HydroPull™ Extended Reach

•

Motor Gas Separator (MGS™)

•

HydroPull™ SC Tool (Stimulation and Cleanout)

•

Water Bypass AV Sub (WBS)

•

High Pressure Rotary Jet (JetRotor™)

•

Engineering Services

•

Custom Tool Development

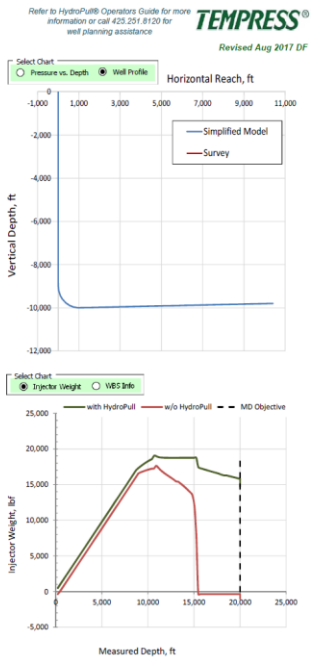
Tempress Job Planning Performance Software Suite

The performance of Tempress Well Intervention tools are enhanced through the use of our proprietary Job Planning Performance Software Suite. The Software is available to predict the performance and configuration of the HydroPull™ tool, the Motor Gas Separator (MGS™) tool and the Water Bypass AV Sub (WBS).

The Tempress Job Planning Performance Software is a critical component in the Front-End Engineering and Design (FEED) required of extended reach and depleted well operations. The Software plays a vital role in Tempress equipment consistently setting or breaking industry records. The Software is located within our Client Login site on our website and training is available at no cost to our clients.

HydroPull™ Performance Software

HydroPull® Extended Reach Model- Simplified Well Profile		Enter All Blue Data		©Tempress OSES 2017
	Well Designation & Date	Wellname		mm/dd/yr
Well Data	Select units	US Units		
	Kickoff point (TVD)	9,000	ft	
	End of curve/landing point (TVD)	10,000	ft	
	Toe depth (TVD)	9,800	ft	1.2 deg toe-up
	Measured Depth (MD) Objective	20,000	ft	
	ID of casing in vertical and curve	4.67	in	
	Lateral ID (cased or open hole)	4.67	in	
	Average dog leg severity in horizontal	1	°/100 ft	
	Static friction coefficient	0.24		.21 for pipe-on-pipe friction reducer, .24 with no FR, .30 if no coil straightener
Workstring (Separate Tab)	Coil OD	2.000	in	Displayed For Reference
	Coil Wall Thickness	0.109	in	
BHA	Minimum flow ID in motorhead	0.70	in	
	HydroPull® tool diameter	2.88	in	
	HydroPull® Configuration (Flow , Impact Rating*)	Standard Flow, High Impact		
	# of Nozzle Ports (bit, bullnose)	6		see Tempress Nozzle Sizes
	Port diameter	0.375	in	
	Tempress® Water Bypass Sub	No		
	No-load motor pressure (see Motor Data Tab)	50	psid	0 if no motor
	On-off bottom motor pressure differential	750	psid	0 if no motor
Operating Parameters	Pump flow rate	3.00	bpm	
	Minimum Weight on Bit	500	lbf	
	Wellhead circulating pressure (choke)	100	psi	gage
	Fluid friction reducer effect	50%	% reduction	
	Fluid density	8.34	ppg	Spec. Gravity= 1.00
	Est. fluid lost to (-) or gained from (+) formation	0.00	bpm	Default is 0
Results	Total BHA pressure drop	1300	psi	differential
	Pump pressure (drilling/milling)	3490	psi	
	Bottomhole circulating pressure (BHCP)	4359	psi	
	Wellhead snubbing force	360	lbf	
	Hydraulic Liftoff force	175	lbf	
	Water hammer pulse in annulus	187	psi	differential
	Water hammer pulse in work string	1036	psi	
	Minimum rupture disk rating	3747	psi	
	Impact force at BHA	3166	lbf	
	Fluid velocity in horizontal section	219	fpm	OK
	Vertical cuttings transport ratio (1-mm sand)	74%		OK
	Water Flow to Motor	3.0	bpm	
	Water Bypass (if WBS selected)	-	bpm	
	On-Off Bottom Motor Flow Variation w/WBS	-		
	Maximum coil feed rate at toe of well	17	ft/min	
	Coil lockup MD without HydroPull®	15246	ft	
	MD with HydroPull®	21998	ft	
	Reach increase due to HydroPull®	6752	ft	



A proprietary software program is available for HydroPull tool job planning. The software evaluates circulating pressures in the well and horizontal reach capabilities based on a set of input parameters. The program also calculates pump pressure requirements, the transport of sand and cuttings in the horizontal and vertical sections of the well, predicted lockup, and the rate at which the tool will pull tubing into the well.

