

July 2017

UHBM-OS

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The off-shore mechanical pumping hydraulic units (UHBM-OS) are a new technological development in the field of hydraulic pumps. They make it possible to use mechanical pumping in off-shore oil platforms due to the design of the system. It allows for the installation of the hydraulic actuator at the head of the well while installing the power unit at a different site of the platform; for example, another level which in turn isolates it from harsh environmental conditions and high tides. Additionally, said hydraulic actuator can be installed in slant wells.



1. Well B-13 (slant 31°)

The operative ranges for this technology include the following:

- Stroke length: 60" and 144"
- Engine power: From 2 to 150 hp.
- PPRL: From 6000 Lbf to 53.000 Lbf.
- Strokes per minute: From 0.5 to 6.

With these ranges, it is possible to operate a wide range of flow rates at different depths.

The first system of this type was installed at the end of July of 2017, at well B-13 operated by Trinity Exploration & Production PLC in the Bravo platform in Trinidad and Tobago.



2. Hydraulic Power Unit

The operative conditions of this first installation were the following:

- Model: UHBM-OS // A2-6-40-2
- Engine power: 2 Hp 1200 rpm 440 V 60 Hz
- PPRL: 6000 Lbf
- Stroke length: 40"
- Strokes per minute: 2
- Total weight (actuator and PU): 520 Kg

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3. Bravo Platform

INPUT DATA					CALCULATED RESULTS (TOTAL SCORE: 91% Grade: A-)				
Strokes per minute:	2	Fluid level			Production rate (bfpd):	29	Peak pol. rod load (lbs):	4293	
Run time (hrs/day):	24,0	(ft from surface):	1620		Oil production (BOPD):	23	Min. pol. rod load (lbs):	873	
Tubing pres. (psi):	100	(ft over pump):	0		Strokes per minute:	2	MPRL/PPRL	0.203	
Casing pres. (psi):	50	Stuf.box fr. (lbs):	100		System eff. (Motor->Pump):	32%	Unit struct. loading:	72%	
		Pol. Rod Diam: 1.5"			Permissible load HP:	1,2	PRHP / PLHP	0,46	
Fluid properties		Motor & power meter			Fluid load on pump (lbs):	1793	Buoyant rod weight (lbs):	1774	
Water cut:	21%	Power Meter	Detent		Fluid level TVD (ft from surface):	1423	N/No: ,013 , Fo/SKR: ,101		
Water sp. gravity:	1	Electr. cost:	\$,1/KWH		PRHP:	,6			
Oil API gravity:	20,0	Type:	NEMA D		Required prime mover size		BALANCED		
Fluid sp. gravity:	0,9479				(speed var. not included)				
Compress. index:	3,0				NEMA D motor:	3 HP			
Pumping Unit: SERINPET					Single/double cyl. engine:	3 HP			
Unit size:	H-60-40 (unit ID: CUSTOM)				Multicylinder engine:	3 HP			
Crank hole number	N/A				Torque analysis and electricity consumption	BALANCED			
Calculated stroke length (in):	40				Peak g'box torq.	N/A			
Crank Rotation:	N/A				Gearbox loading:	N/A			
Max. CB weight	N/A				Cyclic load factor:	N/A			
Adjusted stroke length (in):	40				Counterbalance weight	N/A			
Tubing and pump information					Daily electr.use (KWH/day):	19			
Tubing O.D. (ins):	2,875	Upstr. rod-fl. damp. coeff:	0,100		Monthly electric bill:	\$56			
Tubing I.D. (ins):	2,441	Dnstr. rod-fl. damp. coeff:	0,100		Electr. cost per bbl. fluid:	\$0,064			
Pump depth (ft):	1620	Tubing is not anchored			Electr. cost per bbl. oil:	\$0,081			
Pump condition:	Full				Tubing, pump and plunger calculations				
Pump type:	Insert	Pump vol. efficiency:	90%		Tubing stretch (ins):	,7			
Plunger size (ins):	2	Pump friction (lbs):	200,0		Prod. loss due to tubing stretch (bfpd):	0,6			
Rod string design					Gross pump stroke (ins):	35,0			
Diameter (inches)	Rod Grade	Length (ft)	Min. Tensile Strength (psi)	Fric. Coeff	Pump spacing (in. from bottom):	4,9			
0.625	C (API)	1520	90000	0.22	Minimum pump length (ft):	7,0			
+ 1	C (API)	100	90000	0.22	Recommended plunger length (ft):	2,0			
					Rod string stress analysis (service factor: 0,9)				
					Stress Load %	Top Maximum Stress (psi)	Top Minimum Stress (psi)	Bot. Minimum Stress (psi)	# Guides/Rod
					57%	14242	3746	91	0
					17%	3509	35	-255	0

+ Requires slimhole couplings.
NOTE Stress calculations do not include buoyancy effects.

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True depth (ft)

