

Detection of the Rotational Direction of a Shaft in SKF @ptitude Observer

Introduction

In some applications, it is important to control data collection with respect to the direction of rotation of the shaft. This information is crucial in applications like rolling mills, shovels and draglines, since defects are more visible in a vibration spectra when the machine is under load. This kind of measurement can be complemented with gating (see application note **CM 3175**, *Gating Set up in SKF @ptitude Observer*) to be able to collect vibration data when the machine is, for example, operating at a certain load and rotational speed.

A shovel loading a haul truck.



A dragline in operation.



Fig. 1. Example of machines where the rotational direction is important during the vibration measurement.

Procedure

- 1 Install two tachometers for measuring the rotational speed plus one trigger point (i.e., target) on the shaft. The two tachometers shall be relative close to each other. See the laboratory set up in **fig. 2**.

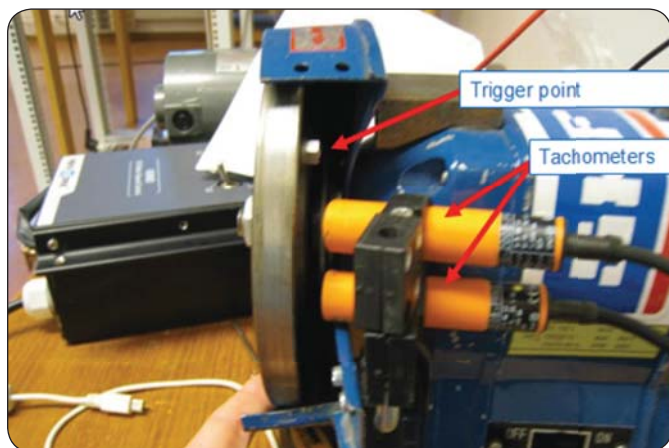


Fig. 2. Mounting of the tachometers and the trigger point.

- 2 First create two digital channels and then two rotational speed points.

- **Digital channels:** Go to **On-line/IMx units** and add two digital channels (→ **figs. 3 and 4**).
- **Digital measurement points:** Go to **On-line/IMx units** and create two digital measurement points (→ **figs. 5 and 6**).

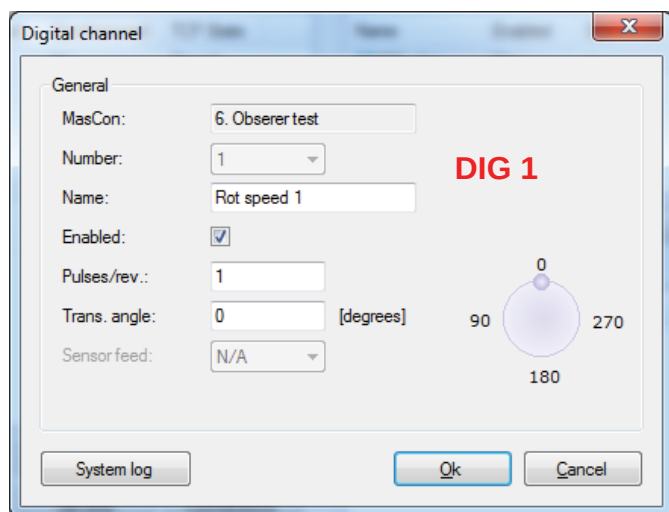


Fig. 3. Set up of digital channel 1.

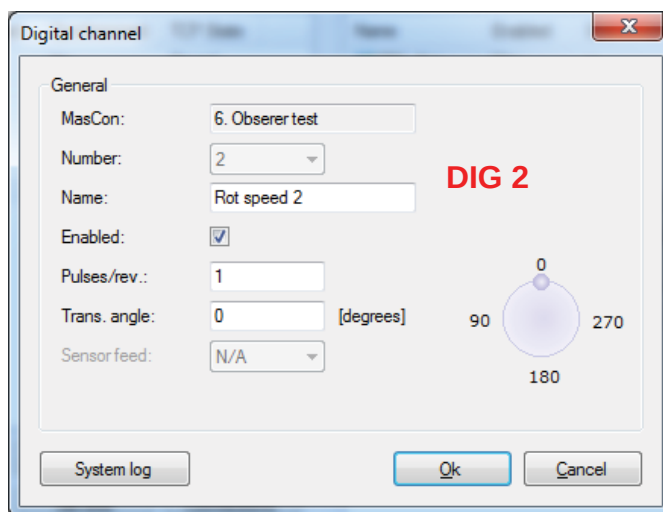


Fig. 4. Set up of digital channel 2.

