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# Order tracking in Observer

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# Agenda for the Order Tracking Presentation

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1. Back ground to Order Tracking
2. How the Order Tracking works in Observer and IMx online system
3. How to set up a Order Tracking point in Observer
4. Results from Order Tracking in a real application

# 1

## Back Ground to Order Tracking

# Back Ground to Order Tracking

- If vibration measurements are going to be collected on a variable speed machine which have no stable speed you will probably end up with spectrums that are not sufficient
- If a normal FFT is taken during a speed variation then the peaks in the spectrum will smear out, they either will be smaller and wider or completely disappear
- For example it will be difficult to find peaks from bearing frequencies in the normal spectrum collected during a speed variation

# Back Ground to Order Tracking

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- When measuring vibrations on a variable speed machine there is a need of constantly follow the speed and adjust the spectrum to the speed
- This is in IMx and Observer on-line system done with Order Tracking

# 2

How the Order Tracking works

# The Functions Behind the Order Tracking in IMx

- To be able to perform a good FFT there is a need of stable speed
- The Order Tracking function in the IMx takes the original time signal and "translate" the signal in to a constant speed signal
- The FFT will find a time signal which appears to be in stable speed. Then the FFT will have no problems of performing a good spectrum



# The Functions Behind the Order Tracking in IMx

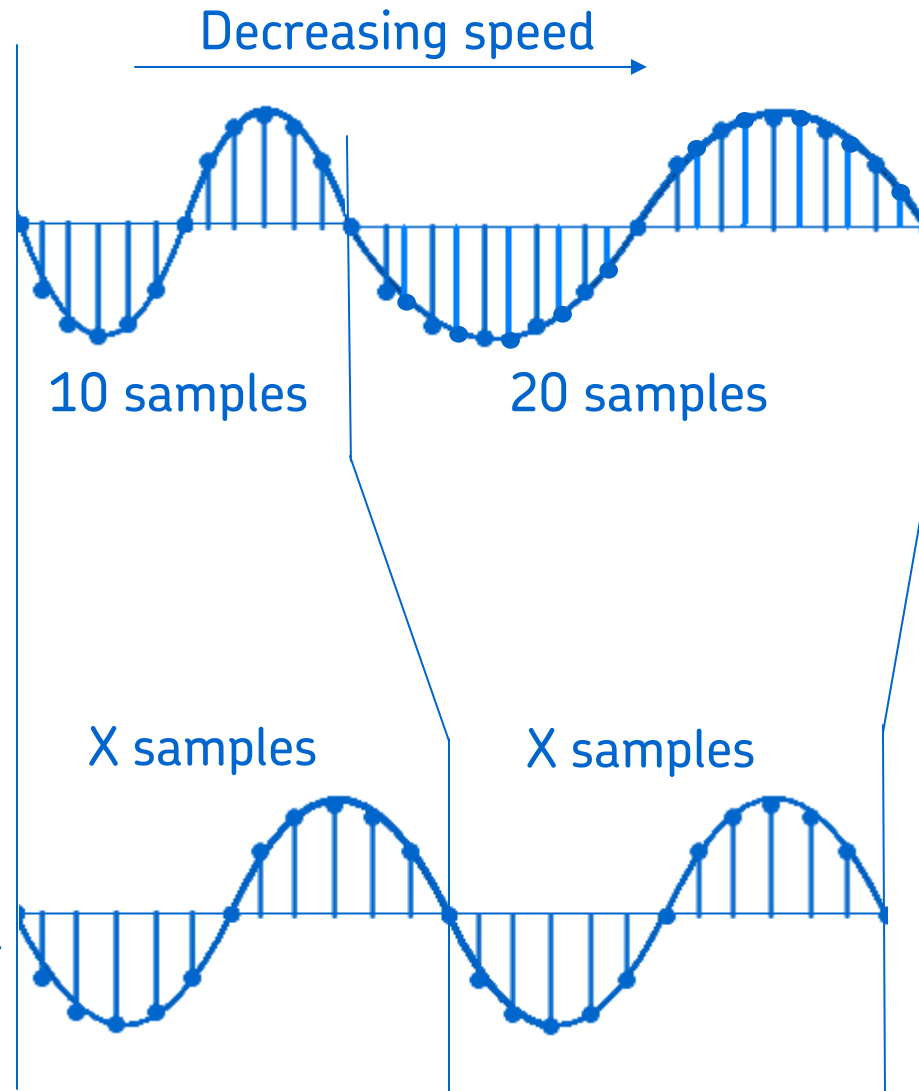
- The IMx will for a Order Tracking point over sample the signal so that there is still room for a longer time signal if the speed is decreasing
- For example if the first revolution of the measurement is at 1000 rpm and for the second revolution has the speed dropped to only 500 rpm
- The the second revolution will be twice as long as the first one
- The sampling rate is still the same but there will be twice as many samples for the second revolution

