## **KellyDown Tips**

Periodic tips to help you use KellyDown more effectively

## **Using the KellyDown Motor Yield Calculator**

The KellyDown **Motor Yield Calculator** was recently incorporated into KellyDown. In its basic form, it is used to calculate the Slide Distance required when drilling a section of hole in order to achieve a specific dogleg rate given the Slide Length, Rotate Length and resultant Dogleg Rate over a previously drilled section of hole. However, it is much more than a simple Motor Yield Calculator when used in conjunction with the **Slide Sheet Editor** and either the **Correction Run** module or the **Ouija Board** module.

1. When used in its basic form, enter the **Slide Length**, **Rotate Length** and **Dogleg Rate** over Interval for the previously drilled section of hole and KellyDown calculates the resultant **Motor Yield**.

KD Motor Yield		- • ×
Motor Yield Calculator		
Slide Length:	15.00	ft
Rotate Length:	75.00	ft
Dogleg Rate over Interval:	1.750	°/100ft
Motor Yield:	10.500	°/100ft
Slide Length Calculator		
Motor Yield:	10.500	°/100ft
Stand Length:	0.00	ft
Required Dogleg Rate:	0.000	°/100ft
Slide Distance:	0.00	ft
Slide Percent:	0	%

2. Enter the **Stand Length** and the **Required Dogleg Rate** for the next drill stand (or section) and KellyDown calculates the **Slide Distance** and the **Slide Percent** for the section.

KD Motor Yield		
Motor Yield Calculator		
Slide Length:	15.00	ft
Rotate Length:	75.00	ft
Dogleg Rate over Interval:	1.750	°/100ft
Motor Yield:	10.500	°/100ft
Slide Length Calculator		
Motor Yield:	10.500	°/100ft
Stand Length:	88.75	ft
Required Dogleg Rate:	3.500	°/100ft
Slide Distance:	29.58	ft
Slide Percent:	33	%

- 3. We'll use the *AA16*, *Run #4* in the example database that is installed with KellyDown to demonstrate how the **Motor Yield** module may be used in conjunction with the **Correction Run** module.
- 4. Open the **Correction Run** module and enter **Sensor to Bit Distance** of 51.53ft and a **Course Length** of 3.00ft, a **Dogleg Rate** of 12.800°/100ft and a Toolface of -45° for the first **Bit Projection**. We'll also enter a single Extrapolation of 32.81ft with a Dogleg Rate of 10.000°/100ft and a Toolface of 100°. Finally enter a Correction Dogleg Rate of 3.500°/100ft.

