Create SKF Multilog On-line System IMx Orbit and SCL Points in SKF @ptitude Analyst

Introduction

Orbit and shaft center line (SCL) points are used to display shaft motion when monitoring turbo machinery faults and to diagnose machine problems (→ **fig. 1**). This procedure will show how to create and set up SKF Multilog IMx orbit and SCL points in SKF @ptitude Analyst software. Please refer to the following application notes for detailed information on system setup and other points configuration:

- **CM3157**, *Start up Guide for SKF Multilog On-line System IMx and SKF @ptitude Analyst*
- **CM3158**, *Add SKF Multilog On-line System IMx Points in SKF @ptitude Analyst*
- **CM3159**, *Add SKF Multilog On-line System IMx AC, DC, Logic and Speed Points in SKF @ptitude Analyst*
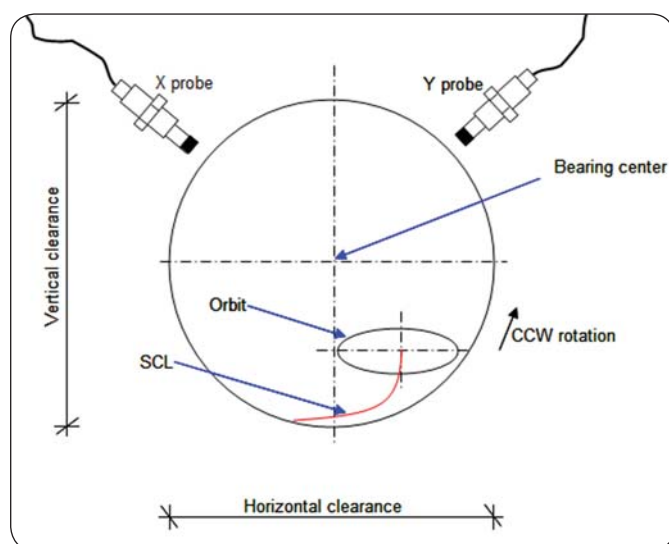

Fig. 1. Orbit and SCL scheme.

Background to orbits and SCL

Orbits and shaft center line plots are used to display how the shaft is moving. These kinds of plots are specially used for analysis of turbomachinery mounted on fluid film bearings. Some turbomachinery mechanical faults have characteristic plot shapes. You can compare the acquired plots with any known characteristics to detect faults and diagnose machine problem.

Orbits

The orbit plot is the combination of two time domain signals describing the shaft movement around its center point. To generate an orbit, the two time domain signals must be acquired at the same time, with the same Fmax and the same number of data samples. The orbit plot is then a relative phase indication between two sensor locations describing the complex harmonic motion of the shaft relative to the bearing. The two sensors (normally eddy current probe) are mounted 90 degrees to each other and the positions most commonly used are 0-90 or 45-135 degrees (→ **fig. 2**). As sometimes it is not easy to place the sensors in these positions due to constructive reasons in the machine, SKF @ptitude Analyst accepts other angle positions and is able to properly compose the orbit and do error corrections.

SCL

A shaft center line plot displays the shaft center DC position changes within a bearing clearance range. An orbit plot represents the shaft center AC dynamic motion. Use a shaft center line plot with an orbit plot to track both aspects of shaft motion.

