



INNOVA
Drilling & Intervention

Innova Engineering Jar Placement Module

How to Guide

Rev 1.1

Contents

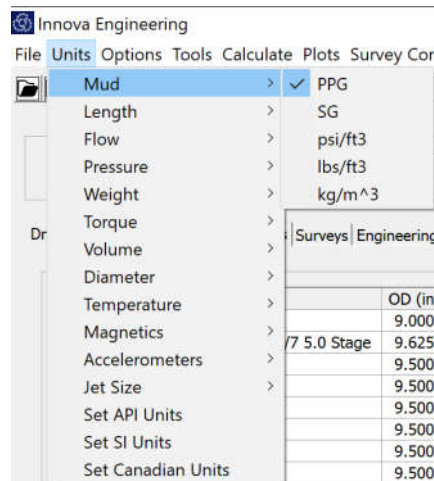
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1.0 – Getting Started

This document describes the jar placement module within Innova Engineering and details the steps required to correctly utilise its functionality.

1.1 – Units

- **Units:** Ensure that all of the units are correctly selected, based on requirements.



1.2 – Jar Placement Data Input Sequence

It is suggested that data is input in the following order to increase input efficiency. This is however, just a guide and the user can deviate from this sequence should they wish.

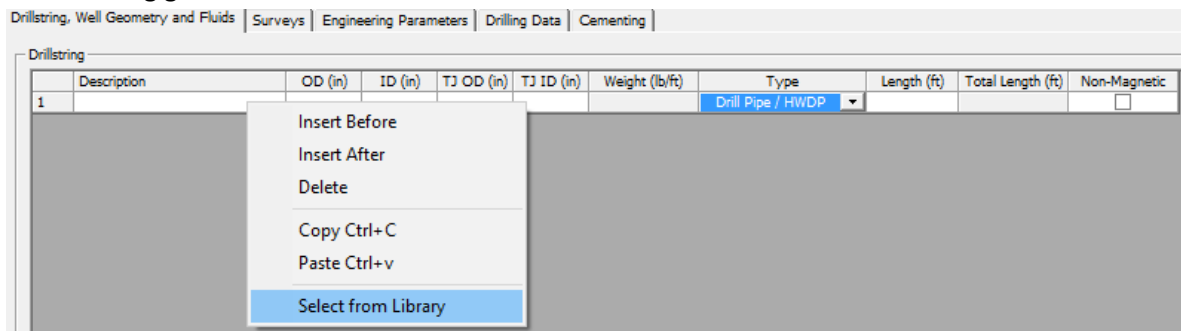
1. Input data in the Drill String table.
2. Input data in the Components Details table for each component.
3. Input the Well Geometry
4. Input the Mud Weight
5. Input the survey data into the Well Plan or Actual Surveys table.
6. Input the Flow Rate
7. Input the Calc Depth in the Torque and Drag section
8. Input WOB Rotate
9. Input Block Weight
10. Input Overpull if applicable
11. Select Tools > Jar Placement

1.3 – Required Inputs

To utilise the jar placement functionality, the following inputs are required.

Drill string, Well Geometry & Fluids Tab

- **Drill String:** Input the assembly as accurately as possible including the drill pipe to surface (note, for the last component e.g. DP to surface, the user does not have to input the exact length as the program will do this automatically based on the calculation depth. Inputting a nominal value of 10 is fine). Note that once a component type has been selected, it is possible to right click on the line and choose "**select from Library**", which will open the components library. The user can then select the appropriate component and insert it directly into the drill string grid.



- **Bit TFA:** The bit TFA is required to calculate the pressure drop at the bit, which is used in the **pump open force** calculation. This is entered in the bit component details section.

Component Details	BHA Weight (Buoyed)
SN	12601188
Gauge OD (in)	17.500
TFA (sq in)	1.2080
Connection Top	7 5/8R

- **Mandrel Area:** The mandrel area of the jar. Sometimes referred to as the pump open area. Used when calculating the **pump open force**. This needs to be input in the jar component details section.

Component Details	BHA Weight (Buoyed)
Connection Bottom	6 5/8R
Tensile Yield (klbs)	
Torsional Yield (kftlbs)	
Latch Up (klbs)	
Latch Down (klbs)	
Impulse (klbs/s)	
Mandrel Area (sqin)	6.500
Stroke Length (in)	7.000

- **Stroke Length:** The Free Stroke length of the jar. The stroke length of the jar controls the amount of time it takes for the hammer to hit the anvil, the longer the stroke the more time the hammer has to accelerate. Typical stroke lengths vary between 7 – 12". It should be noted that the stroke length reported by the manufacturers is usually the total stroke length and should be halved for the purposes of this calculation. This needs to be input in the jar (and accelerator if included) component details section.
- **Well Geometry:** Input casing, liner, riser and open hole details including depths and ID's. For open hole, the ID is the OD of the bit. Note that the user should only enter the well geometry which is relevant for the section in question and should not enter the entire casing string here.

The open hole MD value entered here, is the value used for **Hole Depth** in the jar placement dialog, which dictates the deepest bit measured depth used in the neutral point results.

Well Geometry					
	Type	MD (m)	TVD (m)	ID (in)	OD (in)
1	Riser	1292.00	1292.000	18.75	21.250
2	Casing	2280.00	2166.130	18.38	20.000
3	Open Hole	4300.00	3649.166	17.50	17.500

- **Mud Weight:** This is required for calculating the **buoyancy factor**.

