

Orbit Newsletter Digital Publication

Q1 2022

Orbit 60 Series Update: System 1 and Orbit 60



Introduction

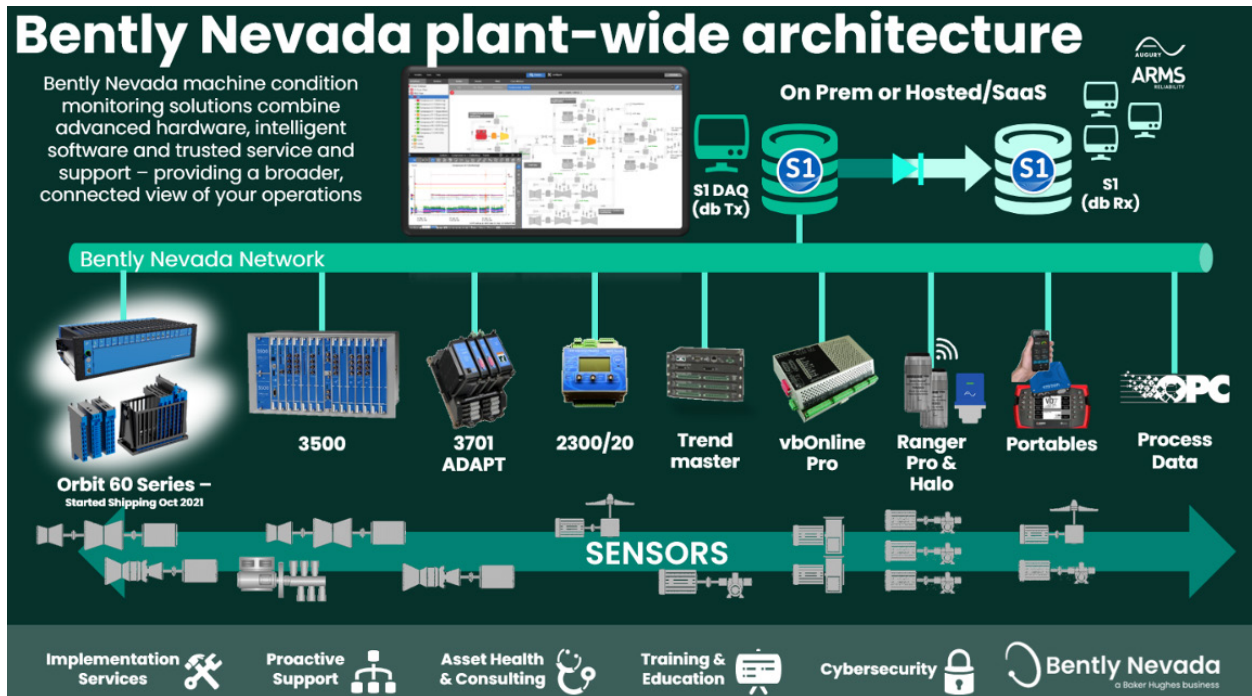
Welcome to our 9th article focused on Orbit 60 and Orbit 60 enabled enhancements. Today, we will be discussing how the Orbit 60's unique capabilities allow you more flexibility and ease of use for System 1. Most of our customers have by now realized the benefits of not only protecting their machinery but managing them as well through System 1. Orbit 60's uniquely cyber secure System 1 interface is only the beginning, and this article will show you how the bi-directional communications of our communication gateway and our listen-only Condition Monitoring Modules, along with our enhanced sensor capabilities will help you accomplish your management mission.