Correction Run	- AA16,	Run #	4												[	×
Bit/TD Projection	I					Se	nsorto Bi	it Di	istance:	51.53	 	Target				
	Measu Dept	ured th	Cour	se gth	Dogl Rat	leg te	Toolfac (°)	æ	Inclination (°)	Azimuth (°)	1	AA16 TD			~	<b>)</b>
	(11)	CC 05	(11)	2.00	(710		45.0	00	00.070	c2 220		Vertical	Depth:		1,596.	45
	5,30	00.00		3.00	12	2.800	-45.0	00	00.272	63.328		No	orthing:		405.12	N
Bit Projection:	0,30	00.00		0.00	0	000	0.0	00	00.272	03.320		E	asting:		4,082.70	) E
	0,30	14 50		0.00	0	000	0.0	00	00.272	63.328		Plane Incli	nation:		90.0	00
	5,4	14.00	4	0.00	10	000	100.0	00	00.272	03.320		Plane A	zimuth:		65.0	00
Extraclation	5,44	47.00	3	0.00	10	000	100.0	00	07.705	00.002			-			
Extrapolation.	5.4	47.35		0.00	0	000	0.0	00	87.705	66 562		Referen	ce Survey	r: [	48	<b>+</b>
	0,4	17.00		0.00			0.0		07.700	00.002						
Measured C Depth (ft)	Course Length (ft)	Inclin (°	ation )	Azin (*	nuth ່)	Ve D	rtical epth (ft)	I	Northings (ft)	Eastings (ft)	;	Dogleg Rate (°/100ft)	Toolface (°)	e	Vertica Section (ft)	al n
Reference Surve	y Data:															
5,363.05		8	8.000	6	3.600	1	,597.86		211.03 N	3,640.3	88 E	7.571	-165.96	59	3,646	5.50
Bit/TD Projection	1:															
5,414.58	51.53	8	8.272	6	3.328	1	,599.42		234.15 N	3,686.4	1 E	0.000	0.00	00	3,693	3.79
Extrapolation:												· · · · · ·				
5,447.39	32.81	8	7.705	6	6.562	1	,600.58		248.03 N	3,716.1	1 E	10.000	100.00	00	3,724	4.24
Bit Projection: 5.366.05 0.00 0.000 0.000 88.272 63.328 Easting: 4.082.70 E 90.000   Bit Projection: 5.414.58 49.53 0.000 0.000 88.272 63.328 Plane Inclination: 90.000   Extrapolation: 5.447.39 32.81 10.000 100.000 87.705 66.562 Plane Azimuth: 65.000   Extrapolation: 5.447.39 0.00 0.000 0.000 87.705 66.562 Reference Survey: 48 9   Measured (t) Course Length (t) Inclination ('') Azimuth ('') Vertical Depth (t) Northings (t) Eastings (t) Toolface (') Vertical Section (')   5.363.05 88.000 63.600 1.597.86 211.03 N 3.640.38 E 7.571 -165.969 3.646.50   Bit/TD Projection: 5.447.39 32.81 87.705 66.562 1.600.58 248.03 N 3.716.11 E 0.000 0.000 3.693.73   Extrapolation: 5.447.39 32.81 87.705 66.56																
5,608.54	161.15	9	2.808	6	8.964	1	,599.86		308.99 N	3,865.2	22 E	3.500	25.2	15	3,876	5.62
End of Correction	5,414.36 51.35 60.2   Extrapolation: 5,447.39 32.81 87.7   End of First Build/Turn: 5,608.54 161.15 92.8   End of Correction Run: 5,742.20 120.70 00.0															
5,747.32	138.78	9	0.000	6	5.000	1	,596.45		363.23 N	3,992.8	37 E	3.500	-125.25	57	4,007	7.20
									Dogleg	Rate (0.010	°/10	Oft to 866.740	0°/100ft):		3.	500
										Course L	engt	h (20.77ft to 2	251.84ft):		299	9.93
							Correspo su	ndi rve	ng measured y should be b	depth on as ack on-track	soci (5,4	ated proposal 455.17ft to 5,8	at which 886.80ft):		5,754	1.86

5. Open the **KellyDown Visualiser** and observe the **Bit Projection**, **Extrapolation** and **Forward Projection** to correct the well back to the plan.



- 6. The correction requires two curved hole sections having dogleg rates of 3.5°/100ft each, one to turn the well back towards the plan and the other to line the well back up with the plan.
- 7. Now look at the **Motor Yield Calculator**. It has translated the two curve sections into slide/rotate sections with the four slide sections having dogleg rates equal to the **Motor Yield** and has displayed the six sections in a grid at the bottom.

KD	Motor Yield						
	Motor Yield Ca	lculator					
		9	lide Length:		15.00	ft	
		Ro	tate Length:		75.00	ft	
	D	logleg Rate o	ver Interval:	-	1.750	°/100	)ft
			Motor Yield:	1	0.500	°/100	)ft
	Slide Length (	alculator					
	Side Length e	alculator	Motor Yield:	1	0 500	°/100	)ff
		9	and Length:	1	61 15	#	
		Required [	)oalea Rate:		3 500	*/100	18
		Cliv	de Distance:		52 72	4	
			ide Demont		22	0/	
		5	ide i ercent.		35	/0	
	Suggested Sli	de/Rotate					
	Bit Depth (ft)	Course Length (ft)	Dogleg Rate (°/100ft)	Toolface (°)	Inclina (°)	ation	Azimuth (°)
	5,447.39				87	7.705	66.562
	5,474.24	26.86	10.500	25.215	90	).257	67.763
	5,581.68	107.43	0.000	0.000	90	).257	67.763
	5,608.54	26.86	10.500	25.215	92	2.808	68.965
	5,631.67	23.13	10.500	-125.257	9	1.405	66.982
	5,724.19	92.52	0.000	0.000	91	1.405	66.982
	5,747.32	23.13	10.500	-125.257	90	0.002	64.999

8. Click on the **Motor Yield** dialog to show the actual sections in the **Visualiser**. If you repeatedly click on the **Correction Run** dialog and then the **Motor Yield** dialog, you will be able to see the difference between the two projections in the **Visualiser**.