Use a shaft center line plot to display changes in radial rotor position with respect to a stationary bearing over a range of time or speed. The DC gap voltage from two orthogonally-mounted proximity probes determines the averaged position change. **Fig. 3** shows a typical shaft center line plot of a machine startup.
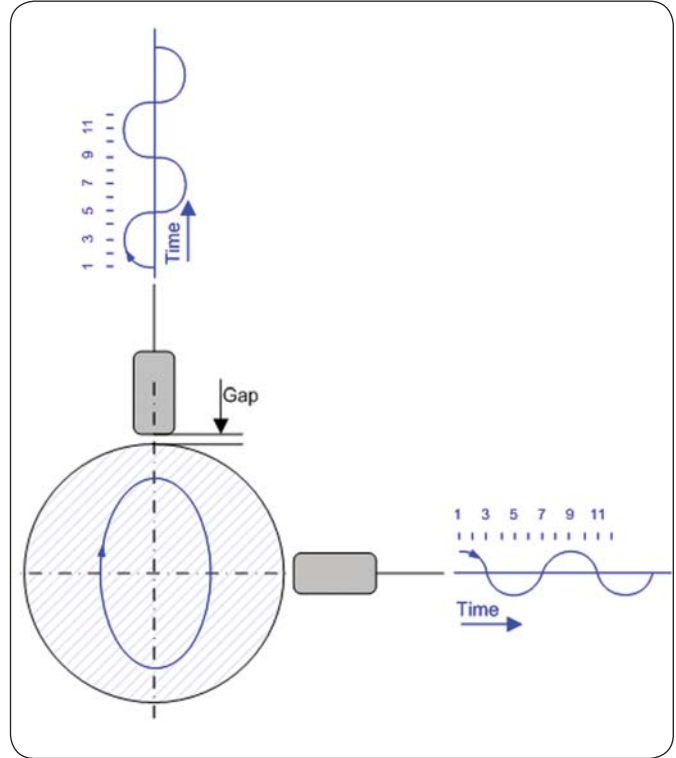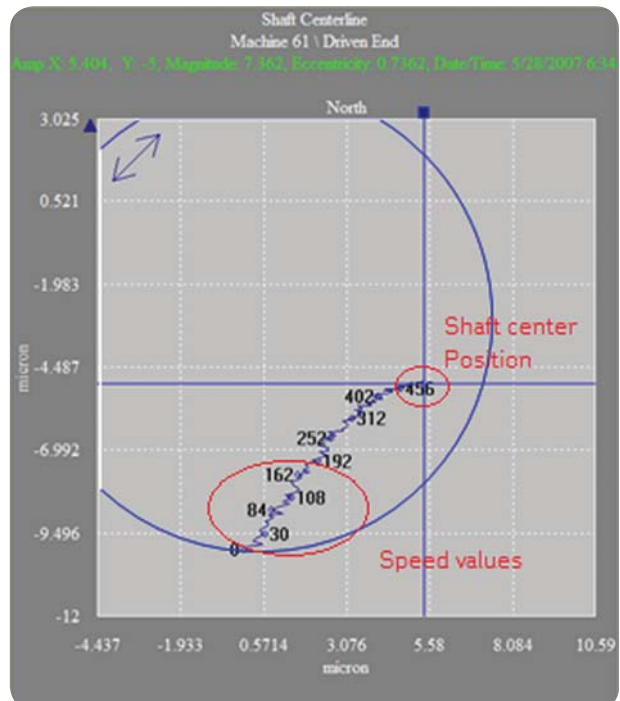

Fig. 2. Orbit construction.

Fig. 3. Shaft center line plot of a machine startup.

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Procedure

1 From SKF @ptitude Analyst, right-click on the needed machine and choose **Insert Item** (→ **fig. 4**).

- Insert a new point: "IMx" as the **DAD type** and "Orbit/SCL" for the **Application**.
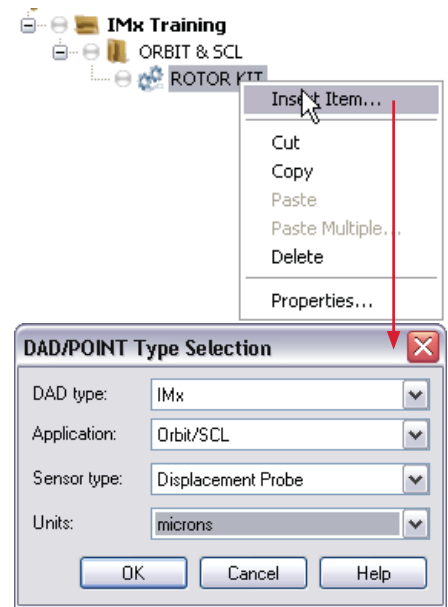- Select the **Sensor type** used and desired **Units**.

Fig. 4. Select the sensor type and unit for "Orbit/SCL".