Our past articles have focused on the cyber security, hardware, and configuration aspects of the system, you may follow the links below to access them:

- [Q1 2020 Orbit Article – Introducing Orbit 60](#)
- [Q2 2020 Orbit Article – Available to Quote – Explore the Cost Savings](#)
- [Q3 2020 Orbit Article – Now – Less Spares!! – How to Choose Input Modules](#)
- [Q4 2020 Orbit Article – System Fundamentals – Output Cards](#)
- [Q1 2021 Orbit Article – Cyber Secure Condition Monitoring!](#)
- [Q2 2021 Orbit Article – Orbit Studio Configuration Software](#)
- [“Beyond the Basics Webinar” – Configuring Orbit 60 with Orbit Studio Software](#)
- [Q3 2021 Orbit Article – API 670](#)
- [Q4 2021 Orbit Article – Dispelling the rumors – 3500 is NOT obsolete!](#)

Probably the most significant outcome of the Orbit 60 design, as it relates to System 1, is its inherently cyber secure communications. This is covered extensively in our [Q1 2021 Orbit article – Cyber Secure Condition Monitoring](#). And, while that is important in our increasingly insecure world, it is certainly not the only important improvement that we've made with regard to System 1.

As you have probably experienced, we have been steadily widening our focus over the past 35 or more years from protecting your high-speed critical sleeve bearing machines, to helping you manage them as well as the plantwide machinery that supports your processes. We started this journey back in 1986 with the industry's first ever Condition Monitoring software Dynamic Data Manager and extended it to plantwide machinery shortly thereafter with our TrendMaster system. These systems have, of course, evolved over time into System 1 and our current monitors and Condition Monitoring products that support it, including Orbit 60, 3500, 3701 Adapt, 2300 as well as the vbOnlinePro and RangerPro periodic systems, and of course our SCOUT portables. And, as can be seen below, all of our products interface with System 1.



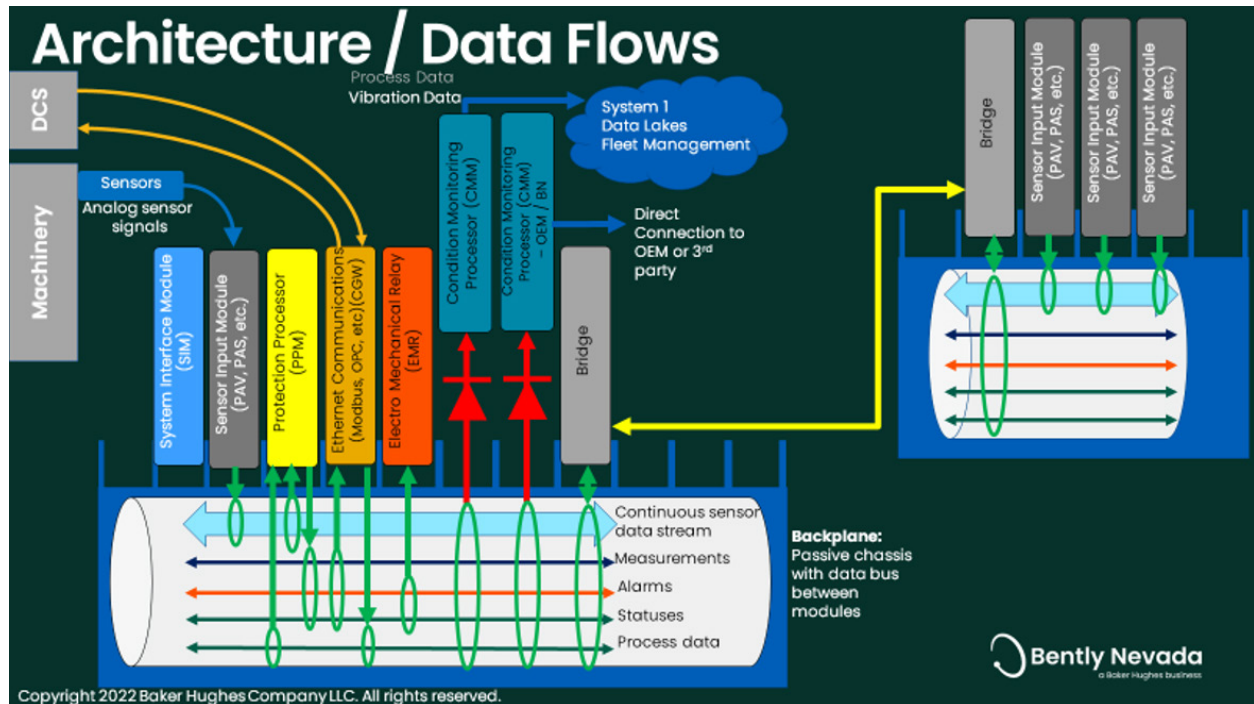
From a traditional sleeve bearing diagnostics approach, having any more than 800 lines of resolution is not only a waste of storage memory and processing power, but unnecessary (honestly, I'm not sure that you even need more than 400 lines). However, if you want to look at rolling element bearing faults or gearbox issues, having 3200-line capability is often desirable. Yes, you guessed it, Orbit 60 can now provide System 1 with 3200 lines of resolution as compared to the 800 lines available with 3500. Further, I have it on good authority that an even greater number of lines will be made available in a future release (firmware upgradeable, of course, and backward compatible to all installed systems).