Fluid properties	
Mud Weight (ppg)	9.5

Surveys Tab

- **Survey Selection:** Jar placement calculations will be run using plan or survey data entered in the **Well Plan** table. In the absence of data in the Well Plan table, data from the **Actual Surveys** table will be used. Data can be input as measured depth, inclination and azimuth in both the Actual Surveys and Well Plan sections, and the program will generate the rest of the numbers using whichever survey calculation method has been selected (Minimum Curvature Default). Jar placement **cannot** be run against surveys input in the RAW surveys table. Either enter the plan or surveys manually, import them or copy and paste the data directly into the cells.

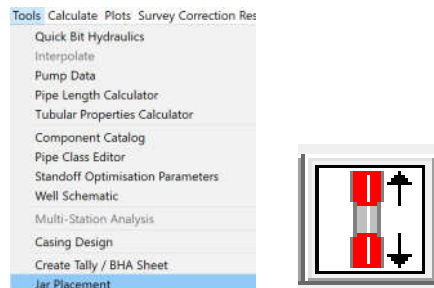
Survey Selection	
Well Plan	
Actual Surveys	
Well Plan	
Raw Surveys	

Engineering Parameters Tab

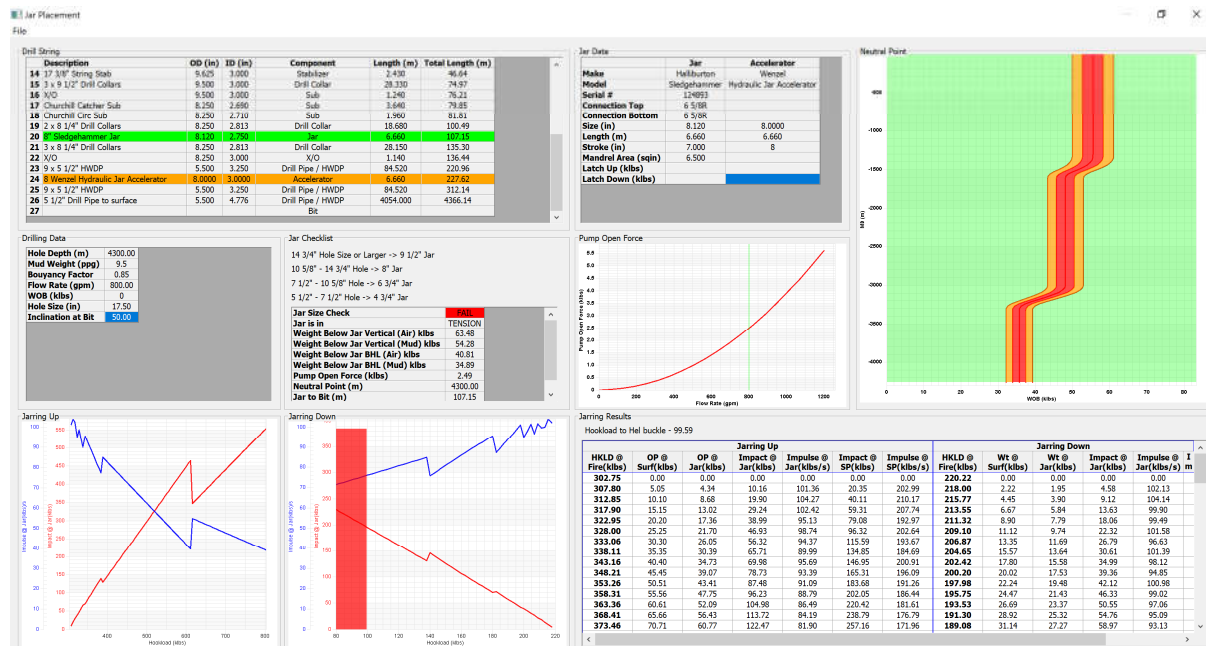
- **Flow rate:** If manual flow increment is selected, the first flow rate entered will be used in the calculation. If the automatic range is selected, the flow rate entered in line 3 will be used. The flow rate is used in the **Pump Open Force** calculation.
- **Torque and Drag Calc Depth:** The value input here will dictate the bit measured depth used in the **Jarring Results** table.
- **WOB Rotate:** The value input here will display in the WOB cell in the Jar Placement dialogs **Drilling Data** section. This is used in the **neutral point calculation**.
- **Block Weight:** Block weight entered here will be added to the values in the **HKLD Fire** column in the **Jarring Results** section.
- **Overpull:** If no overpull is specified the jarring results will be calculated for an overpull up to 500 klbs (250 Tons). If an overpull is specified the jarring results will be calculated up to the overpull value x 2

2.0 – Running the Calculation

Once the user has entered all the required inputs, the jar placement calculations are carried out automatically when the user opens the Jar Placement dialog via **Tools > Jar Placement** or selecting the icon from the toolbar.



3.0 – Jar Placement Dialog



The Jar Placement dialog displays all the information and results relevant to the jar placement module.

