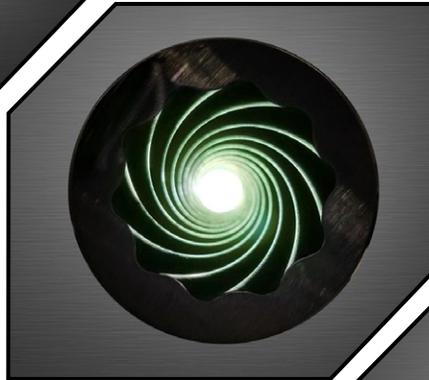


DEPLOY  
**HSRT**  
HI-SPEED REAMING TOOL



**AMIP**  
ALL METAL POWER



DRILL  
**RE|FLEX**  
PREMIUM DRILLING MOTORS



THRU-TUBING INTERVENTION  
**TT-HSRT**  
HI-SPEED REAMING TOOL



**AMIPLI-VIBE**  
FRICTION REDUCTION TOOL w/AMP Inside





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**We** are a motivated Engineering Company.

**InFocus** employs industry veterans and uses the best and newest equipment & practices in the development of all of our product lines.

## WHO WE ARE

InFocus is a privately held company specialized in providing quality products and services to the energy industry.

## OUR VISION

Align with industry leaders around the globe to share innovative technologies and solutions.

## OUR MISSION STATEMENT

Mutual growth through superior innovation, customer service, HSE, quality and commitment.





**InFocus** has been engineering and building the latest in fluid-driven downhole technologies since 2013.

We are an engineering firm with tools in the game - from our HSRT: Hi-Speed Reaming Tools for drilling and thru-tubing intervention, to our award-winning AMP: All Metal Power section technology.

*“We believe, if it’s not fresh or innovative, we’re not into it.”*

We partner with industry leaders who demand groundbreaking NEW technology.

At our core we are an engineering company employing a quick-response staff led by a PhD. These industry professionals use the best and newest equipment & practices in the development of all of our product lines.



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DEPLOY  
**HSRT**  
HI-SPEED REAMING TOOL



**HP/HT**  
HIGH PRESSURE - HIGH TEMPERATURE  
COMPATIBLE PRODUCT



# MULTI-PURPOSE SHOE FOR CRITICAL FUNCTIONS

**The HSRT** Casing Deployment Shoe by InFocus provides a variety of critical functions during the completion stages of each well section. The HSRT system can be configured to run as a high speed reaming solution for casing or tubular deployment, as a casing scraper, or as a jetting tool for well-bore clean-up operations. It also adds a beneficial second shear to the cement being pumped into the annulus, improving the cement bond around casing and liners.

Superior to conventional cementing and guide shoes, the HSRT builds upon their respective features aiding in-hole cleaning and clearing of formation bridges to land casing on depth.

During operation, fluid flow pumped from surface activates a unique impeller system to deliver very high rotational speeds.

Each HSRT tool operates at rotary speeds in excess of 1,500 RPM, in turn generating a unique flow pattern allowing for enhanced fluid carrying capacity making it the ideal candidate for casing and liner cementing operations.



The HSRT Casing Deployment product line is a natural fit for vertical, high angle, & horizontal operations. The low torque, self-centralizing nose design allows for easy tracking of the well-bore, overcoming ledges and other well bore obstructions and minimizing the risk of a side track.

## FEATURES & BENEFITS

- Fluid activated with drillable internals
- Very high rotational speeds achieved with fluid circulation down the string
- Low and uniform pressure drop across the tool making HSRT ideal for completion string deployment
- Optimized nose profiles are available for more aggressive operations
- Multiple jets
- High speed bearings capable of >3000 RPM
- Better hole cleaning prior to cementing
- Improved cementing operations in high angle and horizontal wells
- Can be used as an alternative jetting tool for well-bore clean up and stimulations

## LCM GUIDELINES

### **Lost Circulation Material**

When operating the HSRT, certain lost circulation materials (LCM) can be used safely by following these recommended parameters:

- Particle size should be LESS than 60 – 100 MESH size or smaller
- Larger particle sizes or heavy concentrations of fibrous material tend to start plugging up the HSRT's internal ports that can lead to circulation problems through the HSRT reducing operating performance and potentially plugging the tool off completely.
- LCM should be added slowly in order to avoid plugging the system. NOTE: Always follow the manufacturer's instructions for mixing.
- Add material away from the pump intake. Use a pre-mix system if available.

**Any issues or concerns, please contact your InFocus representative.**



# HSRT: GLOBAL TOOL STATISTICS

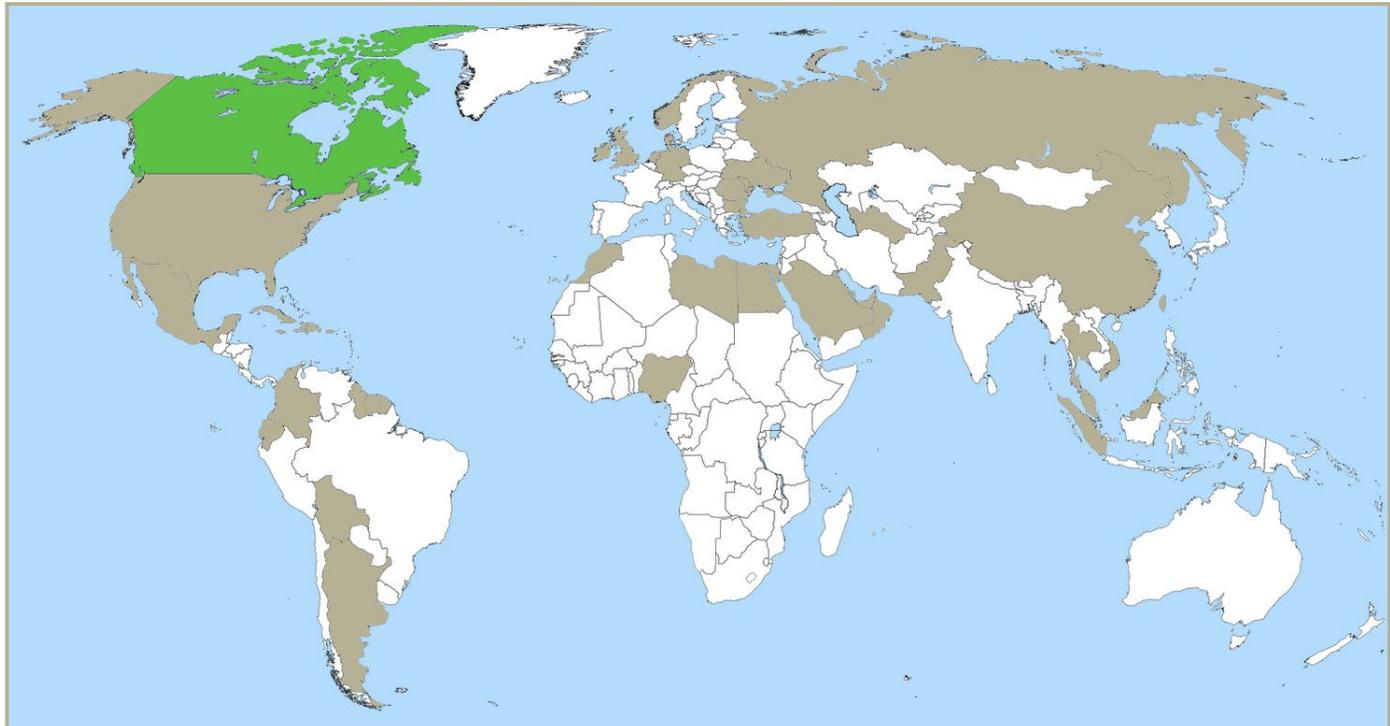
As of this writing, there are over

# 554

**HSRT: Hi-Speed Reaming Tools deployed throughout the world...  
and not one recordable downhole incident since 2017.**

◆ InFocus Group of Companies  
Head Office  
Nisku, Alberta, Canada

◆ Countries where HSRT's have  
been deployed successfully  
since 2016.



# NON-DRILLABLE THRU-TUBING INTERVENTION





## The Hi-Speed Reaming Tools for Thru-Tubing Intervention. Your ‘Everyday Carry’ for scale removal!

InFocus provides a cost-efficient alternative to motors for wellbore cleanouts and scale removal – the Hi-Speed Reaming Tools for thru-tubing intervention. Our ‘Everyday Carry’ HSRT tools are small & compact, provide superior reliability and a low run cost per hour!

These smaller-size HSRT’s can be configured with a wash head to run as a jetting tool for wellbore sand clean up, or with a milling-style head designed for cement clean up.

We supply our own reaming and/or wash heads, but depending on your specific job requirement, we also offer a box- or pin-down adapter so third party heads can be utilized.

The HSRT’s contain no elastomer and can be deployed in harsh environments where acids, solvents and N2 are required for wellbore stimulations. The short compact design allows for ease of handling and is beneficial when short BHA’s are desired. Thru-Tubing HSRT’s can be serviced quickly and easily.

## SPECIFICATIONS - THRU TUBING INTERVENTION

Tool	Hole Size	Casing Size	Flow Rate	TFA	Rotational Speed	Pressure Drop
	in. (mm)	in. (mm)	gpm (lpm)	in <sup>2</sup> (mm <sup>2</sup> )	RPM	psi (kPa)
169	2 (51)	2 3/8 - 5 1/2 (60 - 140)	15 - 80 (57 - 303)	0.22 (14)	700 - 3500	25 - 425 (172 - 2930)
213	2 1/2 (64)	2 7/8 - 7 (73 - 178)	20 - 140 (76 - 530)	0.48 (310)	700 - 4200	75 - 580 (517 - 4000)
287	3 1/8 (79)	3 1/2 - 7 (89 - 178)	30 - 200 (114 - 757)	1.07 (690)	500 - 5700	125 - 4000 (862 - 27580)

Operational specifications are for reference only. Actual tool performance may vary depending on a variety of downhole conditions. Performance data is subject to change without notice.

Tests were conducted with fresh water of 8.33 PPG

\* Sizes vary to Hole Gauge

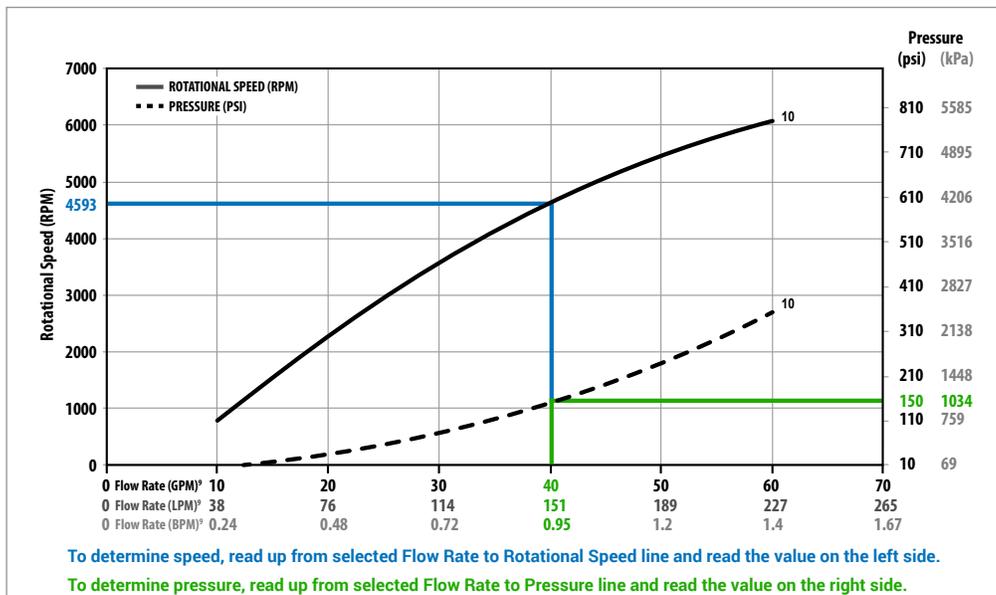
# HSRT: Hi-Speed Reaming Tool - 1.69"

	Imperial	Metric
Overall Length of the Tool <sup>1</sup>	10.24 in	260.1 mm
Maximum Tool Body Diameter	1.690 in	42.9 mm
Maximum Temperature <sup>3</sup>	482°F	250°C
Maximum On-Bottom Bearing Load <sup>4</sup>	5800 lbf	2580 daN
Maximum Off-Bottom Bearing Load <sup>4</sup>	5800 lbf	2580 daN
Maximum Overpull <sup>5</sup>	15700 lbf	6984 daN
Recommended Nose Total Flow Area (TFA)	0.26 in <sup>2</sup>	168 mm <sup>2</sup>
Minimum Internal Port Size <sup>6</sup>	0.16 in	4.0 mm
Burst Pressure	17200 psi	118.6 MPa
Collapse Pressure	10900 psi	75.2 MPa
Peak Power <sup>7</sup>	1.3 HP	1.0 kW
Top Connection <sup>8</sup>	1.000 MT/AMT/AMMT (BOX)	
Bottom Connection <sup>8</sup>	1.000 MT/AMT/AMMT (PIN)	
Milling Style Wash Head Nominal Dia. <sup>2</sup>	1.690 in	42.9 mm
Milling Style Wash Head Config & TFA	1 x Ø5/16 in, 12 x 5/32 in 0.31 in <sup>2</sup>	1 x Ø7.9 mm, 12 x 4mm 200 mm <sup>2</sup>

- 1- Overall length is the shoulder-to-shoulder distance of the Tool ONLY. Additional Crossovers/Noses will add length, see Fishing Drawing for these lengths.
- 2- Wash Head or Bottom Connection Configurations are available. Additional gauge \ bottom connection configurations are available upon request.
- 3- Specified ratings are not applicable at temperatures exceeding this value. Contact InFocus for ratings at elevated temperatures.
- 4- Specified load ratings are based upon onset of bearing damage.
- 5- Specified load rating is based upon tool separation.
- 6- Using LCM particles larger than specified minimum internal port size is not recommended and may cause tool plug-off.
- 7- Peak power is dependent on a variety of operational parameters and true performance may vary based on downhole conditions.
- 8- 1.000 API REG connection is interchangeable with most 1.000 MT, 1.000 AMT, and 1.000 AMMT connections.
- 9- Running above 30 GPM may result in premature wear and tear.
- 10 - Recommended Performance Range. If running past this point, please contact an IDSI Representative.

Box-down & Pin-down options available.

Optional Wash Head configuration available - please inquire.



Operational specifications are for reference only. Actual tool performance may vary depending on a variety of downhole conditions. Performance data is subject to change without notice. Based on fresh water of 8.33 PPG

# HSRT: Hi-Speed Reaming Tool - 2.13"

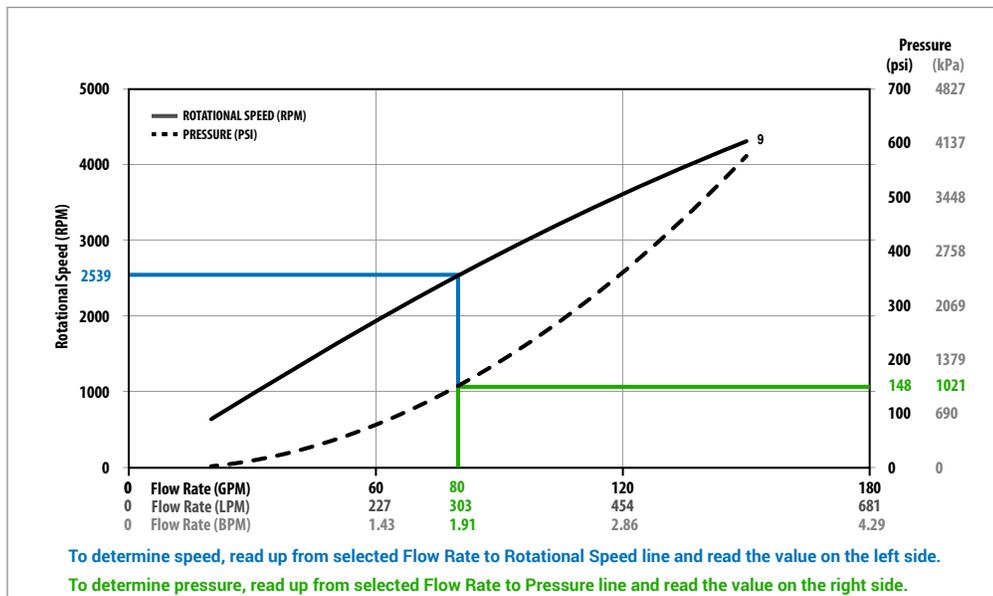
Simple. Innovative.



	Imperial	Metric
Overall Length of the Tool <sup>1</sup>	9.78 in	248.4 mm
Maximum Tool Body Diameter	2.130 in	54 mm
Maximum Temperature <sup>3</sup>	482°F	250°C
Maximum On-Bottom Bearing Load <sup>4</sup>	9600 lbf	4270 daN
Maximum Off-Bottom Bearing Load <sup>4</sup>	9600 lbf	4270 daN
Maximum Overpull <sup>5</sup>	22600 lbf	10053 daN
Recommended Total Flow Area	0.45 in <sup>2</sup>	293 mm <sup>2</sup>
Minimum Internal Port Size <sup>6</sup>	0.14 in	3.6 mm
Burst Pressure	12810 psi	88.3 MPa
Collapse Pressure	12360 psi	85.2 MPa
Peak Power <sup>7</sup>	0.6 HP	0.4 kW
Top Connection <sup>2</sup>	1.500 API REG Box	
Optional Bottom Connection <sup>2,8</sup>	1.500 API REG Pin or Box	
Wash Head Nominal Diameter <sup>2</sup>	2.600 in 2.500 in	66 mm 63.5 mm
Milling Style Wash Head <sup>2</sup>	2.060 in	52.3 mm

- Overall length is the shoulder-to-shoulder distance of the Tool ONLY. Additional Crossovers/Noses will add length, see Fishing Drawing for these lengths.
- Wash Head, Blade Head, or Bottom Connection configurations are available. Minimum clearance of 0.25 inches is recommended between blade nominal diameter and hole diameter. Additional blade / gauge configurations are available upon request.
- Specified ratings are not applicable at temperatures exceeding this value. Contact InFocus for ratings at elevated temperatures.
- Specified load ratings are based upon onset of bearing damage.
- Specified load rating is based upon tool separation.
- Using LCM particles larger than specified minimum internal port size is not recommended and may cause tool plug-off.
- Peak power is dependent on a variety of operational parameters and true performance may vary based on downhole conditions.
- 1.500 API REG Connection is interchangeable with most 1.500 MT, 1.500 AMT and 1.500 AMMT connections.
- Recommended Performance Range. If running past this point, please contact an IDSI Representative.