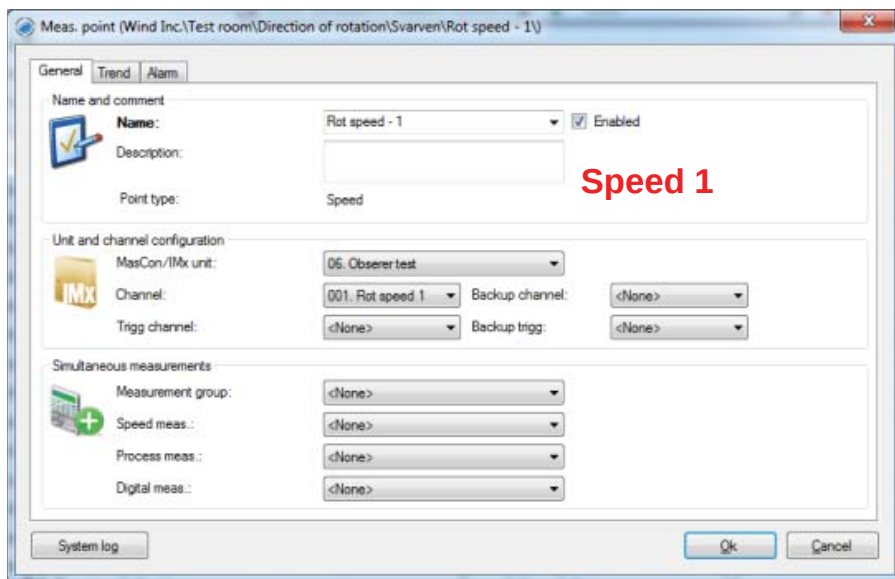


Fig. 5. Set up of digital channel 1.

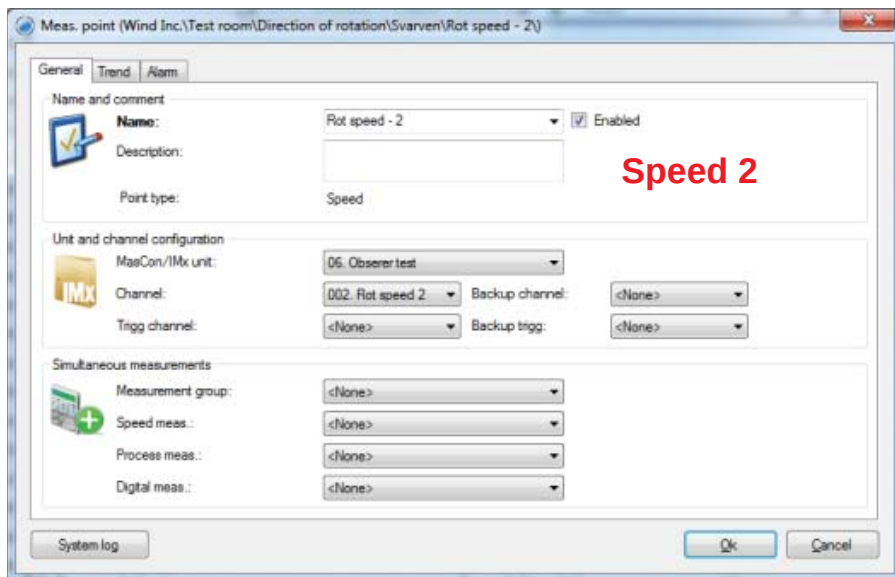


Fig. 6. Set up of digital channel 2.

- 3 Create and configure the "Time difference" measurement point to calculate the time difference between the two trig pulses from the tachometers (→ figs. 7 and 8).

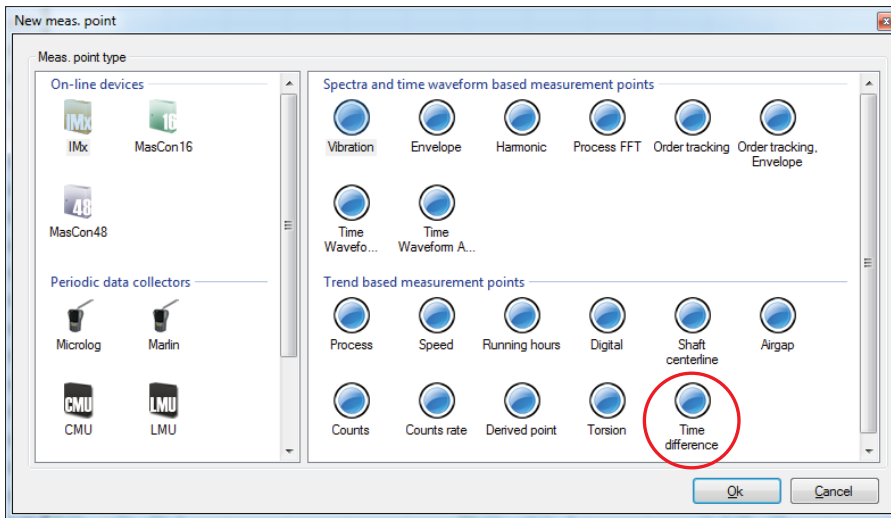


Fig. 7. Create a "Time difference" measurement point.