If you are not sure what resolution what would work best or want multiple ways to collect waveform data, the System 1 – Orbit 60 CMM allows for configuring multiple waveforms on the same sensors. For example: the user may want a focused 800 line spectrum for faster data acquisition during startup and a 3200 line spectrum for very high resolution steady state analysis. These can be configured for the same sensors for individual and independent data analysis.

Having that kind of power doesn't mean that you have to use it all the time though... and, here is where the cyber secure bi-directional communications between the Condition Monitoring Module (the card that passes information from the Orbit 60 to System 1) and System 1 comes into play. We've designed the Condition Monitoring Module to be configured through System 1. If you want to change the resolution, you can now do it directly from your business LAN System 1. No need to go find the key to that locked room in the basement where your control network level System 1 is kept. Now you can do this from the convenience of your desk with absolutely zero impact on your protection system.

The Condition Monitoring Module, CMM, is the device that we use to communicate with System 1. But there are several other attributes that make this module special. First, the CMM has access to all of the data on the backplane of the system. This includes the raw sensor data, processed data such as Direct, Gap, 1X & 2X amplitude & phase information, trended variables and alarm statuses from the Protection Processor Module, PPM, and process data from the Communications Gateway, CGW

(see figure below). This sounds, and is, very powerful, but just like in the old [Ronco Pocket Fisherman commercials](#), or this [beauty](#), “That’s not all...” The Condition Monitoring Module also has all of the processing power that the Protection Processing Module has, as well as an onboard 256 Gb solid state hard drive (more on this later). Remember, the CMM, can only read data from the backplane though, and it has no way of writing data to it through software, firmware or hardware (there are no



physical components in the module to be able to write to the backplane)! This is how we keep the system cyber secure!

