Sound and Vibration Software – BK Connect

Boris MIHAYLOV

SPECTRI Ltd., 30, "St. T. Turnovski" Str., Sofia 1421, spectri@spectri.net, www.spectri.net

Abstract
In this paper information about the product BK Connect is presented. How it enables to increase performance and many benefits which help people to work smarter and more efficiently. Full overview of BK Connect applications and functions.

Keywords: software, sound, vibration, application, testing, analysis

1. Introduction

BK Connect is a sound and vibration software that helps to simplify testing and analysis complexity. That software is provided by the leading supplier of sound and vibration software Brüel & Kjær. Today Brüel & Kjær have more than 11,000 installed software solutions worldwide. This is because these solutions are popular in a wide range of industries. Brüel & Kjær strive to meet the market needs by continuously developing software for the future.

2. Advantages of the BK Connect software

With BK Connect, you get software that:
- Adds a new dimension of user friendliness to sound and vibration testing and analysis;
- Is designed around your needs and tasks, and in particular, your workflow;
- Enables you to work with a high degree of flexibility and efficiency;
- Gives you the benefit of complete accuracy, and reduces risk of errors;
- Offers all the features you would expect from a modern testing and analysis software platform.

User – friendly software with the following advantages:
- Configurable – A flexible setup that can be configured to fit your workflow and no more need for customer specific developments;
- Intuitive – A clean and simple user interface and easy to use and learn;
- Integrated – Eliminates tedious data transfers between multiple systems;
- Reliable – Rely on data to be accurate, ordered and well – annotated. Exceptional data management for confident decision – making;
- Open – Compatible with data from leading and vibration systems and provides an open programming API.

3. Professionals that work on BK connect software

At Brüel & Kjær, every sound and vibration professional works a little differently. That's why BK Connect is designed around unique user workflows and tasks.

Test operators and engineers

Test engineers and operators run efficiently repetitive tests, analyses and reports which calls for hassle – free operations. Smooth, hassle – free testing and analysis can be done by the software by using:
- Pre – defined templates optimized to show only the information needed for the current task;
- Flexible analysis setup with adjustable analysis parameters and pre – defined favorites designed to suit your needs;
- User – defined easy navigation between tasks with the new Done management button;
- Integrated quick reporting is one click away for fast and easy data sharing;
- New innovative accelerometer mounting check to minimize measurement uncertainty.

Sound and vibration specialists

Sound and vibration specialists perform troubleshooting task, as well as developing S&V competences and processes which requires great software.
The benefits of a dynamic test setup:
- Get access to the data and analyses you need when performing troubleshooting;
- Solve the most difficult and complex tests and analyses with confidence;
- A software platform that can help the user evolve and learn by enabling you to make changes to analyses as you go;
- Configure analysis setup and develop templates to be utilized by the organization;
- Easily adjust the analysis process setup with a graphical process chain;
- Assess your data quickly and intuitively in the result matrix.

Test managers

Test managers prime priority is to maximize performance and minimize errors. That is achieved with high productivity while maintaining accuracy and delivery deadlines. The test performance a user can expect:
- Access a global calibration database for data quality tracking;
- Benefit from the Data viewer application that includes tasks for finding, sorting and comparing data;
- Avoid costly downtime with a software that is truly reliable;
- Minimize errors with the possibility of real – time data monitoring.

Test requesters

Test requesters are responsible for the data that the software is working with. It's important to work with accurate data and data you can trust. This is why the BK connect software offers:
- Access fully to documented metadata for finding, sorting and comparing data;
- Get the input and data you need in the right format and delivered on time;
- Have valid data to enable confident decisions about your product's design, quality, durability and more;
- Benefit from reduced time to market by receiving faster and valid test results.

4. Modular software for testing and analysis needs

BK connect applications are user – centric and modular. Each core application can function as a stand – alone tool, or can be combined with other applications.

General purpose analysis software:
- Measurement setup and data recording;
- Data processing and signal analysis.

Structural dynamics software:
  – Modal measurements and analysis;
  – Shock response spectrum analysis;
  – Correlation;
  – Operating Deflection Shapes.

Acoustics:
  – Array analysis;
  – Sound quality metrics.

5. General purpose analysis software applications and options

BK Connect software provides you with the tools to fit the phases of a sound and vibration project scenario – from standard tests to complex troubleshooting, and from data management through to reporting. [1]

Measurement setup and data recording:
  – Get the ability to record time data as it is the most fundamental part of data acquisition;
  – Review historical data to prepare for your test;
  – The hardware setups has the option to configure the transducers using physical or virtual hardware.

Data processing and signal analysis:
  – At the heart of any data processing system are the types of signal analysis, allowing you to solve simple or complex problems;
  – BK Connect has the analysis calculations you need. Whether performing 20 FFT analyses on stationary signals or generating 3D waterfall analyses for non-stationary signals.