	Imperial	Metric
Max. Wash Head Port Config & TFA	1 x Ø0.44 in, 12 x Ø0.19 in 0.48 in <sup>2</sup>	1 x Ø11.1 mm, 12 x Ø4.8 mm 310 mm <sup>2</sup>
Min. Wash Head Port Config & TFA	6 x Ø0.19 in 0.17 in <sup>2</sup>	6 x Ø4.8 mm 110 mm <sup>2</sup>



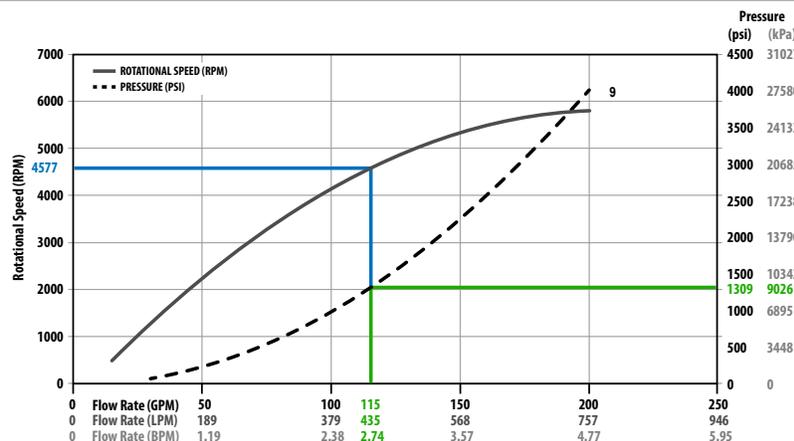
Operational specifications are for reference only. Actual tool performance may vary depending on a variety of downhole conditions. Performance data is subject to change without notice. Based on fresh water of 8.33 PPG

# HSRT: Hi-Speed Reaming Tool - 2.87"

	Imperial	Metric
Overall Length <sup>1</sup>	20.8 in	528.3 mm
Maximum Tool Body Diameter	2.880 in	73 mm
Wash Head Nominal Diameter <sup>2</sup>	3.250 in	83 mm
Milling Head Blade / Nominal Diameter <sup>2</sup>	2.880 in 3.500 in 3.560 in 3.625 in 3.730 in	73 mm 89 mm 91 mm 92 mm 95 mm
Maximum Temperature <sup>3</sup>	482°F	250°C
Maximum On-Bottom Bearing Load <sup>4</sup>	19500 lbf	8674 daN
Maximum Off-Bottom Bearing Load <sup>4</sup>	13700 lbf	6094 daN
Maximum Overpull <sup>5</sup>	33700 lbf	14991 daN
Minimum Wash Head Total Flow Area	0.46 in <sup>2</sup>	297 mm <sup>2</sup>
Milling Head Total Flow Area	0.90 in <sup>2</sup>	582 mm <sup>2</sup>
Minimum Internal Port Size <sup>6</sup>	0.10 in <sup>2</sup>	2.5 mm <sup>2</sup>
Burst Pressure	8950 psi	61.7 MPa
Collapse Pressure	6090 psi	42.0 MPa
Peak Power <sup>7</sup>	4 HP	3 kW
Top Connection	2.375 PAC box	
Wash Head Nominal Diameter <sup>2</sup>	3.250 in	83 mm
Optional Bottom Connection <sup>2</sup>	2.375 PAC pin or box	

- Overall length is the shoulder-to-shoulder distance of the Tool ONLY. Additional Crossovers/Noses will add length, see Fishing Drawing for these lengths.
- Wash Head, Blade Head, or Bottom Connection configurations are available. Minimum clearance of 0.25 inches is recommended between blade nominal diameter and hole diameter. Additional blade / gauge configurations are available upon request.
- Specified ratings are not applicable at temperatures exceeding this value. Contact InFocus for ratings at elevated temperatures.
- Specified load ratings are based upon onset of bearing damage.
- Specified load rating is based upon tool separation.
- Using LCM particles larger than specified minimum internal port size is not recommended and may cause tool plug-off.
- Peak power is dependent on a variety of operational parameters and true performance may vary based on downhole conditions.
- Recommended Performance Range. If running past this point, please contact an IDSI Representative.

	Imperial	Metric
Max. Wash Head Port Config & TFA	1 x Ø0.44 in, 12 x Ø0.31 in 1.07 in <sup>2</sup>	1 x Ø11.1 mm, 12 x Ø7.9 mm 690 mm <sup>2</sup>
Min. Wash Head Port Config & TFA	6 x Ø0.31 in 0.46 in <sup>2</sup>	6 x Ø7.9 mm 297 mm <sup>2</sup>



To determine speed, read up from selected Flow Rate to Rotational Speed line and read the value on the left side.

To determine pressure, read up from selected Flow Rate to Pressure line and read the value on the right side.

Operational specifications are for reference only. Actual tool performance may vary depending on a variety of downhole conditions. Performance data is subject to change without notice. Based on fresh water of 8.33 PPG





## Overview

**Location:** Bonnyville, Alberta

**Well/Run Type:** Sand Cleanout run

**Run Length:** Cleanout to 1267 meters (~4157 ft)

**Products / Services:** InFocus 2.875" HSRT (Hi-Speed Reaming Tool)

## Objectives

Make up and RIH with the InFocus 2 7/8 HSRT with our new Multi (13) Jetted wash head design to perform a sand clean out from surface to 1623m MD.

## Execution

RIH washing to bottom with 80 lpm, 20 scm of N2 with a combined rate of 250 lpm at 13800 KPA. POOH 7m/min sweep keeping 30SCM & 80 LPM @ 14000 KPA and seeing 15% sand cuts reduced to 2%.

## Project Results

Successfully deployed HSRT to plug back at located at 1608m KB and removed approximately 8 – 9m<sup>3</sup> of sand from well bore. Round trip 12 hrs with multiple sweeps.

## Operational Notes

### WELL TYPE

Oil Producer

### BHA

2" Coil Tubing

2" External Slip Coil Connector

2-7/8" HSRT | Hi-Speed Reaming Tool w/ 3.25" OD Multi Directional Jetted Wash head

### Jet Configuration:

1 x Center nozzle is  $\varnothing 0.5625"$  | 12 x Side nozzles are  $\varnothing 0.3125"$  | TFA 1.17 in<sup>2</sup>.





## Overview

**Location:** Oman  
**Onshore / Offshore:** Onshore  
**Formation:** Sandstone  
**Well Type:** Gas  
**Products / Services:** InFocus 2.875" HSRT (Hi-Speed Reaming Tool)

## Objectives

Clean out the Halite/scale deposition inside 4.5" tubing. SL gauge cutter tagged at 4557 m. target depth was 5219 m.

## Thru-Tubing Details

**Coiled Tubing Size:** 1.75" CT  
**Pump Rate:** 1.5 BPM  
**Tubing Size & Weight:** 4.5" TBG 17#  
**Tubing ID:** 3.74"  
**Drift ID:** 3.615"  
**Minimum Restriction:** 3.74"

## Drill-out Observations

The 287 HSRT showed great performance and cleaned out 662 m of scale.

WOB was from 1000 - 2000 lbs. Pumping rate was 1.5 bpm and circulating pressure was 1350 psi.

Operator was pleased to discover that they have the option to use InFocus Thru-Tubing Intervention HSRT's instead of motors for cleaning out scale/halite.



*Customer-supplied images.*





## CASING DEPLOYMENT SIZES



## SPECIFICATIONS - CASING DEPLOYMENT SIZES

Tool	Hole Size	Casing Size	Max. Drillout	Flow Rate	TFA	Rotational Speed	Pressure Drop
	in. (mm)	in. (mm)	in. (mm)	gpm (lpm)	in <sup>2</sup> (mm <sup>2</sup> )	RPM	psi (kPa)
450	6 and up (152)	4 1/2 (114)	3.93 (99.8)	60 - 300 (227 - 1135)	3.22 (20.74)	950 - 4000	150 - 1400 (1034 - 9653)
550	6 1/2 and up (165)	5 1/2 (140)	4.5 (114.3)	60 - 300 (227 - 1135)	4.61 (29.73)	850 - 3600	80 - 1400 (552 - 9653)
700	8 1/2 and up (216)	7 (178)	6.13 (155.7)	80 - 400 (109 - 1514)	10.1 (65.08)	600 - 2600	100 - 1750 (690 - 12066)
963	12 1/4 and up (311)	9 5/8 (244)	8.66 (220)	100 - 700 (379 - 2650)	22 (141.88)	600 - 2600	100 - 1750 (690 - 12066)
13375	16 and up (406)	13 3/8 (340)	12.42 (315.5)	300 - 1800 (407 - 2440)	22.38 (144.4)	40 - 840	30 - 620 (207 - 4275)
13625	17 and up (432)	13 5/8 (346)	12.42 (315.5)	300 - 1800 (407 - 2440)	22.38 (144.4)	40 - 840	30 - 620 (207 - 4275)

Based on fresh water of 8.33 PPG

Operational specifications are for reference only. Actual tool performance may vary depending on a variety of downhole conditions. Performance data is subject to change without notice.

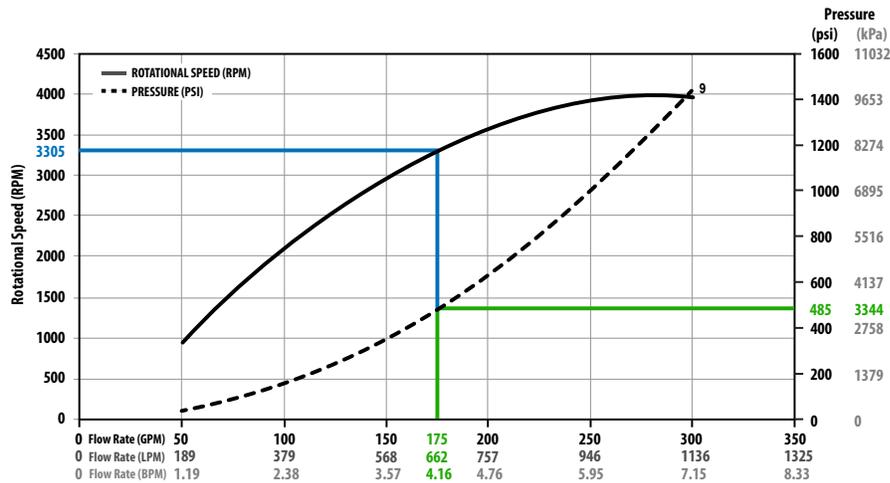
# HSRT: Hi-Speed Reaming Tool - 4.50"

Simple. Innovative.



	Imperial	Metric
Overall Length <sup>1</sup>	39.50 in	1003 mm
Maximum Tool Body Diameter	5.800 in	147 mm
Blade / Nominal Diameter <sup>2</sup>	5.800 in	147 mm
Maximum Temperature <sup>3</sup>	302°F	150°C
Maximum On-Bottom Bearing Load <sup>4</sup>	63900 lbf	28424 daN
Maximum Off-Bottom Bearing Load <sup>4</sup>	44400 lbf	19750 daN
Maximum Overpull <sup>5</sup>	131300 lbf	58405 daN
Nose Total Flow Area	3.22 in <sup>2</sup>	2074 mm <sup>2</sup>
Minimum Internal Port Size <sup>6</sup>	0.10 in	2.5 mm
Burst Pressure	6820 psi	47.0 MPa
Collapse Pressure	6820 psi	47.0 MPa
Maximum Drillout <sup>7</sup>	3.930 in	100 mm
Peak Power <sup>7</sup>	28 HP	21 kW
Top Connection	Blank, VAM, BTC, LTC, or other	
Top Sub Options	Burst Disc available	
Top Sub Length	10.880 in	277 mm
Minimum Recommended Hole Size	6.00 in	152 mm

- <sup>1</sup> - Overall length does not include length of additional top sub required for casing connection.
- <sup>2</sup> - Minimum clearance of 0.25 inches is recommended between blade nominal diameter and hole diameter. Additional blade / gauge configurations are available upon request.
- <sup>3</sup> - Specified ratings are not applicable at temperatures exceeding this value. Contact InFocus for ratings at elevated temperatures.
- <sup>4</sup> - Specified load ratings are based upon onset of bearing damage.
- <sup>5</sup> - Specified load rating is based upon tool separation.
- <sup>6</sup> - Using LCM particles larger than specified minimum internal port size is not recommended and may cause tool plug-off.
- <sup>7</sup> - Maximum drillout is based upon tool internal geometry and may be additionally limited by Top Sub casing connection.
- <sup>8</sup> - Peak power is dependent on a variety of operational parameters and true performance may vary based on downhole conditions.
- <sup>9</sup> - Recommended Performance Range. If running past this point, please contact an IDSI Representative.



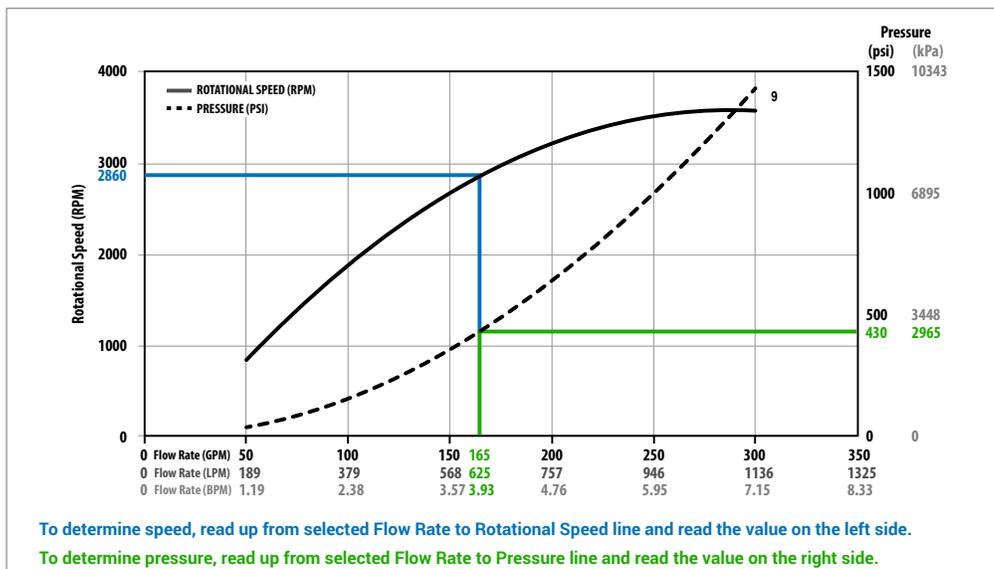
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To determine pressure, read up from selected Flow Rate to Pressure line and read the value on the right side.

Operational specifications are for reference only. Actual tool performance may vary depending on a variety of downhole conditions. Performance data is subject to change without notice. Based on fresh water of 8.33 PPG

	Imperial	Metric
Overall Length <sup>1</sup>	41.40 in	1052 mm
Maximum Tool Body Diameter	6.350 in	161 mm
Blade / Nominal Diameter <sup>2</sup>	7.625 in	194 mm
	7.875 in	200 mm
Maximum Temperature <sup>3</sup>	302°F	150°C
Maximum On-Bottom Bearing Load <sup>4</sup>	57200 lbf	25444 daN
Maximum Off-Bottom Bearing Load <sup>4</sup>	57200 lbf	25444 daN
Maximum Overpull <sup>5</sup>	235000 lbf	104533 daN
Nose Total Flow Area	4.61 in <sup>2</sup>	2974 mm <sup>2</sup>
Minimum Internal Port Size <sup>6</sup>	0.19 in	4.8 mm
Burst Pressure	6820 psi	47.0 MPa
Collapse Pressure	6820 psi	47.0 MPa
Maximum Drillout <sup>7</sup>	4.500 in	114 mm
Peak Power <sup>7</sup>	43 HP	32 kW
Top Connection	Blank, VAM, BTC, LTC, or other	
Top Sub Options	Burst Disc available	
Top Sub Length	10.880 in	277 mm
Minimum Recommended Hole Size	7.875 in	200 mm

- <sup>1</sup> - Overall length does not include length of additional top sub required for casing connection.
- <sup>2</sup> - Minimum clearance of 0.25 inches is recommended between blade nominal diameter and hole diameter. Additional blade / gauge configurations are available upon request.
- <sup>3</sup> - Specified ratings are not applicable at temperatures exceeding this value. Contact InFocus for ratings at elevated temperatures.
- <sup>4</sup> - Specified load ratings are based upon onset of bearing damage.
- <sup>5</sup> - Specified load rating is based upon tool separation.
- <sup>6</sup> - Using LCM particles larger than specified minimum internal port size is not recommended and may cause tool plug-off.
- <sup>7</sup> - Maximum drillout is based upon tool internal geometry and may be additionally limited by Top Sub casing connection.
- <sup>8</sup> - Peak power is dependent on a variety of operational parameters and true performance may vary based on downhole conditions.
- <sup>9</sup> - Recommended Performance Range. If running past this point, please contact an IDSI Representative.



Operational specifications are for reference only. Actual tool performance may vary depending on a variety of downhole conditions. Performance data is subject to change without notice. Based on fresh water of 8.33 PPG

# HSRT: Hi-Speed Reaming Tool - 7.00"

Simple. Innovative.



	Imperial	Metric
Overall Length <sup>1</sup>	41.90 in	1064 mm
Maximum Tool Body Diameter	8.130 in	207 mm
Blade / Nominal Diameter <sup>2</sup>	8.250 in	210 mm
	8.375 in	213 mm
	8.625 in	219 mm
Maximum Temperature <sup>3</sup>	302°F	150°C
Maximum On-Bottom Bearing Load <sup>4</sup>	75100 lbf	33406 daN
Maximum Off-Bottom Bearing Load <sup>4</sup>	75100 lbf	33406 daN
Maximum Overpull <sup>5</sup>	328700 lbf	146213 daN
Nose Total Flow Area	10.09 in <sup>2</sup>	6509 mm <sup>2</sup>
Minimum Internal Port Size <sup>6</sup>	0.25 in	6.4 mm
Burst Pressure	7230 psi	49.8 MPa
Collapse Pressure	7230 psi	49.8 MPa
Maximum Drillout <sup>7</sup>	6.130 in	156 mm
Peak Power <sup>7</sup>	43 HP	37 kW
Top Connection	Blank, VAM, BTC, LTC, or other	
Top Sub Options	Burst Disc available	
Top Sub Length	11.500 in	292 mm
Minimum Recommended Hole Size	8.500 in	216 mm

<sup>1</sup> - Overall length does not include length of additional top sub required for casing connection.

<sup>2</sup> - Minimum clearance of 0.25 inches is recommended between blade nominal diameter and hole diameter. Additional blade / gauge configurations are available upon request.

<sup>3</sup> - Specified ratings are not applicable at temperatures exceeding this value. Contact InFocus for ratings at elevated temperatures.

<sup>4</sup> - Specified load ratings are based upon onset of bearing damage.

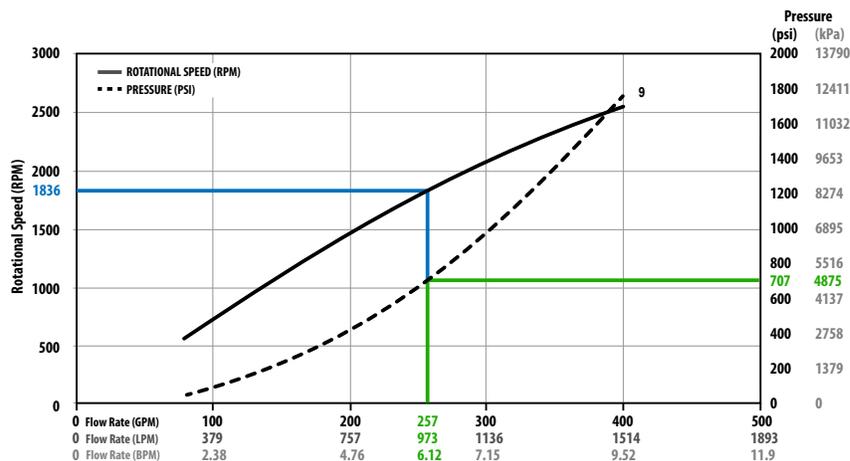
<sup>5</sup> - Specified load rating is based upon tool separation.

