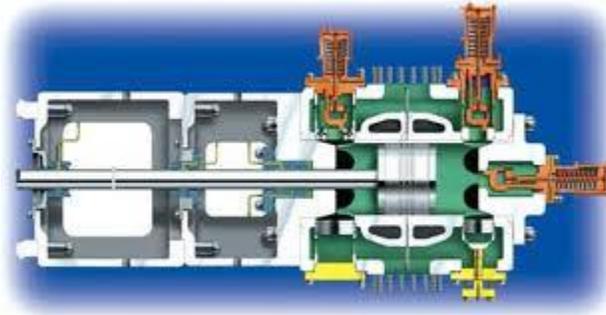# VTB-Sensor - Reliable approach to Monitoring for Impact Severity on Reciprocating Compressors

Reciprocating compressors are positive displacement machines in which the compressing and displacing element is a piston having a reciprocating motion within a cylinder. There are single stage and multiple stage units. There are two types of reciprocating compressors- one type requires a combustion gas engine or an AC motor (high speed separable) which may be connected to a gear box to drive the coupled compressor. Operating speed is typically between 900 and 1,800 rpm. Separable units can be a single stage or have multiple stages. They can be skid mounted, easy to install, and are easily moved to different sites- both onshore and offshore.

The other type of reciprocating compressor has internal power cylinders (low speed integral) that drive the compressor. These units run at speeds of between 200 and 600 rpm. They are commonly used in gas plants and pipeline service where fuel efficiency and long life are critical. Integral compressors may be equipped with two to ten compressor cylinders with power ranging from 140 to 12,000 hp.

Machine Saver, Inc., a Texas based company who created the world's first digital 3-axis vibration transmitter with embedded temperature has enhanced their proven CAN Bus technology to provide accurate and reliable vibration and impact measurements for your reciprocating compressor assets.

Of all the vibration measurements that can be made on a reciprocating compressor, impact detection is the most cost effective. Even for small, spared, non-critical reciprocating compressors, a VTB-Sensor configured for impact monitoring on each compressor cylinder is easily justifiable

VTB-Sensor, Configured for Impacts –How It Works

To set up the VTB-Impact sensor, an operator can set up the window times (reset time) based on the calculation of 960/machine running speed (RPM). The impact threshold levels are user settable in 1 G increment from 2 g up to 20 g pk. The window time will reset continuously and VTB-Net will accurately count how many impacts occurred within the user settable impact thresholds. The amount of impacts within the reset time indicates the repeatability of the impact and the severity of the mechanical looseness. Note that the faster the running machine RPM, the less length of reset time is required for detecting and verifying impact severity.
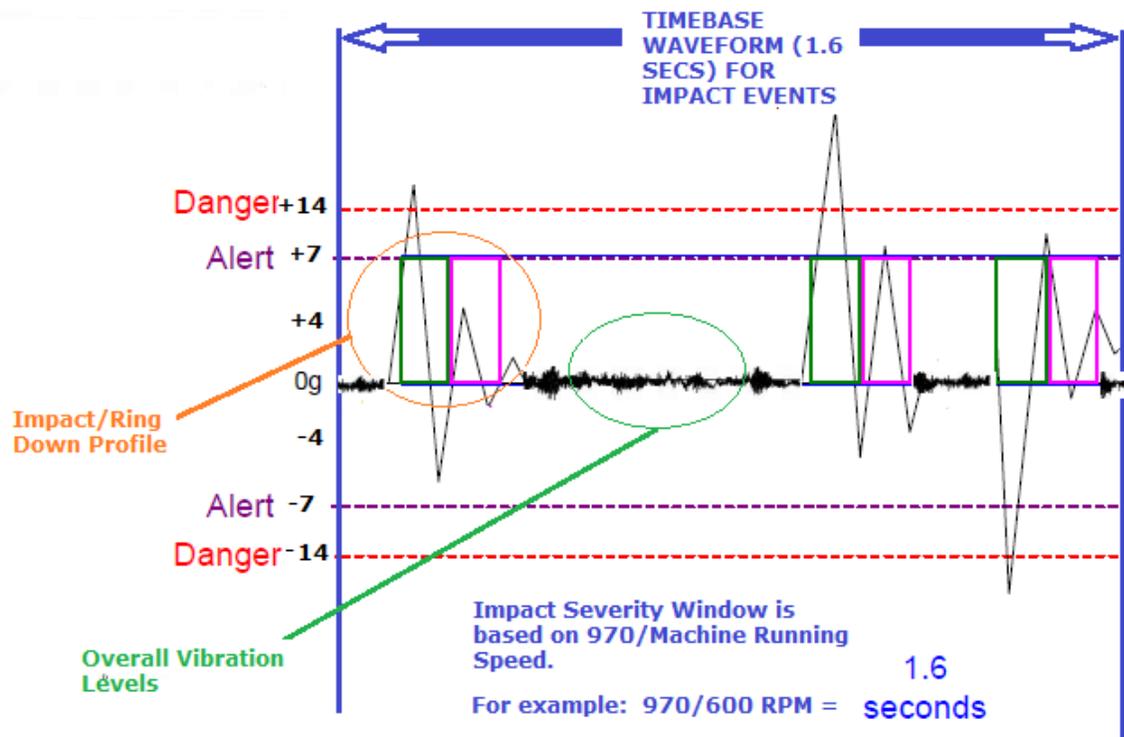
 Window time example:

