Hydraulic Workover & Snubbing Services

Versatile, Cost-Effective & Mobile Tools

SUPERIOR ENERGY SERVICES (AUSTRALIA) PTY LTD
6-10 HUNT PLACE
WURRUK, VICTORIA, 8350

www.superiorenergy.com.au

www.superiorenergy.com

The hydrocarbon industry relies heavily on the efficient operation of its oil and gas wells to sustain economic growth. However, maintaining the productivity and longevity of wells in the face of technical, environmental, and logistical challenges is a persistent issue. Among the advanced technologies available to address these challenges, Hydraulic Workover Units (HWUs) have emerged as a game-changing solution for 'life of well' maintenance and intervention services, both on and offshore, as well as coming to the fore in the emerging Offshore Decommissioning sector.

Hydraulic Workover Units (HWUs) are Versatile, Cost-Effective, and Mobile Tools designed for a wide range of well intervention, maintenance, workover and decommissioning operations. Unlike 'conventional' Drilling Rigs, HWUs use hydraulic power transmitted via 'Cylinders' as opposed to Drill Line, to exert controlled force on tubulars, enabling the installation or removal of equipment, such as Production Tubing, Casing, or Wellbore Plugs. In addition, modern HWUs have the ability rotate tubulars to allow Drilling Milling and Cutting operations to be conducted i.e. Open Hole, Cased Hole Through Tubing or Side Track etc.

In respect to the Offshore Decommissioning sector, HWU Packages can perform the broad spectrum of services required for Well P&As i.e. typically for offshore well applications:

- Well Kill
- Zonal Isolation
- Production Tubing & Completion Recovery
- Production Casing Recovery
- Permanent Barrier placement
- Section Milling
- Casing and Conductor Cutting & Recovery
- Well Head Recovery

These units are ideal for applications in offshore, onshore, and remote environments; being modular in design and construction, they offer a safer and more efficient alternative to traditional workover methods along with risk reduction and value adding capability.

Major Issues affecting the industry

Offshore:

- Offshore Platform sizes vary from small WHP, Monopod, to large multi-well platforms
- Crane capacity downgrade / no crane
- Deck loading limitations
- Regulations for lifting, emissions, zoning, etc
- Access/Tower requirements
- Logistics support
- Water depth
- Cost….

Onshore:

- Well Pads sizes vary from small 'single' to multi-well layouts
- Equipment Access / Egress

- Ground loading limitations
- Regulations for lifting, emissions, noise, zoning, etc
- Logistics and infrastructure support
- Cost….

What are the industry needs:

- Ability to have equipment which serves 80% of the market
  - Intervene and Workover in both the onshore, offshore and inland water markets
- Be able to work with limited crane capabilities (Offshore / Inland Waters)
  - Crane Height / Load capacity
  - Down-rated cranes
  - No cranes
  - Use of Barge / Leap Frog / Modular Cranes
- Reduction in Personnel Exposure to Risk
- Reduction of risks in respect to Working at Height, and in the 'line of fire'
- Maintain equipment stability and security
- Keep mobility without reducing efficiency
- Retain lower cost model to optimise returns in mature assets
- Keep Drilling Rigs drilling!

HWU Solution:

An Integrated HWU Implementation Plan

- Identify and evaluate the issue
- Develop a cost effective and deliverable solution
- Develop and deliver detailed Project Specific Plans, i.e. Services, Equipment, Personnel, Support, Infrastructure requirements
- Use HWU as an Intervention Tool or Workover Rig to perform required work scope

Risk Reduction

- Long-term securing of 'HWU' equipment set
  - Ensure availability of equipment to Intervene and Workover Wells, where 'mean time to failure' is predictable.
- Reduced cost to clients over 'call-off' market rates & mobilisations
  - Dedicated package availability to client, and if applicable, Multi Field Intervention & Workover strategy
- Dedicated equipment built fit for purpose for market needs
  - Standardized offering to meet 80% of market needs
- Move toward removal of 'human interfaces' in the Work Basket & Work Window areas
  - Automation
  - Brining the equipment into the 21st century