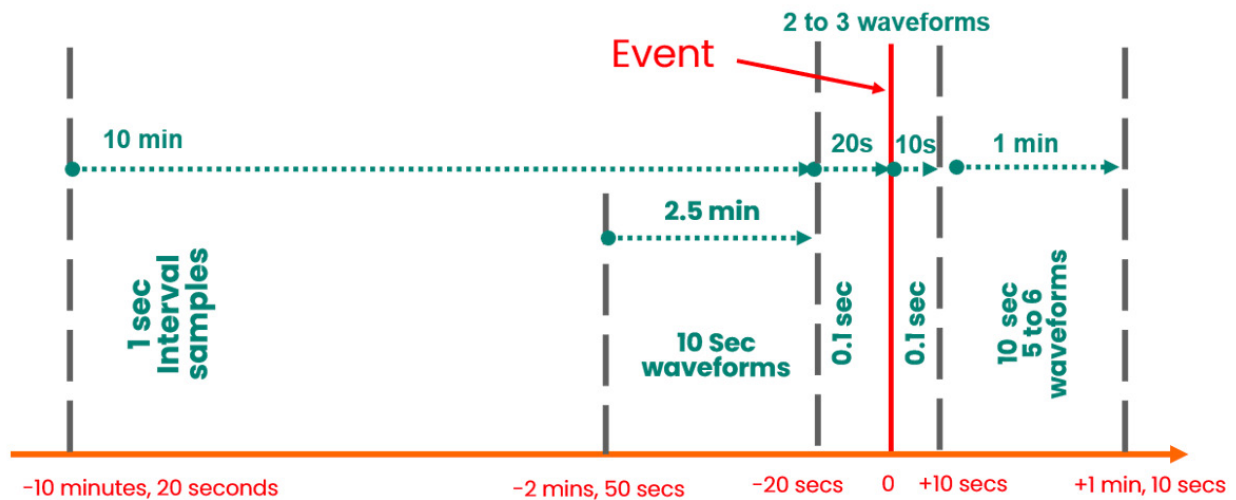
One of the features the onboard processor allows us to implement, is balancing of the processing power. We can, if we like, segregate the machinery protection parameters (think alerts and trips) on the PPM, and put Condition Monitoring parameters (think nice to know, but wouldn't trip on items like gap voltages, bandpass variables, etc.) on the CMM itself, thus balancing resources and providing you with extra value.

Speaking of Condition Monitoring, we have added a couple of new Condition Monitoring parameters with Orbit 60. We now allow multiple bandpass filters on a single waveform, Acceleration Demodulation (Enveloping, Available June 2022) and Sideband Energy Ratios, SER (available late 2022). Most of these new capabilities are used mainly in rolling element bearing and gearbox diagnostics. These were a keen focus of the Orbit 60 design team, allowing us to bring not only your critical machines, but the ancillary machines that keep a process running into your Condition Management software, System 1. The addition of the SER and Enveloping capabilities will be firmware only changes. This means that if you install the hardware today, it can be upgraded to incorporate these new capabilities. This is an ongoing theme for Orbit 60, in that we have designed the hardware to be capable of adding additional features in the future. These additional hardware features, when combined with System 1's trending, plotting and alarming capabilities will provide you with additional value, and diagnostic convenience.

I should mention that these features come straight from our Wind Monitoring systems, of which we have more than 40,000 units installed globally. For those that aren't familiar with Wind Turbine design, please understand that they consist of very large planetary gearboxes with all of the shafts supported by rolling element bearings (until very recently – now new designs do have some sleeve bearings). One of the points here is that Orbit 60 has not only built on our slow speed, gearbox and rolling element bearing experience, but can handle both your high-speed critical machinery, as well as your complex gearbox, REB machinery such as wind turbines and extruders with equal ease.

To make getting these “extra” inputs (ancillary machines) into Orbit 60, we designed the bridging modules (available in an upcoming release) that we have also alluded to in past articles. More to come in a future article by the way, but the bridging modules allow us to connect different input chassis together in one system without the need to add duplicating hardware components such as processing modules, relays, communication gateways, etc. The i/o nature of these chassis also allows you to mount them close to the equipment which can save significant wiring costs. The upshot is that you can now monitor those ancillary machines, such as oil pumps, etc. less expensively, and with greater diagnostic capabilities and all, right alongside your other critical machines, right in System 1.

One more point that should also be mentioned is that soon we will also be able to control how data is captured in transient mode or on alarm. For instance, in our other monitors, we follow a scheme of 1 second data for 10 minutes prior to an alarm (although we should note that System 1 EVO already has a default value of collecting static data every 1 second), 20 seconds of tenth of a second data before the alarm, followed by tenth of a second data for another 10 seconds after the alarm, as well as 10 second waveforms for almost three minutes before and a minute after the alarm as seen in the infographic below:



So, with System 1 having the ability to change this data collection rate, you may opt for a minute or two of tenth of a second data prior to alarm, and five second waveforms. While the alarm data collection parameters are configurable, the default values are still the field proven values mentioned above. The choice is now yours.

