

Tektronix' Multi-Purpose AFG3000

Helps Beijing Machinery Industry College Boost its Electronic Engineering Teaching and R&D Strength



(Above: Tektronix AFG3000 Arbitrary/Function Generator Series)

Solution Overview

Challenge The Beijing Machinery Industry College needed to build a more effective workbench to address the requirements from teaching and running experiments to advanced research and development projects, particularly for developing innovative electronic designs.

Solution The multi-purpose Tektronix AFG3000 arbitrary/function generator combines excellent performance and outstanding usability. Together with Tektronix oscilloscopes, it offers a workbench that addresses requirements from teaching to advanced research.

Benefits The AFG3000 provides excellent performance, a compact footprint, an intuitive user interface and a very large display, enabling teachers and students to run experiments more effectively and stay ahead of the teaching schedule. In addition, it is also an ideal tool for oscillation research.

To “Build an Innovation Nation” is outlined as a top priority for China’s government in its 11th Five Year Plan (government objectives for development, published every 5 years). Underlying this objective are the nation’s initiatives to build capabilities beyond manufacturing, playing a larger role in driving innovation and design. In turn, this will drive a transition where China will become well known not only by the moniker “made in China” but also “designed in China,” and sustain strong economic growth. To do this, however, China faces significant challenges, particularly in strengthening its educational system. This is particularly true with the electronics industry. The industry, with a huge demand for qualified talent, is turning to universities that can fill highly technical engineering positions.

To address this challenge, the Information Department of the Beijing Machinery Industry College (BMIC) recently upgraded its electronics lab with Tektronix AFG3000 arbitrary/function generators. In combination with Tektronix TDS3000, TDS2000 and TDS1000 oscilloscopes already deployed, the AFG3000 provides a solid workbench that enables students to run experiments as well as to build skills in advanced research projects, such as quartz oscillation testing.

Easy Operation and Versatility

A consistent challenge faced by faculty is to simply and accurately demonstrate characteristics of complex electronic signals through fast experiments. Signal generation using inferior or legacy instruments and methods create bottlenecks because the instruments are not intuitive to operate. Moreover, they require a significant amount of time to establish parameters to set-up the experiment. In comparison, the AFG3000 has significantly reduced the complexity in setting-up parameters for conducting the experiment. With an intuitive user interface and easy navigation, and a 10 inch display screen - the industry’s largest - teachers and students can set-up parameters using on-

screen menus and the short-cut buttons on the panel to complete most operations. By directly connecting the AFG3000 to the oscilloscope, teachers and students can obtain detailed parameters of a signal and then generate waveforms. This is a significant improvement when using test instruments to observe and analyze data.

“The Tektronix’ AFG3000 generator is very easy to operate, as is the TDS2000 oscilloscope. It has played a critical role in reducing the complexity and time required to set-up an experiment demo session,” said Liu Guili, deputy-director of the Information Department. “As a result, we spend less time on training on the use of the instrument and have more time to focus on analyzing experiment findings. This leads to more productive coursework and allows our students to quickly gain a good understanding of signal behavior patterns.”

Versatility of the AFG3000 also proves to be valuable in meeting a full range of requirements of the lab, from basic electronics engineering courses to advanced electronics experiments. With the AFG3000, a user can generate one signal or multiple signals. These are used for circuit tests and produce sine waveforms with up to 240MHz frequency, generate arbitrary waveforms with up to 2GS/s, or obtain 1ppm clock stability.

With USB ports for connectivity to PCs, the AFG3000 allows users to easily store waveform data and upload it when necessary. This feature enables professors to further increase the efficiency of their courses by allowing them to save waveforms in advance and load the data onto the AFG300 during the course. In a matter of seconds, the waveform is generated and ready for class demonstration. With this approach, professors can save time and effort in instrument debugging and configuration.

Professor Liu particularly noted the benefits of the AFG3000 for its excellent frequency performance, stating: “The AFG3000 models we use provide up to 110MHz frequency, a significant, dynamic range for testing. It helps students to observe both high frequency and low frequency characteristics of signals under test. This is a great benefit for overall student education.”

Excellent Performance Ideal for Quartz Oscillation R&D Testing

The AFG3000 helps the college to significantly improve the curriculum through its simple and intuitive operation and fast and capable performance. Furthermore, as a multi-purpose signal source solution, it also provides support for researchers in advanced areas, such as quartz oscillation, allowing the University to play a bigger role in cutting-edge research initiatives.

Before the AFG3000 was used, department researchers mainly relied on traditional frequency swept analyzers for the characterization and test of quartz oscillation. But the limitations of this approach posed many challenges, for example researchers were unable to view time-domain waveforms and the change of starting and stopping signal frequencies. And it was impossible to change the phases of frequency swept signals as well.

“Thanks to the high frequency signal generation and adjustable signal phase output, the AFG3000 can effectively enhance the test parameters of quartz oscillation frequency and enable researchers to observe oscillation shift characteristics. As a result, this level of measurement has allowed us to solve some significant problems that had puzzled us for some time,” said Professor Liu.



(Above: Professor Liu is operating a Tektronix AFG3000 in the lab.)