

# Synthetics

## Seismic-to-Well Calibration

The Paradigm Synthetics utility is significantly different from other products on the market today. Its modern technology and fully interactive workflows have turned seismic-to-well calibration into a natural extension of the interpretation workflow, and opened up a whole new world to interpreters.

### Taking Seismic-to-Well Calibration to the Next Level

The Paradigm seismic-to-well calibration utility is a new-generation tool for the Synthetics workflow. Dynamic, interactive and easy to use, the application is based on modern, cutting-edge technology that is unavailable from any competitive offering.

The seismic-to-well calibration tool is an integral part of the Paradigm interpretation system, enabling interpreters to casually perform seismic-to-well calibration within their familiar environment, and make simple use of elaborate technology. The complete calibration workflow can be easily performed directly in the depth domain.

Expert users can perform advanced workflows like multi-well and multi-attribute calibration, AVO and pre-stack calibration, and calibration with rock physics, with the same simplicity of operation.

### Setting New Standards

The Paradigm Synthetics utility is used to generate and optimize synthetic seismograms to match the seismic data. It enables the calibration of well depth with seismic times, and the extraction

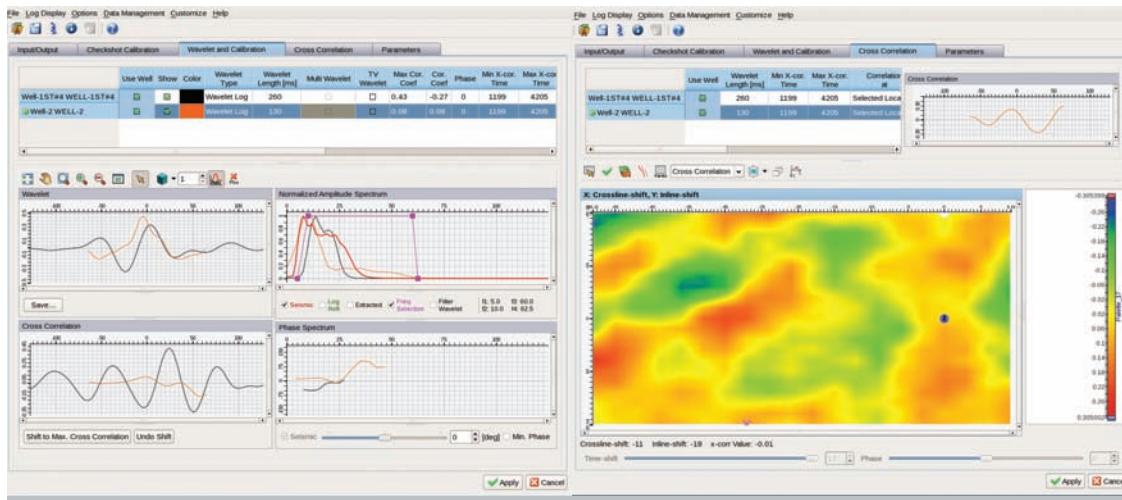


of wavelets that best represent the seismic data, for seismic processing and inversion.

Paradigm offers a broad range of unique functionalities that provide unprecedented benefits to users:

**Full integration:** Seismic-to-well calibration is performed entirely within the Paradigm multi-attribute interpretation environment. Multi-attribute seismic and multi-attribute synthetics are automatically matched with one click of a button.

**Modeling and calibration functionalities:** The seismic-to-well calibration workflow is supported by a set of advanced functionalities. Zero and non-zero offset elastic modeling generates both synthetic seismograms and synthetic gathers. A wide range of methods is available for wavelet extraction, based on interactive and automatic algorithms. The calibration process is enhanced by the ability to automatically estimate the best calibration location. Interactive “stretching and squeezing”, controlled by drift analysis, delivers reliable time-to-depth calibration.