<sup>6</sup> - Using LCM particles larger than specified minimum internal port size is not recommended and may cause tool plug-off.

<sup>7</sup> - Maximum drillout is based upon tool internal geometry and may be additionally limited by Top Sub casing connection.

<sup>8</sup> - Peak power is dependent on a variety of operational parameters and true performance may vary based on downhole conditions.

<sup>9</sup> - Recommended Performance Range. If running past this point, please contact an IDSI Representative.



To determine speed, read up from selected Flow Rate to Rotational Speed line and read the value on the left side.

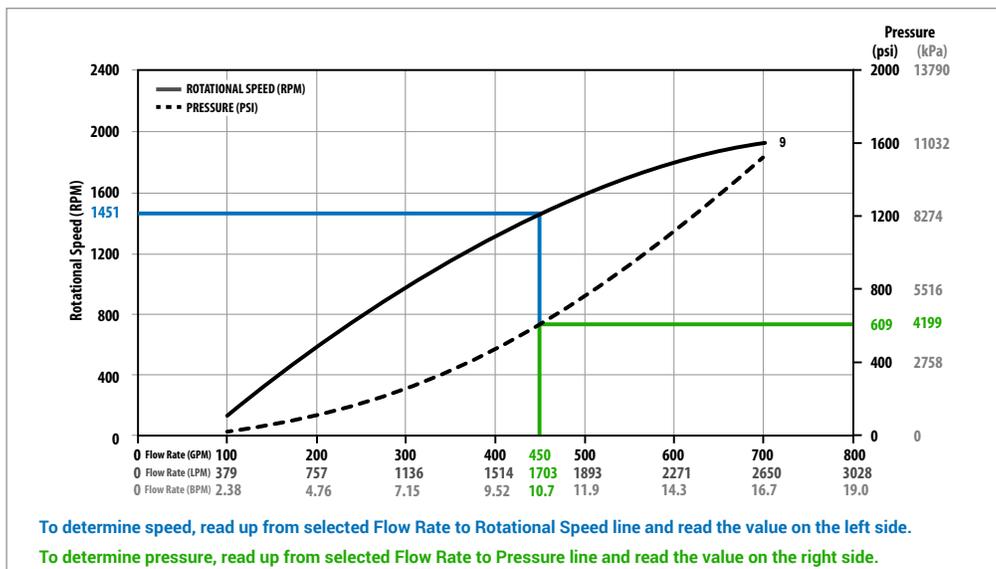
To determine pressure, read up from selected Flow Rate to Pressure line and read the value on the right side.



Operational specifications are for reference only. Actual tool performance may vary depending on a variety of downhole conditions. Performance data is subject to change without notice. Based on fresh water of 8.33 PPG

	Imperial	Metric
Overall Length <sup>1</sup>	48.50 in	1232 mm
Maximum Tool Body Diameter	11.250 in	286 mm
Blade / Nominal Diameter <sup>2</sup>	11.750 in	299 mm
	12.000 in	305 mm
Maximum Temperature <sup>3</sup>	302°F	150°C
Maximum On-Bottom Bearing Load <sup>4</sup>	157600 lbf	70104 daN
Maximum Off-Bottom Bearing Load <sup>4</sup>	103300 lbf	45950 daN
Maximum Overpull <sup>5</sup>	501200 lbf	222945 daN
Nose Total Flow Area	22 in <sup>2</sup>	14193 mm <sup>2</sup>
Minimum Internal Port Size <sup>6</sup>	0.25 in	6.4 mm
Burst Pressure	4730 psi	32.6 MPa
Collapse Pressure	4730 psi	32.6 MPa
Maximum Drillout <sup>7</sup>	8.660 in	218 mm
Peak Power <sup>7</sup>	117 HP	87 kW
Top Connection	Blank, VAM, BTC, LTC, or other	
Top Sub Options	Burst Disc available	
Top Sub Length	11.880 in	302 mm
Minimum Recommended Hole Size	12.000 in	305 mm

- <sup>1</sup> - Overall length does not include length of additional top sub required for casing connection.
- <sup>2</sup> - Minimum clearance of 0.25 inches is recommended between blade nominal diameter and hole diameter. Additional blade / gauge configurations are available upon request.
- <sup>3</sup> - Specified ratings are not applicable at temperatures exceeding this value. Contact InFocus for ratings at elevated temperatures.
- <sup>4</sup> - Specified load ratings are based upon onset of bearing damage.
- <sup>5</sup> - Specified load rating is based upon tool separation.
- <sup>6</sup> - Using LCM particles larger than specified minimum internal port size is not recommended and may cause tool plug-off.
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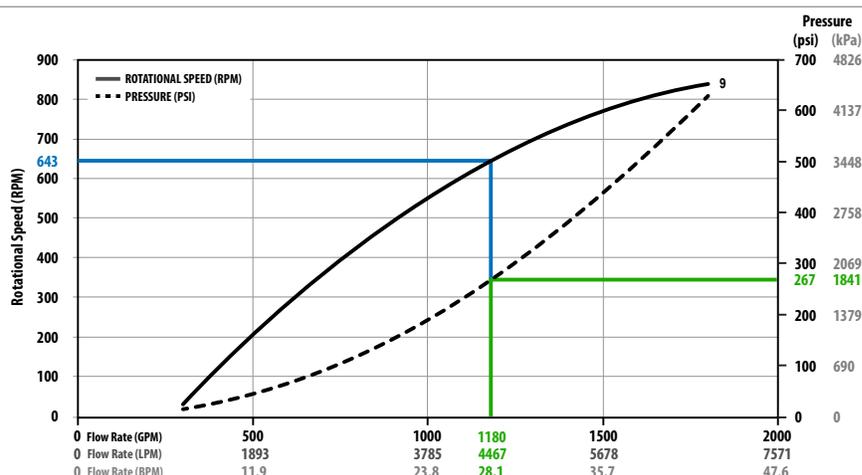
# HSRT: Hi-Speed Reaming Tool - 13.375"

Simple. Innovative.



	Imperial	Metric
Overall Length <sup>1</sup>	58.10 in	1476 mm
Maximum Tool Body Diameter	15.500 in	394 mm
Blade / Nominal Diameter <sup>2</sup>	15.625 in (2a)	397 mm (2a)
	15.875 in (2a)	403 mm (2a)
	16.000 in (2b)	407 mm (2b)
Maximum Temperature <sup>3</sup>	302°F	150°C
Maximum On-Bottom Bearing Load <sup>4</sup>	257700 lbf	114631 daN
Maximum Off-Bottom Bearing Load <sup>4</sup>	223000 lbf	99195 daN
Maximum Overpull <sup>5</sup>	668500 lbf	297364 daN
Nose Total Flow Area	22.38 in <sup>2</sup>	14441 mm <sup>2</sup>
Minimum Internal Port Size <sup>6</sup>	0.50 in	12.7 mm
Burst Pressure	2830 psi	19.5 MPa
Collapse Pressure	2830 psi	19.5 MPa
Maximum Drillout <sup>7</sup>	12.420 in	316 mm
Peak Power <sup>7</sup>	60 HP	45 kW
Top Connection	Blank, VAM, BTC, LTC, or other	
Top Sub Options	Burst Disc available	
Top Sub Length	20.000 in	508 mm
Minimum Recommended Hole Size	17.000 in	432 mm

- <sup>1</sup> - Overall length does not include length of additional top sub required for casing connection.
- <sup>2</sup> - Minimum clearance of 0.25 inches is recommended between blade nominal diameter and hole diameter. Additional blade / gauge configurations are available upon request.  
(2a) is for 13.375"  
(2b) is for 13.625"
- <sup>3</sup> - Specified ratings are not applicable at temperatures exceeding this value. Contact InFocus for ratings at elevated temperatures.
- <sup>4</sup> - Specified load ratings are based upon onset of bearing damage.
- <sup>5</sup> - Specified load rating is based upon tool separation.
- <sup>6</sup> - Using LCM particles larger than specified minimum internal port size is not recommended and may cause tool plug-off.
- <sup>7</sup> - Maximum drillout is based upon tool internal geometry and may be additionally limited by Top Sub casing connection.
- <sup>8</sup> - Peak power is dependent on a variety of operational parameters and true performance may vary based on downhole conditions.
- <sup>9</sup> - Recommended Performance Range. If running past this point, please contact an IDSI Representative.



To determine speed, read up from selected Flow Rate to Rotational Speed line and read the value on the left side.

To determine pressure, read up from selected Flow Rate to Pressure line and read the value on the right side.

Operational specifications are for reference only. Actual tool performance may vary depending on a variety of downhole conditions. Performance data is subject to change without notice. Based on fresh water of 8.33 PPG

## Overview

**Location:** Argentina

**Well/Run Type:** Casing Run

**Run Length:** 3220m / 8.75" hole

**Products / Services:** InFocus 5.50" HSRT: Hi-Speed Reaming Tool

**Date:** April, 2019

## Objectives

Evaluate operational deployment and performance of HSRT on 5.50" casing run. This was the first run of this type of tool in South America, and it was a complete success.

## Tool Deployment

The HSRT product line was designed to provide error-free casing runs, which was definitely the case on this well. For the initial run of the 5.50" HSRT a vertical well was selected with a good caliper log. Even though the full potential of the tool was not seen during this run it did however perform as expected.

Once in open hole, the driller was instructed to monitor the weight on the tool to remain below 10,000 lbs; any point above that threshold, the pumps should be engaged to ream through the obstruction.

From the pressures observed, the HSRT performed very well.

## Well Information

Hole Depth / Size: 3220m / 8.75"

Last casing / Size: 705.8m / 9.625"

Mud Weight: 9.6 ppg

Max GPM: 503 GPM

Total Depth: 3220m / 8.75" hole





## Overview

**Date:** October, 2019

**Location:** Colombia

**Well/Run Type:** Casing Run

**Run Length:** 7825 ft / 14.75" hole

**Products / Services:** InFocus 9-5/8" HSRT: Hi-Speed Reaming Tool

## Objectives

This was the first run of this type of tool in Colombia, in the VIM (Valle Inferior del Magdalena). Previous wells in the area had trouble reaching TD with casing, so a 9-5/8" HSRT was deployed.

## Tool Deployment

The run was a 7825 ft directional well, employing a DDV-valve which is remotely activated through a cable on the outside of the casing. Because of this, the casing could not be rotated at all, which caused casing running issues on the previous well. It was critical that the HSRT to get the casing to depth.

The HSRT was run-in-hole through 2000 ft of 20" casing. Once in open hole, the tool was used throughout the run, circulating and reaming for 5825 ft to TD without incident.

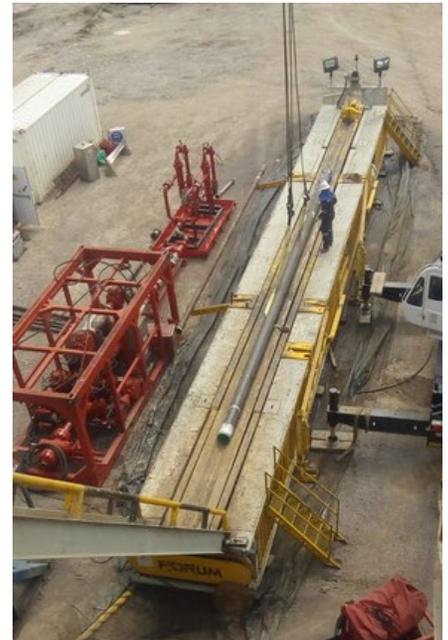
As per the well design, the HSRT was able to land the casing (that could not be rotated) on-depth through problematic formations, providing a considerable time-savings to the Operator.

## Well Information

Hole Depth / Size: 7825 ft / 14.75"

Mud Weight: 12 ppg

Average GPM: 618 GPM





9-5/8" and 7" HSRT's

## Milestone Run

InFocus designed our fleet of HSRT: Hi-Speed Reaming Tools to ream and clean out wellbores, to land casing on bottom and be cemented in place so Operators can drill through the nose of the HSRT and continue drilling the next section. But each HSRT size is also designed to allow a smaller HSRT to run secondary casing or liners, repeating the cleanout and cementing process.

Congratulations to service provider Wildcat, and operator PetroGulf for achieving this milestone run in Egypt, beginning with a 9 5/8" HSRT and completing the second section with a 7" size!

## Overview

**Run Date:** May 19, 2022

**Operator:** PetroGulf Misr

**Location:** Egypt

**Field:** Gabl El Zait

**Onshore/Offshore:** Offshore

**Formation:** South Gharib, Kareem, Nukhul

**Well Type:** deviated well, oil producer

**Pump Rate:** 100 - 250 GPM

**Products / Services:** InFocus 9.63" and 7.00" HSRT: Hi-Speed Reaming Tools

### 9 5/8" Section

**Well Type:** deviated well, oil producer

**Formation:** South Gharib, Kareem  
Nukhul

**Casing Size / Type:** 9 5/8" casing

**Total Depth:** 10012 feet

### 7" Section

**Well Type:** deviated well, 66 deg. inclination

**Formation:** Nukhul

**Casing Size / Type:** 7" liner

**Total Depth:** 12426 feet

## 9 5/8" Section Challenges

- High well inclination angle (66 degrees)
- Presence of ledges in the 12-1/4" open hole as a result of interbedded formations in S.GH, Top Kareem, Base Kareem and Base Nukhul formations.
- Obstructions were faced while pulling the drilling BHA out of hole; then failure to log to TD using the drill string. All of this assured the creation of ledges and hole obstructions while running the casing.

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## 9 5/8" Section Tool Deployment

While running the 9 5/8" casing in hole, the driller activated the HSRT on several occasions to overcome all the ledges and tight spots despite encountering slack-off weights up to 40 KLBs in some depths.

The driller succeeded at placing the casing at the programmed TD.

The rig crew drilled out the HRST successfully without any problem in 45-60 minutes, compared to hours needed by other types of reamers.

**Total Reaming Time, 9 5/8":** One hour

## 7" Section Challenges

- High well inclination angle (66 degrees)
- High risk of differential sticking
- Running with high overbalance to stabilize shale formation (10.9 ppg mud for 10.1 ppg shale pore pressure)
- There are streaks of active shale in base Nukhul formation.



## 7" Section Tool Deployment

- Faced several obstructions while running the 7" liner inside the 9 5/8" casing at 7397, 7711 and 7944 ft depths. Was able to pass the obstructions by washing down, reaming down.
- We used free rotation feature to overcome high drag inside casing.
- Ran 7" Liner string to section TD without rotating the liner string in a safe, cost-effective manner.
- The driller succeeded to place the Liner at the programmed TD
- This was the end of drilling so no-drillout was required.

## Conclusion

The InFocus HSRT: Hi-Speed Reaming Tool proved its ability in overcoming all the obstructions faced while running in hole. The HSRT allowed the casing to reach the programmed TD without any problem, at minimal cost and with zero rig non-productive time.



## Hat Trick (*noun*)

- three successes of the same kind, especially consecutive ones within a limited period.
- (chiefly in ice hockey or soccer) the scoring of three goals in a game by one player.
- (in cricket) the taking of three wickets by the same bowler with successive balls.

**InFocus has scored a ‘hat trick’ in South America with three HSRT: Hi-Speed Reaming Tools in one well!**

The HSRT was designed to ream and clean out wellbores, land casing on bottom and be cemented in place so operators can drill through the nose of the HSRT and continue drilling the next section. Each HSRT size is also designed to allow a smaller HSRT to run secondary casing or liners, repeating the cleanout and cementing process.

Congratulations to service provider PTI, and operator Porex-Colombia for running an InFocus 9 5/8” HSRT, then a 7”, and finally a 4 1/2” size all in the same wellbore! This is a tremendous success and another global first!



## Overview

**Run Date:** July 23, 2022

**Operator:** Porex Resources

**Location:** Boranda Norte 1, Colombia

**Field:** PAREX-ECP Playon magna Sirga-Bogota

**Onshore/Offshore:** Onshore

**Well Type:** deviated well, oil producer

**Pump Rate:** 85 - 283 GPM

**Products / Services:** InFocus 9.63” | 7.00” | 4.50”

HSRT: Hi-Speed Reaming Tools

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## Casing Challenges

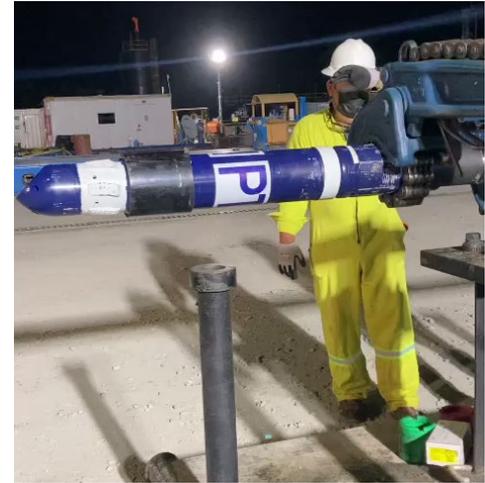
The complexity of this project created the need for the type of assurance the HSRT tools provide. This well was designated as “ST-2” meaning there were two sidetracks, and the first two sections drilled (12-1/4” cased using a 9-5/8” HSRT, and an 8-1/2” cased with a 7” HSRT) were meant to separate and isolate the water sources. Final deviation was 96 degrees; at that angle it is difficult to move a casing string. The operator was using a top drive rig which allowed them to drill faster, and also run casing faster, so in order to ensure that the casing went to bottom, all three HSRT tools were required.

The operator began running the final 4.50” casing string and 4.50” HSRT on July 23 at 4:am, reaching open hole that same day at 13:00 hrs. Once they began reaming the section, average torque seen was 3,649 ft-lbf. Flow rates were seen 85 – 283 GPM (US Gal/min), with an average flow rate of 184 GPM (US Gal/min) at a measured depth (MD) – 14,690 ft (4,477.5 m)

## Conclusion

Each time the pumps were stopped, the weight-on-bit (WOB) increased, therefore the 4.50” HSRT was very much needed to clear the way to case the final well section.

The InFocus family of HSRT: Hi-Speed Reaming Tools proved their ability in overcoming all obstructions faced while running in hole, allowing casing to reach the programmed TD without any problem, at minimal cost and with zero rig non-productive time.



*Preparing the third HSRT prior to starting the casing run.*

*Our global clients DON'T TAKE CHANCES when running casing; they get to bottom on time and on depth with HSRT: Hi-Speed Reaming Tools from InFocus.*





13-3/8" HSRT:  
 Hi-Speed Reaming Tool

## Job Data

**Run Date:** February 11, 2020  
**Open Hole:** 16"  
**Section Length:** 7,530 ft (2,295 m)  
**Onshore/Offshore:** Onshore  
**Well Trajectory:** Vertical  
**Casing Spec:** 13 3/8", BTC, L-80, 72 ppf / K-55, 68 ppf  
**Products / Services:** InFocus 13-3/8" HSRT: Hi-Speed Reaming Tool

## Drill Out Performance

**Bit:** 12.25" PDC  
**Duration:** 2-3 hours (full shoe track)  
**Parameters:** 500 gpm (1893 lpm), 70-80 rpm, 10-20 kips

## Challenge

Enabling a 13-3/8" casing string to reach total depth (TD) in Kuwait's notoriously challenging West Kuwait formation zones. This had already been attempted with a conventional shoe track which could not reach the required minimum casing point, resulting in the 13-3/8" casing string being pulled out of hole.