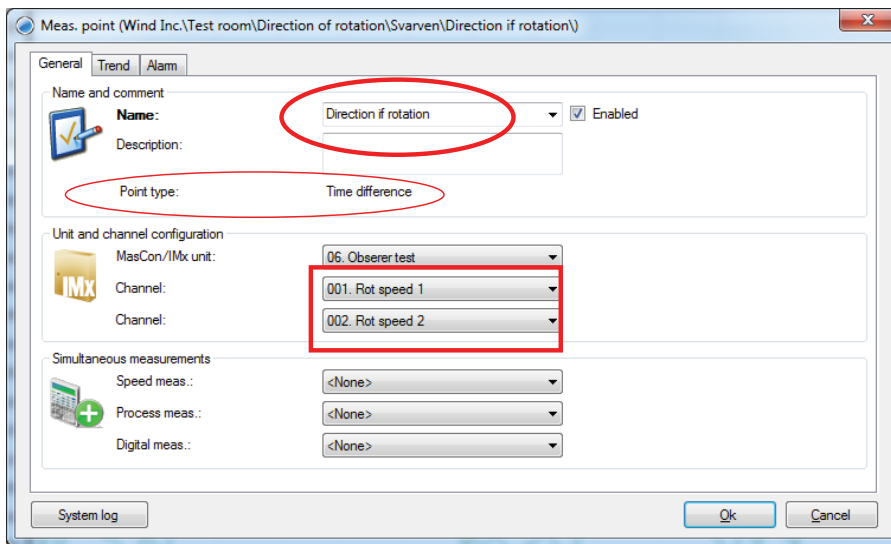


Fig. 8. Configuration of the "Time difference" measurement point.

- 4 A measurement point has to be created to be able to trend the time difference (→ **figs. 9, 10 and 11**), due to that a sensor on the machine has to be selected to be able to create this point. **This can be any sensor on the machine (→ fig. 9).**
- In the "Simultaneous measurements" section in the **General** tab, one of the "Rotational speed points" needs to be selected as a **Speed meas.** It doesn't matter which one you select (→ **fig. 10**).
 - The "Direction of rotation" point in **fig. 10** also has to be selected as a **Process meas.** in the "Simultaneous measurements" section settings.
 - Also see the necessary settings for the "Active range" in the **Trend** tab (→ **fig. 11**).



Fig. 9. Create vibration measurement point.

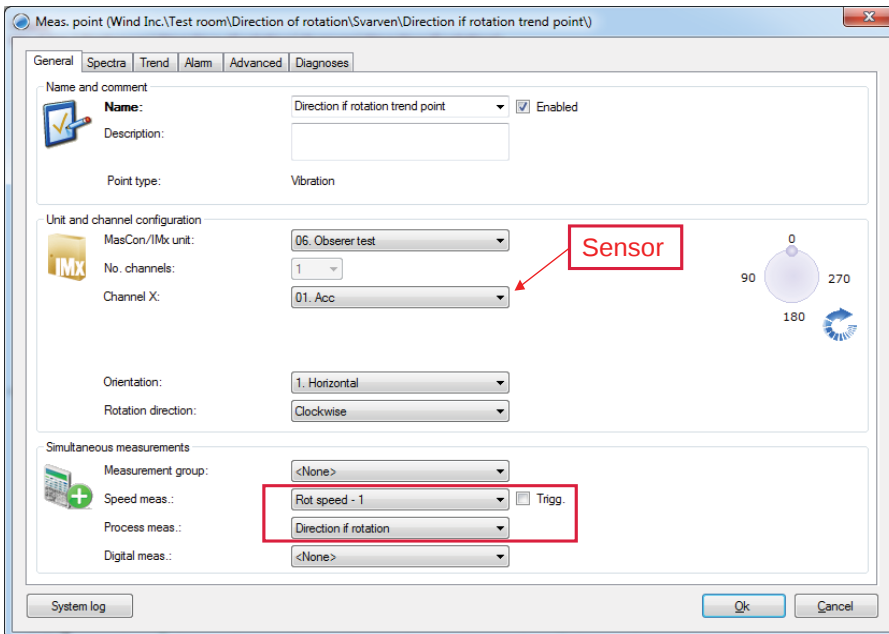


Fig. 10. Select a vibration point on your machine, and also select one of the rotational speed measurement points plus the process measurement point called "Direction if rotation" in this case.