6. Structural dynamics software applications and options

BK Connect allows you to observe, analyze and document the dynamic behavior of structures using a single software platform covering set-up, measurement, analysis, and test-FEA integration.

Shock response and spectrum analysis
  – A transient (shock) event, has the potential to damage components in a structural system;
  – With any motion input to a system, the response can be amplified by structural resonances, increasing the risk of damage;
  – All five SRS models mentioned in ISO 18431-4:2007 are implemented.

Correlation
  – Correlation Analysis is an easy to use post processing application;
  – Analysis and Structural Measurements constitutes an integrated system for modal measurements, modal analysis and model correlation.

Modal measurements and analysis
  – Set up perform single or multi-reference hammer and shaker measurements;
  – Accurate and reliable results even in the most demanding situations;
  – Targeted set of mode indicator functions, curve – fitters and analysis validation tools.

7. Acoustics software applications and options

BK Connect acoustic signature has the ability to visualize the sound field using noise source identification to understand not only the acoustic level, but if the end user will like how the product sounds.

Acoustics software applications and options:

Array analysis:
– Acoustic camera is a complete troubleshooting system for real – time noise source identification (NSI);
– Used for both stationary and non – stationary measurements;
– The array post – processing suite includes beamforming and holography.

Sound quality metrics:
– The sound quality of a product is of ever – increasing importance when assessing the total quality of the product;
– Traditional objective measuring and analysis methods are not enough for analyzing product sound;
– In the end, only the human ear can tell the designer whether he is producing the right sound.

8. BK Connect applications

BK Connect applications are the following:
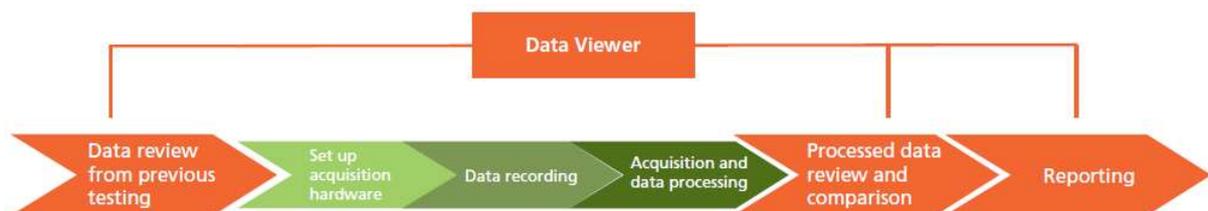*- Type 8400 Data viewer*

Figure 1. 8400 Data viewer application block scheme

Data viewer includes the necessary tasks to search the database, review data, and generate report. Data analysis and review is where S&V engineers typically spend a majority of their time. This can be done before, during or after the data processing.

Reporting and data management is very important when solving a problem and then documenting it. BK Connect software supports this critical piece of the workflow by:
– Documenting tests with metadata;
– Has integrated report to Word or PowerPoint;
– Customizable export to Excel;
– Builds the report as you go, develop report templates that can be populated automatically through the process chain or use the advanced reporting through the data table viewer.
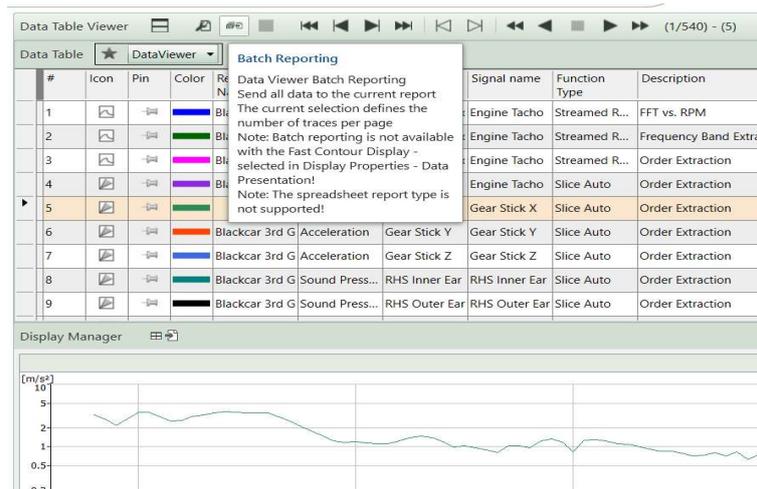
Figure 2. Data viewer application type 8400

- Type 8402 – Time Data Recorder

Time Data Recorder is a dedicated recorder inside BK Connect. The Recorder Task, when coupled with the Hardware Matrix and the Real Time Monitor, gives a unique recording experience. The Time Review task gives some additional validation and trimming tools.