3.1 - Drill String

Drill String					
Description	OD (in)	ID (in)	Component	Length (m)	Total Length (m)
14 17 3/8" String Stab	9.625	3.000	Stabilizer	2.430	46.64
15 3 x 9 1/2" Drill Collars	9.500	3.000	Drill Collar	28.330	74.97
16 X/O	9.500	3.000	Sub	1.240	76.21
17 Churchill Catcher Sub	8.250	2.690	Sub	3.640	79.85
18 Churchill Circ Sub	8.250	2.710	Sub	1.960	81.81
19 2 x 8 1/4" Drill Collars	8.250	2.813	Drill Collar	18.680	100.49
20 8" Sledgehammer Jar	8.120	2.750	Jar	6.660	107.15
21 3 x 8 1/4" Drill Collars	8.250	2.813	Drill Collar	28.150	135.30
22 X/O	8.250	3.000	X/O	1.140	136.44
23 9 x 5 1/2" HWDP	5.500	3.250	Drill Pipe / HWDP	84.520	220.96
24 8 Wenzel Hydraulic Jar Accelerator	8.0000	3.0000	Accelerator	6.660	227.62
25 9 x 5 1/2" HWDP	5.500	3.250	Drill Pipe / HWDP	84.520	312.14
26 5 1/2" Drill Pipe to surface	5.500	4.776	Drill Pipe / HWDP	4054.000	4366.14
27			Bit		

Non-editable display of the drill string entered in the Drill String section of the main UI. Jars are highlighted in green and accelerators in orange.

3.2 - Jar Data

Jar Data		
	Jar	Accelerator
Make	Halliburton	Wenzel
Model	Sledgehammer	Hydraulic Jar Accelerator
Serial #	124893	
Connection Top	6 5/8R	
Connection Bottom	6 5/8R	
Size (in)	8.120	8.0000
Length (m)	6.660	6.660
Stroke (in)	7.000	8
Mandrel Area (sqin)	6.500	
Latch Up (klbs)		
Latch Down (klbs)		

Non-editable display of the jar and accelerator component details entered in the Drill String section of the main UI. Only **Stroke** and **Mandrel Area** affect the jar placement results. All other cells are for reference only.

- **Stroke:** This is the free stroke length and is used in the impact and impulse calculations.
- **Mandrel Area:** Is used in the pump open force calculation.

3.3 - Drilling Data

Drilling Data	
Hole Depth (m)	4300.00
Mud Weight (ppg)	9.5
Bouyancy Factor	0.85
Flow Rate (gpm)	800.00
WOB (klbs)	0
Hole Size (in)	17.50
Inclination at Bit	50.00

Non-editable display of drilling data used in the jar placement calculations.

- **Hole Depth:** Value taken from the deepest MD entered in the Well Geometry section of the main UI. Dictates the deepest depth that the neutral point calculation is run.
- **Mud Weight:** Value from the Fluid Properties, Mud Weight cell. Used in the buoyancy factor calculation.
- **Bouyancy Factor:** Calculated using the below formula.

$$BF = 1 - (MW/k)$$

Where BF is buoyancy factor, MW is mud weight and k is a (mud weight unit dependant) constant. Buoyancy factor is used in the neutral point and jarring results calculations.

- **Flow Rate:** Value from the Engineering Parameters tab. If manual flow increment is selected, the first flow rate entered will be used in the calculation. If the automatic range is selected, the flow rate entered in line 3 will be used. Used in the pump open force calculation.
- **WOB:** Value from Torque and Drag sections WOB Rotate cell. Used in the neutral point calculation.
- **Hole Size:** Value from Well Geometry, Open Hole, ID cell. Used in the **Jar Size Check** and **Jarring Results** calculations.
- **Inclination at Bit:** Interpolated inclination from the survey listing at the **Hole Depth**. Used in the **Weight Below Jar BHL (Air)/(Mud)** calculation.

3.4 – Jar Checklist

Jar Checklist	
14 3/4" Hole Size or Larger -> 9 1/2" Jar	
10 5/8" - 14 3/4" Hole -> 8" Jar	
7 1/2" - 10 5/8" Hole -> 6 3/4" Jar	
5 1/2" - 7 1/2" Hole -> 4 3/4" Jar	
Jar Size Check	FAIL
Jar is in	TENSION
Weight Below Jar Vertical (Air) klbs	63.48
Weight Below Jar Vertical (Mud) klbs	54.28
Weight Below Jar BHL (Air) klbs	40.81
Weight Below Jar BHL (Mud) klbs	34.89
Pump Open Force (klbs)	0.00
Neutral Point (m)	4300.00
Jar to Bit (m)	107.15

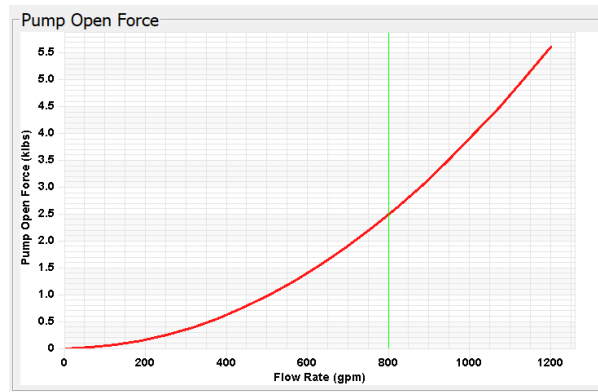
Non-editable display of calculated data.