# The Functions Behind the Order Tracking in IMx

Everything that happens on sample 1 and 2 in the sinus with lower speed of the original time signal is transferred in to sample 1 in the second sinus in the Order Tracked signal. Then the Order Tracked signal goes in to FFT

True Time signal

Order Tracked Time signal



# The Functions Behind the Order Tracking in IMx

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- After the Order Tracking function has created a time signal which appears to be at stable speed
- Then the time signal goes in to normal FFT or in to Enveloping
- The result for the user is a spectrum based on orders of the revolution with clear peaks

# 3

## How to Set Up a Order Tracking Point in Observer

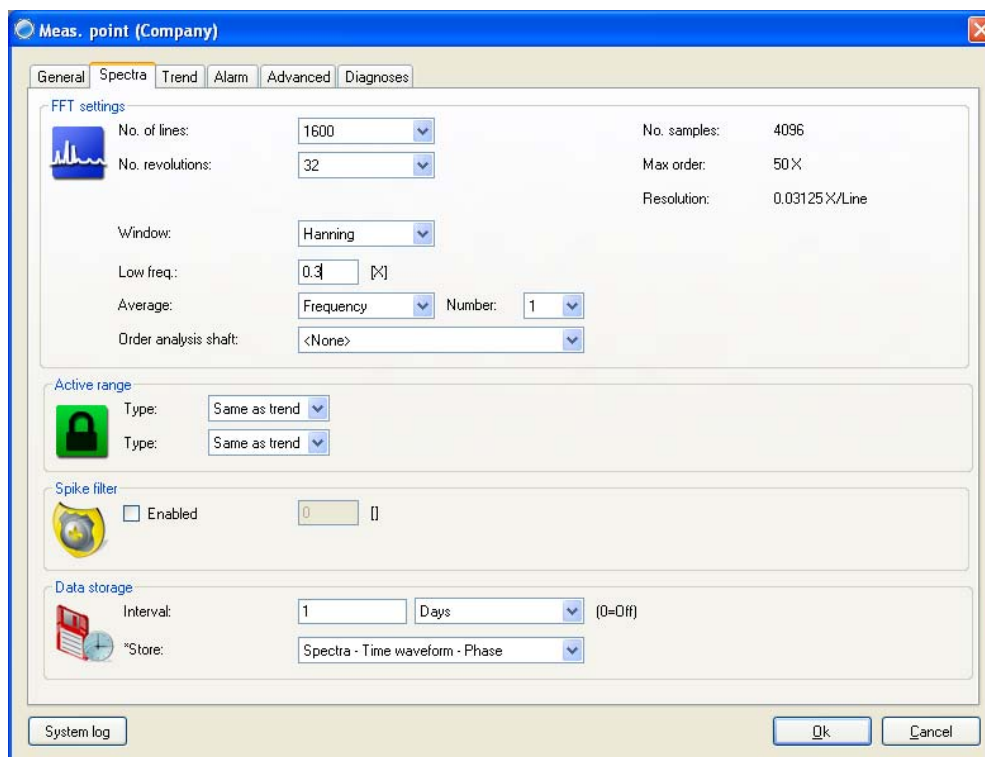
# Set Up Order Tracking Point

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1. Start Observer and Monitor
2. Create IMx units, channels and hierarchy according to the Manual
3. Right click on a machine and choose add point
4. Highlight IMx and double click on Order Tracking or Order Tracking Envelope
5. The thinks that are different for a Order Tracking point compared with standard vibration points are the FFT settings