## Solution

OWS deployed a 13-3/8" x 15-5/8" hydraulically activated Defuse™ High Speed Casing Reamer ("De-fuse"). This is designed to address the tight hole and wellbore ledges, creating a nominal ID for the casing to pass through.

## Tool Deployment / Execution

The 13 3/8" Defuse was made up on a pipe rack, then picked up to rig floor and tested to 200 gpm. The tool was run in hole, filling up casing at every joint and breaking circulation every 20 joints. Tight hole was observed at 7,195 ft after which the string was picked up. The Defuse was hydraulically activated and flow rate stepped up from 900 – 1100 gpm. The tool was activated throughout the run to achieve an additional 500ft more than the previous casing run. The wellbore was circulated clean and a cement operation was performed through the Defuse tool. Shoe track was drilled out with a 12.25" PDC bit without any issues.

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## Results

- ✓ Successfully worked through the tight hole interval operating at maximum parameters.
- ✓ 500 feet more than the previous casing run.
- ✓ Casing landed beyond the minimum casing point, allowing the cementation operation to be carried out.



## Job Data

**Run Date:** August 30, 2025  
**Location:** Charagua, Bolivia  
**Onshore/Offshore:** Onshore  
**Well Depth:** 4,995 m MD (16,388 ft)  
**Last Casing String:** 9-5/8" landed @ 3,487 m MD (11,440 ft)  
**Open Hole Section:** 1,508 m (4,948 ft)  
**Casing Size for this Run:** 7"  
**Well/Tun Type:** Exploratory Gas well, J-Type Well at 47°  
**Mud Weight:** 17.7 - 18 ppg  
**Bottomhole Temperature:** 131°F (55°C)  
**Products / Services:** InFocus 7" HSRT: Hi-Speed Reaming Tool

## Objective(s) and/or Known Hole Problems

The objective was to land casing in a directional "J" type well with high tortuosity.

Due to high tortuosity in the build and tangent section (reaching 47°), the Customer was expecting a complicated and time-consuming liner run, (as an example, the calibration run/wiper trip took up to 4 days to complete due to the high tortuosity). Expectations to land the 7" liner were quite low.

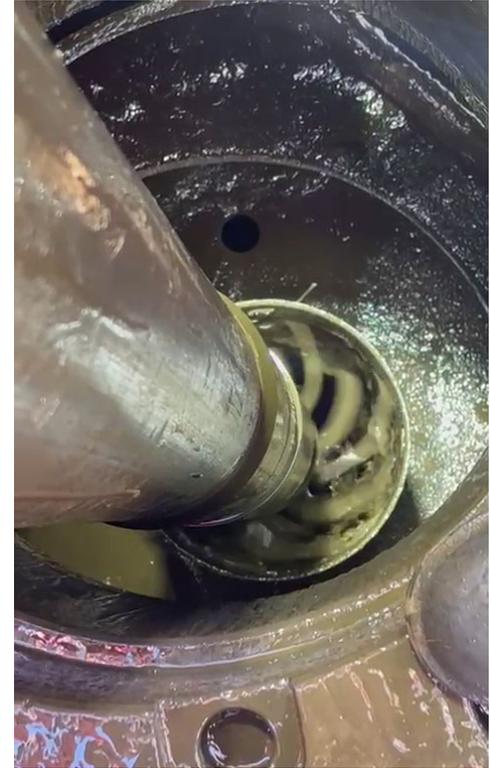
An important note is that the casing **could not be rotated** during deployment.

## Tool Deployment / Execution

- WOB: 40,000 to 80,000 lbs
- Maximum Flow Rate: 150 GPM was used to control well ECD
- Total Reaming Time in Open Hole section: 25.18 hours.
- Liner Set at 4,835 m MD (15,863 ft)

The HSRT's fluid-driven drive system allows the tool to rotate **without casing rotation**, which helped to greatly improve run performance.

Despite the high tortuosity of the well, the HSRT enabled the operator to land the liner much closer to TD than expected by the Customer. Total reaming time in open hole section was 25.18 hours. Once landed, the wellbore was circulated and conditioned for cementing. Cementing operations took place without incident.



*Bolivia's first HSRT: Hi-Speed Reaming Tool being tested at surface.*

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7" HSRT:  
Hi-Speed Reaming Tool

## Drill-out Observations

The drillout went without incident, completing the operation in approximately one hour using a 6-in bit.

## Conclusions / Benefits

- ✓ The HSRT does not require casing rotation to activate. By pumping from surface, the hydraulic high speed reaming action of the HSRT allowed the operator to ream through obstructions, and to condition the wellbore to aid with 7" liner deployment by reciprocating the liner.
- ✓ HSRT allowed the operator to go farther and faster than expected.



## Operational Notes / Well Information

**Casing Size/Type:** 7" #32 Q125 thread THS 523

**Well Depth:** 4,995 m MD (16,388 ft)

**Maximum Temperature:** 131°F (55°C)

**Circulating Pressure:** 2000 psi @ 150 GPM

**Total Trip-In Time:** 88.5 hrs

**Total Trip-In Time (Open Hole):** 49 hrs

**Total Hours of Circulation to the Bottom of the Well:** 25.18 hrs

**Total Hours from Shoe to Landing the 7" Liner:** 20.29 hrs.

(Well was circulated to change the density from 17.7 ppg to 18 ppg.)

*InFocus would like to thank Petrolog.*



**AIII**  
ALL METAL POWER

DRILL  
**REFLEX**  
PREMIUM DRILLING MOTORS

**HP|HT**  
HIGH PRESSURE - HIGH TEMPERATURE  
COMPATIBLE PRODUCT

 **Infocus**  
DOWNHOLE SOLUTIONS INC.



**AMP**  **GLOBAL TOOL STATISTICS**  
ALL METAL POWER

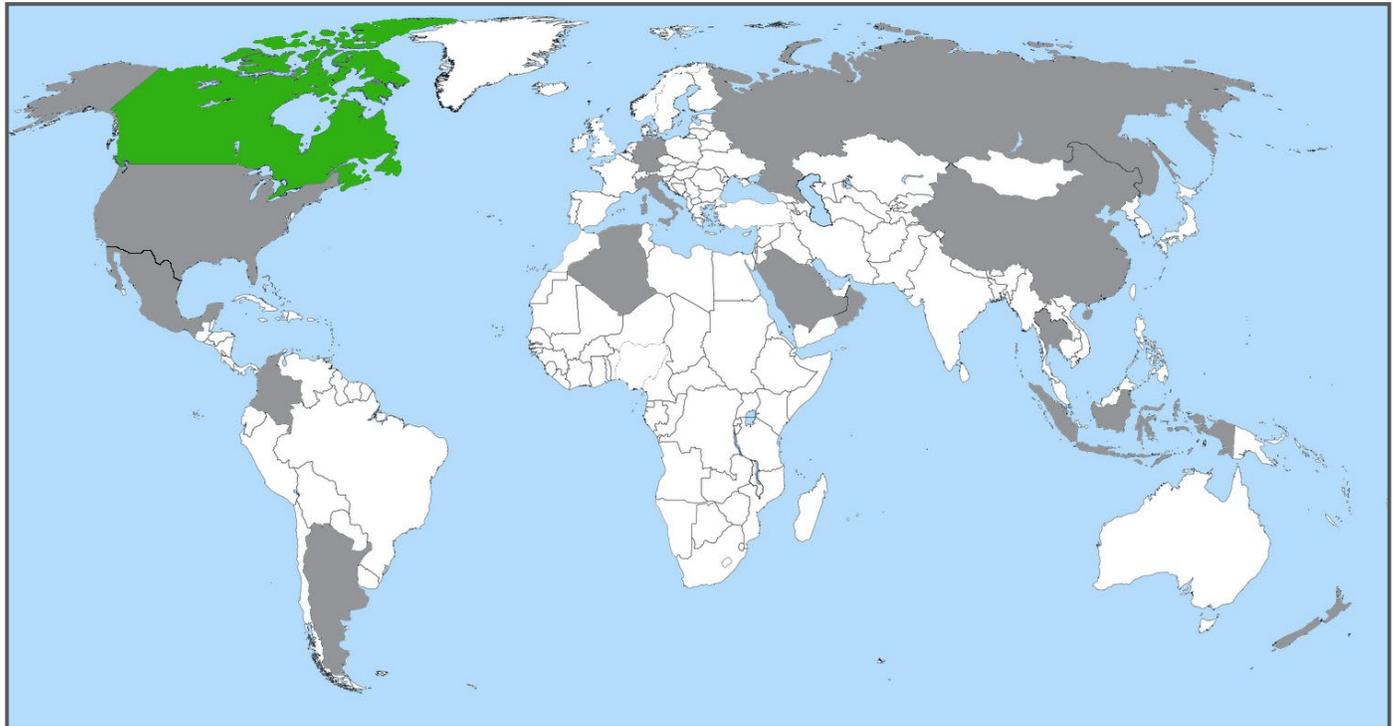
As of this writing, there are over

**300**

**AMP: All Metal Power Sections deployed throughout the world.**

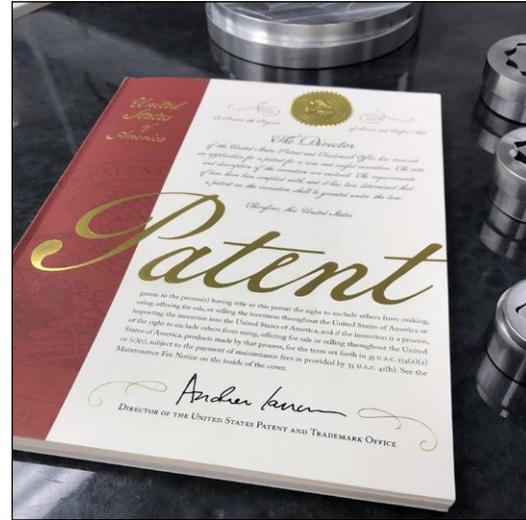
 InFocus Group of Companies  
Head Office  
Nisku, Alberta, Canada

 Countries where AMP's have  
been deployed successfully  
since 2017.





InFocus had the honor of winning the inaugural ICOTA (Intervention & Coiled Tubing Association) Canada 2018 'Innovation Award' for developing AMP: All Metal Power section technology.



**Elastomer-less Fluid-Driven Power Sections**  
**InFocus US Patent Number US10,676,992**  
**Issued June 9, 2020.**  
**Patent Pending in Canada.**



**Editorial about AMP power sections in Oilfield Technology Magazine.**



[Click here to read the article.](#)

**RE|FLEX Premium Drilling Motors** are a major advancement in PDM technology. The RE|FLEX Premium bearing section is a proprietary design, developed to convert extreme loading parameters into efficient drilling action.



The RE|FLEX Premium motor features proprietary fatigue resistant connections not only for best-in-class torque capacity, but intended to maximize resistance to bending stress.

Internal components are optimized for cyclic fatigue-loading (bending stress) which is another common failure mechanism seen in the form of twist-offs.



The unique, simplified design of the RE|FLEX Premium bearing section is built with the highest quality materials and patent-pending processes to ensure reliable operating life for years to come.

### Rotor Catch Mechanism

There are TWO Catch Mechanisms in the RE|FLEX 2-7/8" drilling motor.

a.) Lower Catch Mechanism - Reduces the risk of the bit and internal components from being lost downhole in the event of a failure/twist-off in the driveline.

b.) Upper Catch Mechanism (Rotor Catch) - Prevents the tool from being lost downhole in the event of a housing failure below the stator.



### Double Shouldered Connections

All internal connections on RE|FLEX motors are double-shouldered, designed with bending and high torque in mind. Two shouldering faces increase the friction of a connection, leading to a higher torque rating and increased durability.

*RE|FLEX Bearing Sections are designed to work with the highest-torque power sections available. The robust design of the RE|FLEX ensures it will have the ability to mill multiple frac plugs in one run at a low run cost-per-hour.*





## AMP: All Metal Power Elastomer-less Power Sections Patented. Award-Winning.

AMP: All Metal Power sections are rated to **temperatures greater than 300°C (572°F)**, so they are not susceptible to extreme temperature and most mud-related issues seen with traditional PDM's.

All Metal Power (or metal-to-metal) means there is **absolutely no elastomer present** within the power section, eliminating the greatest risk currently known to drilling motor operations - elastomeric damage.

InFocus has supplied over three hundred 2-7/8" AMP power sections globally.



# Your Everyday Workhorse™



*The metal-to-metal fitment within the AMP: All Metal Power Section translates into much higher operating regimes.*



## AMP: All Metal Power Elastomer-less Power Sections

... continued

Stator elastomer (rubber) is susceptible to a number of failure modes related to downhole conditions including:



one or more of the above conditions.

- **Rubber Chunking / Splitting** - The most common failure mode. Chunking can result from mechanical stress and strain, fluid incompatibility leading to material breakdown, uneven growth (internal heat build-up) or abnormal shrinking. Rubber curing (hardening) will also accelerate this failure method. Curing is accelerated greatly with heat and can even be introduced prematurely during the rubber injection process itself.

- **Blistering** - Seen as a reaction to certain lubricants and gases resulting in what known as explosive decompression.

- **De-bonding** - Primers / Glue reacting to fluid and lubricants incompatibility or poor application.

- **Seal (Performance) / Pressure Issues** - Poor fit from

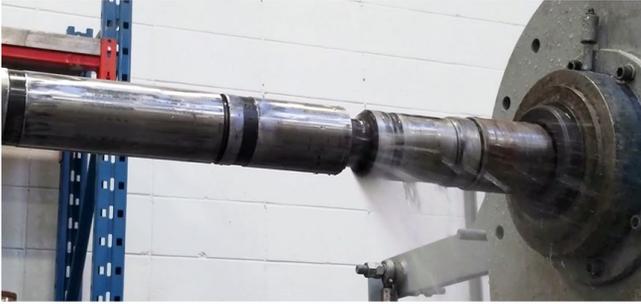
## Fluid Types vs. Increased Reliability to a Traditional Power Section

InFocus recommends that our customers use standard industry practices for sands and solids concentrations. Listed here are results we have seen regarding fluid compatibility. (Refer to the table.)

- Invert / Diesel based mud systems - no issues. Excellent compatibility
- N2 - no issue.
- Solvents - no issues.
- Chlorides - the AMP will hold up much better than a traditional chrome rotor would over time. Best practices would be to flush with fresh water at surface and service the motor as soon as possible.
- Acids - same as above for chlorides.

Type	Increased Performance
Acid	Mild to Moderate
Solvents	Excellent
Oil-Based Mud	Excellent
Water-Based Mud	Mild
H2S	Mild
Nitrogen	Excellent *

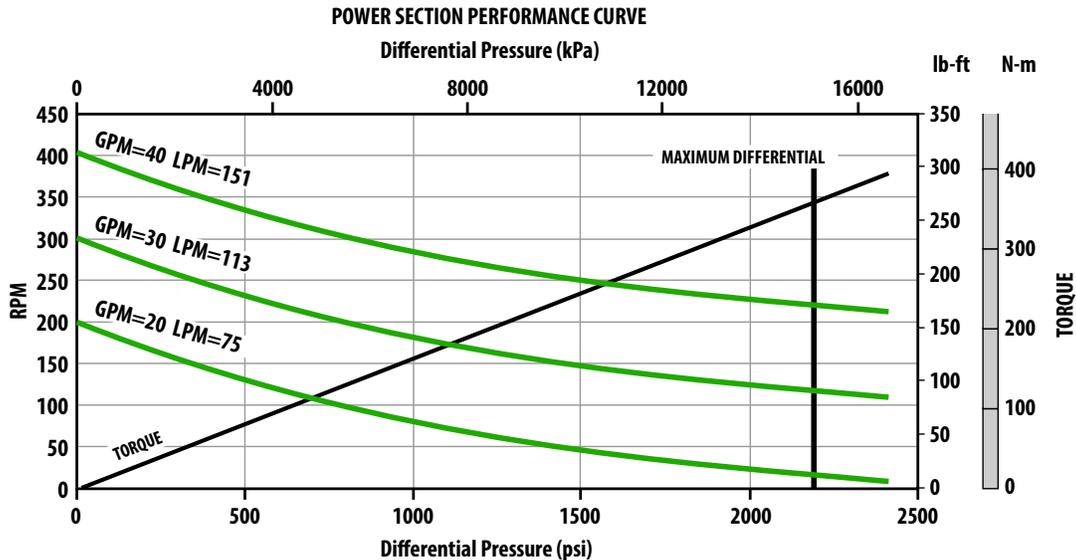
\* provided that sufficient fluid is pumped to ensure sealing operation (I.e. will not spin on air alone)



	Imperial	Metric
Overall Length	125.00 in	3175 mm
Bit-to-Bend Length	AVAILABLE UPON REQUEST	
Nominal Diameter	1.70 in	43 mm
Top Connection	NC 12	
Bottom Connection	1" API REGULAR	
Well Size	1 7/8 - 2 3/4 in	48 mm - 70 mm
Maximum Weight On Bit	12000 lbf	5338 daN
Torque Slope	0.121 ft-lbf/psi	0.024 Nm/kPa
Rotation	10.10 rev/gal	2.67 rev/L
Flow Rate	20 - 40 GPM	75 - 151 LPM
No Load Bit Speed	202 - 404 RPM	
Maximum Differential Pressure	2194 psi	15125 kPa
Full Load Torque	266 ft lb	361 Nm
Power	12 HP	9 kW



Operational specifications are for reference only. Actual tool performance may vary depending on a variety of downhole conditions. Performance data is subject to change without notice.

