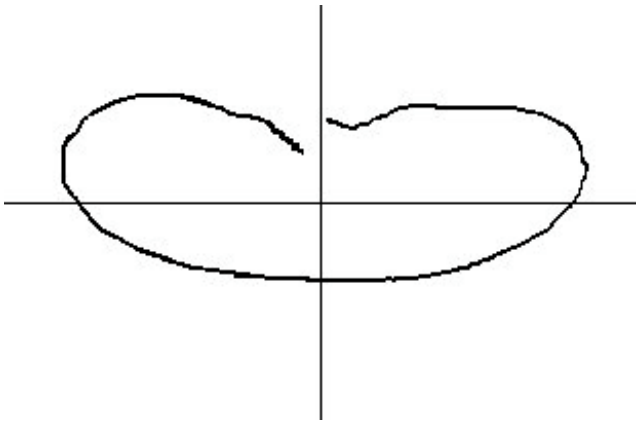
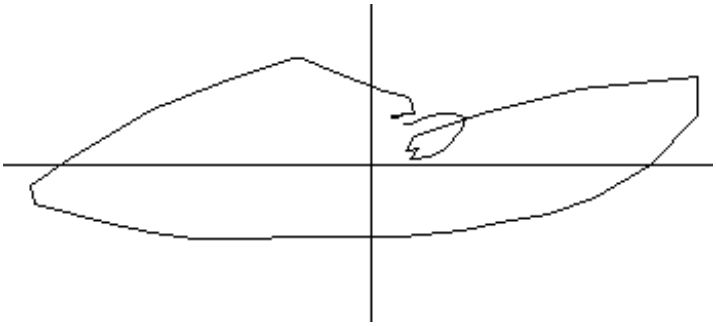
Data Skewing and Deskewing with Micro Coil Probes

Standard ACFM probes, such as weld probes and mini pencil probes, contain concentric Bx and Bz sensors. This means that the Bx and Bz signals from a defect are always measured at the same part of a defect at any given time. This in turn means that the butterfly plot is generally a symmetric, open loop, an example of which is shown below.

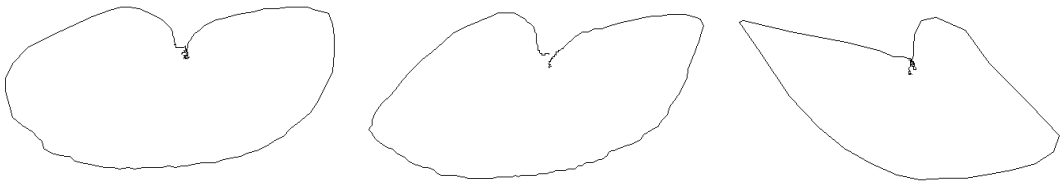


ACFM probes designed for higher sensitivity, or access to very tight geometries (e.g. micro pencil probes, thread probes and high frequency probes) contain smaller Bx and Bz sensors which cannot be wound concentrically. This means that the Bx and Bz signals from a defect measured at any given time are from different parts of the defect. This in turn skews the data display so that the butterfly plot is an asymmetric loop, an example of which is shown below.

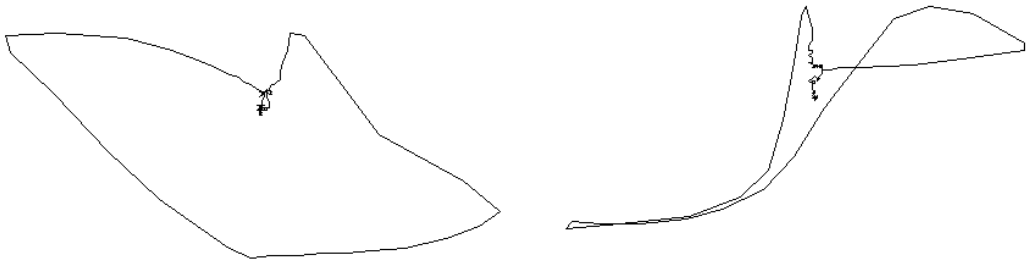


NB. An exception to this occurs for probes that have encoders fitted. In this case, the software is able to adjust the data so that Bx and Bz readings coincide in position, giving a symmetric butterfly loop.

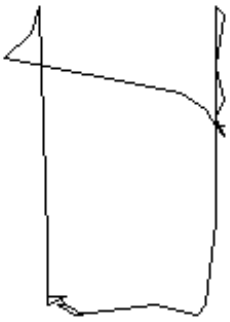
In order to reduce the skewing effect, Assist software up to version 2.5.02 contained an algorithm to shift the data to simulate coincident sensors. This algorithm assumed a particular probe speed, so some skewing of the data remained if the probe was moved faster or slower than this nominal speed. Also, the nominal speed depended on the speed of the PC and other variables, so could not be fixed for a given probe. Examples of the effect of the deskewing are shown below, with (reading from left to right) probe speed just right for optimum deskewing, speed less than nominal and speed greater than nominal.



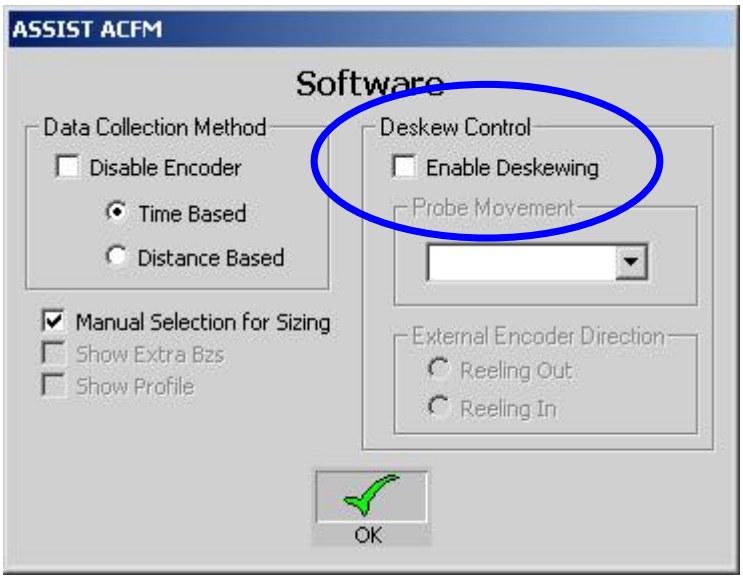
The deskewing algorithm also assumes the probe is being moved in the direction specified (i.e. A or C) for a scan. If the probe is moved in the opposite direction, the algorithm adds to the skewing effect, making the loop more skewed. This causes complications when scans are made to find the ends of a defect. In this situation, the probe is moved back and forth and the deskewing algorithm means that the butterfly loop is not retraced. The example below shows two scans of the same defect - on the left scanned in the direction expected by the software, and on the right scanned in the opposite direction.



Another side effect of the deskewing algorithm is seen if the probe is lifted off the surface. Instead of a straight inclined line in the butterfly plot, a square loop is plotted which may cause confusion with defect signals (see example below).



The side effects described above have caused problems to some users, so TSC have now made deskewing for non-encoder probes with micro coils optional in Assist versions 2.5.03 and later. The default configuration now has the deskewing algorithm turned off. The following display shows where the deskewing can be turned on.



It is recommended that deskewing is turned on for normal detection scans, but turned off when looking for defect ends (or other times when the probe is deployed in both directions in the same scan), or in situations where variable lift-off is expected.