- **Jar Size Check:** A pass or fail check based upon the jar size and the hole size. This is to confirm that the correct OD jar has been chosen for the given hole size. Note that a Fail in this cell has **NO** effect on the jarring calculations, which will be run regardless. All this cell does is highlights to the user if the size of the jar selected is suitable for the hole size based on a checklist which can be fully edited by the user. This is a warning and no more.
- **Jar is in: TENSION or COMPRESSION.** Based upon the input data, this cell shows whether the jar is currently in tension or compression.
- **Weight Below Jar Vertical (Air):** The weight below the jar in a vertical well in the absence of a drilling fluid. Calculated by the sum of the component weights (input in the Drill String section of the main UI) beneath the jar.
- **Weight Below Jar Vertical (Mud):** The weight below the jar in a vertical well, taking in to account the buoyancy effect of the drilling fluid. Calculated by multiplying the Weight Below Jar Vertical (Air) by the buoyancy factor.
- **Weight Below Jar BHL (Air):** The weight below the jar at the bottom hole location (the bit depth) in the absence of a drilling fluid. Calculated by multiplying the Weight Below Jar Vertical (Air) by the cosine of the Inclination at Bit.
- **Weight Below Jar BHL (Mud):** The weight below the jar at the bottom hole location (the bit depth), taking in to account the buoyancy effect of the drilling fluid. Calculated by multiplying the Weight Below Jar Vertical (Mud) by the cosine of the Inclination at Bit.
- **Pump Open Force:** The force generated by the flow of drilling fluid through the BHA that acts to open the jar. Calculated by the bit pressure loss multiplied by the Mandrel Area.
- **Neutral Point:** The MD of the point in the drill string that transitions from compression to tension based upon the input data. This is directly affected by the WOB.
- **Jar to Bit:** The distance from the top of the jar to the face of the bit.
- **Accelerator to Bit:** The distance from the top of the accelerator to the face of the bit.

3.5 – Pump Open Force Chart

The pump open force chart displays the pump open force versus the flow rate. The green vertical line depicts the currently selected flow rate.

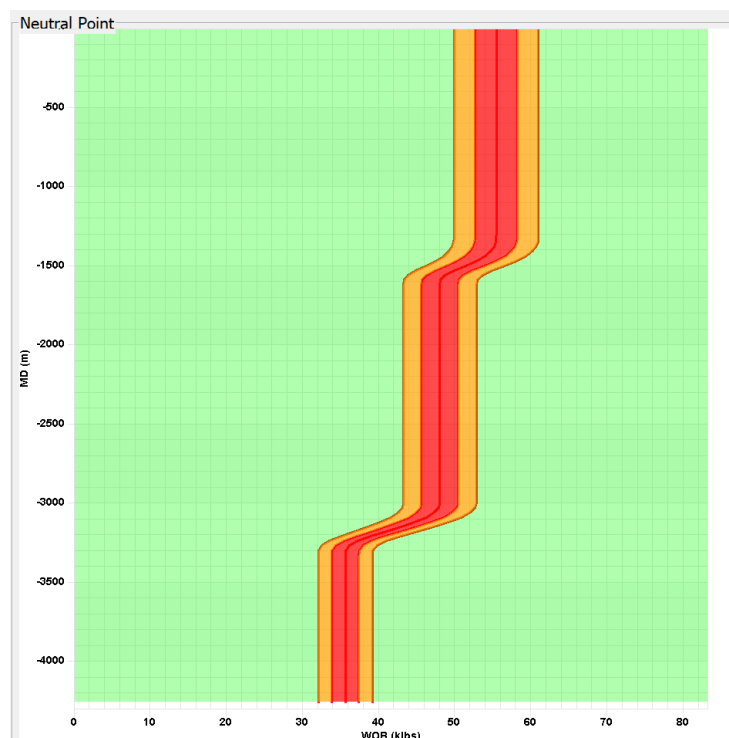
For details on adjusting the chart settings see **Appendix A – Context Menu**.



3.6 – Neutral Point Road Map

The neutral point chart is a neutral point road map, which shows the WOB to avoid at every depth along the well path. The centre of the red area represents the neutral point. The red section represents a $\pm 5\%$ safety margin, and the orange area represents a $\pm 10\%$ safety margin. This gives the personnel on the job a WOB range to avoid for any given MD along the entire well path. Note that the 5% and 10% margins are the default values, but these can be changed based on user requirements via the **settings menu**.

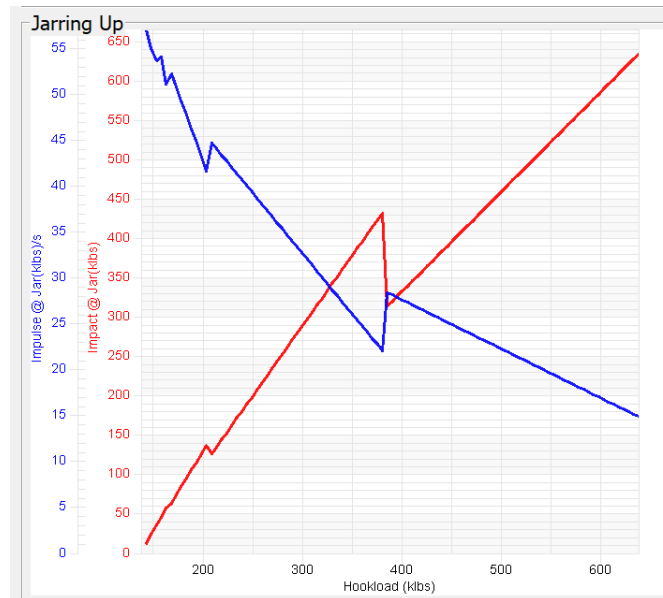
For details on adjusting the chart settings see **Appendix A – Context Menu**.