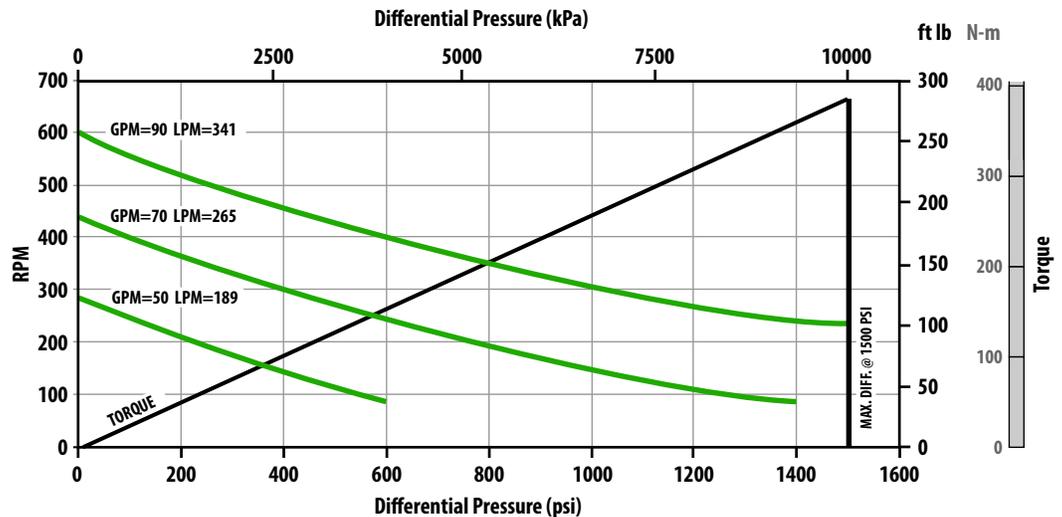


	Imperial	Metric
Overall Length	152.6 in	3876 mm
Bit-to-Bend Length	AVAILABLE UPON REQUEST	
Nominal Diameter	2.18 in	55 mm
Top Connection	1 1/2" API REG	
Bottom Connection	1 1/2" API REG	
Well Size	2.36 - 3.74 in	60 mm - 95 mm
Weight	129 lbs	58.5 kg
Temperature Rating *	572°F	300°C
Max. Overpull and Weight on Bit (while being able to re-run the bearings)	22500 lbf	10009 daN
Operating Weight on Bit	8000 lbf	3559 daN
Max. Overpull (without being able to re-run the bearings)	28000 lbf	12455 daN
Flow Rate	50 - 90 GPM	189 - 341 LPM
Rev/Unit volume	@ 50 - 5.7 rev/gal @ 70 - 6.3 rev/gal @ 90 - 6.7 rev/gal	@ 189 - 1.5 rev/l @ 265 - 1.66 rev/l @ 341 - 1.77 rev/l
No Load Bit Speed	285 - 600 RPM	
Maximum Differential Pressure	1500 psi	10343 kPa
Full Load Torque	285 ft lb	386 Nm
Power	13 HP	9.7 kW



Operational specifications are for reference only. Actual tool performance may vary depending on a variety of downhole conditions. Performance data is subject to change without notice.

POWER SECTION PERFORMANCE CURVE



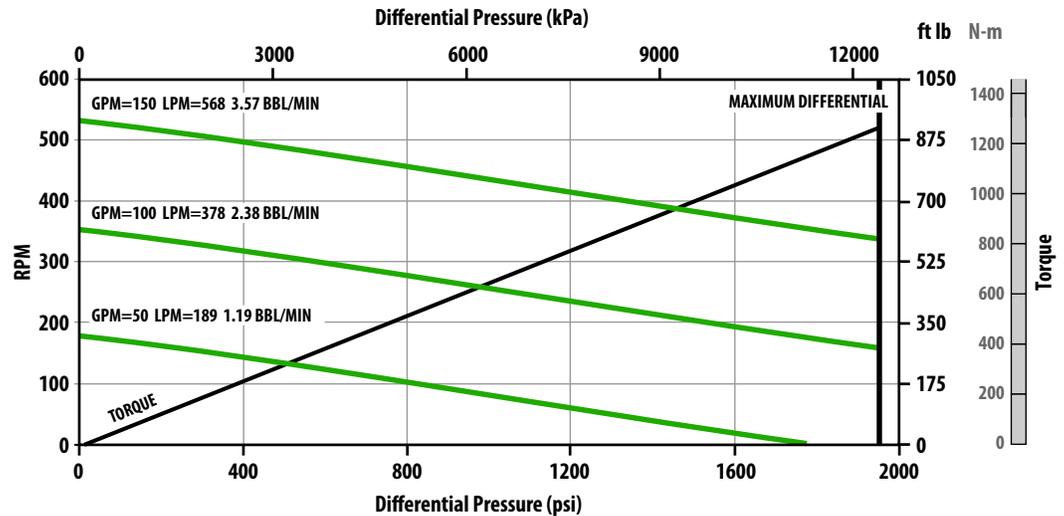
\* The AMP power section is rated to 572°F (300°C). Compatible with oil-based muds, acids, solvents, and high chloride content fluids.

	Imperial	Metric
Overall Length	164.00 in	4166 mm
Bit-to-Bend Length	AVAILABLE UPON REQUEST	
Nominal Diameter	2.90 in	74 mm
Top Connection	2 3/8 PAC (NC16)	
Bottom Connection	2 3/8 PAC (NC16)	
Well Size	3 5/8 - 3 7/8 in	92 mm - 98 mm
Weight	268 lbs	122 kg
Temperature Rating	572°F	300°C
Maximum Weight On Bit	22500 lbf	10000 daN
Flow Rate	50 - 150 GPM	189 - 568 LPM
Rev/Unit volume	3.66 rev/gal	0.98 rev/l
Pressure Drop ΔP	500 psi	3448 kPa
No Load Bit Speed	183 - 550 RPM	
Maximum Differential Pressure	1950 psi	13445 kPa
Full Load Torque	890 ft lb	1206 Nm
Power	93 HP	70 kW



Operational specifications are for reference only. Actual tool performance may vary depending on a variety of downhole conditions. Performance data is subject to change without notice.

POWER SECTION PERFORMANCE CURVE

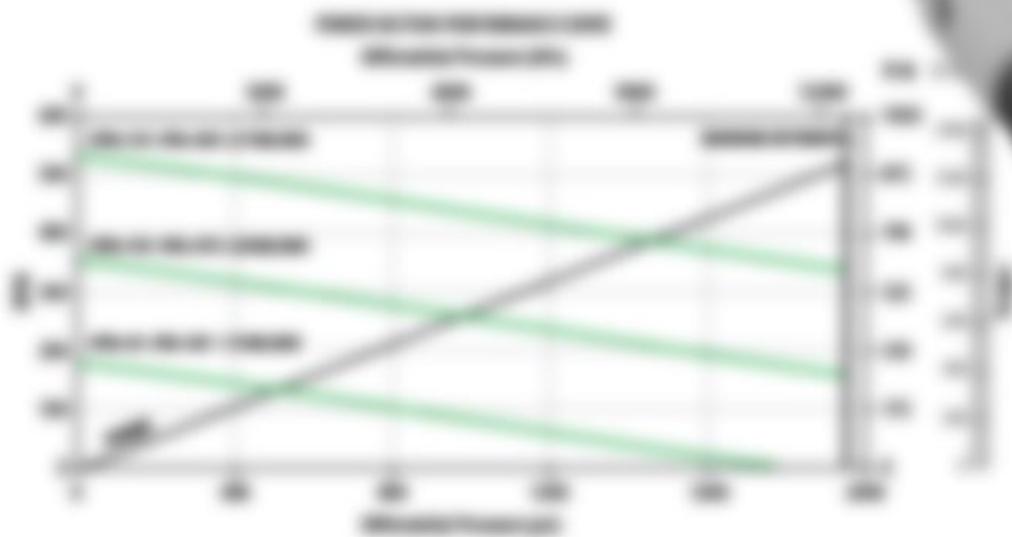


\* The AMP power section is rated to 572°F (300°C). Compatible with oil-based muds, acids, solvents, and high chloride content fluids.

Performance Data			
Parameter	Value	Unit	Notes
Max Torque	1000	ft-lb	
Max RPM	1000	rpm	
Max Power	1000	hp	
Max Thrust	1000	lb	
Max Weight	1000	lb	
Max Length	1000	ft	
Max Diameter	1000	in	
Max Temperature	1000	°F	
Max Vibration	1000	g	
Max Noise	1000	dB	
Max Efficiency	1000	%	
Max Reliability	1000	hrs	
Max Maintenance	1000	hrs	
Max Cost	1000	\$	
Max Lead Time	1000	days	
Max Warranty	1000	years	



**4-3/4" / 5" Sizes Currently Being Updated**



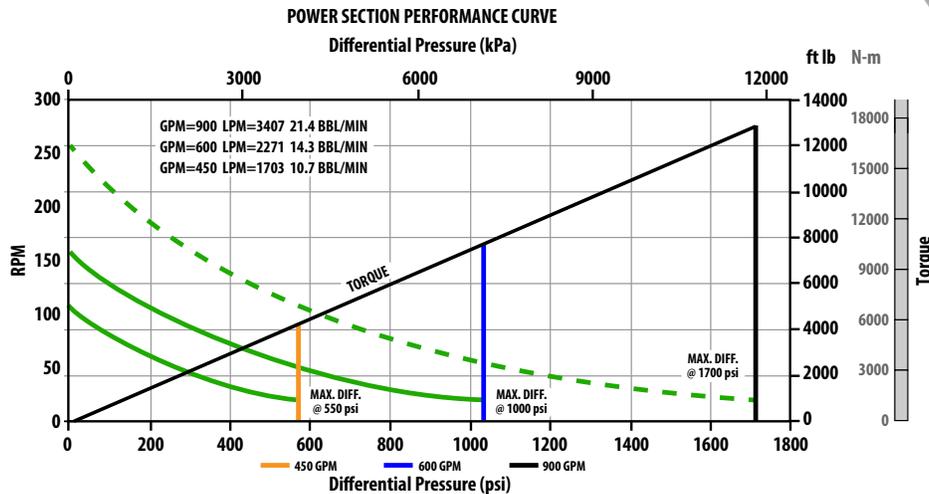
	Imperial	Metric
Overall Length	168.7 in	4284 mm
Bit-to-Bend Length	53.15 in	1350 mm
Nominal Diameter	6.75 in	171 mm
Top Connection	4 1/2 IF BOX	
Bottom Connection	4 1/2 REGULAR BOX	
Well Size	8 1/2 - 12 1/4 in	216 mm - 311 mm
Weight	1394 lbs	632 kg
Temperature Rating	572°F	300°C
Continuous Operating WOB (Dynamic)	79000 lbf	35141 daN
Maximum WOB (Static)	290000 lbf	128998 daN
Flow Rate	450 - 900 GPM	1703 - 3407 LPM
Rev/Unit volume	@ 450 - 0.24 rev/gal	@ 450 - 0.06 rev/l
	@ 600 - 0.26 rev/gal	@ 600 - 0.07 rev/l
	@ 900 - 0.29 rev/gal	@ 900 - 0.077 rev/l
No Load Bit Speed	110 - 250 RPM	
Max. Differential Pressure	1700 psi	11721 kPa
Full Load Torque	12800 ft lb	17354 Nm
Power	90 HP	67 kW

Compatible with oil-based muds, acids, solvents, and high chloride content fluids.



Operational specifications are for reference only. Actual tool performance may vary depending on a variety of downhole conditions. Performance data is subject to change without notice.

Straight or Fixed Bend Assembly options available.  
Optional Slick or Bladed Housing.



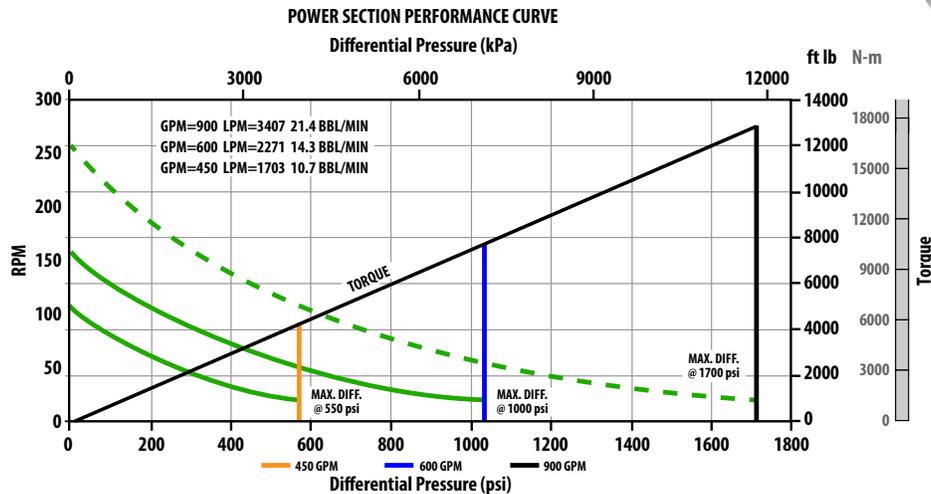
	Imperial	Metric
Overall Length	168.7 in	4284 mm
Bit-to-Bend Length	53.15 in	1350 mm
Nominal Diameter	7.00 in	178 mm
Top Connection	4 1/2 IF BOX	
Bottom Connection	4 1/2 REGULAR BOX	
Well Size	8 1/2 - 12 1/4 in	216 mm - 311 mm
Weight	1438 lbs	652 kg
Temperature Rating	572°F	300°C
Continuous Operating WOB (Dynamic)	79000 lbf	35141 daN
Maximum WOB (Static)	290000 lbf	128998 daN
Flow Rate	290000 lbf	128998 daN
Rev/Unit volume	450 - 900 GPM	1703 - 3407 LPM
No Load Bit Speed	@ 450 - 0.24 rev/gal @ 600 - 0.26 rev/gal @ 900 - 0.29 rev/gal	@ 450 - 0.06 rev/l @ 600 - 0.07 rev/l @ 900 - 0.077 rev/l
Max. Differential Pressure	110 - 250 RPM	
Full Load Torque	12800 ft lb	17354 Nm
Power	90 HP	67 kW

Compatible with oil-based muds, acids, solvents, and high chloride content fluids.



Operational specifications are for reference only.  
Actual tool performance may vary depending on a variety of downhole conditions.  
Performance data is subject to change without notice.

Straight or Fixed Bend Assembly options available.  
Optional Slick or Bladed Housing.



	Imperial	Metric
Overall Length	168.7 in	4284 mm
Bit-to-Bend Length	53.15 in	1350 mm
Nominal Diameter	7.25 in	184 mm
Top Connection	4 1/2 IF BOX	
Bottom Connection	4 1/2 REGULAR BOX	
Well Size	8 1/2 - 12 1/4 in	216 mm - 311 mm
Weight	1497 lbs	679 kg
Temperature Rating	572°F	300°C
Continuous Operating WOB (Dynamic)	79000 lbf	35141 daN
Maximum WOB (Static)	290000 lbf	128998 daN
Flow Rate	290000 lbf	128998 daN
Rev/Unit volume	450 - 900 GPM	1703 - 3407 LPM
No Load Bit Speed	@ 450 - 0.24 rev/gal @ 600 - 0.26 rev/gal @ 900 - 0.29 rev/gal	@ 1703 - 0.06 rev/l @ 2271 - 0.07 rev/l @ 3407 - 0.077 rev/l
No Load Bit Speed	110 - 250 RPM	
Max. Differential Pressure	1700 psi	11721 kPa
Full Load Torque	12800 ft lb	17354 Nm
Power	90 HP	67 kW

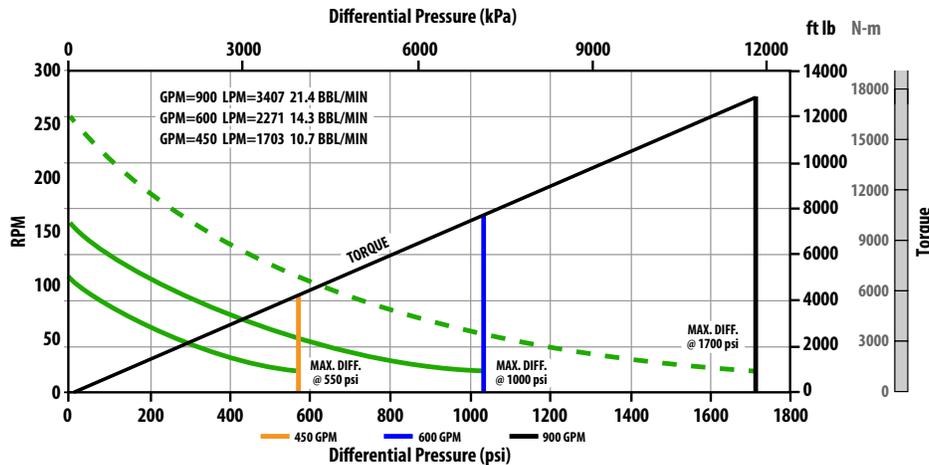
Compatible with oil-based muds, acids, solvents, and high chloride content fluids.



Operational specifications are for reference only. Actual tool performance may vary depending on a variety of downhole conditions. Performance data is subject to change without notice.

Straight or Fixed Bend Assembly options available.  
Optional Slick or Bladed Housing.

POWER SECTION PERFORMANCE CURVE

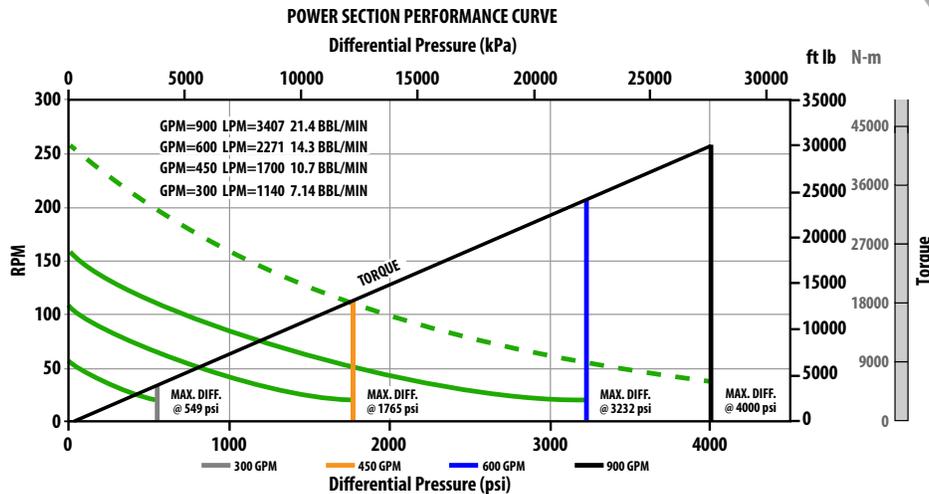


	Imperial	Metric
Overall Length	293.9 in	7465 mm
Bit-to-Bend Length	53.15 in	1350 mm
Nominal Diameter	6.75 in	171 mm
Top Connection	4 1/2 IF BOX	
Bottom Connection	4 1/2 REGULAR BOX	
Well Size	8 1/2 - 12 1/4 in	216 mm - 311 mm
Weight	2533 lbs	1149 kg
Temperature Rating	572°F	300°C
Continuous Operating WOB (Dynamic)	79000 lbf	35141 daN
Maximum WOB (Static)	290000 lbf	128998 daN
Flow Rate	300 - 900 GPM	1140 - 3407 LPM
Rev/Unit volume	@ 300 - 0.19 rev/gal	@ 1140 - 0.05 rev/l
	@ 450 - 0.24 rev/gal	@ 1703 - 0.06 rev/l
	@ 600 - 0.26 rev/gal	@ 2271 - 0.07 rev/l
	@ 900 - 0.29 rev/gal	@ 3407 - 0.077 rev/l
No Load Bit Speed	55 - 250 RPM	
Max. Differential Pressure	4000 psi	27580 kPa
Full Load Torque	30000 ft lb	40675 Nm
Power	283 HP	211 kW
Compatible with oil-based muds, acids, solvents, and high chloride content fluids.		



Operational specifications are for reference only.  
Actual tool performance may vary depending on a variety of downhole conditions.  
Performance data is subject to change without notice.

Straight or Fixed Bend Assembly options available.  
Optional Slick or Bladed Housing.