TEMPRESS®
OIL STATES Energy Services

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Engineering Services

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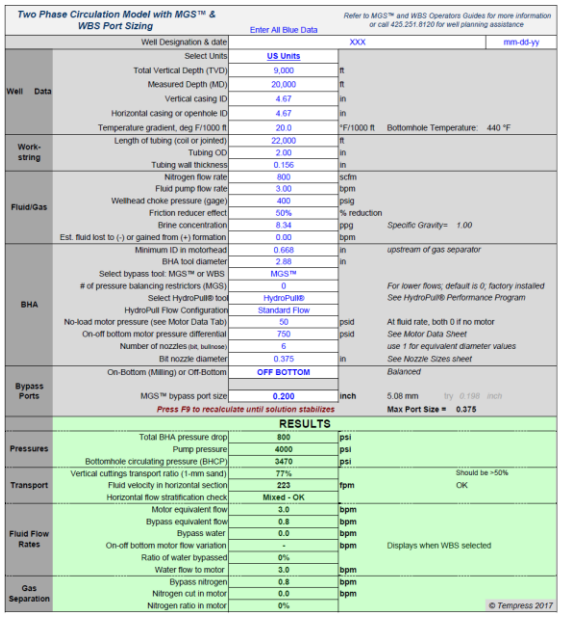
Custom Tool Development

Motor Gas Separator (MGS™) and Water Bypass Sub (WBS) Performance Software

A proprietary software program is available for MGS and WBS tool job planning. The software evaluates the best separator and fluid bypass performance range for the job. The software outputs circulating pressures in the well, the transport of sand and cuttings in the horizontal and vertical sections of the well, equivalent fluid flow rates, amount of water flow to the motor, and the amount of gas separation based on a set of input parameters.



Two Phase Circulation Model with MGS™ & WBS Port Sizing

Refer to MGS™ and WBS Operators Guides for more information or call 425.251.8120 for well planning assistance

Enter All Blue Data

	Well Designation & date	XXX		mm-dd-yy
Well Data	Select Units	US Units		
	Total Vertical Depth (TVD)	9,000	ft	
	Measured Depth (MD)	20,000	ft	
	Vertical casing ID	4.67	in	
	Horizontal casing or openhole ID	4.67	in	
	Temperature gradient, deg F/1000 ft	20.0	°F/1000 ft	Bottomhole Temperature: 440 °F
Work-string	Length of tubing (coil or jointed)	22,000	ft	
	Tubing OD	2.00	in	
	Tubing wall thickness	0.156	in	
Fluid/Gas	Nitrogen flow rate	800	scfm	
	Fluid pump flow rate	3.00	bpm	
	Wellhead choke pressure (gage)	400	psig	
	Friction reducer effect	50%	% reduction	
	Brine concentration	8.34	ppg	*Specific Gravity= 1.00*
	Est. fluid lost to (-) or gained from (+) formation	0.00	bpm	
BHA	Minimum ID in motorhead	0.668	in	*upstream of gas separator*
	BHA tool diameter	2.88	in	
	Select bypass tool: MGS™ or WBS	MGS™		
	# of pressure balancing restrictors (MGS)	0		*For lower flows; default is 0; factory installed*
	Select HydroPull® tool	HydroPull®		*See HydroPull® Performance Program*
	HydroPull Flow Configuration	Standard Flow		
	No-load motor pressure (see Motor Data Tab)	50	psid	At fluid rate, both 0 if no motor
	On-off bottom motor pressure differential	750	psid	*See Motor Data Sheet*
	Number of nozzles (bit, bullnose)	6		*use 1 for equivalent diameter values*
	Bit nozzle diameter	0.375	in	*See Nozzle Sizes sheet*
Bypass Ports	On-Bottom (Milling) or Off-Bottom	OFF BOTTOM		*Balanced*
	MGS™ bypass port size	0.200	inch	5.08 mm try 0.198 inch
	Press F9 to recalculate until solution stabilizes			Max Port Size = 0.375
	RESULTS			
Pressures	Total BHA pressure drop	800	psi	
	Pump pressure	4000	psi	
	Bottomhole circulating pressure (BHCP)	3470	psi	
Transport	Vertical cuttings transport ratio (1-mm sand)	77%		Should be >50%
	Fluid velocity in horizontal section	223	fpm	OK
	Horizontal flow stratification check	Mixed - OK		
Fluid Flow Rates	Motor equivalent flow	3.0	bpm	
	Bypass equivalent flow	0.8	bpm	
	Bypass water	0.0	bpm	
	On-off bottom motor flow variation	-	bpm	Displays when WBS selected
	Ratio of water bypassed	0%		
	Water flow to motor	3.0	bpm	
Gas Separation	Bypass nitrogen	0.8	bpm	
	Nitrogen cut in motor	0.0	bpm	
	Nitrogen ratio in motor	0%		

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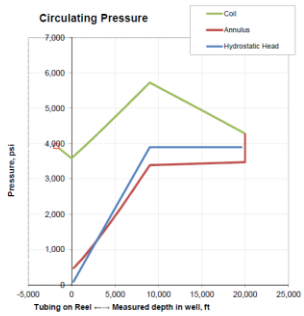
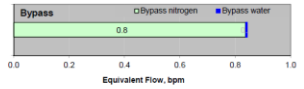
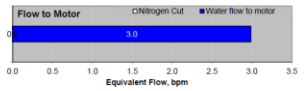
Performance Software is designed specifically for use with Tempress ® tools only. Released May 2017 DF







Case Histories

Please contact us or visit our website for the most recent Case Histories.

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