3.7 – Jarring Up Chart

The jarring up chart displays the calculated jarring up impulse and impact at the jar, versus hook load.

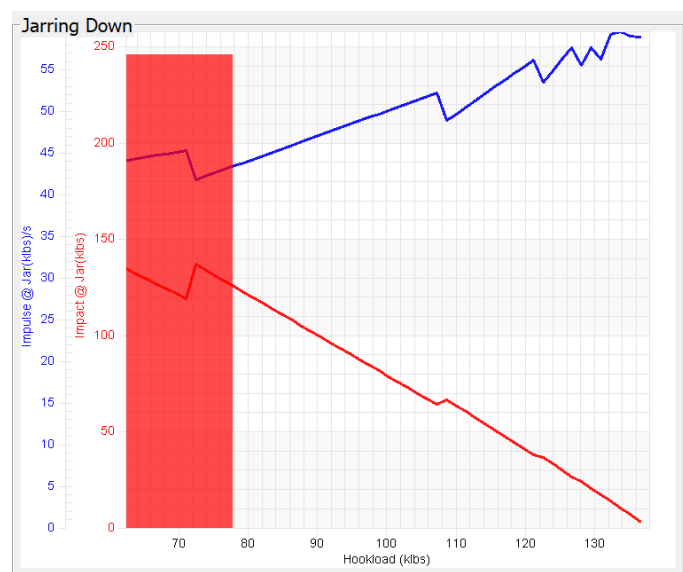
For details on adjusting the chart settings see **Appendix A – Context Menu**.



3.8 – Jarring Down Chart

The jarring down chart displays the calculated jarring down impulse and impact at the jar, versus hook load. The area shaded in red indicates the hook load range in which the string is modelled as being helically buckled. The buckling will occur at some point in the drill string above the jar and simply indicates that it may not be possible to transmit the required weight to cock / fire the jar. This range is indicated in the jarring results table by lines highlighted in Orange.

For details on adjusting the chart settings see **Appendix A – Context Menu**.



3.9 – Jarring Results Table

Jarring Results
Hookload to Hel buckle - 77.87

Jarring Up							Jarring Down						
HKLD @ Fire(klbs)	OP @ Surf(klbs)	OP @ Jar(klbs)	Impact @ Jar(klbs)	Impulse @ Jar(klbs/s)	Impact @ SP(klbs)	Impulse @ SP(klbs/s)	HKLD @ Fire(klbs)	Wt @ Surf(klbs)	Wt @ Jar(klbs)	Impact @ Jar(klbs)	Impulse @ Jar(klbs/s)	Impact @ SP(klbs)	Impulse @ SP(klbs/s)
137.85	0.00	0.00	0.00	0.00	0.00	0.00	137.85	0.00	0.00	0.00	0.00	0.00	0.00
142.90	5.05	5.05	12.79	57.14	25.68	114.76	136.46	1.39	1.39	3.58	58.97	7.15	117.96
147.95	10.10	10.10	24.91	55.04	50.40	111.38	135.07	2.78	2.78	7.12	59.09	14.26	118.37
153.00	15.15	15.15	36.32	53.71	74.11	109.59	133.68	4.18	4.18	10.58	59.64	21.24	119.78
158.05	20.20	20.20	46.14	54.14	95.51	112.08	132.28	5.57	5.57	13.96	59.23	28.12	119.29
163.11	25.25	25.25	57.67	51.22	119.39	106.03	130.89	6.96	6.96	17.45	56.28	35.15	113.35
168.16	30.30	30.30	63.52	52.34	135.08	111.31	129.50	8.35	8.35	20.60	57.64	41.69	116.64
173.21	35.35	35.35	74.11	50.82	157.59	108.08	128.11	9.75	9.75	24.03	55.56	48.63	112.44
178.26	40.40	40.40	84.69	49.31	180.10	104.85	126.71	11.14	11.14	26.70	57.62	54.48	117.57
183.31	45.45	45.45	95.28	47.79	202.62	101.63	125.32	12.53	12.53	30.04	56.27	61.30	114.80
188.36	50.51	50.51	105.86	46.27	225.13	98.40	123.93	13.92	13.92	33.38	54.91	68.11	112.03
193.41	55.56	55.56	116.45	44.75	247.64	95.17	122.54	15.32	15.32	36.72	53.55	74.92	109.26
198.46	60.61	60.61	127.04	43.24	270.16	91.95	121.14	16.71	16.71	38.16	56.16	79.00	116.26
203.51	65.66	65.66	137.62	41.72	292.67	88.72	119.75	18.10	18.10	41.34	55.36	85.58	114.59
208.56	70.71	70.71	148.21	40.20	315.19	85.50	118.36	19.49	19.49	44.52	54.55	92.17	112.93
213.61	75.76	75.76	158.80	38.68	337.71	82.28	116.97	20.89	20.89	47.70	53.74	98.75	111.26
218.66	80.81	80.81	169.39	37.16	360.23	79.05	115.57	22.28	22.28	50.88	52.94	105.33	109.59
223.71	85.86	85.86	179.98	35.64	382.75	75.82	114.18	23.67	23.67	54.06	52.13	111.92	107.92
228.76	90.91	90.91	190.57	34.12	405.27	72.60	112.79	25.06	25.06	57.24	51.33	118.50	106.25
233.81	95.96	95.96	201.16	32.60	427.79	69.38	111.40	26.46	26.46	60.42	50.52	125.08	104.58
238.86	101.01	101.01	211.75	31.08	450.31	66.15	110.00	27.85	27.85	63.60	49.71	131.67	102.91
243.91	106.06	106.06	222.34	29.56	472.83	62.93	108.61	29.24	29.24	66.78	48.91	138.25	101.25
248.96	111.11	111.11	232.93	28.04	495.35	59.70	107.22	30.63	30.63	69.96	48.11	144.83	99.58
254.01	116.16	116.16	243.52	26.52	517.87	56.48	105.83	32.03	32.03	73.14	47.31	151.41	97.91
259.06	121.21	121.21	254.11	25.00	540.39	53.25	104.43	33.42	33.42	76.32	46.51	157.99	96.24
264.12	126.26	126.26	264.70	23.48	562.91	50.03	103.04	34.81	34.81	79.50	45.71	164.57	94.57
269.17	131.31	131.31	275.29	21.96	585.43	46.80	101.65	36.20	36.20	82.68	44.91	171.15	92.90
274.22	136.36	136.36	285.88	20.44	607.95	43.58	100.26	37.60	37.60	85.86	44.11	177.73	91.23
279.27	141.41	141.41	296.47	18.92	630.47	40.35	98.86	38.99	38.99	89.04	43.31	184.31	89.56

