

Innova Engineering - Magnetic Interference Example

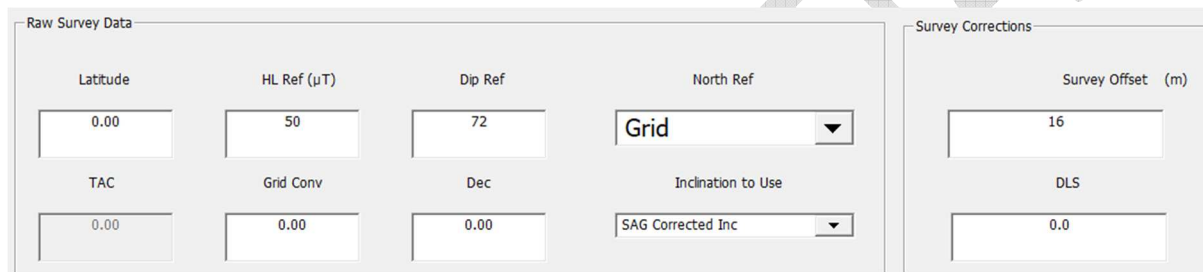
This tutorial demonstrates how to use Innova Engineering to calculate the expected levels of magnetic interference from the drill string, for a given well path and BHA.

This example project guide comes as part of the standard install and can be found in the following location: **C:\Program Files (x86)\Innova Drilling and Intervention\Innova Engineering\Manuals**

Load the **Hydraulics - Example Project.ieng**, which can be found in the following location: **C:\Program Files (x86)\Innova Drilling and Intervention\Innova Engineering\Example Projects**.

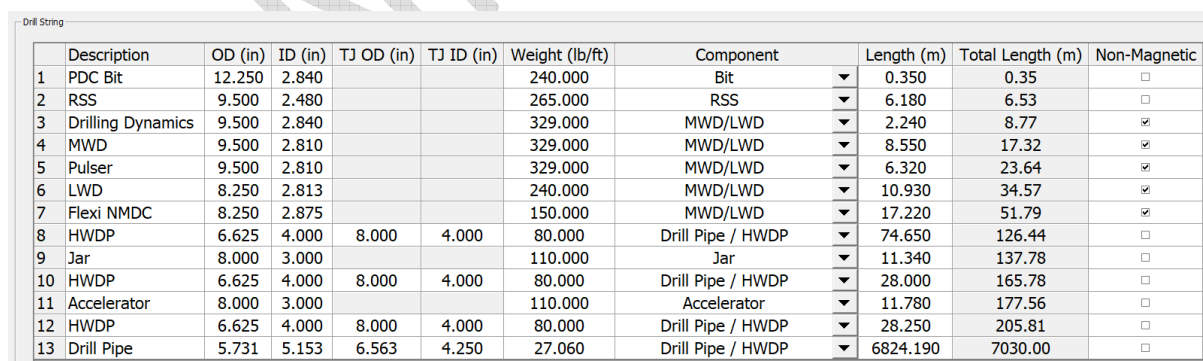
Click on the Surveys tab

Enter 50 for HL ref and 72 for dip ref. These values would be obtained from a magnetics model such as BGGM or IGRF.



The image shows two side-by-side dialog boxes. The left box, titled 'Raw Survey Data', contains input fields for Latitude (0.00), HL Ref (50), Dip Ref (72), North Ref (Grid), TAC (0.00), Grid Conv (0.00), Dec (0.00), and Inclination to Use (SAG Corrected Inc). The right box, titled 'Survey Corrections', contains input fields for Survey Offset (16) and DLS (0.0).

Enter 16 for the sensor offset, this value would be obtained from the MWD service company and is the distance from the bit to the directional sensor. It should be noted that the MWD sensor has to be placed within a nonmagnetic component in the BHA. It is also advisable to never place the MWD sensor within 3m of a steel component. Nonmagnetic components can be easily selected in the BHA by ticking the Non-Magnetic tick box in the Drill String section. In this example this has already been done for you.



