

Order-based NVH

T101

OVERVIEW

This **sigPOD Noise, Vibration & Harshness (NVH) template** monitors noise and vibration characteristics to detect problems with moving assemblies, such as motors, gearboxes and pumps. Raw noise or vibration data is collected from pressure, force, acceleration or noise sensors (i.e. microphones), while an encoder tracks angular position over the test cycle. This is then analyzed in the time domain and frequency domain with the built-in Fast Fourier Transform capabilities of the sigPOD. Even subtle defects can be reliably detected by monitoring specific frequency components. Order-based analysis provides the ability to track position- or speed-related characteristics. By replacing subjective evaluation with objective testing, field returns due to “undesirable noise” or malfunctioning components can be dramatically reduced, significantly improving overall quality. Depending on the type of assembly, this application will allow you to capture a broad range of defects, including:

- Off-balance assemblies
- Tight-fitting components
- Missing, malformed or malfunctioning components
- Damaged gears

Please note that this configuration is intended as a starting point and may require modifications to meet your specific requirements

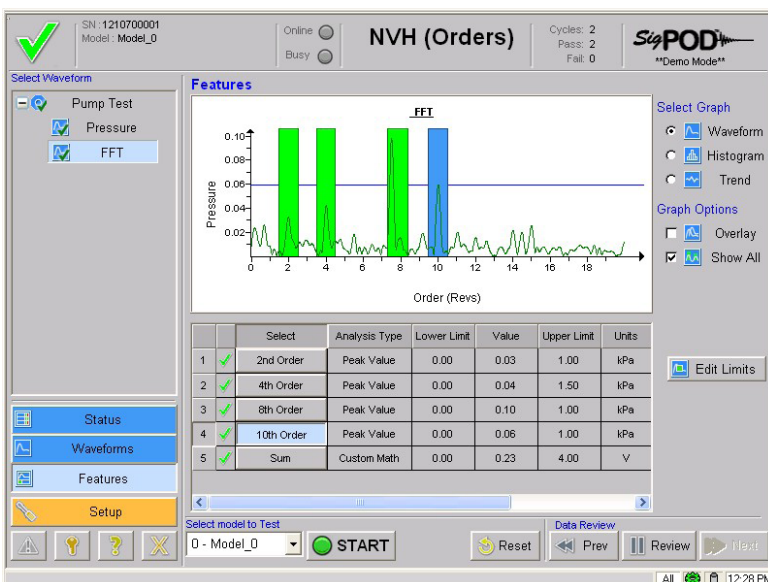


Installing the template

You can install the template using the **System Shell** interface. See the last page of this guide for complete installation instructions.

Requirements

There are separate templates for **PSV version 3.16 and the newer 4.0**. Check your sigPOD to see which template you should use. It requires a sigPOD with a minimum of 2 analog channels and one encoder channel, such as a model 1302.



SETUP

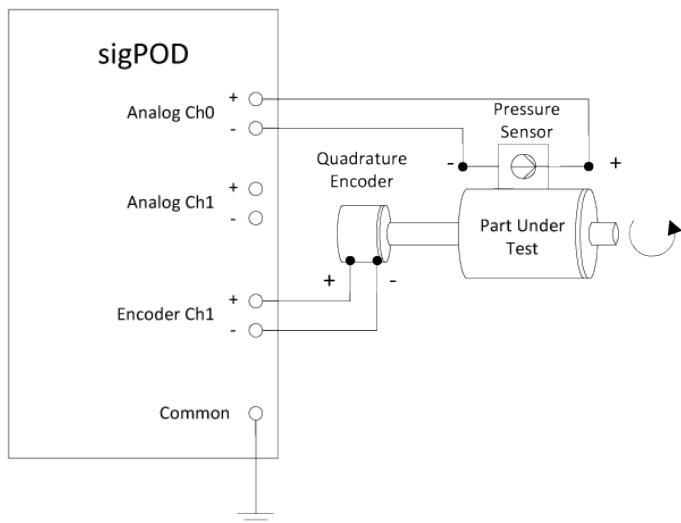
The base configuration is set up with a 50 kHz sampling rate and a 1 second duration. These parameters should be tailored to each specific implementation to ensure the process is fully characterized. The settings will depend on the type of part and the particular test (e.g.: rate of rotation of the part under test).

SENSORS

The application is configured for a rotating fluid pump test. The assigned analog input channel is **00: Pressure**. The assigned encoder input channel is **00: Encoder**.

SCHEMATIC DIAGRAM

Below is a schematic diagram of the sigPOD order-based NVH test setup.



PRESSURE

(Analog Input 00) can be measured with a high-speed transducer that produces a 0-10VDC output. An accelerometer, microphone or force sensor may also be used depending on the application.

ENCODER

Encoder sensing (Encoder Input 00) is provided by a quadrature encoder with 5V TTL output. The sensor resolution must be adequate to properly accommodate order-based analysis.

