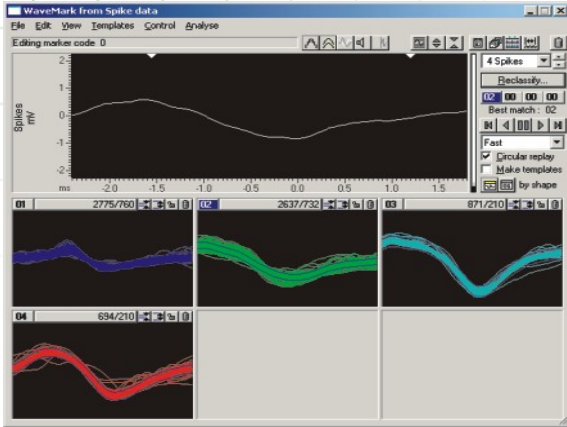


Spike2



Life sciences data acquisition and analysis system

Spike sorting

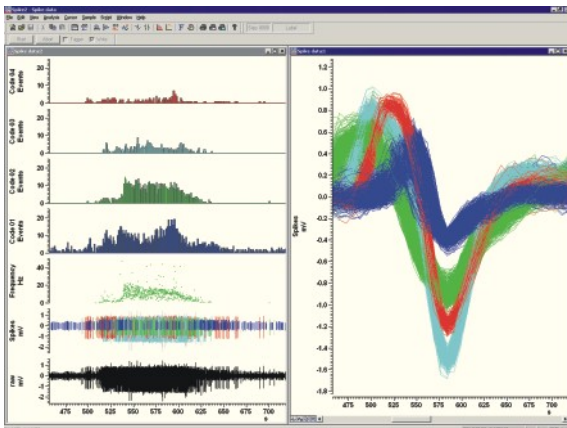


Template setup dialog

Spike2 classifies waveform shapes based on full wave templating on one or multiple channels both on-line and off-line. Spike2 includes single electrode input, stereotrode and tetrode capture and analysis. To complement the template matching, the software also includes clustering using Principal Component Analysis (PCA) and direct waveform feature measurements.

Main features

- On-line and off-line spike sorting
- Sort 8 spike types per channel on 32 channels on-line (more off-line)
- Single electrode, stereotrode and tetrode recordings
- Multiple sorting methods
- On-line analysis functions
- Synchronize multiple systems for recording larger numbers of channels
- Display sorted spike classes from one channel as separate channels



Spike data draw modes

Sorting methods

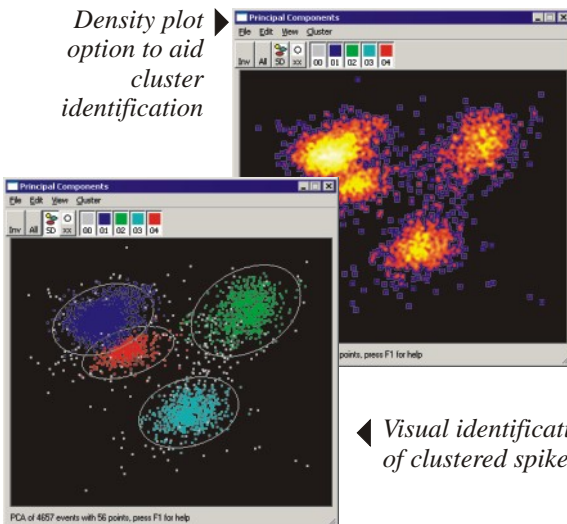
Template matching

- Automatic or manual template generation
- User-defined parameters for setting quality of fit
- Compare, merge and delete templates
- Templates can be fixed or can track changes to spike shape over time
- Modify templates on-line
- Saved templates can be loaded for use with different channels and files

Clustering

As an alternative to template matching, spikes can be sorted by cluster cutting. Values calculated by PCA or user-defined measurements are plotted to a 3D clustering window.

