Welcome to the Insider
The Data Physics Internal Newsletter

This is the first issue of the Insider in the new Fiscal Year starting February 1, 2011. Data Physics enjoyed revenue growth of over 40% in the year just concluded and looks forward to another year of stellar growth. The world economy is recovering from the wobbles of the recent past, showing better opportunities for significant growth. To meet growth targets and improve the experience of the user, Data Physics continues to improve performance and quality across all three major product families. Software releases planned for this quarter include many enhancements to SignalCalc analyzers, including disk mirroring for realtime data recording and new options for SignalStar controllers in the form of Multi Frequency Sine for single shaker testing and Mixed Mode for Multi Shaker testing. SignalForce DSA10 series amplifiers now include the optional E-link remote interface and planned enhancements to shaker systems include 3” displacement on most SignalForce LE series shakers.

The high growth rate also challenges us to improve our delivery performance and we are looking to hire new employees in several areas. There are openings for Shaker Field Service and Manufacturing Technicians in both Hamden and Corona facilities, Sales Engineers in several regions of the US, and an Administrative Assistant and Applications Engineers located in San Jose. There are also openings for Interns in several locations. You are invited to refer suitable candidates with the promise of a monetary reward for successful hiring of your referred candidates. The size of reward will vary between $250 and $1000 depending on the position.

As we get ready to launch a new website and the first issue of SignalNews, the quarterly journal that will be circulated to users, we are also looking for feedback from the readership of the Insider on how we may improve our marketing communications. Stories on novel applications, problems solved using Data Physics products and compliments earned from users all make for excellent news. Please address letters to the editor, bourke.macdonald@dataphysics.com.

This issue of The Insider covers:

**SignalCalc:**

Rotating Machinery Analysis Paper Presented at IMAC XXIX.

**SignalStar:**


A recent article in Sound and Vibration magazine titled “A Brief History of Modern Shaker Controllers” presents a version of the evolution of vibration controllers where vibration controllers are divided into generations. Although the article presents some historical information and interesting pictures of older vibration controllers, it ultimately leads to a description of the authors most recently introduced vibration controller, Crystal Instruments Spider 81. In conclusion, the Data Physics SignalStar controllers still represent the “state of the art” in closed loop vibration control.

Rotating machinery diagnostics is an essential and often the most important function in industrial process and power generation applications. A variety of methods and tools are employed by test personnel over the past several decades, from route based walk around methods with single and dual channel data collectors to permanently installed long term condition monitoring systems, but there does not appear to be a universally accepted set of practices that results in comprehensive diagnostics capabilities of the machinery under test. This paper examines the range of solutions available to analysts in the paper manufacturing and power generation industries with a closer look at important considerations for tachometer signal processing and the need for re-sampling of time domain data into the angle domain and presents a new paradigm for mobile and highly flexible testing of all machinery, regardless of size and complexity, with a single and customizable dynamic signal analyzer.

This paper will be available for download from the new Data Physics website in the SignalCalc Library.

Introduction: SignalStar Multi Shaker Mixed Mode

components can be superimposed on broadband random.

Multi Shaker Mixed Mode allows definition of the complete MDOF vibration environment including cross coupling between control points. Broadband random and narrowband random component references include power spectral density profiles for each control point and cross spectra, coherence, or coherence and phase profiles for the definition of the coupling between control points. Sine component sweep profiles include both amplitude and phase information to accurately reproduce the relative sinusoidal motion between control points.

The user can define run schedules for the test with multiple test levels and durations. The schedules include the ability to turn on and off narrowband and sine components. Component sweeps can also be scheduled to start and stop. More complex run schedules can include looping of run schedule stages.
The Evolution of the Vibration Control System

A recent article in Sound and Vibration magazine titled “A Brief History of Modern Shaker Controllers” presents a version of the evolution of vibration controllers where vibration controllers are divided into generations. Although the article presents some historical information and interesting pictures of older vibration controllers, it ultimately leads to a description of the authors most recently introduced vibration controller, Crystal Instruments Spider 81. Similar to an “infomercial”, it appears the objective of the author is to sell the author’s product.

While most articles in a publication like this have the underlying purpose of promoting a particular product or company, this one was particularly egregious, specifically referring to other vibration controller vendors while positioning the Spider 81 product as a new “4th generation” of vibration controller. Ironically, recent advertisements from Vibration Research refer to its most recent controller as its 5th generation. However, in doing so in an advertisement and referring to its own 5th generation, it seems more genuine, though one is hard pressed to think of what products represent the first three generations.

The reference to 4th generation in this article evokes thoughts of smart phones and cellular carrier technology with 3g and 4g. In cellular technology there are debates as to what constitutes 4g. Different cellular companies are promoting different technology in order to provide it. Actually, none of the cellular companies promoting 4g service meet the official speed of 100 Mbps. However, it is generally accepted that 4g is a leap in performance including drastically increased data speeds and enhanced security measures.