- 9. Close the **Survey Editor** and the **Correction Run** and **Motor Yield** modules will also close.
- 10. Now open the **Slidesheet Editor** and open the **Correction Run** module from within the **Slidesheet Editor**. The **Bit to Sensor Distance**, **Slide Ahead**, **Motor Output** and **Toolface** etc. are all transferred from the **Slidesheet Editor** to the **Correction Run** module.
- 11. Now open the **Motor Yield Calculator** and notice that all the values have been transferred from the **Slidesheet Editor** and the **Correction Run** module and the Slide/Rotate sections are immediately displayed in the **Visualiser**.

KC	Motor Yield								
	Motor Yield Ca	alculator							
		9	Slide Length:		13.12	ft			
		Ro	tate Length:		14.11	ft			
	D	logleg Rate o	ver Interval:		4.106	°/100	00ft		
			Motor Yield:		8.519	°/100	)ft		
	-Slide Length C	Calculator							
			Motor Yield:		8.519	°/100	)ft		
		St	and Length:	1	93.47	ft			
		Required D	)ogleg Rate:		3.500 °/100				
		Slic	de Distance:		79.48	ft			
		SI	lide Percent:		41 %				
	Suggested Sli	de/Rotate							
	Bit Depth (ft)	Course Length (ft)	Dogleg Rate (°/100ft)	Toolface (°)	Inclin (*	ation )	Azimuth (°)		
	5,447.39				8	3.049	64.652		
	5,487.13	39.74	8.519	52.775	90	0.099	67.348		
	5,601.12	113.99	0.000	0.000	90	0.099	67.348		
	5,640.86	39.74	8.519	52.775	92	2.146	70.045		
	5,673.03	32.17	8.519	-113.012	9	1.073	67.522		
	5,765.30	92.27	0.000	0.000	9	1.073	67.522		
	5,797.47	32.17	8.519	-113.012	90	0.001	65.000		

12. But that's not all, click on the **View Report** button to view and or print a detailed **Motor Yield Report** including the last five survey records, the projection to the bit, extrapolation and the slide/rotate sequence Agilis Software Solutions Inc.