2 From the **Point Properties** window, choose the **General** tab (→ **fig. 5**).

- Set the point **Name** and check the **Enable data collection** option.
- All information about the sensor type and units displays in the **General** tab.
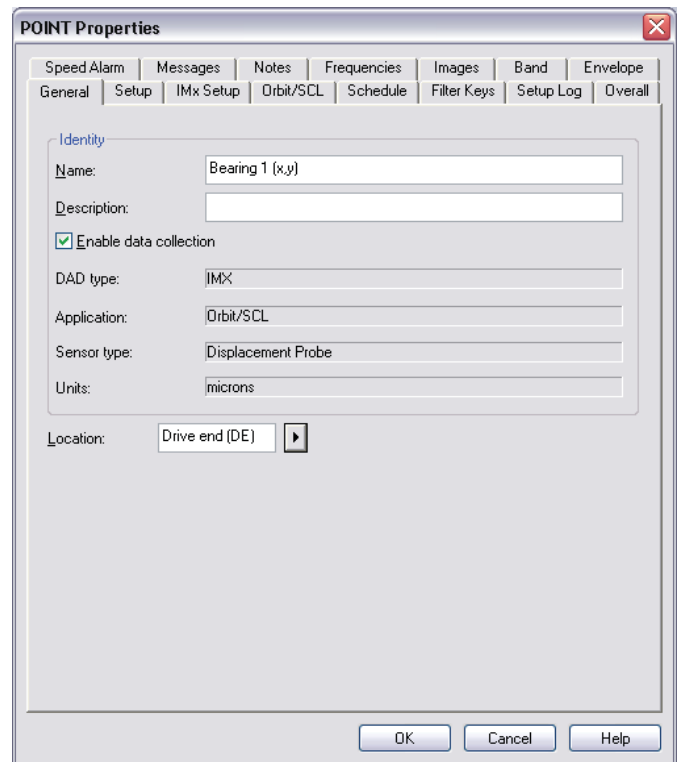- Note that the **Description** and **Location** are not needed.

Fig. 5. Point Properties' General tab.

3 Choose the **Setup** tab (→ **fig. 6**).

- Select IMx as the **Device**.
- Select the frequency type (**Freq. type**): Fixed span / Order track.
- Set the other parameters according to your needs

In **Save data**, select "FFT, time and phase". If you do not have speed reference, then you can select "FFT and time" (no phase) and set the **Speed** value manually.
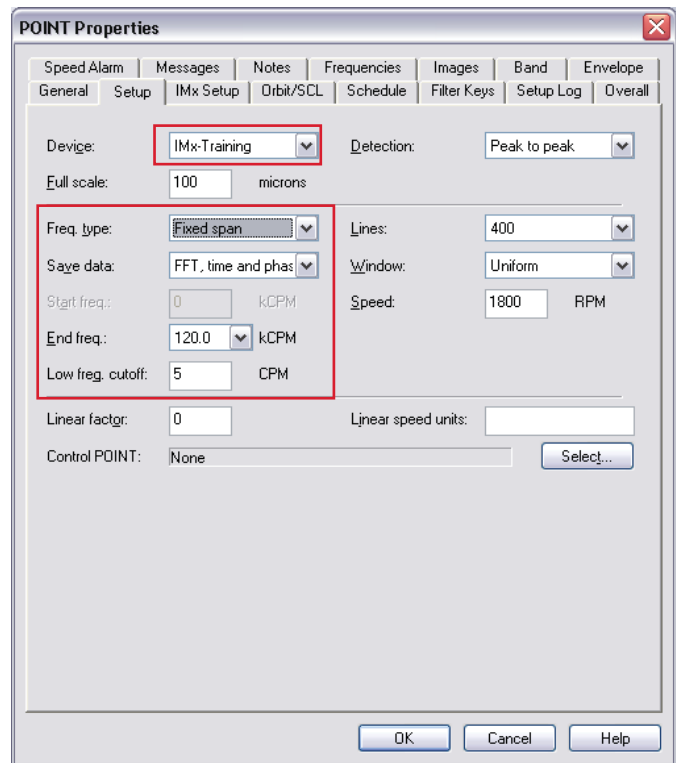

Fig. 6. Point Properties' Setup tab.

