as well as other markets and users of alternative technology pumps; particularly split-case, and canned vertical turbine centrifugal pumps, and plunger positive displacement pumps where the SPS has a number of significant advantages, including:

- Short delivery times
- Competitive up front pricing and very low whole life cost
- Minimal routine maintenance requirements
- Environmentally friendly, no leakage collection and disposal problems
- Pulsation / vibration free, and very low noise levels
- Maximum “up-time”
- Adaptable for changing operating conditions
- Minimum down time, major components are “modules” which can be easily replaced on location
- Electric motors directly couple to the bearing frame, reducing the number of wearing components (there are no gearboxes or v-belts)
- A solitary mechanical seal in the suction chamber is only subjected to suction pressure
- Parallel systems for higher capacities and flexible operation

SPS Features and Benefits

Markets and Applications

Oil and Gas
- Produced water injection, disposal
- Waterflood injection
- Pipeline booster
- Crude oil transfer
- Jet pumping
- Hydraulic power fluid
- Amine/NGL/C02

Mining
- De-watering
- Dust suppression
- Hydraulic power fluid

Industrial
- Industrial process fluids
- Alternative to “API610” process pumps
- Reverse osmosis
- Geothermal injection
- Wash-down
- De-scaling
- Effluent disposal
- Pipeline booster
- High pressure transfer

Wood Group Control Telecom pump controller provides unparalleled flexibility for local and/or remote pump monitoring and control for fixed, variable speed or engine driven units. Features include:
- locally stores historical data
- locally analyzes data
- Communicates to remote locations on demand through
- Anologue and Digital in/outputs
- Scada compatible
- RS-232 and 485 Ports
- Phone /radio modem

Wood Group ESP Vector III Variable Speed Drives (VSD) are available for SPS to provide the maximum flexibility in performance. Vector III features near sine-wave and low harmonic content as a result of variable sine-wave generation technology (VSG technology™). This results in improved motor and cable life. Drives are available in 6, 12 and 18 pulse IEEE-519 compliant configurations. Various enclosures are available, with NEMA 1 (IP20) and 3R (IP54) being standard.
Surface Pumping Systems

Versatile Low maintenance high-pressure pump. The right choice for many traditional Plunger pump, split-case and Vertical turbine centrifugal pump applications.

- Short delivery time
- Minimal routine maintenance
- Environmentally friendly design
- Adaptable for changing conditions
- Ease of access and change-out modules
- API 682 mechanical seal options
- API 610 flush / quench options
- Energy efficient

Pump Element

Multi stage centrifugal pump with industry leading high efficiency designs. Supplied as a replaceable module. Additional pump elements can be added or de-staged if required for changing duty conditions. Most pumps are “mixed flow” design for improved abrasion resistance, improved gas handling and higher efficiency.

Discharge Head

Standard Flanges are ANSI B16.5 Class 300 through 2500, Lap Joint Type to allow for alignment with Pipework. Other connections / flange standards available.

30.5” (775mm) Fixed Pipework Height

Minimizes pipework changes in the event of future configuration changes. The Pump, Bearing Frame, Suction, Discharge and Motor Shaft are maintained at the same level even if pump element or motor are changed.

Provision for Future Skid Extension(s)

Provides flexibility for changing duty conditions or to facilitate reusing the existing SPS as the basis for entirely different future applications. In addition; where site access is limited (for example in underground mines) multiple piece skids can be provided to facilitate access then reassembled on location.

Easily Modified Skid™ (1) EMS™

Rigid base frame for low vibration and ease of installation. Incorporates integral lifting lugs throughout, machined motor adapter plate (shown in green), which together with the skid motor plate are predrilled for virtually all available motor options.

(1) Patent Pending
**Bearing Frame (Thrust Chamber)**
Supplied as replaceable module. Interchangeable between systems regardless of the size pump element installed. Very low number of rotating parts for long trouble-free life, simple operation and minimal routine maintenance.

Oil ring lubrication for optimum oil dispersion and reduced operating temperatures. Thermocouple installed to provide periodic or permanent temperature monitoring / shut down protection.

Labyrinth shaft seals protect the internals from the environment without wearing the shaft surface.

**Motors**
Conventional industry standard 2-pole NEMA and IEC foot mounted electric motors are used in configurations to suit local requirements for; enclosure type, voltage, frequency, insulation class, hazardous area, etc.

Other drive options include gas or diesel engine via a speed increaser.

**Flexible Coupling**
Grid or Gear Style Couplings are standard equipment for long life and minimal routine maintenance requirements. Others coupling types are available on request.

**Mechanical Seal and Stub Shaft**
Optimized mechanical seal only design. Operates at suction pressure. Standard seal features silicon carbide faces. Seals available up to 3000 PSI. Options include API682 cartridge type, and API flush and quench plans. Front Pull-Out™ (1) design allows for rapid change-out of seal and / or stub shaft without disturbing bearing frame and flexible motor coupling thus avoiding realignment or the requirement of spacer coupling.

(1) Patent Pending

**Suction Chamber**
Can be rotated in 45% Increments.

Standard Flanges ANSI B16.5 Class 150 through 2500. Other connections / flange standards available.

**Instrumentation / Protection**
Standard SPS package includes:
- Suction and Discharge Pressure indicating and Control Switches.
- Vibration Switch.
- Bearing Frame Thermocouple.

Other options can be accommodated on request.

Finite element analysis of rigid easily modified skid.
Surface Pumping Systems

60 Hz performance capabilities

60 Hz (3570 rpm) Selection Chart

For higher pressures or flows SPS are operated in parallel or series.

Data above represents standard configurations - SPS are routinely configured to meet customer specific requirements.

The first systems were installed over ten years ago, there are now hundreds of SPS operating around the world - mostly on arduous, continuous service applications. Below are examples of installations in USA.

Mississippi - USA
C02 Pipeline booster
5000 BPD (146 USgpm/33 m3/hr)
1200 PSI (83 BAR) Suction pressure
2000 PSI (138 BAR) Discharge pressure
Plan 53 pressurized flush package.
“Front Pull-out™” API682 double mechanical seal

New Mexico - USA
Produced water disposal
8000 BPD (233 USgpm/53 m3/hr)
per unit

Texas - USA
Waterflood Injection
20,000 BPD (583 USgpm/50 m3/hr)
per unit

Plan 53 pressurized flush package.
“Front Pull-out™” API682 double mechanical seal
Examples of International Installations

Surface Pumping Systems

**50 Hz performance capabilities**

**50 Hz (2975 rpm) Selection Chart**

<table>
<thead>
<tr>
<th>Pump Series</th>
<th>Housing diameter</th>
<th>Housing pressure limit</th>
<th>Power limit</th>
<th>BEP % Efficiency</th>
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<td>TD</td>
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<td>167</td>
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</table>

For higher pressures or flows SPS are operated in parallel or series.

Data above represents standard configurations - SPS are routinely configured to meet customer specific requirements.