APPLICATION CONFIGURATION

The Order-based NVH application comes configured with a single operation: **Pump Test**. To add operations, please refer to the *sigPOD PSV User Guide* for more details.

Within **Pump Test**, the following waveforms and features are defined:



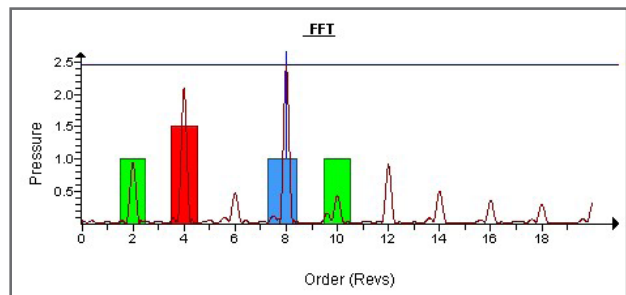
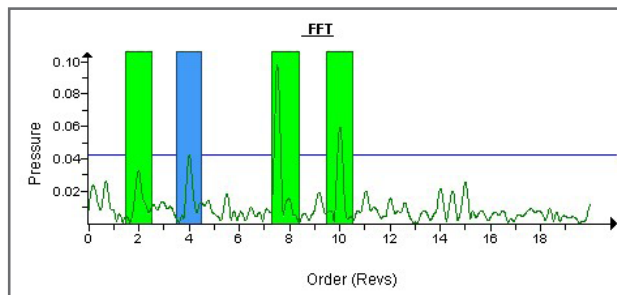
WAVEFORM DEFINITIONS

WAVEFORM	Y-INPUT	X-INPUT	WAVEFORM PROCESSING	DESCRIPTION
Pressure	Pressure	Time	None	The raw pressure signal.
Orders FFT	Pressure	Encoder	FFT	The signal is converted to the frequency domain in order to analyze specific frequency components.

FEATURE DEFINITIONS

WAVEFORM	FEAT #	FEATURE NAME	FEATURE TYPE	DESCRIPTION	EXAMPLES OF DEFECTS DETECTED
Pressure	1	Pk to Pk	Peak to Peak	The maximum pressure oscillation during testing.	The maximum pressure fluctuation can be an indicator of component defects.
	2	RMS	RMS	The root mean square value of pressure.	The relative magnitude of the signal can be monitored to ensure the part is operating within the appropriate limits.
Orders FFT	1	Band 1 Peak	Peak Value	The peak amplitude of the 2nd order.	A known defect that is linked to an order.
	2	Band 2 Peak	Peak Value	The peak amplitude of the 4th order.	A known defect that is linked to an order.
	3	Band 3 Peak	Peak Value	The peak amplitude of the 8th order.	A known defect that is linked to an order.
	4	Band 4 Peak	Peak Value	The peak amplitude of the 10th order.	A known defect that is linked to an order.
	5	Sum	Custom Math	The sum of the major frequency components is calculated.	Defects in one or more sub-components in the assembly can cause higher overall total magnitudes.


WAVEFORMS



Before you install the template

- Download the correct version of the template from the website (for PSV 3.16 or for PSV 4.0 or higher)
- Ensure the correct PSV version is already installed on the sigPOD (PSV 3.16 or PSV 4.0 or higher)
- If the template is on a USB flash drive, ensure the flash drive is inserted in the USB port of the sigPOD.

To install the template

1. On the *System Shell* toolbar, click *Install* to open the *Install* dialog box.
2. In the *Type* area, ensure *Back Up* is selected.
3. From the *Location* drop-down list, select one of the following:
 - X:\[Removable] – if the template file is on a USB flash drive
 - <Network Places> – if the template file is on a network drive
4. Click the  button next to the Location drop-down list.
5. In the *Open* dialog box, navigate to the template file (.SBK) to be installed.
6. Select the template filename, and click *Open*.
The template filename and properties are displayed in the *Install* dialog box.
7. In the *Install* column, *Component* area, ensure the *Calibration*, *Configuration*, and *Application Data* check boxes are selected.
8. Click *OK*.
9. To start the installed template, click *Run* on the *System Shell* toolbar.

For more information about installing application backup files, including template files, see the *InspeXion System Shell User Guide*. (To access, click *Install* on the *System Shell* toolbar, and then click *Help* in the *Install* dialog box).

About sigPOD Application Templates

sigPOD is a uniquely versatile platform that can be used for different applications across the production line. A sigPOD template serves as a starting point for configuration of the unit for a particular manufacturing test or monitoring requirement. Additional manual configuration will usually be required to fit to a test environment's specific circumstance. Please consult the sigPOD PSV user guide to learn more about how to configure the software. If you have suggestions on other templates or would like to share your own, contact us. If you require a customized application to meet your specific needs, our Manufacturing Intelligence Team can develop one for you. Request more information at inquiries@sciometric.com.

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