The jarring results table showing the results of the jarring calculations. These results are the source of the data that is plotted in the **Jarring Up** and **Jarring Down** charts. Note, that in the jarring down section of the results table, any lines which are highlighted in orange, indicate the hook load range in which the string is modelled as being **helically** buckled. The buckling will occur at some point in the drill string above the jar and simply indicates that it may not be possible to transmit the required weight to cock / fire the jar. This range is represented in the jarring down chart by the red shaded area.

- **HKLD @ Fire:** The surface hook load used to fire the jar This takes in to account the string weight and pick up forces which need to be overcome before the jar starts to have overpull applied. The calculation assumes **CHFF 0.15** and **OHFF 0.25**.
- **OP @ Surf:** The overpull registered at surface for a given hook load.
- **OP @ Jar:** The overpull at the jar for a given hook load. This takes in to account the effects of drag.
- **Wt @ Surf:** The weight registered at surface for a given hook load.
- **Wt @ Jar:** The weight at the jar for a given hook load. This takes in to account the effects of drag.
- **Impact @ Jar:** The impact at the jar resulting from the jar firing when the associated hook load is registered at surface. Calculated utilising the length of the drill collars above the jar, the stroke length of the jar, the overpull/weight applied and the drag in the hole.
- **Impulse @ Jar:** The impulse at the jar resulting from the jar firing when the associated hook load is registered at surface. Calculated as the integral of impact force with respect to time.
- **Impact @ SP:** The impact at the stuck point (the bit) resulting from the jar firing when the associated hook load is registered at surface. Calculated utilising the length of the drill collars above the jar, the stroke length of the jar, the overpull/weight applied, the drag in the hole and the distance between the jar and the stuck point.
- **Impulse @ SP:** The impulse at the stuck point (the bit) resulting from the jar firing when the associated hook load is registered at surface. Calculated as the integral of impact force with respect to time.

4.0 – Outputs

Within the Jar Placement dialog, the user can output the following via the **File Menu**:

- Jar placement report
- The jarring results table data
- Any of the charts present.



4.1 - Print Report

The user selects **File > Print Report**. This generates a report which can be saved to pdf format.



The report includes all the data and charts displayed within the Jar Placement dialog.

4.2 - Print Results Grid to Text File

Exports the data in the Jarring Results table in a **.txt** file format.