## Anglian Oil Company Ltd. Northern Lights

Motor Yield Report Report for AA Pad, AA16, Run #4

Measured ( Depth (ft)	Course Length (ft)	inci. (°)	(Grid) Azimuth (°)	Vertical Depth (ft)	Northings (ft)	Eastings (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Toolface (°)	Travelling ( Distance (ft)	Cylinder Highside Direction
Existing S	urvey l	Data									
5,247.46		90.000	64.500	1,597.54	161.11 N	3,536.15 E	3,539.55			9.90	83.68
5,276.76	29.30	90.000	65.000	1,597.54	173.60 N	3,562.65 E	3,566.72	1.707	90.000	10.02	83.76
5,308.59	31.82	90.300	64.400	1,597.46	187.20 N	3,591.42 E	3,596.23	2.108	-63.434	10.18	84.33
5,335.82	27.23	90.000	64.100	1,597.39	199.03 N	3,615.94 E	3,621.40	1.558	-135.000	10.53	84.90
5,363.05	27.23	89.000	63.600	1,597.63	211.03 N	3,640.39 E	3,646.50	4.106	-153.438	11.10	83.93
Projection	I TO BIT										
5,392.92	29.88	88.616	61.420	1,598.25	224.82 N	3,666.88 E	3,673.75	7.408	-100.000	12.49	81.73
5,414.58	21.65	88.616	61.420	1,598.77	235.18 N	3,685.89 E	3,693.33	0.000	0.000	13.91	80.40
Extrapola	<u>tion</u>										
5,447.39	32.81	88.049	64.652	1,599.72	250.05 N	3,715.12 E	3,723.36	10.000	100.000	15.17	77.53
Correction	n to W	ell Plan									
5,460.00	12.61	88.700	65.508	1,600.08	255.36 N	3,726.55 E	3,735.09	8.519	52,775	15.23	76.20
5,480.00	20.00	89.731	66.865	1,600.36	263.43 N	3,744.85 E	3,753.82	8.519	52.751	14.90	74.81
5,487.13	7.13	90.099	67.348	1,600.37	266.21 N	3,751.42 E	3,760.53	8.519	52.732	14.66	74.51
5,500.00	12.87	90.099	67.348	1,600.34	271.16 N	3,763.29 E	3,772.68	0.000	0.000	14.14	74.03
5,520.00	20.00	90.099	67.348	1,600.31	278.87 N	3,781.75 E	3,791.55	0.000	0.000	13.35	73.20
5,540.00	20.00	90.099	67.348	1,600.28	286.57 N	3,800.21 E	3,810.42	0.000	0.000	12.55	72.27
5,560.00	20.00	90.099	67.348	1,600.24	294.27 N	3,818.67 E	3,829.30	0.000	0.000	11.76	71.21
5,580.00	20.00	90.099	67.348	1,600.21	301.97 N	3,837.12 E	3,848.17	0.000	0.000	10.98	70.00
5,600.00	20.00	90.099	67.348	1,600.17	309.68 N	3,855.58 E	3,867.04	0.000	0.000	10.20	68.61
5,601.12	1.12	90.099	67.348	1,600.17	310.11 N	3,856.61 E	3,868.09	0.000	0.000	10.16	68.53
5,620.00	18.88	91.072	68.629	1,599.98	317.18 N	3,874.12 E	3,885.98	8.519	52.775	9.18	67.43
5,640.00	20.00	92.102	69.987	1,599.42	324.25 N	3,892.82 E	3,905.06	8.519	52.788	7.60	66.97
5,640.86	0.86	92.146	70.045	1,599.39	324.54 N	3,893.62 E	3,905.88	8.519	52.826	7.52	66.97
5,660.00	19.14	91.508	68.544	1,598.78	331.30 N	3,911.52 E	3,924.14	8.519	-113.012	5.94	66.91
5,673.03	13.03	91.073	67.522	1,598.49	336.18 N	3,923.60 E	3,936.48	8.519	-113.060	5.18	66.88
5,680.00	6.97	91.073	67.522	1,598.36	338.84 N	3,930.04 E	3,943.06	0.000	0.000	4.85	66.87
5,700.00	20.00	91.073	67.522	1,597.98	346.49 N	3,948.52 E	3,961.95	0.000	0.000	3.89	66.85
5,720.00	20.00	91.073	67.522	1,597.61	354.13 N	3,966.99 E	3,980.84	0.000	0.000	2.93	66.81
5,740.00	20.00	91.073	67.522	1,597.23	361.78 N	3,985.47 E	3,999.73	0.000	0.000	1.98	66.73
5,760.00	20.00	91.073	67.522	1,596.86	369.42 N	4,003.95 E	4,018.62	0.000	0.000	1.02	66.52
5,765.30	5.30	91.073	67.522	1,596.76	371.45 N	4,008.84 E	4,023.62	0.000	0.000	0.76	66.37
5,780.00	14.70	90.583	66.369	1,596.55	377.20 N	4,022.37 E	4,037.46	8.519	-113.012	0.22	64.90
Corrected	to We	ell Plan									
5,797.47	17.47	90.001	65.000	1,596.46	384.40 N	4,038.29 E	4,053.76	8.519	-113.029	0.00	0.00
All data is in Fe Vertical depths	et (USS) are relativ	urvey) unle ve to RKB.	ss otherwise Northings ar	stated. Directi nd Eastings ar	ons and coordina e relative to Well	tes are relative to AA16x	o Grid North.				
The dogleg sev Vertical Section	erity is in h is from V	Degrees p V ell AA 16x	er 100 feet (U calculated al	S Survey). ong an azimu	th of 86.682° (Gr	id).					
Based upon mi	nimum a	invatura ca	culations at	a measured d	enth of 5 707 474	•					
Dased upon mi	annum a	n valute ca	colduolis, dl	a measured 0	opar 010,797.4/1	s,					