Figure 3. Time Data Recorder application

The Recorder task, when coupled with the Hardware Matrix and the Real Time Monitor, gives a unique recording experience. The advanced version includes a Time Review task for listening to recorded data and making simple edits such as trimming to a specific range of interest.
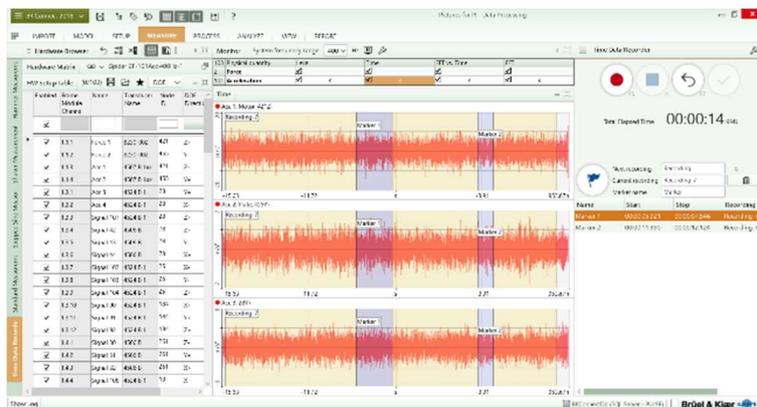

Figure 4. Time data recorder type 8402 application

- Type 8401 Hardware

Hardware setup application minimizes both the time with the physical hardware and the software licenses required to prepare for your tests. Allows the user to prepare the set-up either physical or virtual configuration, including the monitors and the simple recorder. This application also includes the transducer manager and verification.

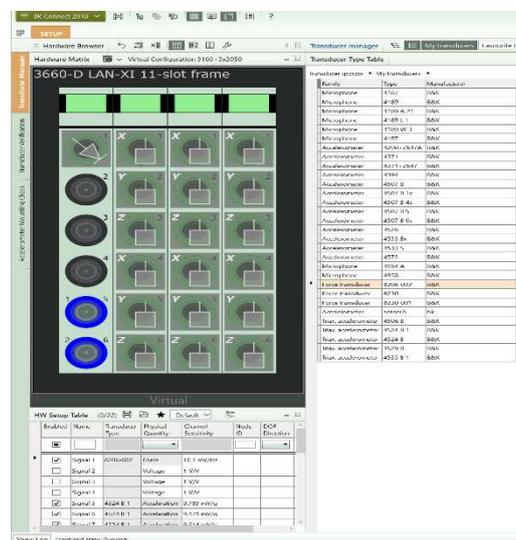**Figure 5. Hardware setup application block scheme**

Figure 6. Hardware Setup application

This application allows the user to not only set up their test but is also the basic recording application.

Hardware Setup, 8401 has the following characteristics:
- Up to two LAN – XI modules;
- Transducer Manager for transducer setup;
- Hardware browser for channel setup;
- Transducer calibration/verification;
- Real Time Monitor including the Simple Recorder.

Hardware Setup, 8401- A has the following characteristics:
- Prerequisites: 8401;
- Multiple modules;
- System validation tasks (analogue/digital diagnostics);
- Advanced system verification tasks (SIM-X) utilizing unique Brüel & Kjær measurement chain technology.
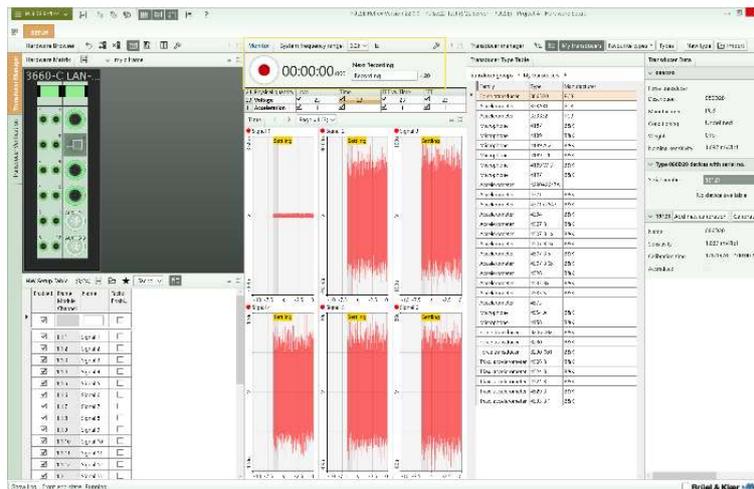
Figure 7. Basic Recording Application