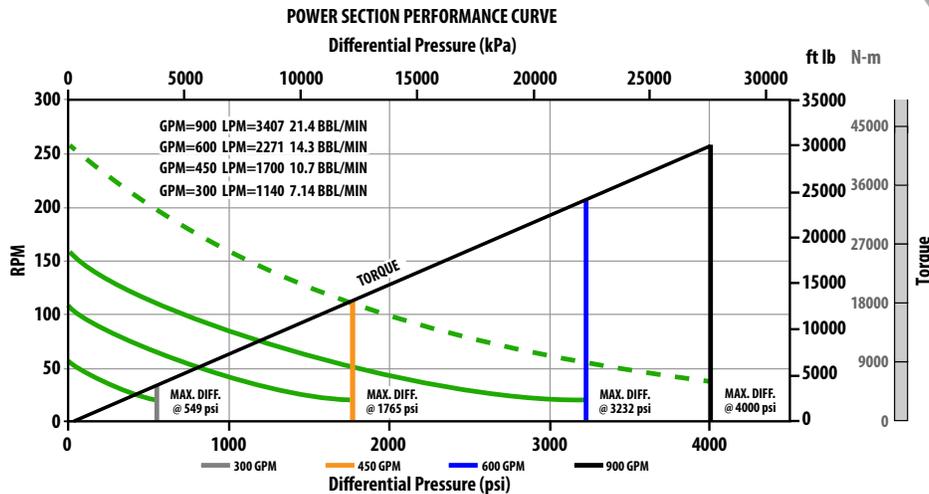


	Imperial	Metric
Overall Length	293.9 in	7465 mm
Bit-to-Bend Length	53.15 in	1350 mm
Nominal Diameter	7.25 in	184 mm
Top Connection	4 1/2 IF BOX	
Bottom Connection	4 1/2 REGULAR BOX	
Well Size	8 1/2 - 12 1/4 in	216 mm - 311 mm
Weight	2560 lbs	1202 kg
Temperature Rating	572°F	300°C
Continuous Operating WOB (Dynamic)	79000 lbf	35141 daN
Maximum WOB (Static)	290000 lbf	128998 daN
Flow Rate	300 - 900 GPM	1140 - 3407 LPM
Rev/Unit volume	@ 300 - 0.19 rev/gal	@ 300 - 0.05 rev/l
	@ 450 - 0.24 rev/gal	@ 450 - 0.06 rev/l
	@ 600 - 0.26 rev/gal	@ 600 - 0.07 rev/l
	@ 900 - 0.29 rev/gal	@ 900 - 0.077 rev/l
No Load Bit Speed	55 - 250 RPM	
Max. Differential Pressure	4000 psi	27580 kPa
Full Load Torque	30000 ft lb	40675 Nm
Power	283 HP	211 kW
Compatible with oil-based muds, acids, solvents, and high chloride content fluids.		



Operational specifications are for reference only. Actual tool performance may vary depending on a variety of downhole conditions. Performance data is subject to change without notice.

Straight or Fixed Bend Assembly options available.  
Optional Slick or Bladed Housing.

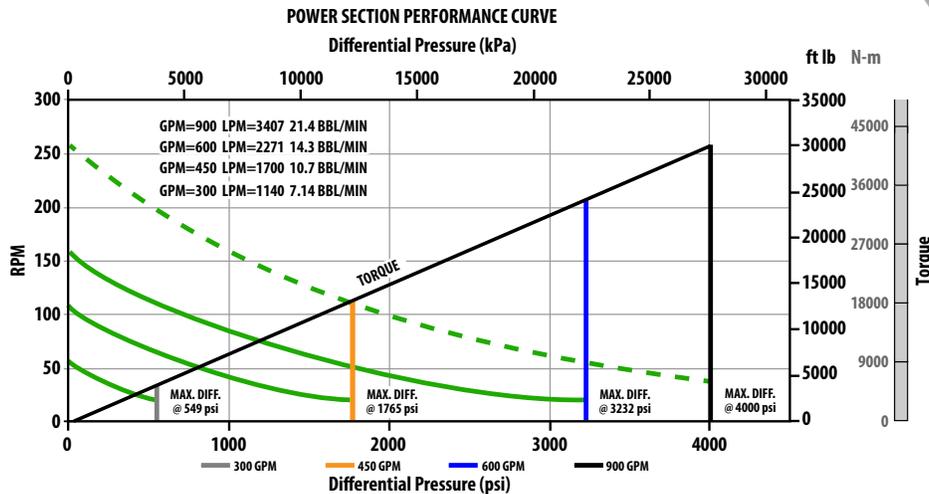


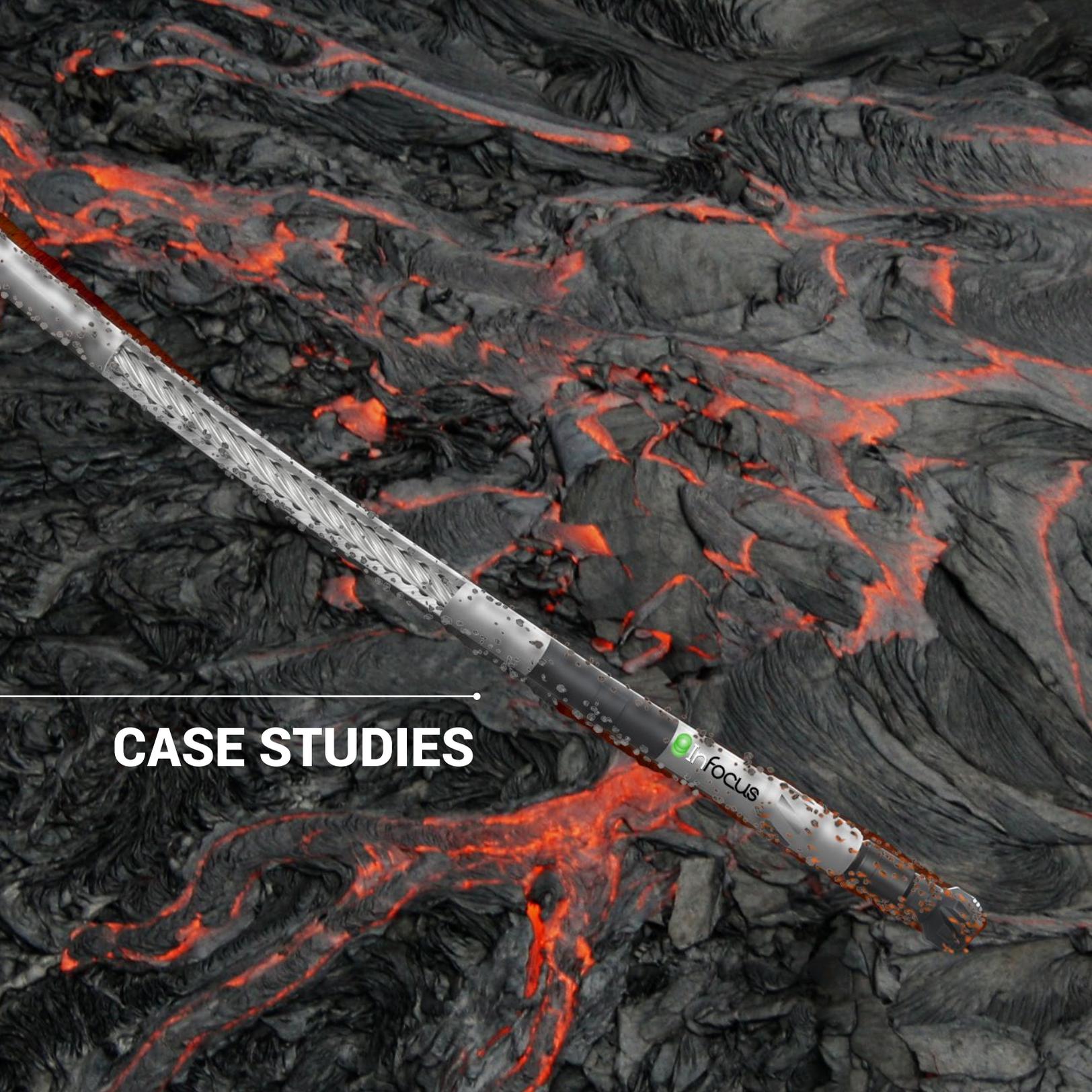
	Imperial	Metric
Overall Length	293.9 in	7465 mm
Bit-to-Bend Length	53.15 in	1350 mm
Nominal Diameter	7.25 in	184 mm
Top Connection	4 1/2 IF BOX	
Bottom Connection	4 1/2 REGULAR BOX	
Well Size	8 1/2 - 12 1/4 in	216 mm - 311 mm
Weight	2809 lbs	1274 kg
Temperature Rating	572°F	300°C
Continuous Operating WOB (Dynamic)	79000 lbf	35141 daN
Maximum WOB (Static)	290000 lbf	128998 daN
Flow Rate	300 - 900 GPM	1140 - 3407 LPM
Rev/Unit volume	@ 300 - 0.19 rev/gal	@ 300 - 0.05 rev/l
	@ 450 - 0.24 rev/gal	@ 450 - 0.06 rev/l
	@ 600 - 0.26 rev/gal	@ 600 - 0.07 rev/l
	@ 900 - 0.29 rev/gal	@ 900 - 0.077 rev/l
No Load Bit Speed	55 - 250 RPM	
Max. Differential Pressure	4000 psi	27580 kPa
Full Load Torque	30000 ft lb	40675 Nm
Power	283 HP	211 kW
Compatible with oil-based muds, acids, solvents, and high chloride content fluids.		



Operational specifications are for reference only. Actual tool performance may vary depending on a variety of downhole conditions. Performance data is subject to change without notice.

Straight or Fixed Bend Assembly options available.  
Optional Slick or Bladed Housing.





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# CASE STUDIES



## Objective

In May of 2018, to independently validate the new 2-7/8 AMP, InFocus conducted 3rd party dyno testing of the power sections at a third party provider in Red Deer, AB. The objective was to demonstrate repeatable high torque and extended run time performance of InFocus' 2-7/8" AMP (ALL METAL POWER) sections.

This test was successful and well received by all parties present. This testing provided valuable 3rd party data on the performance, durability and wear characteristics of the power sections. Dyno test data was provided by the third party provider.

## Test Procedure

1. Initial runs were done with no brake load to confirm operating parameters and establish the no load RPMs at different flow rates. This established the No Load Bit Speed range of 251 – 524 RPM, with corresponding flow rates of 68 – 144 GPM.

2. 1st Load run – 100 GPM Flow Rate

(a) This started at a flow rate of 65 GPM, and a diff pressure of 800 psi. Produced a stable torque of 375 lb-ft and was held for 15 minutes before increasing flow rate to 100 GPM.

(b) 100 GPM: the brake load was gradually increased over 25 minutes, with steadily increasing torque values 740 lb-ft at a diff pressure of 1,570 psi.

3. 2nd Load run – 66 GPM flow rate

(a) This test was started at a flow rate of 100 GPM, and the motor was held at 765 lb-ft for 10 minutes. Flow rate was then dropped to 80 GPM.

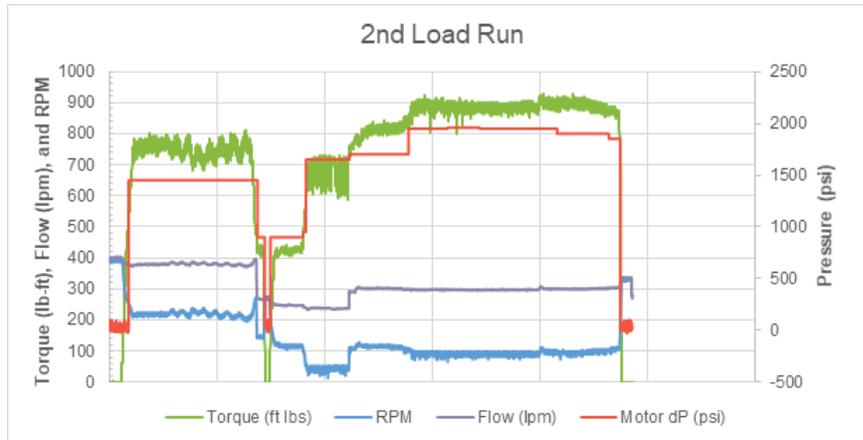
(b) The stable load was 410 lb-ft at a diff pressure of 900 psi. This was steadily increased over 25 minutes until a torque of 890 lb-ft was reached at a diff pressure of 1,950 psi.

(c) This 890 lb-ft load was held for over 30 minutes at a speed of just under 100 RPM with no drop in performance or change in diff pressure.

Tests were very successful and proved the AMP power section can operate at a variety of load conditions, and can transition easily between loading conditions, all while putting out very high torque for it's size in a sustained (>30min) high load test. Data from the 2nd load run, where maximum torque of 890 lb-ft was achieved and sustained, is plotted in Figure 1.

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**Figure 1 - Graphical results of 2nd Load Run**

## Post-Run Dimensional Inspection

Aside from testing the performance of the power section, the second goal of these dyno tests were to see the dimensional change of the of the 2-7/8" AMP power section after a sustained high-torque run. This was done with a combination of visual inspection and laser scan comparison before and after dyno testing.

### Visual Evaluation of Rotor Profile

Contact appears to have occurred along one side of the profile of the rotor lobe, and in some locations extended to the rotor lobe tip. This is the side where the rotor rolls into the stator. This contact patch does not appear to have any divots or dents or even a step change in lobe thickness. The rotor profile still feels smooth and looks like the contact is more of a polish than any appreciable wear.

**NOTE:** The rotor was manufactured to a milled finish, resembling "snake skin". The scaling seen is from the manufacturing process and not from dyno testing.



**Figure 2 - Closeup of rotor contact patch**

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**Figure 3 - Alternate view of rotor contact patch**

## Visual Evaluation of Stator Profile

The stator was evaluated via visual inspection with a borescope, as well as tactile evaluation.

Contact appears to be on the flanks on either side of the stator minors, where the rotor makes rolling contact with the stator. The contact patches are smooth, and free of divots and dents. The edges of the contact patches are gradual and no step changes or indents are visible. This wear pattern is consistent through most of the stator. As seen on the rotor, this contact appears to be mostly polish rather than any appreciable wear.



**Figure 4 - Post-run borescope of stator**

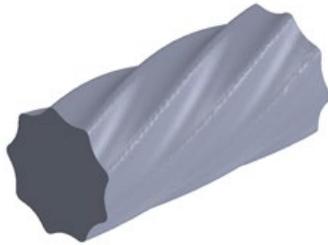
## Laser Scans

To quantify the contact and dimensional change seen in the visual inspection, laser scan data was used to evaluate profile change caused by testing.

Laser scans were taken at 2 points in the life of the rotor. Sequence of events follows:

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1. Rotor was manufactured
2. 1st laser scan taken to verify geometry
3. Rotor was sent for treatment (adds approximately 0.002" to the entire profile)
4. Motor was assembled, and dyno tested
5. 2nd laser scan taken to evaluate change after dyno testing
6. Laser scan data from both scans was imported into SOLIDWORKS, converted from mesh to solid geometry, and compared to nominal profile.



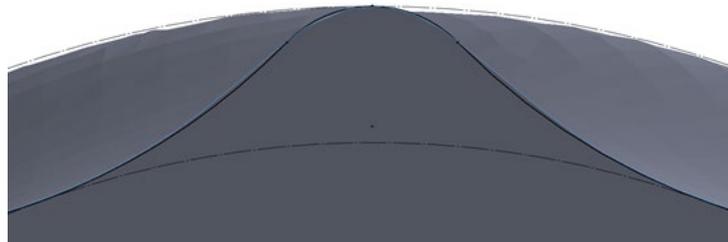
**Figure 5 - Example of laser scan data import in SOLIDWORKS**

## Post Test Data Analysis

For both laser scans, a 4-6" representative section of the rotor was scanned, then imported into SOLIDWORKS, converted from mesh to solid, and then cross sections were taken and compared to the nominal profile.

**NOTE:** It is important to note that the points are imported as a polygon mesh from the laser scan data, so there is some rounding error as the curvature of the tips are connected straight line segments rather than true, clean arcs.

The initial laser scan, taken directly after manufacturing, showed the minors to be exactly on size, and the majors very slightly under the maximum nominal dimension. This was consistent across most of the lobes and fell within the acceptable tolerance.

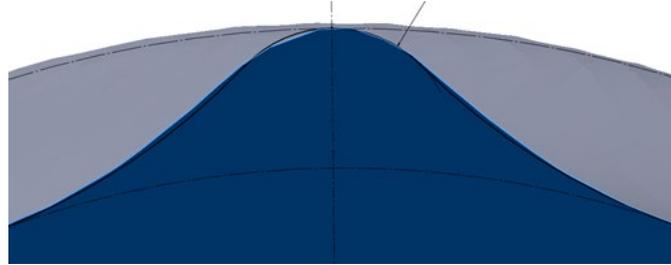


**Figure 6 - Sample lobe profile after manufacturing**

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The post-dyno laser scans help quantify what was seen in the visual rotor inspection. The minors and the flanks saw no wear, and scans show them to be approximately 0.002" thicker than in the first scan. This is consistent with the expected growth due to rotor treatment. The dimensional change on the majors varied between lobe and profile location, but was generally between 0.001 – 0.002". On most lobes this contact was preferential to one side of the major, which again lines up with the visual inspection and the side of the major that would roll into the stator.



**Figure 7 - Sample lobe profile after dyno testing**

Although 0.001 – 0.002" dimensional change was observed on most majors, it is unlikely that this change would continue to progress at the same rate. In the final dyno test of the day, maximum torque of 890 lb-ft was achieved and held for a period of over 30 minutes without any measurable decrease in performance. This may indicate that observed dimensional change is initial run-in of the rotor and may not lead to performance degradation over time.

## Conclusions

The third party dyno testing was very successful and proved the performance capabilities and dimensional characteristics of the 2-7/8" AMP power section. While further analysis continues to be done, some initial conclusions can be drawn from the test data and post-run inspection.

### High Torque from Short Power Section

The 2-7/8" AMP power section produced exceptional torque in a very short power section. The torque produced is one of the highest in class for its diameter, but it does so with just 78" (6.5 ft) of total length. This allows operators to run a shorter BHA without sacrificing power or performance.

**890 lb-ft @ 1950 psi from a 78" (6.5 ft) power section.**

### Minimal Wear & Sustained Performance

In the dyno tests, dimensional change of 0.001" – 0.002" was seen on the majors, mostly on the side where the major rolls into the stator lobe. Initial run-in was expected from this power section, and does not seem to degrade motor performance. In the final load test of the day, after the motor had already seen sustained run time, maximum torque of 890 lb-ft was achieved and sustained for over 30 minutes without any measurable drop in performance.

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### **High Flow Rate @ 0 Load**

The AMP power section is capable of very high flow rates at low load. This is advantageous when drilling/milling plugs and ports. The higher annular velocity improves cutting removal and milling/drilling efficiency.

The initial No Load dyno runs demonstrated RPM in the range of 251 – 524 RPM, with corresponding flow rates of 260 lpm – 535 lpm (68 – 144 GPM). After data processing and extrapolation, the published No Load Bit Speed of 183 RPM – 550 RPM were established over flow ranges of 189 LPM – 568 LPM (50 - 150 GPM)

### **Stall Resistant**

Looking at the performance curve for the 2-7/8" AMP, it appears that the RPM curve for the AMP power section does not see a dramatic drop-off like is seen in traditional power sections. During the 3rd party dyno testing, the test was run to maximum pump capacity without being able to stall the power section.