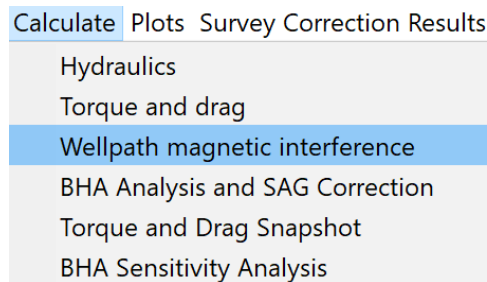
	Description	OD (in)	ID (in)	TJ OD (in)	TJ ID (in)	Weight (lb/ft)	Component	Length (m)	Total Length (m)	Non-Magnetic
1	PDC Bit	12.250	2.840			240.000	Bit	0.350	0.35	☐
2	RSS	9.500	2.480			265.000	RSS	6.180	6.53	☐
3	Drilling Dynamics	9.500	2.840			329.000	MWD/LWD	2.240	8.77	☒
4	MWD	9.500	2.810			329.000	MWD/LWD	8.550	17.32	☒
5	Pulser	9.500	2.810			329.000	MWD/LWD	6.320	23.64	☒
6	LWD	8.250	2.813			240.000	MWD/LWD	10.930	34.57	☒
7	Flexi NMDC	8.250	2.875			150.000	MWD/LWD	17.220	51.79	☒
8	HWDP	6.625	4.000	8.000	4.000	80.000	Drill Pipe / HWDP	74.650	126.44	☐
9	Jar	8.000	3.000			110.000	Jar	11.340	137.78	☐
10	HWDP	6.625	4.000	8.000	4.000	80.000	Drill Pipe / HWDP	28.000	165.78	☐
11	Accelerator	8.000	3.000			110.000	Accelerator	11.780	177.56	☐
12	HWDP	6.625	4.000	8.000	4.000	80.000	Drill Pipe / HWDP	28.250	205.81	☐
13	Drill Pipe	5.731	5.153	6.563	4.250	27.060	Drill Pipe / HWDP	6824.190	7030.00	☐

Select Well Plan from the Survey Selection.

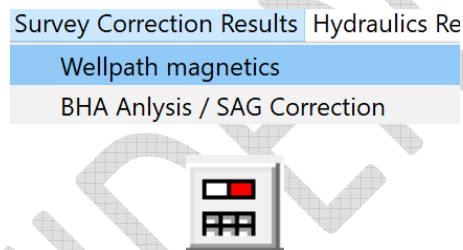


The image shows a 'Survey Selection' dialog box with a dropdown menu currently displaying 'Well Plan'.

Run the magnetic interference calculation by clicking the menu option or clicking the tool bar button.



The Wellpath Magnetics Results will automatically be displayed once the calculation is completed. Results can be viewed after closing the Wellpath Magnetics Results window by clicking on the Survey Correction Results menu or by clicking the tool bar button