With this in mind, we should look at the advances touted in this article. The figure comparing controller architecture used in the article and in Crystal Instruments advertising is shown below.
The primary feature distinguishing this “4th generation” controller is its ability to link multiple chassis over a network for a larger vibration control system. Does this sound familiar? A comparison of the architectures of the Abacus and the Spider 81 is shown here.

The Data Physics Abacus already provides the ability to link multiple chassis over a network. In addition, the Abacus provides local throughput disks in each chassis to ensure recording at maximum sample rate for up to 32 channels per chassis, regardless of the number of chassis. A closer look at the channel to channel phase match specification for each system shows that the Abacus offers 0.05 to 0.5 degrees phase match to 40 kHz, while the Spider 81 only offers +/- 1 degree to 20 kHz. Abacus systems with over 1000 channels are currently in use by Data Physics customers. Clearly, the “4th generation” vibration controller’s chief innovation is inferior to the existing Abacus.

High channel count vibration controllers have been in use for many years now. The most important recent innovation in closed loop vibration control is the ability to control multiple shakers and multiple degrees of freedom. This capability has even been added to Mil-Std-810g. Data Physics SignalStar controllers offer both, high performance, large channel counts and multi shaker control. A SignalStar Matrix controller was recently delivered to a US military research and development center with the capability to drive up to 5 shakers with 120 input channels.
In the final analysis, vibration controllers' capabilities should be judged based on the complete system performance. The Data Physics SignalStar controllers still represent the “state of the art” in closed loop vibration control. When other vibration controllers are ranked with the SignalStar controllers on an evolutionary scale, you will find that they are still not quite walking upright.

**SignalForce Sales Highlights**

**Government of Israel, Department of Defense selects LE-358/DSA10-20K**

Data Physics was awarded a purchase order for our LE-308/DSA10-20K shaker system by the Government of Israel, Department of Defense office based in New York. The LE-308 shaker system will be fitted with the Lin-E-Air low frequency isolation system and mounted in a VH frame. The system will include V-Groove wheels and casters to allow the shaker to be wheeled in and out of their climatic chamber.

**Lockheed Martin Sunnyvale selects LE-DSA10-APG-2**

Lockheed Martin has selected the LE-DSA10-APG-2 digitally switching amplifier designed specifically to drive dual acoustic generators at their Sunnyvale, California satellite testing facility. This order is the second of what will eventually be eight systems to be replaced over the next couple of years.

**Major Shipments**

On December 5, Data Physics shipped a SignalForce LE-5022/DSA10-360K shaker system to the Engineering Center at BMW in Munich. The shaker was mounted onto a specially designed MST-52 Monobase and was fitted with 16 Low Pressure T-Film Hydrostatic Bearings for maximum overturning moment restraint. For Vertical Testing the shaker was fitted with an LE-HE-S52-52”h x 52” guided magnesium head expander. The head expander was fitted with a specially designed lifting system, which facilitates the changeover from vertical testing to horizontal testing. The head expander lifts straight up and locks into place, allowing the shaker to be rotated and operated in the horizontal axis. The system will be used in the development testing of BMW’s PHEV/EV Hybrid vehicle components.
ISO9001:2008 Certification
On December 10, Data Physics Corona successfully completed the ISO9001:2008 Audit and Certification by BSI, with no major non-conformities found. This certification makes Data Physics the only US based shaker manufacturer to be ISO9001:2008 certified and shows our commitment to quality and continuous improvement of the SignalForce product line. The PDF will be available on the new website.
**Technical Issues**

**When to select the optional welded magnesium Drive Adapter**

The question of “when do we have to choose the optional welded magnesium Drive Adapter” has come up several times in recent months, so we wanted to take this opportunity to explain the typical rule of thumb for selecting a Drive Adapter versus just the standard in-line drive connection.

Typically, the SignalForce MST-XX Monobase systems include an in-line drive connection. This is usually a simple removable plate that connects the slip plate to the central horizontal row of inserts on the shaker armature. This connection is well suited for small lightweight packages - less than 100 lbs (45 kg), typically with oil film slip tables or even with low pressure guide bearings. However, if the planned testing includes larger payloads with high overturning moments, the welded magnesium Drive Adapter is recommended.

To go one step further, when the slip table system uses high pressure hydrostatic journal bearings or low pressure T-Film bearings, the welded magnesium Drive Adapters should always be used. The Drive Adapter is designed to allow maximum transmission of force into the slip plate, with minimal losses across the bolted joint. This design has proven to have the best dynamic characteristics of any drive configuration available and has been adopted across the entire shaker industry.

**Price Changes**

A number of price list changes have been made; these changes will be reflected in the next price list release:

A. The Multi Axis Mixed Mode control options have been added to the Matrix controller (DP850-N13).
B. The Multi Shaker Mixed Mode Waveform Generator option has been removed (DP850-55).
C. The Disk Mirroring option has been added to the Abacus Network Peripheral (DP700-XX-A1MHD).

**Upcoming Conferences and Trade Shows**

Data Physics will be exhibiting SignalCalc Analyzers, SignalStar Controllers, and SignalForce Shakers at several conferences and trade shows in the next few months including:


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