Density plot option to aid cluster identification



Visual identification of clustered spikes

Cluster window

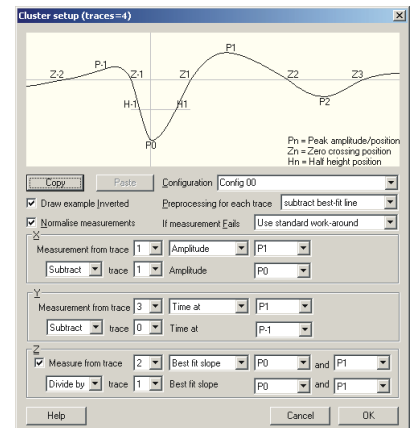
- View can be rotated in 3 dimensions using mouse or sliders
- K-means and normal mixtures algorithms for automatic cluster separation
- Manual cluster separation by placing ellipses
- View dots from a percentage of the entire time range and step through time to track moving clusters
- Generate interval histograms based on displayed clusters
- Show/hide particular clusters
- Visual identification of clustered spikes occurring within a specified refractory period
- Density plot option to aid cluster identification
- Copy values as text (underlying data values and display co-ordinates)
- Select individual spikes with a mouse click for manual classification

Principal Component Analysis

- Select principal components to plot on X, Y and Z axes
- Calculation of components for multiple trace (stereotrode or tetrode) channels based on entire waveform, peak amplitude or ratio of peak to mean amplitudes

User-defined measurements

- Select measurements for X, Y and Z axes to cluster the data
- Measure times, amplitudes, slopes and areas
- Save up to 10 configurations containing different sets of measurements
- For multiple trace data, measure individual trace or mean of trace measurements



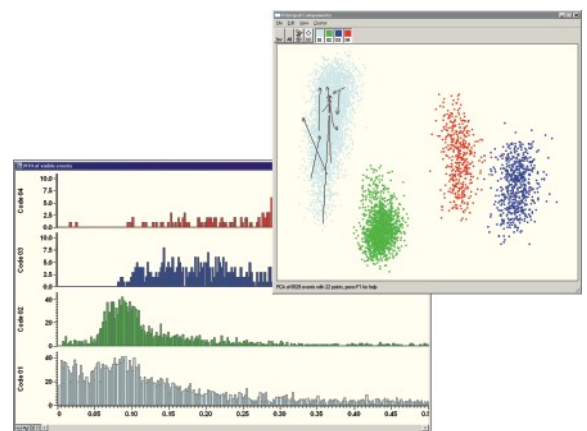
Cluster generation by user-defined measurements

Spike analysis functions

Built-in analysis functions for spike data include:

- PSTH's
- Cross correlations
- Interval histograms
- Rate displays
- Mean and instantaneous frequencies
- Spike-triggered averaging
- Phase histograms

You can perform these analysis functions on-line and off-line, carry out further analysis with the script language or import the data into other software, for example Matlab.

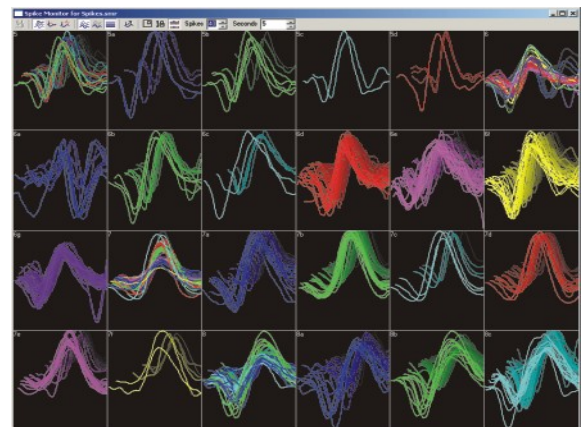


Interval histograms from current clustered spikes, short intervals identified in cluster plot

Spike monitor

The resizable spike monitor window displays spike activity in a grid, with one grid cell per channel.

- Display up to the last 40 spikes lying in a user-defined time range
- Review spike activity from the current sampling time or at any time within the data file
- Open the template editing dialog for a channel with a mouse click
- Select display mode:
 - 3D with spikes moving away through time
 - 2D with all spikes overdrawn
 - 2D with last spike shown separately from the overdrawn spikes
- Show or hide duplicates of main spike channels



Multi-channel spike monitor

CED hardware

When used with CED 1401 interfaces, Spike2 enables you to capture continuous waveforms, event and marker data while sorting spikes in real time and generating output stimuli.

CED

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