Value Added

- Ability to enhance service provider 'ROI' through higher equipment utilization

- Conversion from Offshore to Onshore Quick Rig set up
  - HWU & Fluid systems to serve both on & offshore markets at reduced cost with improved efficiencies
- Use of HWU equipment sets for Heavy Intervention, Workover and short 'infill' drilling programs
  - Proven to be economical for niche markets – *500m max is optimum for Side Track*
- Core service provision in HWU Workover mode
- Industry keeps Drilling Rigs 'drilling' in high-cost markets

Current Industry Issues

- **Outdated Technology**

  - Require moving hydraulic control systems forward using latest generation hydraulic control systems
  - Where practicable and appropriate, attain an overall reduction of the human / equipment interface
  - Through equipment Design & Engineering, reduce impact to the environment i.e. noise pollution, emissions and spill control.
  - Through equipment Design & Engineering, minimise component & package weights to suit the offshore environment (i.e. Cranes, Deck Loading)
  - Meet the needs of both onshore & offshore workover and or live well market

- **Business Model**

  - Traditionally HWU providers operate in a 'response' mode for short term, call off contracts

  - Clients looking to secure services and equipment on longer term contracts allows for the appropriate Investment and 'ROI' on major capital asset program –

    - Short Term / Call Off projects which require 'Capital Investment' of Equipment, do not provide adequate opportunity to recover a suitable portion of the Capital Investment, without making 'charge out rates' uncompetitive.

    - Conventional Intervention Projects of 1-year duration (or less) provide minimum opportunity for the Contractor & Client to establish a meaningful working relationship. From the Contractors perspective there is insufficient time to fully assess the needs of the Client, and from the Clients perspective there is insufficient time to fully observe the overall capability of the Contractor.

    - Within 'Short Term Contracts' and or 'Call Off Contracts'; it is more difficult to establish robust Contractor / Client relationships. Longer Term Contracts i.e. 3 year plus extension options; provide the ability to develop strong relationships, which lead to 'Bi Directional Trust & Understanding'; which ultimately delivers upper quartile service, support and value to both parties i.e. each time a 'short-term' or 'call off' scope of work is to be conducted, relationships require to be established or renewed, which is an inefficiency to the project.

- The 'full-time' use of equipment & personnel provides the benefit of Equipment 'Up Time' i.e. reduced Repair & Maintenance Costs as equipment is being operated and serviced on a daily basis; in addition; competence & knowledge of project assigned personnel is maintained in respect to Client / Location Operating Standards, Practices & Expectations; both of which lead to operational safety and efficiency i.e. Contractors personnel become 'Core to the Location' and are not observed as 'short term visitors'.

Offshore Market vs Land Market Equipment Optimization Considerations

- **HWU Stand-Alone Unit designs are typically:**
  - Modular and light weight
  - Designed for broad market access
  - Mobility satisfies many offshore physical challenges / not an advantage on land.
  - How to improve land rig up efficiency w/o impacting offshore mobility e.g.
  - Light Workover Fluids system
    - Modular 600bbls Fluids system (*alternative volumes can be delivered*)
    - Can be used Onshore in Trailer mounted Quick Rig mode
    - Can be used Offshore as Skid mounted equipment

- **Onshore (Land) Production Intervention & Workover Market**
  - Efficiency Driven
  - Highly Mobile Equipment Packages
  - Trailer Mounted Quick Rig Packages:
    - Reduced qty of lifts to RU / RD Equipment
    - Reduced time to RU / RD Equipment
  - Pre-Assembled BOP Packages, reduces RU / RD times
  - Dedicated Support Sub Structure providing stability and reduce Guy Lines & Anchors *(Overbalanced Operations)*
  - Dedicated Support Sub Structure eliminating Operational Loading and Stress / Fatigue to the Well Head *(Overbalanced Operations)*
  - Trailer Mounted Prime Movers and utilities Packages (Electric & Pneumatic Generation)
  - Trailer mounted Pumping and Fluids Packages