File Edit Format View Help
Jar Placement Results

Jarring Up

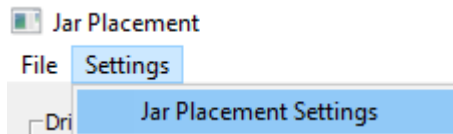
WOB @ Fire(kN/s)	OP @ Fire(kN/s)	OP @ Surf(kN/s)	OP @ Jar(kN/s)	Impact @ Jar(kN/s)	Impulse @ Jar(kN/s)	Impact @ SP(kN/s)	Impulse @ SP(kN/s)	WOB @ Fire(kN/s)
206.20	6.80	6.80	6.80	22.84	22.84	6.80	6.80	206.20
209.52	5.85	4.34	18.99	59.17	128.84	2.18	59.87	9.88
206.27	29.38	14.68	21.42	57.15	123.65	4.30	57.72	129.38
309.62	55.15	13.82	31.22	55.79	63.69	113.82	289.38	6.34
214.08	28.28	12.36	35.45	55.79	82.89	123.48	287.12	6.73
133.73	25.25	22.78	49.57	53.27	180.62	138.28	284.94	18.98
124.08	28.28	35.45	55.79	123.48	180.60	287.78	13.88	11.45
129.83	25.25	38.29	63.69	62.32	175.45	123.26	288.38	15.26
216.26	38.29	56.77	72.78	51.26	188.40	188.40	17.44	12.75
127.25	28.28	38.29	63.69	62.32	175.45	123.26	288.38	15.26
144.08	58.51	61.41	98.99	88.48	193.58	182.93	144.64	21.88
158.88	55.54	67.75	188.99	67.88	212.85	188.36	21.88	18.88
155.88	68.41	52.89	188.99	45.88	212.28	97.19	189.48	26.16
168.13	61.46	61.41	118.29	66.41	210.15	96.41	182.45	15.41
165.18	78.71	68.77	127.19	43.19	278.98	91.84	181.32	36.52
179.13	71.76	61.18	136.48	41.88	286.25	89.47	181.13	32.78
171.28	88.81	88.42	123.97	46.48	278.48	88.86	178.56	36.88
189.13	85.86	73.79	131.72	44.37	295.89	99.47	178.77	37.86
186.18	96.86	78.24	136.47	42.88	311.36	136.56	176.56	36.78
188.41	95.86	82.48	147.22	43.22	338.78	97.89	174.41	41.42
185.48	185.81	85.81	154.47	42.82	368.11	95.88	172.23	43.88
400.53	186.41	76.16	162.72	42.88	361.51	94.16	174.85	40.87
405.58	181.81	85.81	178.44	41.88	382.82	91.23	177.78	40.86
415.88	128.25	98.84	178.22	48.37	408.32	91.84	181.58	41.78
415.88	123.25	184.58	181.76	48.35	423.73	96.45	181.51	42.12
425.79	123.25	184.58	181.76	48.35	423.73	96.45	181.51	42.12
425.79	123.25	123.25	281.46	39.25	452.54	98.48	181.51	42.12
428.84	126.36	127.28	289.21	38.44	469.94	85.79	181.57	42.12
435.89	144.41	123.54	235.86	38.86	487.75	85.88	181.57	42.12
438.84	146.86	128.88	224.78	37.49	506.75	84.21	181.61	42.12
449.89	153.52	138.23	232.45	36.52	522.16	82.59	184.43	42.12
451.88	158.19	136.18	248.38	36.16	539.56	81.44	184.25	42.79
458.89	168.87	138.23	247.78	35.77	558.97	80.15	184.87	42.77
461.44	168.47	143.25	255.78	35.28	578.37	79.86	184.87	42.77
468.18	171.72	145.19	263.45	34.62	597.78	77.77	184.71	42.12
471.28	176.77	151.25	271.19	34.85	618.19	76.48	185.55	76.16
478.29	181.81	158.27	278.84	33.48	638.59	75.28	187.35	76.49
481.56	188.87	168.41	286.49	32.88	660.88	73.91	187.17	88.47
486.18	191.88	168.41	286.49	32.31	683.48	72.42	187.88	88.47
491.88	200.87	173.15	289.34	31.18	706.25	70.84	188.63	87.21
496.89	208.87	188.29	292.19	31.75	729.81	69.25	189.42	87.21
506.89	213.12	182.52	324.41	38.81	751.82	67.47	189.27	87.21
511.42	221.27	188.46	331.48	39.56	776.43	65.18	189.49	152.88
516.78	222.22	191.88	340.93	38.89	793.83	64.80	191.93	88.22
521.75	227.27	196.54	348.48	38.16	812.24	63.40	192.73	88.22
526.88	232.32	199.48	356.43	37.75	830.64	62.12	193.55	100.29
531.85	237.37	204.82	364.48	37.17	849.05	61.80	193.37	100.27
536.98	242.42	208.36	371.92	36.99	867.45	60.49	193.19	100.45

4.3 - Export Charts

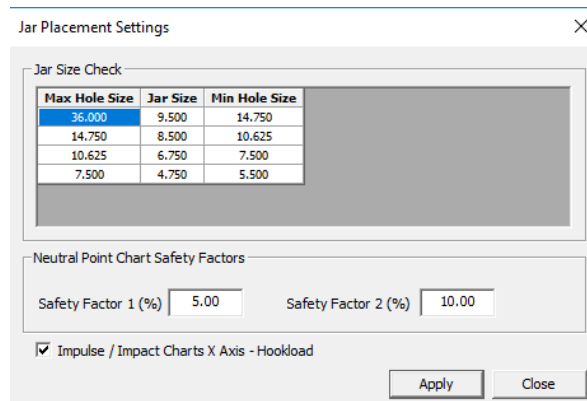
Additionally, the user can export any of the charts individually using the right click context menu and selecting **Export Dialog**. For more information on exporting charts see **Appendix A – Context Menu**.

5.0 – Settings Menu

The settings Menu gives the user access to the Jar Placement Settings dialog.



The Jar Placement Settings dialog is where the user can adjust the jar check size and neutral point chart safety factors.



Jar Check Size: The user can enter the jar sizes and the relevant minimum and maximum hole sizes the jars are suitable to be run in. This information will be displayed on the main Jar Placement dialog in the jar checklist section. These sizes will also be used by the program for the **Jar Size Check**, where the user will be informed if the jar they have entered into the drill string is suitable, based on the hole size selected.