## CASE STUDY: 2-7/8" AMP Sand Cleanout w/Nitrogen - Grande Prairie, Alberta, CANADA

case study no. 0027



### Overview

**Location:** Grande Prairie, Alberta

**Well/Run Type:** Oil & Gas cleanout run using Nitrogen (N<sub>2</sub>)

**Run Length:** Cleanout to 4500 meters

**Circulating / Drilling Hours:** 69.5 hrs

**Products / Services:** InFocus 2.875" Drilling Motor w/AMP - All Metal Power section

### Objectives

The objective of this run was to circulate through sand bridges that were cutting off gas production.

### Results

An InFocus AMP - All Metal Power section was brought in to aid the Operator with this cleanout. The Operator did small sweeps, not trying to be aggressive to avoid the coil getting stuck behind the BHA. The Operator would tag sand bridges and do small wiper trips, circulating sand up and out of the well. It took 3 days to reach TD of 4500m following this practice.

100 l/min of fresh water and up to 50 SCM of nitrogen was pumped through the tool for 69.5 straight hours. As a bypass tool was not run above the AMP, all fluid and gas was pumped through the motor, which completed the entire run.

Upon return to InFocus, the motor was serviced and then Dyno tested. Post-run performance verification aligned perfectly to the benchmark pre-run Dyno verification.

### Benefits

The Operator was able to utilize high N<sub>2</sub> rates throughout this run with no damage to the power section. This particular AMP now has 220 combined run hours on it as of this writing.

### Operational Notes

#### BHA

Coil Connector

Bi-directional Jar

MHA (dual float, disconnect, circulation sub)

InFocus 2-7/8" AMP Motor, 9:10 Lobe 3.8 Stage

Pineapple Mill



## Overview

**Location:** Eagleford, South Texas  
**Well/Run Type:** Oil & Gas cleanout run  
**Run Length:** Cleanout from 14,053' to 16,046'  
**Circulating Hours:** 19 hrs  
**Products / Services:** InFocus 2.875" Drilling Motor w/AMP  
 All Metal Power Section

## Objectives

The objective of this run was to circulate and clean through dissolvable frac plugs.

## Tool Deployment

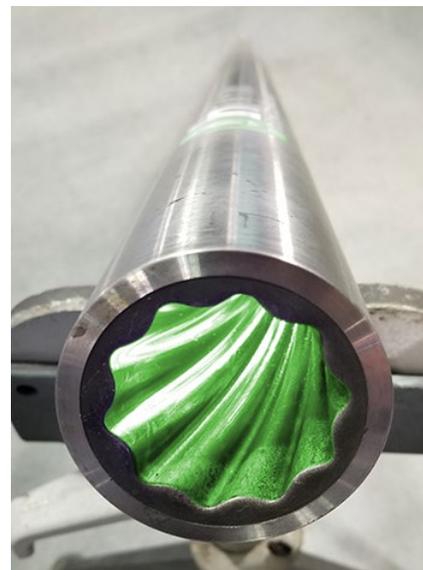
An InFocus 2.875" AMP - All Metal Power section was brought in to aid the Operator with this cleanout. The Operator would tag plugs and wash through them, circulating debris up and out of the well. It took 19 hours to reach a TD of 16,046'.

With a downhole temperature of 350°F, a starting wellhead pressure of 6000 psi and a circulating pressure of 7000 PSI at a rate of 1.25 bbl/min, it was decided to pump a sweep of friction reducer to lower circulating pressures. This proved to be helpful and rates were increased over time to 2.5 bbl/min at a circulating pressure of 8800 psi at TD.

Upon return to the shop, the motor was Dyno tested. Post-run performance verification aligned perfectly to the benchmark pre-run Dyno verification. **The AMP power section showed no significant wear or any visual deformation.**

## Benefits

The Operator would be able to run this power section on multiple wells or runs with no need to change out motors or have any concerns of damage to a standard rubber power section.





## Overview

**Location:** British Columbia, Canada LSD 100/04-32-063-01 W6M

**Well/Run Type:** Composite plug milling

**CT Size:** 2-3/8"

**Pump Rate:** 145 - 185 GPM

**Products / Services:** InFocus 2.875" RE|FLEX Drilling Motor w/AMP - All Metal Power Section

## Objectives

The objective of this run was to mill composite frac plugs.

## Tool Deployment

An InFocus 2.875" AMP - All Metal Power section was selected for this composite plug drillout because it would be working in two-phase fluid (produced H<sub>2</sub>O and N<sub>2</sub>). The Operator would tag plugs and mill through them, circulating debris up and out of the well.

A total of 14 plugs were milled on this run. Average mill time per plug was 7 minutes.

## Benefits

The Operator would be able to run this AMP: All Metal Power section on multiple wells or runs with no need to change out motors or have any concerns of damage to a standard rubber power section.





## Overview

**Location:** Germany

**Well/Run Type:** Milling / Cleanout run

**Run Length:** Cleanout to 1267 meters (~4157 ft)

**Products / Services:** InFocus 2.875" AMP All Metal Power Section

## Objectives

The objective on this well was to mill out Barium Strontium Sulfate scale, with a thickness of one inch.

## Results

Operator decided to try an InFocus AMP: All Metal Power section on this well. After the tool was run in hole to 771 m (2530 ft), milling operations began. The InFocus motor with AMP All Metal Power section ran almost continually for 120 hours (5 days) to a total depth of 1267 m (4157 ft). This produced a milling rate of 4.13 m/hour. Pumping fresh water at an average flow rate of 350 l/min (92.5 gal/min), circulation pressure of 290 bar @ 70°C.



## Benefits

Built for multi-use applications, this InFocus motor with AMP: All Metal Power section removed the scale from this interval depth, supplying the torque required to complete this milling operation over five straight days. After the run, the motor was returned to the facility and dyno tested, and the AMP power section showed no change in performance.

## Operational Notes

### WELL TYPE

Gas Producer

### BHA

2" Coiled Tubing

Outline Connector

DFCV

Hydraulic Disconnect 7/8" Ball

Dual Circ Sub 3/4" Ball, 5K Burst Disc

2 7/8-in. Thru-tubing motor w/AMP: All Metal Power section technology

Micon Mill 95mm (3.75") mill OD

### TOTAL DEPTH

~4,157 ft (1267 m) MD

### CASING SIZE & TYPE

4.50-in., 15.5 lb/ft



## Overview

**Date:** August - September 2020

**Location:** New Zealand

**Well/Run Type:** Milling / Cleanout run

**Run Length:** Cleanout to 1267 meters (~4157 ft)

**Products / Services:** InFocus 2.875" AMP - All Metal Power Section

## Tubing Details

**Tubing Size & Wt:** 5-1/2" Cr13-S95, 20.3 lbs/ft

**Tubing ID:** 4.184"

**Drift ID:** 4.059"

**Min. Restriction:** 3.85"

**Coil Tubing Size:** 2"

## Objectives

The objective was to mill calcium carbonate scale and or remove other obstructions in two wells to be prepared for acid-ization. These operations were performed over several days and runs utilizing one 2-7/8 All Metal Power (AMP) 9|10 3.8 stage motor while pumping bi-phase fluid of fresh water and N<sub>2</sub>, followed up with a mutual solvent and acid treatment.

## Results

### Well 1 – Summary of Operations

Well Details: 6971m MD | 3631m TVD | H<sub>2</sub>S 5ppm | CO<sub>2</sub> 7% | BHT 120C / 248F |  
BHP 3,335 PSI | SISP 2741 PSI

Five BHA's were deployed with the 2-7/8" AMP motor in over 134 operating hrs with a combined 40 hrs of circulating time. During the course of the operation, N<sub>2</sub> and fresh water were pumped at an average rate of 800 SCF & 1.2bpm (avg circulation pressure 2460psi | WHP 1450psi) during the first phase of milling and descaling the targeted depth range of 5950 to 5990m MD. The second phase of treatment, (Musol® A) mutual solvent was pumped followed with an organic acid at an avg rate of 0.8bpm. N<sub>2</sub> was then brought online and pumped at a rate of 800scf to displace these fluids out the coil tubing over the targeted depth interval.

### BHA Configurations Deployed

Connector - Slip type connector, pull test to 40,000lbs

Crossover

Bulk-Head

... continued next page

### **BHA Configurations Deployed, continued**

Coil-Link Tool  
 Coil Link Crossover  
 Motorhead Assembly, (MHA) 7/8" Disconnect Ball, 3/4" Circulation Ball, 5K bust disk  
 Dual Acting Hydraulic Jar  
 Lower Heavy Duty Drop Ball Disconnect, 5/8" Ball  
 2.875" Thru Tubing AMP Motor  
 Extension, to simulate Under-Reamer | Used in BHA's 1, 2, 3, & 5  
 Under-Reamer 4.050" Open | Used in BHA 4  
 3.745" MDX Diamond Mill C/W Side Jet | Used in BHA's 1, 2  
 3.710" 5 Bladed Flat Bottom Junk Mill | Used in BHA's 3 & 4  
 3.625" OD Diamond Taper Mill | Used in BHA 5

### **Well 2 – Summary of Operations**

Well Details:  
 6430m MD | 3630m TVD | H2S 5ppm | CO2 7% | BHT 120C / 248F | BHP 3,335 PSI |  
 SISIP 2741 PSI

Two BHA's were deployed with the 2-7/8" AMP motor (same motor used in Well 1) over 56 operating hrs with a combined 14 hrs of circulating time. During the course of the operation, N2 and fresh water were pumped at an average rate of 800 SCF & 0.80bpm (avg Circulation Pressure 2625psi | WHP 880psi) during the first phase of milling and descaling the targeted depth range of 5414 to 5540m MD. The second phase of treatment included pumping an organic acid at an avg rate of 1.0 bpm with N2 being brought online and pumped at a rate of 500scf to displace the acid out the coil tubing over the targeted depth interval.

### **BHA Configurations Deployed**

Connector - Slip type connector, pull test to 40,000lbs  
 Motorhead Assembly, (MHA) 7/8" Disconnect Ball, 3/4" Circulation Ball, 5K bust disk  
 Dual Acting Hydraulic Jar  
 Lower Heavy Duty Drop Ball Disconnect, 5/8" Ball  
 2.875" Thru Tubing AMP Motor  
 Extension, to simulate Under-Reamer | Used in BHA 1  
 Under-Reamer 4.050" Open | Used in BHA 2  
 Cross over, 2-3/8" PAC Pin x 2-3/8" Reg Box | Used in BHA 2  
 3.710" 5 Bladed Flat Bottom Junk Mill | Used in BHA 1  
 3.625" OD Diamond Taper Mill | Used in BHA 2

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## **Conclusions**

The 2.875" (AMP) All Metal Power section performed multiple operations in several BHA's with various fluids such as water, solvents, acids and N2 without issue, resulting in no NPT to the operator. Upon return to the facility, the AMP was inspected and was found to be in good condition. The AMP was then dyno tested and the results were within 3% of the pre job dyno test.

With these recent runs to date this specific 2.875" AMP has achieved another milestone in accumulating over 405 circulating hrs in some of the harshest operating conditions in jobs here in Canada, Mexico, Colombia, Germany and New Zealand.

We at InFocus would like to thank Taranaki for their support and contributions to this milestone of higher asset utilization, low run cost per hour, and high reliability of our AMP product line.

# **AMPLI·VIBE**

FRICTION REDUCTION TOOL w/AMP Inside



**AMP**  
ALL METAL POWER





# AMPLI-VIBE

**The AMPLI-VIBE** Friction Reduction Tool is based on InFocus' highly successful AMP: All Metal Power section technology. Like the AMP, the Ampli-Vibe is all-metal construction - with absolutely no elastomer present.

It is designed with double-shouldered connections throughout, and will operate in temperatures up to 456°F. The 2-1/8" size operates as a frequency of 5 - 19 Hz, and 2-7/8" size operates at a frequency of 4 - 12 Hz.

## FEATURES

- Robust all-metal design with no elastomer
- Double shouldered connections with metal-to-metal seals
- Temperature compatible to 456°F
- Pressure drop can be calibrated to customer-specific requirements.

### Ideal:

- Any application where friction reduction is needed for a smoother operation
- Reduction of helical buckling and assists with optimizing WOB
- Compatible with all BHA's in drill strings and workover strings including coiled tubing
- In wells with multi-phase flow (N2)
- For spotting acid or xylene during multi-step cleanouts
- In HP/HT wells
- In all Geothermal applications
- With High Chloride produced water
- With Produced water with hydrocarbon present (condensate)
- With H2S present in the wellbore



The Ampli-Vibe Friction Reduction Tool is based on InFocus' highly successful AMP: All Metal Power section technology. Like the AMP, the Ampli-Vibe is all-metal construction - with absolutely no elastomer present.

It is designed with double-shouldered connections throughout, and will operate in temperatures up to 456°F. The 2-1/8" Ampli-Vibe tool operates at a frequency of 5 - 19 Hz.

	Imperial	Metric
<b>Overall Length</b>	54.49 in	1384 mm
<b>Standard Diameter</b>	2.180 in	55 mm
<b>Top Connection</b>	1 1/2 REG (AMMT)	
<b>Bottom Connection</b>	1 1/2 REG (AMMT)	
<b>Temperature</b>	456°F (236°C)	
<b>Flow Rate - Gallons per Minute</b>	50 - 150 GPM	
<b>Flow Rate - Liters per Minute</b>	189 - 568 LPM	
<b>Flow Rate - Barrels per Minute</b>	1.2 - 3.6 BPM	
<b>Absolute Overpull</b> (some connections are yielded and some parts require replacement)	28000 lbf	12455 daN
<b>Overpull for Re-Run</b> (Safe Work Load)	22400 lbf	9964 daN
<b>Frequency</b>	5 - 19 Hz	

Operational specifications are for reference only. Actual tool performance may vary depending on a variety of downhole conditions. Performance data is subject to change without notice. 1.500 API REG connection is interchangeable with most 1.500 MT, 1.500 AMT and 1.500 AMMT connections.



## 2 7/8" (73 mm) AMPLI-VIBE Friction Reduction Tool

The Ampli-Vibe Friction Reduction Tool is based on InFocus' highly successful AMP: All Metal Power section technology. Like the AMP, the Ampli-Vibe is all-metal construction - with absolutely no elastomer present.

It is designed with double-shouldered connections throughout, and will operate in temperatures up to 456°F. The 2-7/8" Ampli-Vibe tool operates at a frequency of 4 - 12 Hz.

	Imperial	Metric
<b>Overall Length</b>	62.81 in	1595 mm
<b>Standard Diameter</b>	2.875 in	73 mm
<b>Top Connection</b>	2 3/8 PAC (NC 16)	
<b>Bottom Connection</b>	2 3/8 PAC (NC 16)	
<b>Temperature</b>	456°F (236°C)	
<b>Flow Rate - Gallons per Minute</b>	80 - 230 GPM	
<b>Flow Rate - Liters per Minute</b>	303 - 871 LPM	
<b>Flow Rate - Barrels per Minute</b>	1.9 - 5.5 BPM	
<b>Absolute Overpull</b> (some connections are yielded and some parts require replacement)	48000 lbf	21350 daN
<b>Overpull for Re-Run</b> (Safe Work Load)	38400 lbf	17080 daN
<b>Frequency</b>	4 - 12 Hz	

Operational specifications are for reference only. Actual tool performance may vary depending on a variety of downhole conditions. Performance data is subject to change without notice. 1.500 API REG connection is interchangeable with most 1.500 MT, 1.500 AMT and 1.500 AMMT connections.





## Overview

**Run Date:** April 25, 2021

**Location:** Saudi Arabia

**Onshore/Offshore:** Onshore

**Well Type:** Gas producer

**Total Depth:** 18,110 ft

**Products / Services:** InFocus AMP Combo: 2.875" AMP: All Metal Power section and  
2.875" FRT: Friction Reduction Tool

## Objectives

The objective of this proposal was to mill the 46 plugs set to isolate between proppant frac stages with a 2-3/8" coiled tubing.

## Tool Deployment/Execution

Performed all pressure tests and function tests successfully.

1st run: Milling plugs with 4.250" mill bit and motor with AMP: All Metal Power section.

- Milled out / drifted 46 plugs and reached TIV
- Maximum depth reached 18,020 ft.
- Fatigue added 22% @ 12,595 ft. from free end

## Results

This entire operation was performed in a single run.

This tool combination milled out / drifted 46 plugs and reached the Tubing Isolation Valve (TIV). The coiled tubing was able to maintain a pump rate of 2.7 BPM.

Most importantly for everyone involved, no HSE issue occurred during job execution.

## BHA

- Coil connector for 2.375" Coil
- 2.875" MHA
- 2.875" Jar
- 2.875" FRT: Friction Reduction Tool (agitator with AMP Inside)
- 2.875" Drilling motor with AMP: All Metal Power section.
- Mill bit 4.250"

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## Thru-Tubing Details

**Coiled Tubing Size:** 2.375"

**Pump Rate:** 2.3 - 2.7 BPM

**Tubing Size & Weight:** 5.5" CSG 26#

**Tubing ID:** 4.548"

**Drift ID:** 4.432"

**Minimum Restriction:** 4.432"

## Conclusions / Benefits

The InFocus AMP / FRT combo used in this deep plug milling operation saw no limitation on circulating hours compared to conventional PDM and extended reach tool. This provided a cost savings to the client not only by reducing the number of runs, but also with the addition of the FRT which reduced fatigue on the coiled tubing string. More sizes of this exciting combination will be released soon.

*InFocus would like to thank: National Energy Services Reunited Corp. (NESR)*





## Overview

**Run Date:** May 11, 2021

**Location:** Saudi Arabia

**Onshore/Offshore:** Onshore

**Well Type:** Gas producer

**Total Depth:** 18,110 ft

**Products / Services:** InFocus AMP Combo: 2.875" AMP: All Metal Power section and  
2.875" FRT: Friction Reduction Tool

## Objectives

The objective of this proposal was to mill the 46 plugs set to isolate between proppant frac stages with a 2-3/8" coiled tubing.

## Tool Deployment/Execution

Performed all pressure tests and function tests successfully.

1st run: Milling plugs with 4.250" mill bit and motor with AMP: All Metal Power section.

- Milled out / drifted 46 plugs and reached TIV
- Maximum depth reached 18,020 ft.
- Fatigue added 21.80% @ 14,870 ft.

## Results

This tool combination milled out all 46 plugs then tagged the Tubing Isolation Valve (TIV). The coiled tubing unit also performed a cleanout run while preparing to retrieve the fish (they succeeded in retrieving a missing wireline gun).

For everyone involved, no HSE issue occurred during job execution.