- **Offshore Production Intervention & Workover Market**
  - Efficiency Driven
  - Modular, Light Weight, and minimal Footprint Equipment Packages, due to
    - *Crane Limitations*
    - *Deck Loading Limitations*
    - *Well Head / Marine Riser Loading Limitations*
  - 4-way Skidding capability to support multi well operations
  - Safe & Efficient Personnel access / egress
  - Pre-Assembled BOP Packages, reduces RU / RD times

- Dedicated Support Sub Structure providing stability and reduce Guy Lines & Anchors *(Overbalanced Operations)*
- Dedicated Support Sub Structure eliminating Operational Loading and Stress / Fatigue to the Well Head / Marine Riser *(Overbalanced Operations)*
- Optional 'vertical' Pipe Racking to assist with multiple pipe tripping scenarios (Drill / Mill / Fish etc.)
- Modular Prime Movers and Utilities Packages (Electric & Pneumatic Generation)
- Modular Pumping and Fluids Packages

The Oil & Gas sector faces several unique challenges that complicate well maintenance efforts:

Mature Fields: On average 70%, is the amount of Worldwide Oil & Gas Production from Mature Fields, and 35% is the average Worldwide 'Recovery Factor' for Oil Fields. A 'Mature Field' is not defined by its age, but where it currently is, relative to 'Peak Production', e.g. once the Field is past the Peak Production and commences the 'Decline Curve', the Field can be deemed as 'Mature'.

Aging Infrastructure: Many oil and gas fields and production structures are decades old, making them prone to structural degradation and reduced output i.e. Facilities and Wells in less than optimum physical condition

Logistical Constraints: The terrain and remote locations of oilfields, create logistical hurdles for deploying and operating traditional maintenance equipment.

Economic Pressures: Fluctuating oil prices necessitate cost-effective maintenance solutions to sustain profitability.

Environmental Concerns: Stricter environmental regulations require technologies that minimize the ecological footprint of well and equipment maintenance activities.

Workforce Safety: Ensuring the safety of workers is a priority, particularly in high-pressure environments and hazardous conditions.

HWUs address these challenges 'head-on', making them a compelling choice for the oil & gas industry.

Advantages of HWUs in 'Life of Well' Maintenance and Support

Cost-Effectiveness: HWUs offer significant cost savings compared to traditional drilling rigs. Their smaller footprint, reduced manpower requirements, and lower operating costs make them an economical option for well intervention and well maintenance.

Enhanced Mobility: The compact and modular design of HWUs allows for easy transportation and assembly in remote or offshore locations. This mobility reduces downtime and ensures timely intervention.

Operational Versatility: HWUs can perform a wide range of tasks, including pulling and running tubulars, retrieving stuck pipes, and managing well kicks. Their adaptability makes them suitable

for complex remedial and maintenance scenarios, as well as the emerging Offshore / Onshore P & A Decommissioning sector.

Safety and Environmental Benefits: HWUs are engineered with advanced safety features and automated controls, minimizing the risk of accidents. Their hydraulic systems reduce emissions and noise, aligning with environmental compliance standards.

Minimized Non-Productive Time (NPT): HWUs enable quick deployment and efficient operations, reducing the time wells remain offline. This ensures sustained production and revenue.

Offshore and Onshore Oil & Gas fields play a critical role in the industry's hydrocarbon output, but they also present unique challenges. HWUs are particularly advantageous in offshore settings due to their compact modular design and ability to operate on smaller platforms. These units can execute interventions without requiring costly rig mobilizations, making them an ideal solution for offshore well maintenance.

To maximize the full benefits of HWUs, the industry requires to prioritize and promote 'service' adoption, capability and capacity which in turn, provides:

Technology Transfer: Collaboration between HWU Service providers and Clients can facilitate the transfer of knowledge and skills.

Workforce Training: Equipping local technicians and engineers with the expertise to operate and maintain HWUs will enhance operational efficiency and create employment opportunities.

