

SeisPos

SeisPos is a Windows based program used to perform processing of raw navigation data for seismic surveys from UKOOA P2 raw data format to UKOOA P1/90 final data format.

SeisPos comprises a number of discrete modules which, executed in turn, form a logical processing flow.

Input

- Builds a proprietary database of network and observation data from raw data files recorded in UKOOA P2/91 and P2/94 formats.
- Performs format compliance checking and data integrity checks, taking advantage of redundant information.

Precondition

- Pre-conditions raw data to eliminate outliers and reduce noise.
- Supports non-interactive and interactive processing using time series plots.
- Multi-layered de-spiking using median, absolute and rate of change gates.
- Multi-layered filtering using averaging, polynomial and rate of change.
- Multi-layered interpolation and extrapolation.
- Parameter application to data groups.
- Manual editing, correction and synthesis of data.
- Interpolate data to shot event time.
- Dynamically displays detailed statistical data for each data sample.
- Time series plots linked to network display.
- Display rate of change, delta, polynomial delta, comparison, raw minus processed plots.
- Extensive display options, including scaling, delta, rate of change, polynomial fit, raw-processed.
- Summary report.

Database

- Fast bespoke binary database of header information, raw and processed data.
- Manual creation and deletion of header information where relevant.
- Data editing.

- Coordinate transformations: grid ↔ geographical.
- Creation of manual nodes – essential for 2D surveys.
- Creation of observations. Data can be modelled from nominal value, course made good or any existing recorded data – essential for 2D surveys.
- Creation of network of magnetic variation points – essential for 2D surveys without active tailbuoys.
- Dump database tables to file in comma separated value format, suitable for most spreadsheets.
- Arithmetic operations.

Network Adjustment

- Multi-vessel, multi-streamer.
- Fully integrated weighted least squares solution.
- User configurable Delft method statistical testing incorporating automatic rejection or weighting of observations.
- Least squares solution for rotation and stretch for each streamer (if at least one active tailbuoy is present).
- Streamer shaping by circular arc method.
- Magnetic variation from multiple points by inverse square method.
- Options for source array orientation – course made good, gyrocompass, streamer compasses.
- Supports dynamic speed of sound for acoustic ranges.
- Staged configurable output of all positioning and QC data:
 - Any shot range can be computed without the need to re-adjust the whole survey line.
 - Sub-networks may be defined and adjusted for diagnostic purposes.
- Dynamic interactive graphics.
- Dynamically provides numeric data and time series plots of node and observation data, coordinates and QC statistics.
- Outputs all statistics for use in the QC module.
- Produces numeric summary files of all statistics, linked where applicable to observation time series plots.
- Statistics produced are:
 - Unit variance
 - Degrees of freedom
 - Number of iterations
 - Streamer rotation
 - Streamer stretch
 - Semi-major axes (95%)
 - External reliability

- Number of observations to a node
- Residuals
- Normalised residuals
- Marginally detectable errors
- A priori SD (used if varied by auto-weighting)

Output

- Outputs user configurable positioning data in the industry standard UKOOA P1/90 format or Shell Processing Support (SPS) format.
- P1/90 decimation by shot and receiver group.
- Header from pre-compiled file, or internally generated.
- Optional interpolation of missing shotpoints.
- Application of tidal reductions
- Correction to bathymetry for vessel draught and speed of sound

Quality Control

- Interactive time series plots of all adjustment QC data:
 - Unit variance
 - Degrees of freedom
 - Number of iterations
 - Streamer rotation
 - Streamer stretch
 - Semi-major axis (95%)
 - External reliability
 - Number of observations to a node
 - Residuals
 - Normalised residuals
 - Marginally detectable errors
 - A priori SD (used if varied by auto-weighting)
- Shot distance, time interval, vessel speed and course made good.
- Observation data
- Node coordinates:
 - Easting, northing
 - Along line and across line distance
- Plot functions:
 - Comparisons
 - Rate of change
 - Delta

- Data table
- Shot domain and time domain

Additional Features

- Trend analysis: customisable line-by-line trend plots for all data items.
- Final report: user comments and summary statistics for all data items.
- Scaled network display from header definitions supporting:
 - Horizontal and vertical plans
 - Interactive node and observation information
 - Interactive measurements
 - Zooming
 - Printing
 - Saving to bitmap
- P2 header difference report.
- Extraction of partial P2
- Shot report.
- Streamer compass bias estimate computations by spatial method and least squares polynomial fit.
- Plot configuration and printing module for automated printing of user configurable data.
- Full history of saved numeric summaries on all processes.
- Comprehensive log file of all operations and processes.
- Warning and format violation log.
- Simultaneous multi-line processing.
- Simultaneous multi-project processing.
- Automatic, non-interactive processing – “fast-track” P2 to P1/90.
- Multi-tasking environment.