13. You may also interpolate the correction based on several criteria including Measured Depth, Inclination, Azimuth etc. and don't forget, KellyDown doesn't just show the first interpolation that satisfies the criteria, but all of them. For example, if you enter an Azimuth value, KellyDown will find all the interpolated depths having that azimuth.

1	🛈 Inte	rpolated Sur	vey Data [A	A16 - Run #	4]									• ×
	No.	Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	Northings (ft)	Eastings (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Toolface (°)	Distance to Plan (ft)	Highside Direction to Plan	Proposed Inclination (°)	Proposed Azimuth (°)
	• 1	5,382.15	88.755	62.206	1,598.00	219.73 N	3,657.39 E	3,663.97	7.408	-100.000	11.85	82.499	90.000	65.000
	2	5,699.08	91.073	67.522	1,598.00	346.13 N	3,947.66 E	3,961.08	0.000	0.000	3.93	66.853	90.000	65.000
	3	190.11	0.010	66.000	190.11	0.26 S	0.32 E	0.31	0.289	153.335	0.41	-117.557	0.000	0.000
	4	410.99	0.018	66.000	410.99	0.39 S	0.10 E	0.08	0.351	-162.975	0.40	-81.031	0.000	0.000
	5	451.64	0.009	66.000	451.64	0.37 S	0.12 E	0.10	0.267	175.630	0.39	-84.597	0.000	0.000
	6	514.44	0.084	66.000	514.43	0.49 S	0.09 E	0.06	1.184	-170.283	0.49	-76.510	0.000	0.000
	7	3,008.06	89.338	66.000	1,593.82	789.77 S	1,508.79 E	1,460.55	10.187	-88.170	5.35	119.143	89.818	66.314
	8	5,467.25	89.073	66.000	1,600.22	258.34 N	3,733.16 E	3,741.86	8.519	52.751	15.17	75.609	90.000	65.000
	9	5,784.71	90.426	66.000	1,596.51	379.11 N	4,026.68 E	4,041.87	8.519	-113.029	0.12	63.043	90.000	65.000
	ŧ	Add New Inte	erpolation											

14. You may also perform a detailed **anti-collision scan** on the correction run and show the proximity of other wells in the **Quick Scan** module.



15. From the **Slidesheet Editor**, open the **Ouija Board** module. Set the required **Dogleg Rate** to 3.5°/100ft and immediately see the suggested Slide/Rotate sequence in order to penetrate the target centre.

Motor Yield Ca	alculator					
	9	Slide Length:		13.12	ft	
	Ro	tate Length:		14.11	ft	
D	ogleg Rate o	ver Interval:		4.106	°/100	Oft
		Motor Yield:		8.519	°/100	Oft
Slide Length (	Calculator					
		Motor Yield:		8.519	°/100	Oft
	St	and Length:	1	15.64	ft	
	Required [	ogleg Rate:		3.500	Oft	
	Slie	de Distance:		47.51	ft	
	S	lide Percent:		41	%	
Currented Cli	de (Detete					
Suggested Sil	de/Rotate					
Bit Depth (ft)	Course Length (ft)	Dogleg Rate (°/100ft)	Toolface (°)	Inclin (°	ation )	Azimuth (°)
5,447.39				8	8.049	64.65
5,471.14	23.75	8.519	45.649	8	9.464	66.09
5,539.27	68.13	0.000	0.000	8	9.464	66.09
E 500.00	23.75	8.519	45.649	9	0.879	67.54
5,563.03		0.000	0.000	0	0.070	07 E