4 Choose the **IMx Setup** tab (→ **fig. 7**).

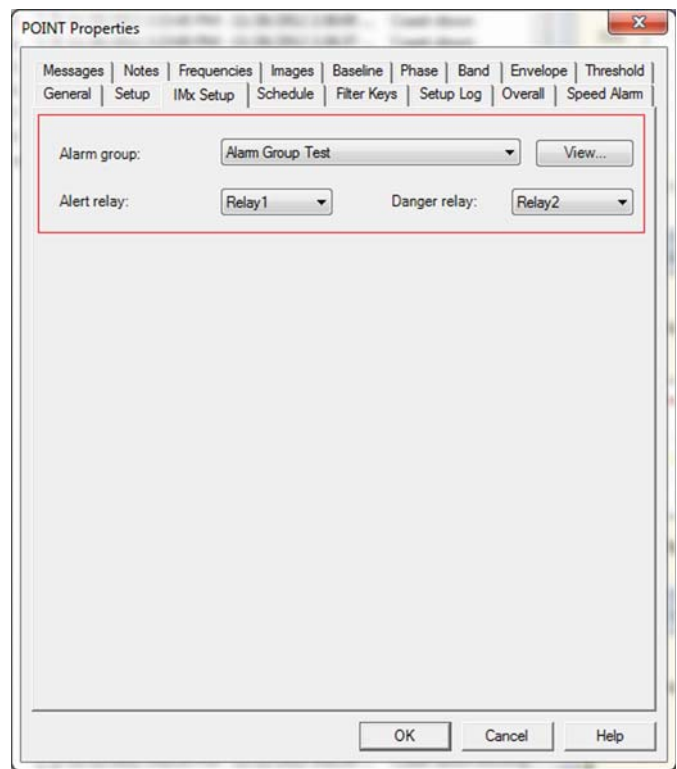- Select the **Alarm group** and alarm relays.

Fig. 7. Point Properties' IMx Setup tab.

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5 Choose the **Threshold** tab (→ **fig. 8**).

- Select the speed, process and digital references if needed (→ **fig. 9**).
- Select and set **Enable active range** if needed.

Refer to Application Note **CM3161**, *Create Alarm Groups, Set up Relays and Active Ranges for SKF Multilog On-line System IMx in SKF @ptitude Analyst*.
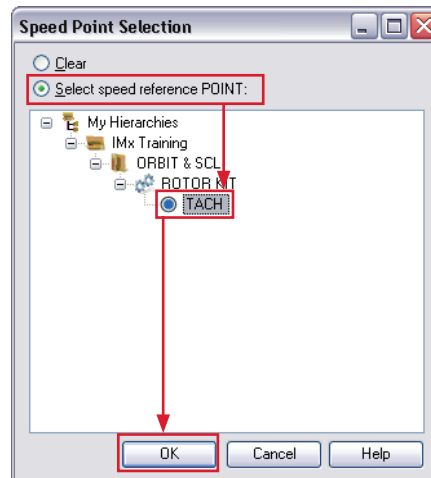

Fig. 8. Point Properties' Threshold tab.

Fig. 9. Select speed, process and digital references.

6 Choose the **Orbit/SCL** tab (→ **fig. 10**).

- Select the X and Y **Channel name** and **Sensor angle**.
- Set the shaft position and **Tacho angle**.
- Set the X and Y **Cold gap**, **Cold gap position*** and **bearing clearance**.
- Set the other tabs as needed.