Regulatory Support: Policymakers should provide incentives for the adoption of advanced technologies like HWUs, ensuring alignment with national energy goals and environmental policies.

Infrastructure Development: Investment in Transport and Logistics infrastructure will ease the deployment of HWUs to remote oil and gas fields.

As the global hydrocarbon industry evolves, the adoption of innovative technologies such as HWUs shall be pivotal in addressing the dual challenges of maintaining productivity and minimizing costs. By integrating HWUs into 'well maintenance' strategies, the industry can extend the lifespan of aging wells, reduce operational risks, and ensure a sustainable energy future.

Hydraulic Workover Units and associated services represent a transformative opportunity for the Hydrocarbon industry to optimize well maintenance. Their cost-effectiveness, mobility, safety features, and environmental compliance make them an indispensable tool for addressing the unique challenges of the sector. By embracing HWUs, the Industry's 'Operators' can secure their position as safe, reliable and cost-efficient hydrocarbon producers while maintaining Well Work Over and Heavy Duty Well Intervention efficiency and sustainability.

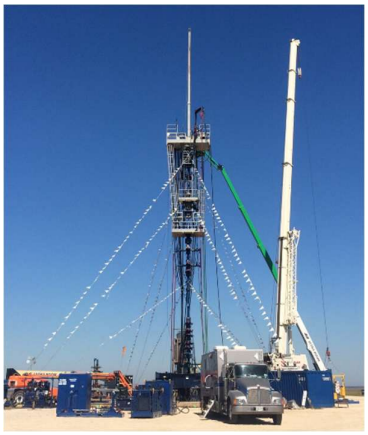
Appendix 1

What is Snubbing Operations in the O&G Industry

In the oil and gas operations, advancements in drilling technologies have given rise to various well-intervention methods. One such specialized technique is Snubbing operations.

In this blog, we will delve into the intricacies of snubbing, exploring its definition, applications, equipment, and the crucial role it plays in maintaining integrity and productivity.

Understanding Snubbing Operations:



Snubbing is a well-intervention method designed to perform various tasks in ***live wells*** without the necessity of killing the well. Unlike traditional Workover Rigs, Snubbing operations allow for the manipulation of Tubular, Tools, and Equipment in and out of the wellbore while maintaining well control.

Hydraulic Workover Operations, also conducted using a Hydraulic Jack, work on ***Over Balanced / Dead Wells,*** like traditional Workover Draw Work Rigs. Hydraulic Workover Operations also allow for the manipulation of Tubular, Tools, and Equipment in and out of the wellbore, however, in Hydraulic Work Over Operations (as with traditional Workover Rigs) heavy well bore fluid maintains well control.

Applications:

Snubbing is employed in a range of heavy-duty well-intervention activities, including but not limited to:

1. **Wellbore Cleanout:** Removing debris, sand, or other obstructions from the wellbore i.e. Scale Milling.

2. **Through Tubing Operations:** Running or retrieving various downhole tools / assemblies and conducting Through Tubing tasks i.e. Plug / Packer / Nipple Milling, Installation / Retrieval of Straddle Assemblies & Plugs, installation / Retrieval of Velocity or Syphon Strings.