## BHA

- 2-3/8" HPCT - 22,668 ft
- FRT: Friction Reduction Tool (agitator with AMP inside)
- 2.875" Drilling motor with AMP: All Metal Power section.
- Five-blade mill bit 4.250"
- Treated water with pumping friction reducer additive
- 40# gel

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## **Thru-Tubing Details**

**Coiled Tubing Size:** 2.375"

**Pump Rate:** 2.3 - 2.7 BPM

**Tubing Size & Weight:** 5.5" CSG 26#

**Tubing ID:** 4.548"

**Drift ID:** 4.432"

**Minimum Restriction:** 4.432"

## **Conclusions / Benefits**

Compared to a conventional PDM and extended reach tool there was NO LIMITATION on circulating hours with the InFocus metal combo used in this deep plug milling operation. Not only did this provide a cost savings to the client by reducing the number of runs and reducing fatigue on the coiled tubing string, the client was able to perform multiple runs with the same BHA. More sizes of this exciting combination will be released soon.

*InFocus would like to thank: National Energy Services Reunited Corp. (NESR)*



DEPLOY.  
**ANTI-TORQUE SWIVEL**  
CIRCULATING HEAD & SCREEN SUB

**COMBINATION CIRCULATING HEAD  
and SCREEN SUB**  
with ADJUSTABLE REACTIVE TORQUE BACKUP





## Anti-Torque Swivel for Workover Rig Applications

The Anti-Torque Swivel by InFocus can be used in conjunction with motors on service/workover rigs instead of power swivels. Common uses are drilling out cement, retainers, bridge plugs or stage collars.

Designated as a Combination Circulating Head and Screen Sub, the swivel works off of pump pressure. In pump-on mode, lockup occurs, taking up reactive torque of the motor.

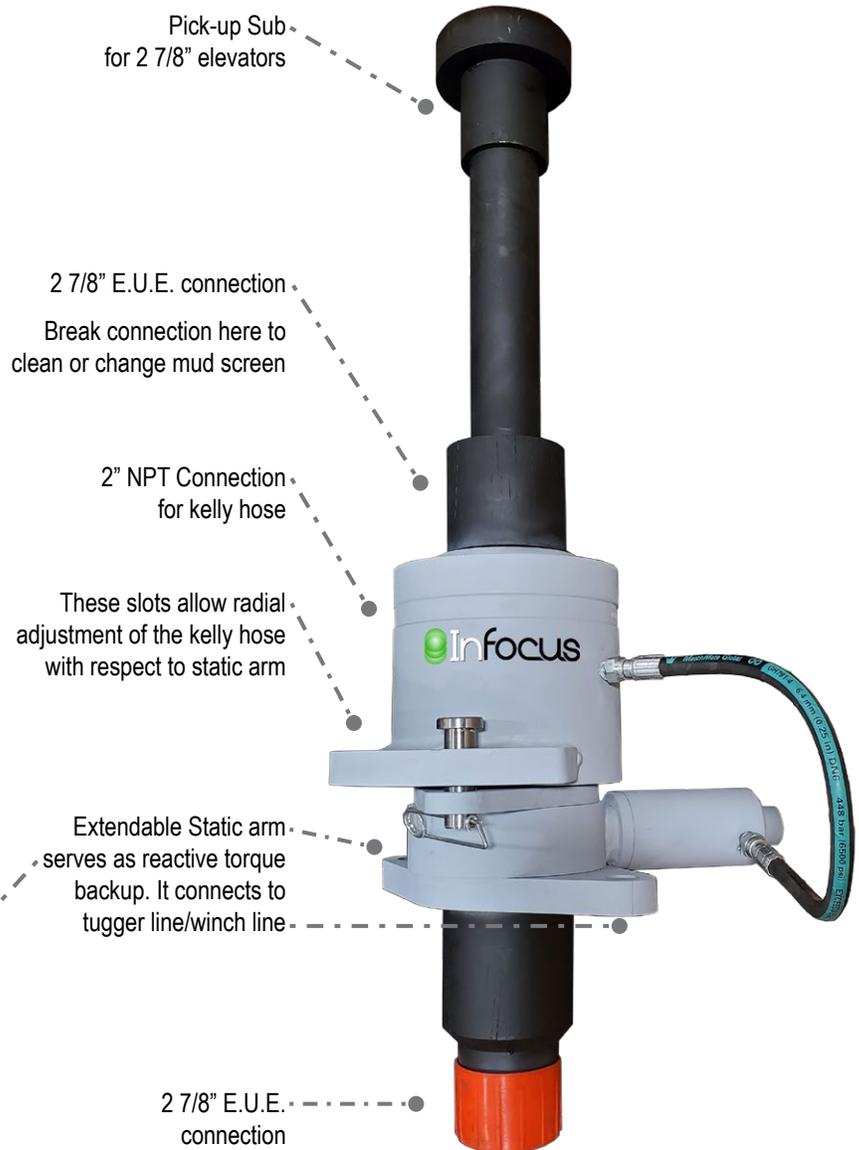
Drill string will rotate freely in both directions until the mud pump is engaged. Lockup is in effect until the pump is disengaged, allowing free rotation for connections.

**Maximum Operating Pressure:** 3000 psi

**Maximum Pressure:** 6500 psi  
(based on compensator line hose)

2-7/8" version shown here.

3-1/2" version available



**SUPPORTING OUR  
SERVICE  
VALUED CUSTOMERS**

**Talk to your Customers...**



**... we'll handle the dirty work.**



## In-House Servicing

InFocus offers motor servicing in our Nisku, Alberta facility. Take advantage of our highly experienced staff and local contacts, and our Operations team of veteran directional drillers and global drilling tool servicing trainers.

- Let us service your motors while you coordinate with your customers! We will handle the dirty work.
- Motor / Equipment purchase discounts available when combined with a service agreement. We will sell you a full motor at a preferred rate if we service and/or store your tools if requested, while providing your company a competitive servicing rate.
- Take advantage of combination pricing on InFocus products that can be incorporated into your project! (including but not limited to: AMP: All Metal Power (metal-to-metal) power sections, HSRT Hi-Speed Reaming Tools for casing landing, Thru-Tubing HSRT casing cleanout tools and/or casing recovery, FRT: Friction Reduction Tools w/AMP Inside (agitators), Anti-Torque Swivels) and more.
- In-house Dyno testing available – call Operations for more details.
- As a valued customer, access to our full-support engineering team.
- InFocus will coordinate Third Party Inspection of your components.
- Storage available

## Training

InFocus always provides full service work instructions, specification sheets, fishing diagrams, and recommended operational procedures along with instructional videos for each product. Full service training is available with every product sold. Our Certified Technicians are based in Canada and can train your employees at any location in the world, with the option of in house training by sending your technicians for training at our location.

We will provide full Competency Certificates from our experienced Global Training Managers.

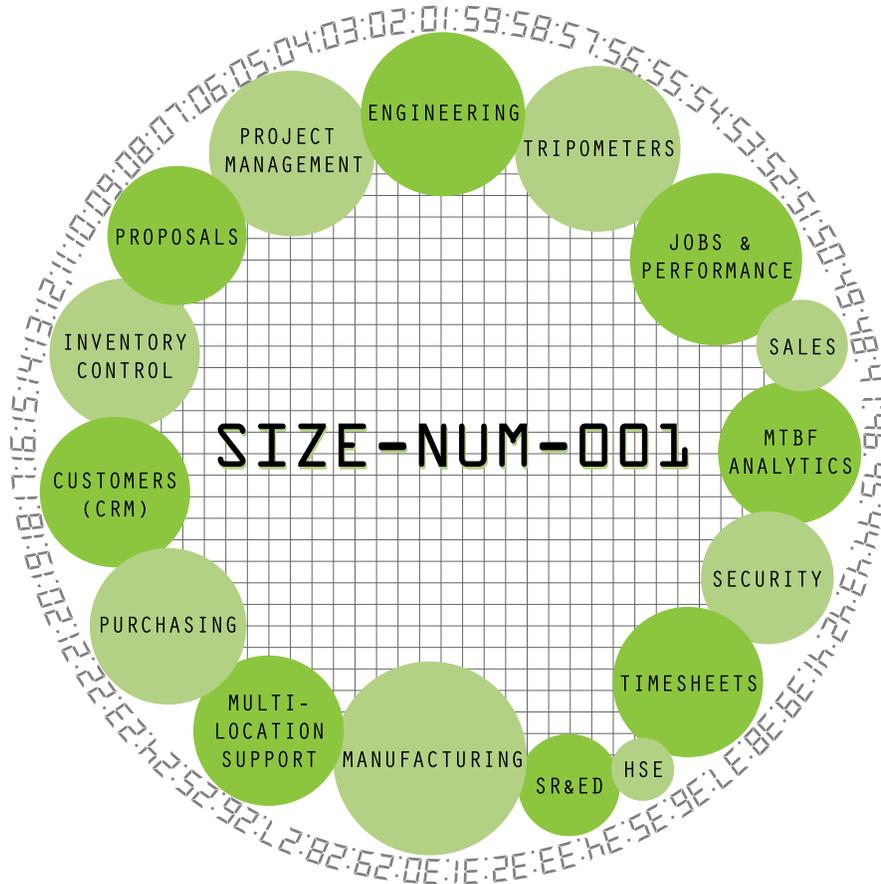
SAY 'NO!' TO:

- \* out-of-date spreadsheets
- \* grease-stained misplaced work sheets
- \* smudged whiteboards

**YOU DESERVE BETTER.**

**GRiD BEGINS WITH A PART NUMBER**

**AND IS BASED ON TIME**



BYE-BYE SPREADSHEETS.

**HELLO GRiD.**



## GRiD | OPERATIONS POWERHOUSE

GRiD is an integrated inventory and operations management solution.

Teams use it to manage their function within the corporate ecosystem.

Individuals and global teams transact real-time data and coordinate their activities via guided workflows, while managers maintain visibility and control.

ADVANCED MTBF ANALYTICS

REAL-TIME CUSTOMER REPORTING

OPERATION AND TIME-BASED ALERTS

INTUITIVE

CLOUD-BASED

\* REAL-TIME ASSET TRACKING VIA GPS OR MOBILE

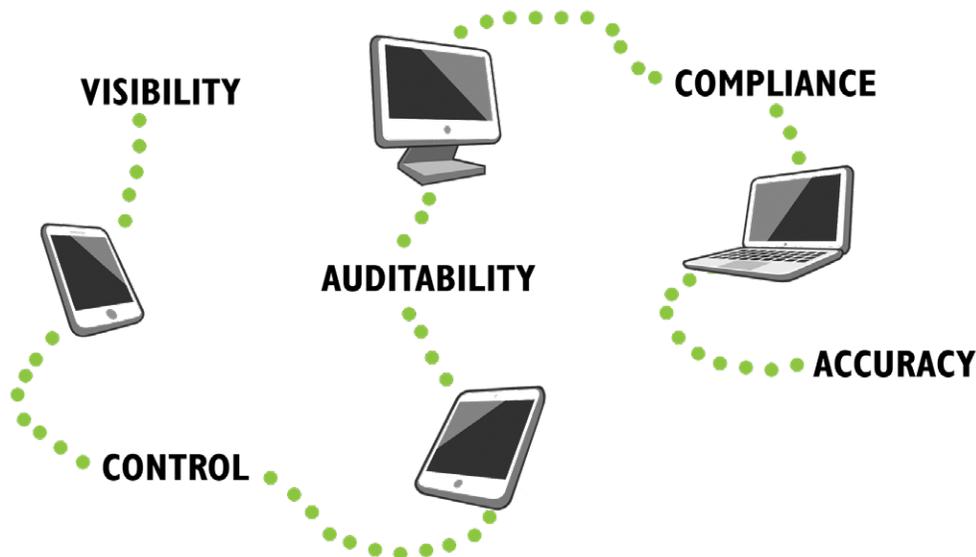
INTEGRATED TRAINING VIDEOS

\* MAPS / QUICKBOOKS® INTEGRATION

BANK-LEVEL SECURITY (SSL)

AUTOMATIC UPDATES

\* OPTIONAL



# Connecting your business to the technology resources you need.

*It's Monday morning and engineers are busy designing the next big thing while the sales team adds activity to the operations queue and manufacturing assembles and repairs inventory.*

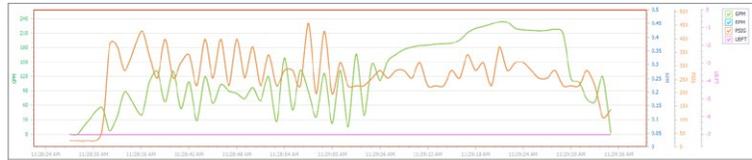
*From the outside, it appears like everything is running smoothly. From the inside, however, we know it to be a chaotic story that involves umpteen out-of-date spreadsheets, grease-stained and misplaced work orders, and a smudged whiteboard that serves as a job and inventory tracking system.*

*GRiD is a single, integrated inventory and operations management solution that teams use to manage their function within the corporate ecosystem.*

*Individuals and global teams transact real-time data and coordinate their activities via guided workflows while managers maintain visibility and control from thirty-thousand feet.*



Bye-bye spreadsheets. Hello **GRiD**.



## Need a smart<sup>er</sup> way to manage your inventory?

*Bye-bye Spreadsheets. Hello GRiD.*

### ENGINEERING

From part number management to hierarchical bills of materials and a change request workflow, engineers can configure their foundational profiles and constraints.

### MANUFACTURING

From inventory acquisition to inspection, assembly to deployment, and repair to retirement, manufacturing teams use GRiD to coordinate their shop floor. Full transactional history is maintained for audit and compliance, while integrated part number management, version control and assembly configurations seamlessly avoids errors in purchasing, inspection, and manufacturing.

*No more costly mistakes.*

### PURCHASING

Adding inventory couldn't be easier. Utilize purchase requisitions along with approval workflows, handle partial receipts, or quick-add new serialized or non-serialized items.

### SALES

Create a professional proposal in minutes and automatically convert it into a sales order. The sales team will see a dramatic improvement in their productivity while managers ensure control and consistency by configuring global pricing and discount rules.

### INVENTORY CONTROL & REAL-TIME TRACKING

GRiD's foundation is inventory control. From acquisition to sale or deployment, serialized items to non-serialized items, shipments to status updates, barcoding, and real-time location and condition tracking via satellite or cellular, an asset's entire lifecycle is managed with complete transactional auditability. You will always know where things are, in addition to current status details, manufacturing and deployment history.

GRiD software can be implemented into any organization without the need for existing workflows, procedures, or protocols to be changed. GRiD adapts to your business--not the other way around.

### CRM

GRiD is the single source of truth for operational contact management. Manage your customer and vendor relationships. Neatly linked to proposals, projects, purchase and sales transactions, deployment, and repair history, each customer and vendor profile provides quick access to relevant transactional history within the system.

### PROJECT MANAGEMENT

Finally, a team project management tool that isn't too difficult to learn, does what really needs to be accomplished, and links to real-world data and activities. From time and task management to milestones, resource utilization to scheduling, and notifications to profitability analysis, it only makes sense to integrate a full-featured project management system within GRiD.

### PERFORMANCE TRACKING

GRiD tracks field performance and hosts intelligence and mapping tools for engineers and operations professionals to use to analyze various tool reliability and performance metrics. On-the-fly MTBF analysis, configurable tripometers, and morning coffee emails help everyone stay on top of what really matters.

### SR&ED

GRiD manages projects and related transactions to support an SR&ED claim. A built-in eligibility wizard helps identify projects and activities to allow for simple claim development and auditable support.

### DASHBOARDS

GRiD greets each user with a friendly and colorful welcome screen that displays their accessible modules, personal work queue, assigned tasks, and various analytics to maximize their productivity.

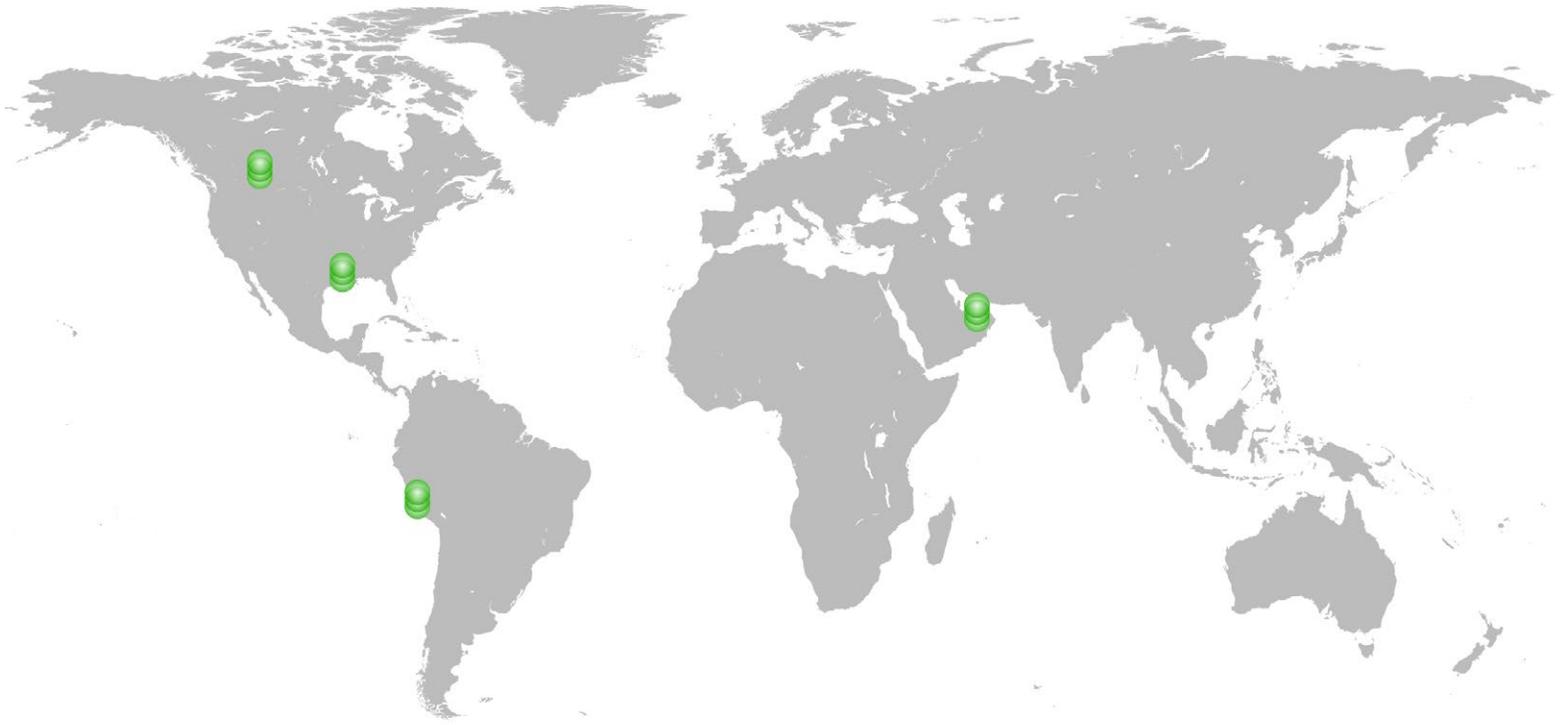
### OTHER BENEFITS & DETAILS

- Import existing data
- Integrated training videos
- Supports multiple locations and divisions
- Real-time email notifications & alerts
- \* Maps / QuickBooks® integration
- Real-time asset tracking via GPS or mobile
- Role / group-based security
- Cloud (no hardware required) or onsite database
- Data exchange with other applications
- Automatic enhancements and updates
- Bank-level security (SSL)
- Brandable application and reports

\* Optional



## Connect With Us



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