* For **Cold gap position**, select:
  – "Bottom" for horizontal shafts
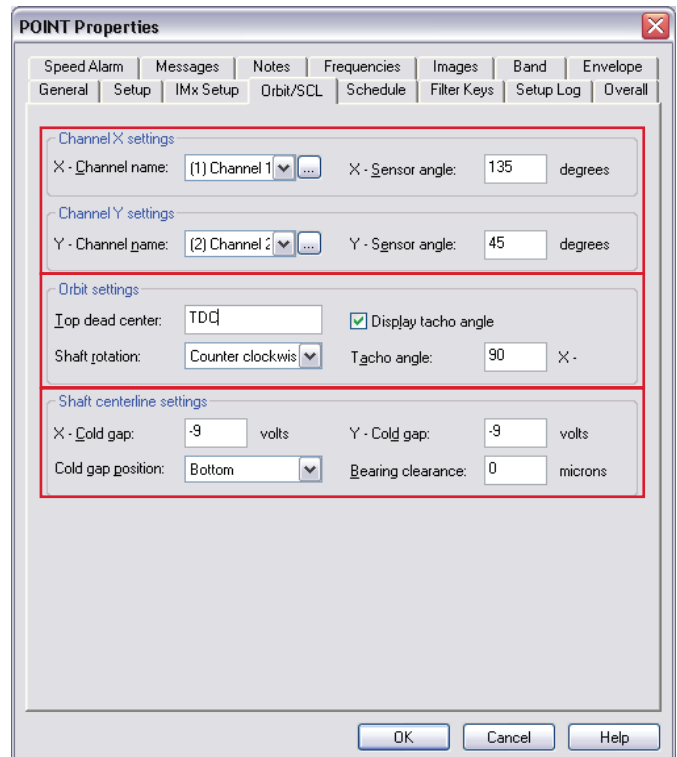 – "Center" for vertical shafts
  – "Top" for overhung shafts

Fig. 10. Point Properties' Orbit/SCL tab.
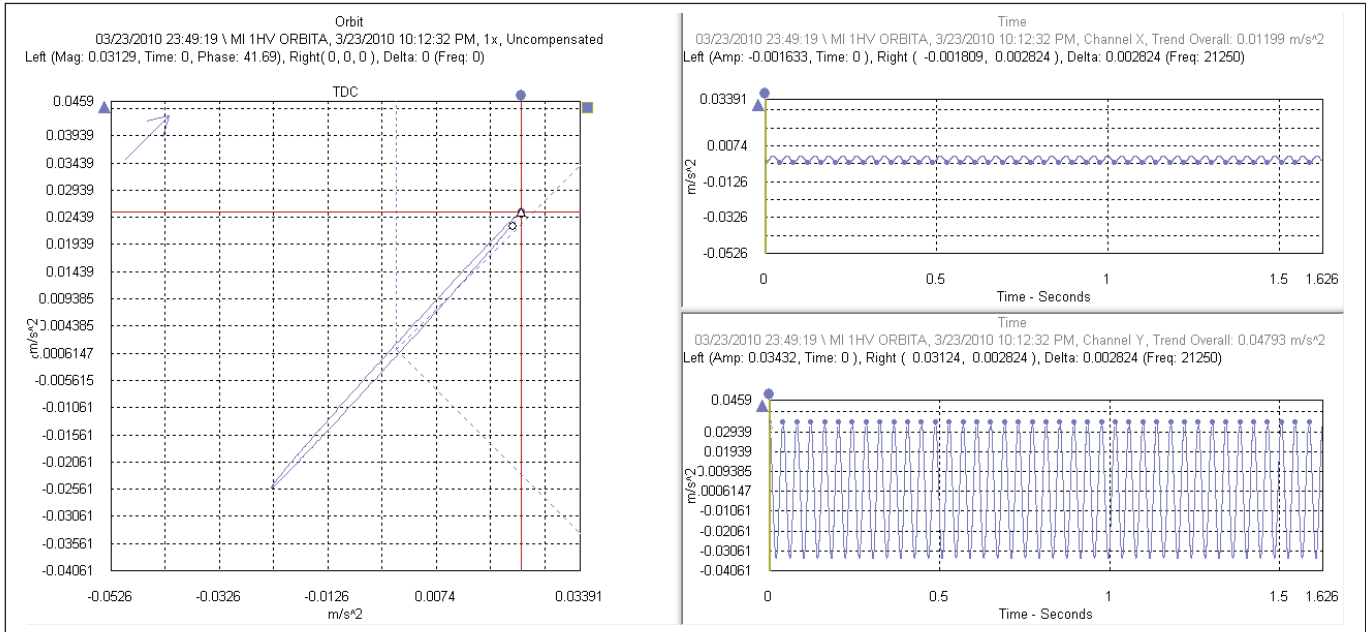
7 Right-click on the plot for plot settings.