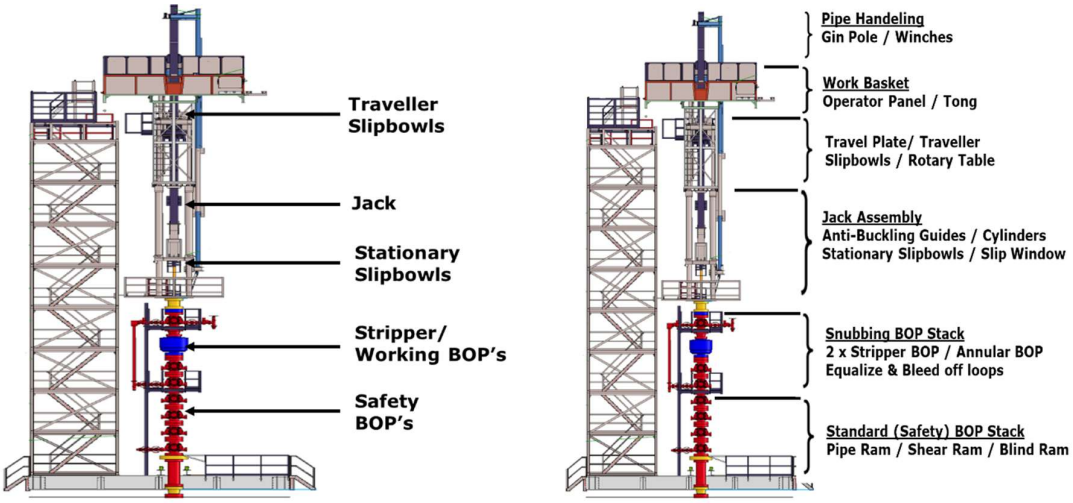
3. **Fishing Operations:** Retrieving equipment, tools or assemblies lost in the wellbore.

4. **Casing and Tubing Operations:** Running, Pulling, or Manipulating Casing and Tubing Strings.

5. **Well Control / Kill Operations:** 'On Bottom' Well Kill, Lub & Bleed Operations

6. **Underbalanced Drilling:** Conducting drilling operations while maintaining well control.

Key Components of Snubbing Operations:



1. Snubbing Unit: At the heart of snubbing operations is the snubbing Unit / Jack, a specialized hydraulic unit that provides the force needed to push or pull tubulars into or out of the wellbore. These units are equipped with a hydraulic power system, control console, and a snubbing platform.

2. Snubbing Pipe String: The snubbing pipe string consists of a series of tubulars, including jointed pipe or coil tubing, used to convey tools and equipment into the wellbore during snubbing operations.

3. Slip and Seal Assembly: Critical to maintaining well control, the slip and seal assembly is designed to grip the tubing or casing, preventing the uncontrolled release of hydrocarbons during operations.

4. Work Platform: A work platform is an essential part of the snubbing unit, providing a stable surface for the crew to manipulate tools and equipment during operations.

5. BOP (Blowout Preventer): Similar to conventional drilling operations, Snubbing operations utilize Blow Out Preventers to control well pressure and prevent the release of hydrocarbons.

Advantages of Snubbing Operations:

1. **Live Well Capability:** Snubbing allows for well interventions without shutting down the well or killing it, enhancing efficiency and reducing downtime.

2. **Versatility:** The technique is versatile and can be adapted for a wide range of applications, from routine maintenance to more complex interventions.

3. **Safety:** By eliminating the need to kill the well, snubbing operations enhance safety by minimizing the potential for formation damage and reducing the risks associated with well control incidents.
4. **Reduced Environmental Impact:** Snubbing operations often result in reduced environmental impact due to the avoidance of well kill fluids and the associated waste disposal.

Challenges and Considerations:

While Snubbing operations offer numerous advantages, they also present unique challenges. These include:

1. **Complexity:** Snubbing operations require specialized training and expertise due to the complexity of working in live wells.

2. **Equipment Maintenance:** The high-pressure and high-temperature conditions encountered in wellbore environments can lead to increased wear and tear on snubbing equipment, necessitating regular maintenance.

3. **Well Control:** Maintaining well control is paramount in snubbing operations to prevent blowouts and other potentially catastrophic events.

Conclusion:

Snubbing operations have become an integral part of well-intervention strategies in the Oil & Gas industry.

The technique's unique ability to perform ***live well*** interventions with reduced downtime and increased safety has positioned this Heavy Duty Well Intervention Service as an asset and valuable technique for Operators seeking to enhance well productivity and longevity.

As technology continues to advance, and industry professionals gain more experience with Snubbing operations, this innovative approach to Well Intervention shall play an increasingly pivotal role in maintaining the integrity of Oil and Gas wells worldwide.

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