Motor Yield R	eport Report -	Run #4	_											
	Agi	lis						Anglian Oil Company Ltd						
	Software Solut	ions Inc.					Northern Lights							
	Motor Yie	ld Ren	oort Re	port for A	A Pad. A	A16. Run #4								
						,								
	Measured Depth (ft)	Course Length (ft)	inci. (°)	(Grid) Azimuth (°)	Vertical Depth (ft)	Northings (ft)	Eastings (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Toolface (°)	Travelling C Distance (ft)	ylinder Highside Direction		
	Existing S	urvey	Data											
	5,247.46 5,276.76 5,308.59 5,335.82 5,363.05	29.30 31.82 27.23 27.23	90.000 90.000 90.300 90.000 89.000	64.500 65.000 64.400 64.100 63.600	1,597.54 1,597.54 1,597.46 1,597.39 1,597.63	161. 11 N 173. 60 N 187. 20 N 199. 03 N 211. 03 N	3,536.15 E 3,562.65 E 3,591.42 E 3,615.94 E 3,640.39 E	3,539.55 3,566.72 3,596.23 3,621.40 3,646.50	1.707 2.108 1.558 4.106	90.000 -63.434 -135.000 -153.438	9.90 10.02 10.18 10.53 11.10	83.682 83.762 84.330 84.908 83.937		
	<b>Projection</b>	n to Bit	t											
	5,392.92 5,414.58	29.88 21.65	88.616 88.616	61.420 61.420	1,598.25 1,598.77	224.82 N 235.18 N	3,666.88 E 3,685.89 E	3,673.75 3,693.33	7.408 0.000	-100.000 0.000	12.49 13.91	81.739 80.409		
		uon												
	5,447.39 Projection	32.81 1 to Ta	88.049	64.652	1,599.72	250.05 N	3,715.12 E	3,723.36	10.000	100.000	15.17	77.536		
	5,460.00 5,471.14 5,480.00 5,500.00 5,520.00	12.61 11.14 8.86 20.00 20.00	88.801 89.464 89.464 89.464 89.464 89.464	65.421 66.099 66.099 66.099 66.099	1,600.07 1,600.24 1,600.32 1,600.51 1,600.70	255.37 N 259.94 N 263.53 N 271.63 N 279.74 N	3,726.55 E 3,736.71 E 3,744.81 E 3,763.09 E 3,781.37 E	3,735.08 3,745.49 3,753.78 3,772.50 3,791.23	8.519 8.519 0.000 0.000 0.000	45.649 45.628 0.000 0.000 0.000	15.23 15.13 14.99 14.67 14.36	76.259 75.510 75.041 73.948 72.807		
	5, <b>/</b> 80. J	20.00	<del>9</del> 0.879	01.0	1,597	J/9.75 m	4,021.55 E	.ر. 6.57-	0.00J	U.00U	3.1z	70.670		
	5,800.00 5,820.00 5,840.00	20.00 20.00 20.00	90.879 90.879 90.879	67.547 67.547 67.547	1,597.17 1,596.86 1,596.56	387.39 N 395.03 N 402.66 N	4,039.81 E 4,058.29 E 4,076.78 E	4,055.46 4,074.35 4,093.25	0.000 0.000 0.000	0.000 0.000 0.000	2.18 1.24 0.30	70.828 70.721 69.942		
	Target Pla	ne Sin	nulatio	n (distan	ce to targ	<u>get centre: 0</u>	.02ft)							
	5,846.43	6.43	90.879	67.547	1,596.46	405.12 N	4,082.72 E	4,099.32	0.000	0.000	0.00	0.000		
	The dogleg sev Vertical Section	verity is in n is from \	ve to RKB. Degrees p N ell AA16:	Northings an Northings ar per 100 feet (U x calculated al	Saled. Directi nd Eastings ar S Survey). long an azimu	e relative to Well /	es are renauve tr 4A16x d).	o ona worth.						
	Based upon mi the bottom hole	inimum c e displace	urvature ca ment is 4,	lculations, at 102.77ft, in th	a measured d e direction of	epth of 5,846.43ft 84.333° (Grid).	-							

If you have a question you would like answered in KellyDown Tips, reply to this email with your question. If you would like anything added to KellyDown to make it more useful or user friendly, reply to this email with your requests. You can download the latest version of KellyDown from <u>www.kellydown.ca</u>