Orbit
03/23/2010 23:49:19 \ MI 1HV ORBITA, 3/23/2010 10:12:32 PM, 1x, Uncompensated
Left (Mag: 0.03129, Time: 0, Phase: 41.69), Right(0, 0, 0), Delta: 0 (Freq: 0)

Time
03/23/2010 23:49:19 \ MI 1HV ORBITA, 3/23/2010 10:12:32 PM, Channel X, Trend Overall: 0.01199 m/s^2
Left (Amp: -0.001633, Time: 0), Right (-0.001809, 0.002824), Delta: 0.002824 (Freq: 21250)

Time
03/23/2010 23:49:19 \ MI 1HV ORBITA, 3/23/2010 10:12:32 PM, Channel Y, Trend Overall: 0.04793 m/s^2
Left (Amp: 0.03432, Time: 0), Right (0.03124, 0.002824), Delta: 0.002824 (Freq: 21250)

Fig. 11. Orbit plot.

8 Right-click on the plot for plot settings.

Shaft Centerline
03/23/2010 23:49:19 \ MI 1HV ORBITA
Amp X: -0.008117, Y: 0.009852, Magnitude: 0.01277, Eccentricity: 0.001277, Date/Time: 3/23/2010 10:12:32 PM
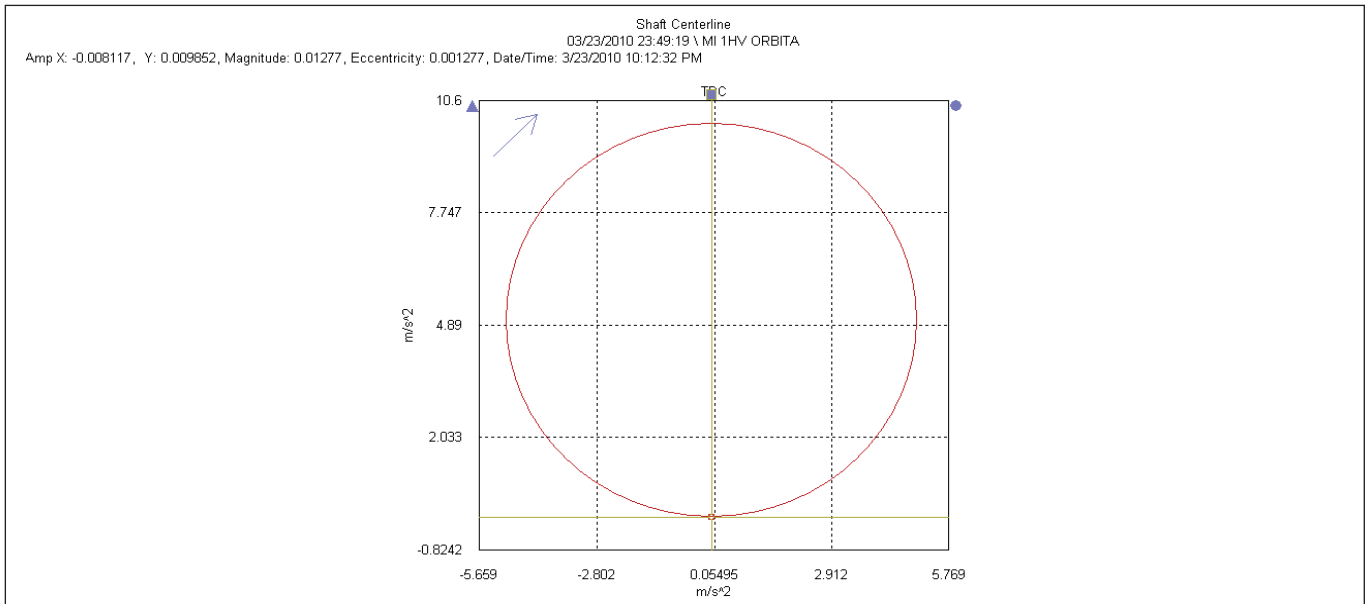
Fig. 12. Shaft center line plot.

Please contact:

SKF Condition Monitoring Center – Luleå
Aurorum 30 · SE-977 75 Luleå · Sweden
Tel: +46 (0)31 337 1000 · Fax: +46 (0)920 134 40

Web: www.skf.com