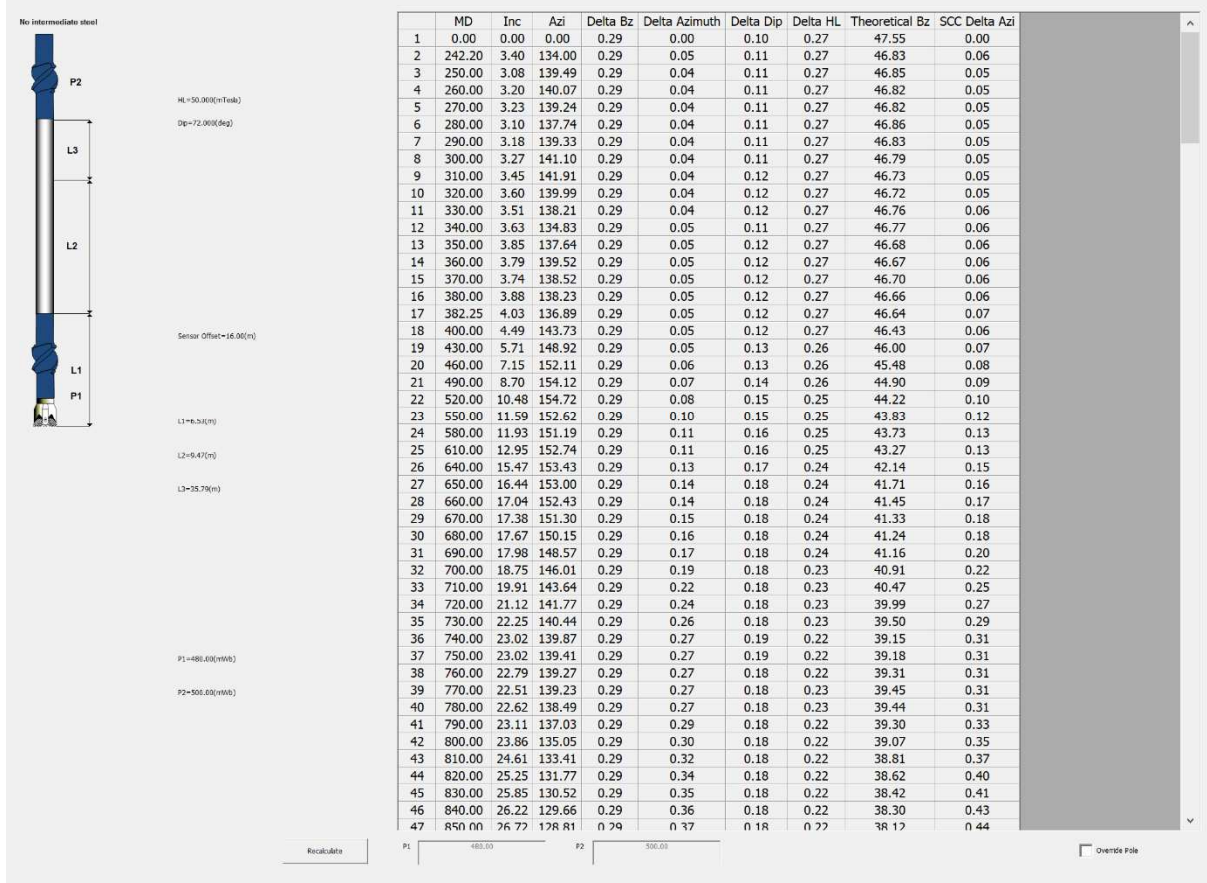
The results will display a diagram of the BHA and indicate which configuration has been identified by the program

There are four options

1. No intermediate Steel
2. Intermediate Steel Above
3. Intermediate Steel Below
4. Intermediate Steel above and below

Wellpath Magnetics Results

File



The calculation above was done for the "Well Plan". To calculate for different surveys select a different survey grid in Survey Selection.

Azimuth: The azimuth displayed is referenced to **Magnetic North** and will therefore look different when compared to the azimuth that was entered in the plan (which could be referenced to Grid or True North). The correction applied to the input azimuth is automatic and is based on the Geomagnetic data that you have entered in the Raw Survey Data Section.

Delta Bz: The expected error between the **Theoretical Bz** and the **Measured Bz** (from MWD) for raw, uncorrected surveys.

Delta Azimuth: The expected error in the raw uncorrected azimuth reading, <0.25 degrees is considered acceptable

Delta Dip: The expected error between the calculated dip (from the geo-mag data) and the actual measured value (from MWD).

Delta HL: The expected error between the calculated magnetic field strength (from the geo-mag data) and the actual measured value (from MWD).

Theoretical Bz: The theoretical magnetic field strength expected in the Z axis with no interference.

SCC Delta Azi: The expected error in the SCC corrected azimuth, <0.25 degrees is considered acceptable. This is affected by the Latitude entered in the Raw Survey Data section.

Override Pole: When checked this allows the user to manually enter pole strength values for P1 and P2.

Recalculate: Selecting recalculate will repeat the calculation using the editable P1 and P2 values displayed.

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