- Data processing application type 8403 and 8404

Data processing application can include any of the task included in the other BK Connect core applications. The analysis can be defined using the specialist mode executed using the operator mode. It includes the fundamental analysis capabilities including FFT Spectrogram, Overall levels profile, pre-processing elements such as acoustics weighting, FIR filters and integration.
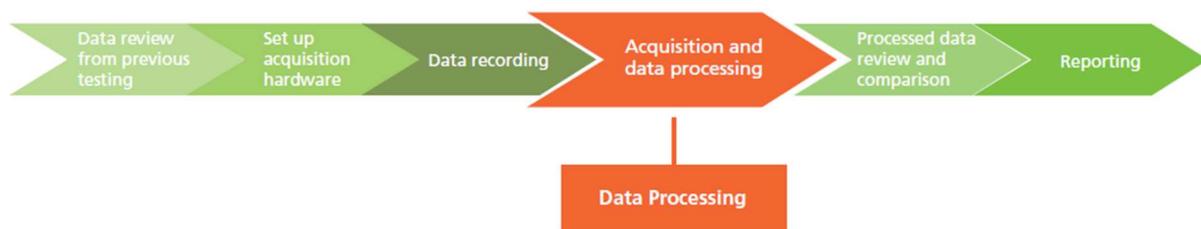

Figure 8. Data processing application block scheme

Data processing brings together a comprehensive set of signal analysis tools for post – processing sound and vibration data. It can include any task from the other core applications.

Central to data processing is the process chain which is a graphical tool for setting up the analysis process using individual, separately configurable elements for filtering, analysis, display and storage of results. On its own, the Data Processing application is only for post – processing time or function data. With the addition of hardware setup and time recorded licenses, the application expands to include real – time monitoring, spectral measurements and recording. Using the built – in automation tools, the workflow that can be achieved matches the ease of use and flexibility that our customers expect.

The Data Processing application is designed as a completely integrated solution for teams providing targeted usability for each standard profile.

Data Processing type 8404 Specialist license is the needed to create the process chain for analysis and template.

Data Processing type 8403 Operator license is needed to execute the Specialist created template.

The main goal of this is to simplify the user interface using favorites. For example in a template you can define which tasks should be available and you can define which analysis parameters are available.
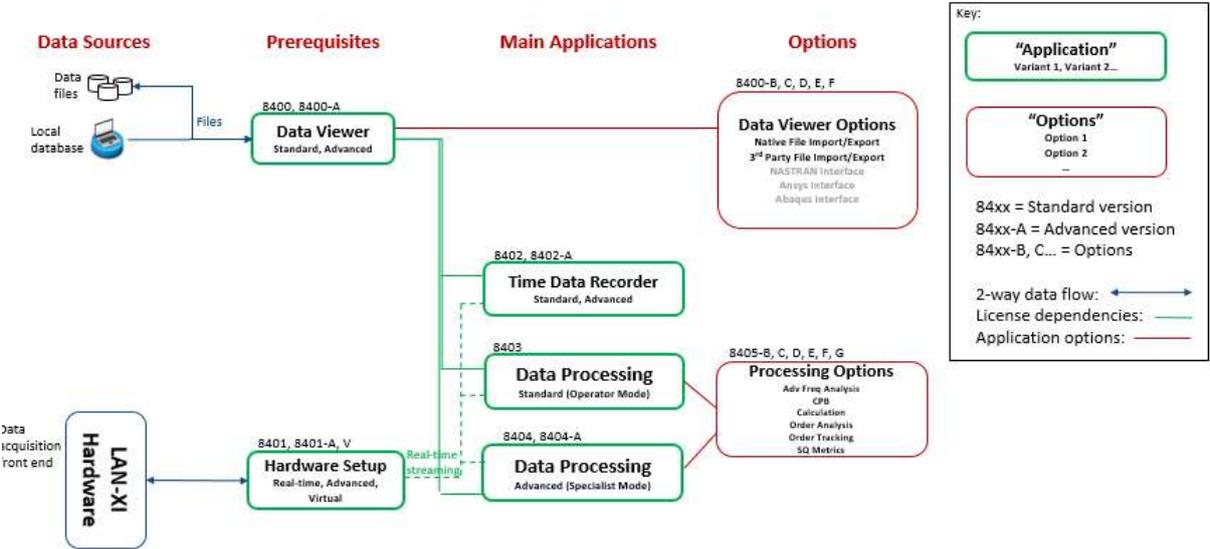

Figure 9. Product structure for BK Connect 2018

9. Conclusions

BK Connect is a new and highly innovative software that is a part of the products' range of Brüel & Kjær. Developed by a group of specialists to facilitate noise and vibration activities. The wide range of options and applications that the software offers extends the scope of work in this area. Full of innovative features and functions, this user-friendly platform reduces overall testing complexity. It helps work smarter and with a high degree of flexibility, while reducing the risk of errors.

References

1. Brüel & Kjær , https://www.bksv.com/en/News/Introducing-BK-Connect, 06 Feb 2018.