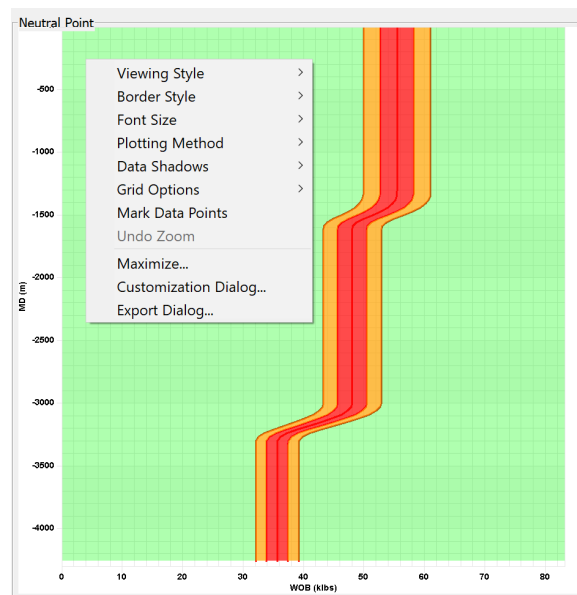
Neutral Point Safety Factors: The safety factors entered here are represented on the neutral point chart on the main Jar Placement dialog.

- Safety factor 1 is represented by the red highlighted area
- Safety factor 2 is the orange area displayed on either side of the neutral point line.

The default values are 5% and 10% respectively but can be changed here, as per the user's requirements.

Impulse/Impact Charts X Axis Hookload: When checked, the X axis of the Jarring Up and Down charts will represent the Hookload at surface. If unchecked, the X axis will represent the relevant Overpull (Jarring Up) and Slack Off (Jarring Down) values.

Appendix A – Context Menu



The context menu is available in every plot by right clicking anywhere on the plot. This allows the user to change certain aspects of the plot based on their requirements. It should be noted that almost all of the functions available in this menu, are also available in the **Chart Properties**.

Viewing Style – Allows the user to select the desired Chart style.

Border Style – Allows the user to select the desired Border style of the chart.

Font Size – Allows the user to select the desired font size, which will affect all fonts on the chart including title and axis labels. Large, Medium or Small.

Plotting Method – Allows the user to select the way the line is plotted: Point, Line, Bar, Points + Line, Spline Area.

Data Shadows – Allows the user to select between off, shadow and 3D.

Grid Options – Allows the user to change the grid options in the chart.

Mark Data Points – Adds the data points relating to the data labels

Undo Zoom – Resets the zoom on the chart. Pressing the Z button has the same effect.

Maximise – Maximises the chart to fill the screen. Escape button exits this view.

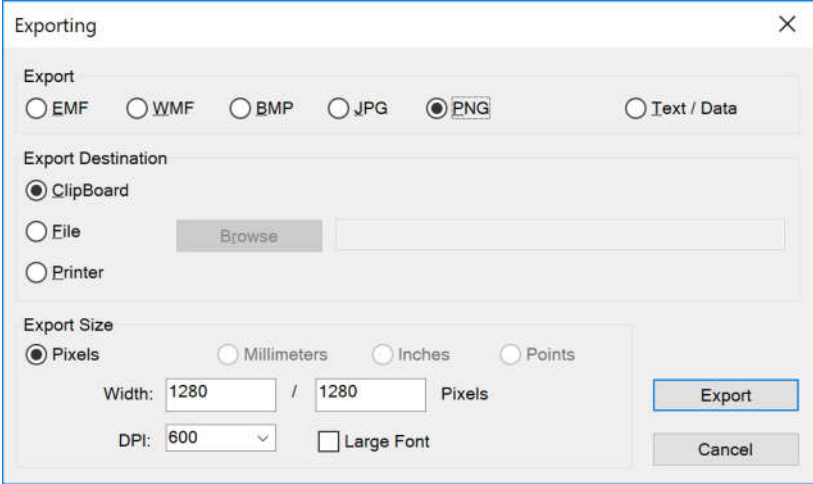
Customization Dialog – Opens a dialog with more user definable chart options.

Export Dialogue – Allows the user to Export the chart using multiple image formats: EMF, WMF, BMP, JPG and PNG. The user has 3 options:

- **Clipboard:** exports directly to clipboard, allowing images to be quickly added to word, excel & PowerPoint documents

- **File:** Creates an image file of the chart which can be used on its own or imported into any suitable document
- **Printer:** Sends the chart to the printer

The user can also choose the relevant Width, Pixels and DPI to use for the export. For Clipboard and File options, Pixels is the only available selection. When Printer is selected, the Millimeters, Inches and Points options become available to select.



The image shows a software dialog box titled "Exporting" with a close button (X) in the top right corner. The dialog is organized into three main sections: "Export", "Export Destination", and "Export Size".

- Export:** Contains five radio button options: EMF, WMF, BMP, JPG, and PNG (which is selected). There is also a "Text / Data" option.
- Export Destination:** Contains three radio button options: Clipboard (selected), File, and Printer. The "File" option is accompanied by a "Browse" button and an empty text field.
- Export Size:** Contains three radio button options: Pixels (selected), Millimeters, Inches, and Points. Below these are input fields for "Width" (set to 1280) and "Height" (set to 1280), followed by the unit "Pixels". There is also a "DPI" dropdown menu set to 600 and a checkbox for "Large Font".

At the bottom right of the dialog are two buttons: "Export" and "Cancel".