▲ Seismic-to-well calibration

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**Multi-well:** Seismic-to-well calibration enables the simultaneous processing of many wells within a multi-well visualization framework, allowing the user to easily QC and manage the calibration workflow. In addition to accelerating the interpretation process, the multi-well approach enables the user to use a coherent workflow for wavelet estimation. All wells can be processed together in a well-defined and logical workflow, generating a single wavelet that characterizes the seismic data.

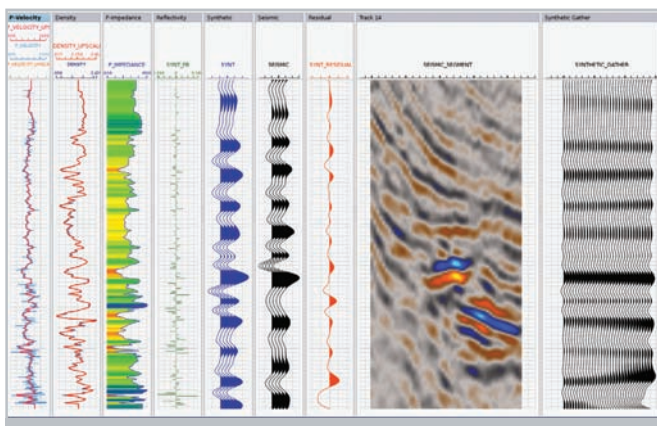
**Multi-attribute:** Various synthetic seismograms corresponding to AVO and other attributes are automatically produced and displayed within relevant seismic/attribute datasets. The utility performs multi-attribute wavelet extraction, producing a separate wavelet for each attribute in an easily-managed process.

**Integrated crossplotting:** A powerful tool for crossplotting logs, synthetic seismograms and seismic data, and for performing calibration in crossplot space. Interactive and easy-to-use crossplot color coding schemes help extend the interpretation workflow towards quantitative characterization.

**Comprehensive display:** All relevant logs, seismic data and synthetic seismograms are displayed in a dedicated window using predefined or user-customizable layouts. A wide range of display options enables the creation of many types of layouts, for effective QC of the different stages in the process.

**Advanced checkshot calibration analysis:** Performed as an integral part of the calibration process, either automatically or interactively.

**Dynamic stretch and squeeze:** Performed together with drift analysis directly in the Paradigm multi-attribute interpretation environment.



▲ Display from synthetic utility

**Correlation maps:** Enable users to optimize time-phase shift analysis as well as find the best lateral position for calibration.

**Deviated wells:** Calibration on deviated wells can be performed and visualized dynamically within the interpretation framework. Wavelets for deviated wells are extracted using true 3D correlations with the seismic data.

**Seismic-to-well calibration directly in depth:** Seismic-to-well calibration can be done directly on seismic depth data, so that seismic depth is tied to well depth. The application does the needed time-to-depth conversions internally in a manner which is invisible to the user. From the user's perspective, the well tie is done in depth, and the wavelets are in time. Updated checkshots can be automatically created as a byproduct of this process.

**Rock physics modeling:** The seismic-to-well calibration utility is synergetic with rock physics modeling. This enables, for example, an interactive analysis of the effect of fluid and/or porosity changes on the various synthetic seismograms.

**Full volume modeling:** Full volume, synthetic datasets of various attributes, and full 3D pre-stack datasets can be easily produced.

## Interoperability

All Epos®-based applications enable interoperability with third-party data stores, including:

- OpenWorks® R5000
- GeoFrame® 2012
- JavaSeis

## System specifications

- All 64-bit, for x64 architecture processors
- Red Hat® Enterprise Linux® 5.3 and above, 6.0 and above

## The Paradigm Advantage

- Seismic-to-well calibration performed directly in Paradigm visualization windows ensures an efficient and natural work process.
- A valuable tool for both casual users and experts, as it is easy to use, yet sophisticated and comprehensive.
- Unique multi-well and multi-attribute design significantly reduces workflow complexity.
- Automatic and interactive processes help compress time to decision.