> Machine Running Speed of 200 RPM, 960/200 = 4.80 seconds
>
> Machine Running Speed of 600 RPM, 960/600 = 1.60 seconds
>
> Machine Running Speed of 1200 RPM, 960/1200 = 0.80 seconds
>
> Machine Running Speed of 1800 RM, 960/1800   = 0.53 seconds

1) The VTB-COM web interface software menu allows machine configurations for running speeds between 200 and 1800 RPM;

2) It is essential that the impact signal can be detected and verified for impact monitoring accuracy, repeatability, and system reliability;

3) The VTB-Impact sensor must be mounted vertically and centered on frame extension and cross-head guide and connected to VTB-Com. Once the compressor reaches normal running speed, look at VTB-Net's software menu to review the sensor's g pk acceleration values (Y axis).   Use this level as a reference for setting the impact thresholds, e.g., 2 g or 5 g above highest pk vibration level shown below.

System
Configuration
Logged data
CAN Devices
Data Display
Sensors Status

Logout

Impact Mode Sensors

SN/RTU	Alarm	CAN	Temperature	Type	Axis	Impact Window	Alert Count	Danger Count	Avg. Alert (Peak)	Avg. Danger (Peak)
00003752 / 2		1	70 °F	25g2g	2	1.00	3	8	4.8 g	6.4 g

An operator can use the VTB-Net software menu to set up the VTB-Sensor configured for impact severity monitoring. The operator can set up the window times (reset time) based on the calculation of 960/machine RPM. The threshold impact levels are user settable to 2 g, 5g, 10g, 15g, and 20g. The window time will reset continuously and VTB-Net will accurately count how many impacts occurred within the user settable impact thresholds. The amount of impacts within the reset time let us know the repeatability of the impact and the severity of the mechanical looseness. This is obtainable from 960/ Machine RPM. The faster (slower) the machine RPM, the more (less) length of reset time is required.

An operator needs to setup two (2) impact thresholds (alert and danger), but, if the only (1) danger impact threshold is enabled, note that any meaningful impacts below the threshold level are detected by the 2nd internal sensor that can be trended for analysis.

Conclusion

This technical brief has practical suggestions to assist you in your impact severity monitoring and protection application.   We want to support you with a reliable vibration, impact severity, and temperature product that successfully and consistently detects, monitors, analyzes, and protects your equipment investment. Let us know about your application by consulting with the Machine Saver team at service@machinesaver.net   Our team can provide vibration monitoring solutions and benefits for your present application and extend their vibration expertise and new technology to your entire balance of plant. Product and application information is available at www.machinesaver.com