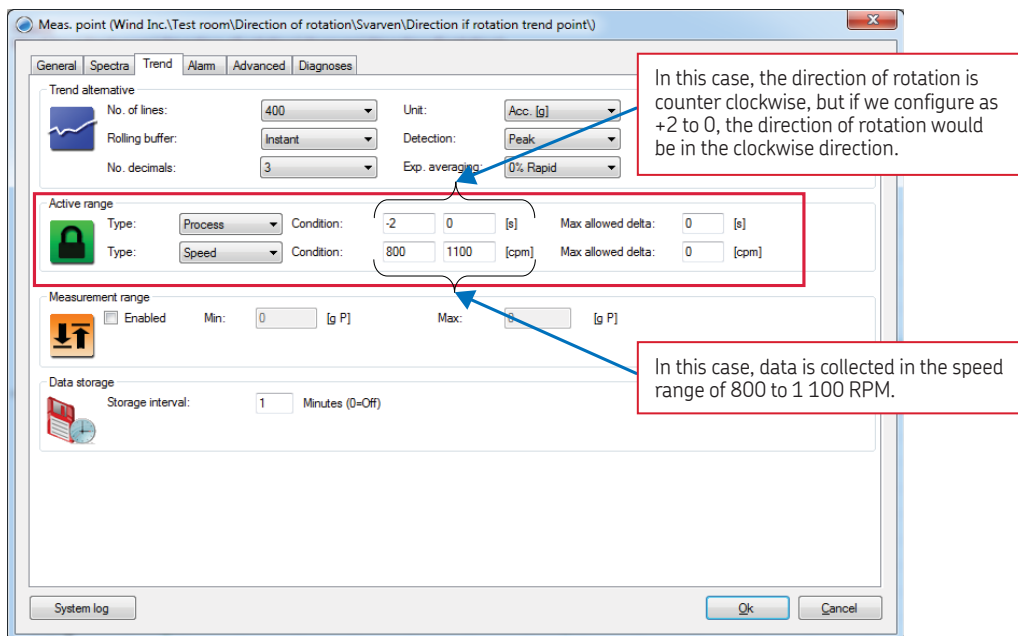


Fig. 11. An example of the "Active range" settings on the vibration measurement point.

- 5 There is a positive and a negative time difference for this type of measurement (→ fig. 12). For the set up in this example, a positive time difference corresponds to a clockwise direction of the shaft, and the negative time difference corresponds to a counter clockwise direction of the shaft.

NOTE. This observation of the rotational direction needs to be done by the person who sets up the system. When you start up the system, you need to make a note which direction corresponds to the + or – sign in the trend (→ fig. 12).

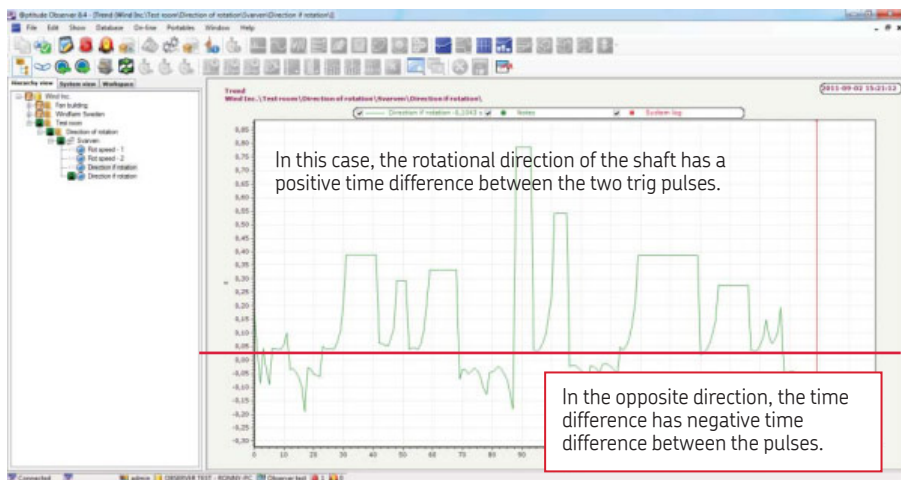


Fig. 12. The trend diagram for the time difference measurement point.

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