While the above is great for machinery issues, what if you could also do this for your process data, and/or instrumentation faults, such as "Not OK's?" This would help bring greater clarity into what happened and help to differentiate between annoying spiking issues and actual machinery problems. Those capabilities are on the drawing board and should be coming soon. It should also be noted that the process data capture, may be limited by the speed of your DCS system, as DCS's tend to serve data at slower rates than Orbit 60's capability to ingest. This is due to the nature of DCS data, which tends to be scalar data rather than waveform data, which is of course the strength of Orbit 60 and System 1.

Speaking of diagnostics and machinery issues, another roadmap feature is having process data coming into your system through the new two-way communication gateway will give you a whole new and powerful perspective on your data as well. Imagine being able to correlate your process data with your vibration data, right in your Condition Monitoring system. Yes, we were able to do this with Modbus and OPC data imported into System 1, but realistically, how many folks actually do? Having an easily implemented and cyber secure way to get your process data into System 1 - now, this is a game changer.

Earlier in the article, I noted that the Condition Monitoring Module, which is what we use to communicate with System 1 has a solid-state hard drive built in. This 256 Gb drive stores approximately a week's worth of data. The week by the way, could be a very busy week for your machine, as the design for seven days of data includes ten startup and shutdowns (data intensive) per day. This suggests that if your machine is at steady state without alarms the hard drive may be able to hold several weeks or more of data. Why is this important? Two reasons jump out. First, if you lose your connection to System 1, within the data storage time your System 1 data will not be lost. As soon as the connection is restored, all of the historical data on the hard drive will be sent to System 1. The other reason that this may be important is that if your Orbit 60 isn't connected to System 1, and the machine trips, it is possible to extract the data using the Orbit Studio configuration software. The data can then be sent to our MDS engineers for analysis, and an informed "go/no go" decision for a restart can be made.

So, as you can see, we've done a lot of work to improve the security, and functionality of System 1 to enable you to expand its footprint throughout your plant. Which enables you to have greater confidence that your machinery is managed below the Alert level and avoiding unwanted surprises.

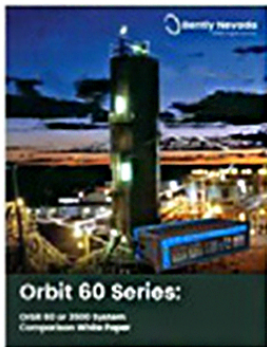
More information is available on our website:



Next Steps

Our teams are excited to discuss Orbit 60 in more detail. We have multiple technical white papers available for a deeper dive into the following topics. Please reach out through the contact us link below to receive a copy and we will connect you with your local expert.

Orbit 60 Series or 3500 Detailed Comparison



Orbit 60 Series Data Security Condition Monitoring Module



Orbit 60 Series Bridging Concepts Technical Information



- **Orbit 60 Series or 3500 Detailed Comparison** - This document details the difference between Bently Nevada's Orbit 60 Series machinery protection system and the 3500 system.
- **Orbit 60 Data Security Condition Monitoring Module** - This document is intended to describe how the Condition Monitoring Module in the Orbit 60 Series Monitoring System provides a secure solution with full high-resolution data to external networks without jeopardizing the operation of the protection functions.
- **Orbit 60 Series Bridging Concepts** - Bently Nevada introduces the concept of bridging with the Orbit 60 Series system architecture.
- **Coming Soon:** Protection Schemes & 3500 Retrofit White Papers

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[Product Video – Orbit 60 Full length](#)

[Orbit 60 Series and System 1: Bloomberg TV:](#)

[Houston Chronicle: Bently unveils the Orbit 60](#)

[Turbo Machinery Magazine – Bently Nevada’s New Platform](#)

[Why Orbit 60? Why Now?](#)

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