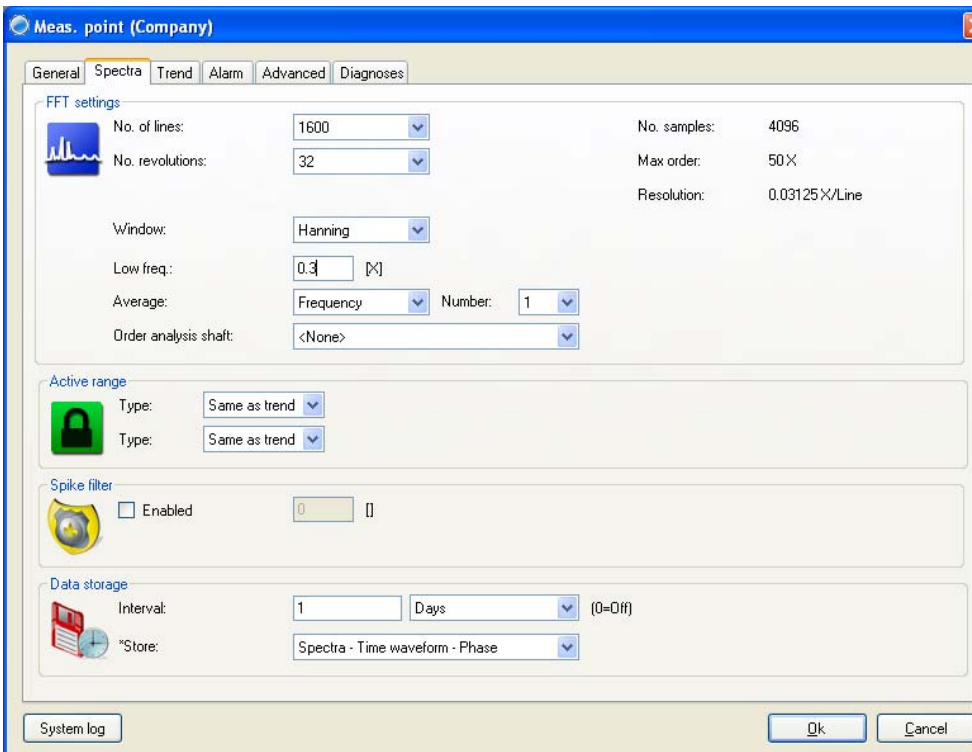
# FFT settings for Order Tracking

- The Settings for the FFT is for a Order Tracking point in Number lines and Numbers of revolutions
- No Fmax is chosen
- The Max frequency is chosen as max order according to how many revolutions and number of lines



# FFT settings for Order Tracking

- 1600 lines and 32 revolutions results in a max order of 50X
- This gives a Fmax of 1000Hz at 1200 rpm and Fmax of 1250Hz at 1500 rpm
- So Fmax will change with the machine speed
- Note also that low frequency cut off is in orders (X)



The screenshot shows the 'Meas. point (Company)' software window with the 'Spectra' tab selected. The 'FFT settings' section includes the following parameters:

- No. of lines: 1600
- No. revolutions: 32
- No. samples: 4096
- Max order: 50 X
- Resolution: 0.03125 X/Line
- Window: Hanning
- Low freq.: 0.3 [X]
- Average: Frequency (Number: 1)
- Order analysis shaft: <None>

The 'Active range' section shows two Type: Same as trend settings.

The 'Spike filter' section has an 'Enabled' checkbox and a value of 0.

The 'Data storage' section shows an Interval of 1 Days (0=Off) and a 'Store' option set to 'Spectra - Time waveform - Phase'.

Buttons at the bottom include 'System log', 'Ok', and 'Cancel'.

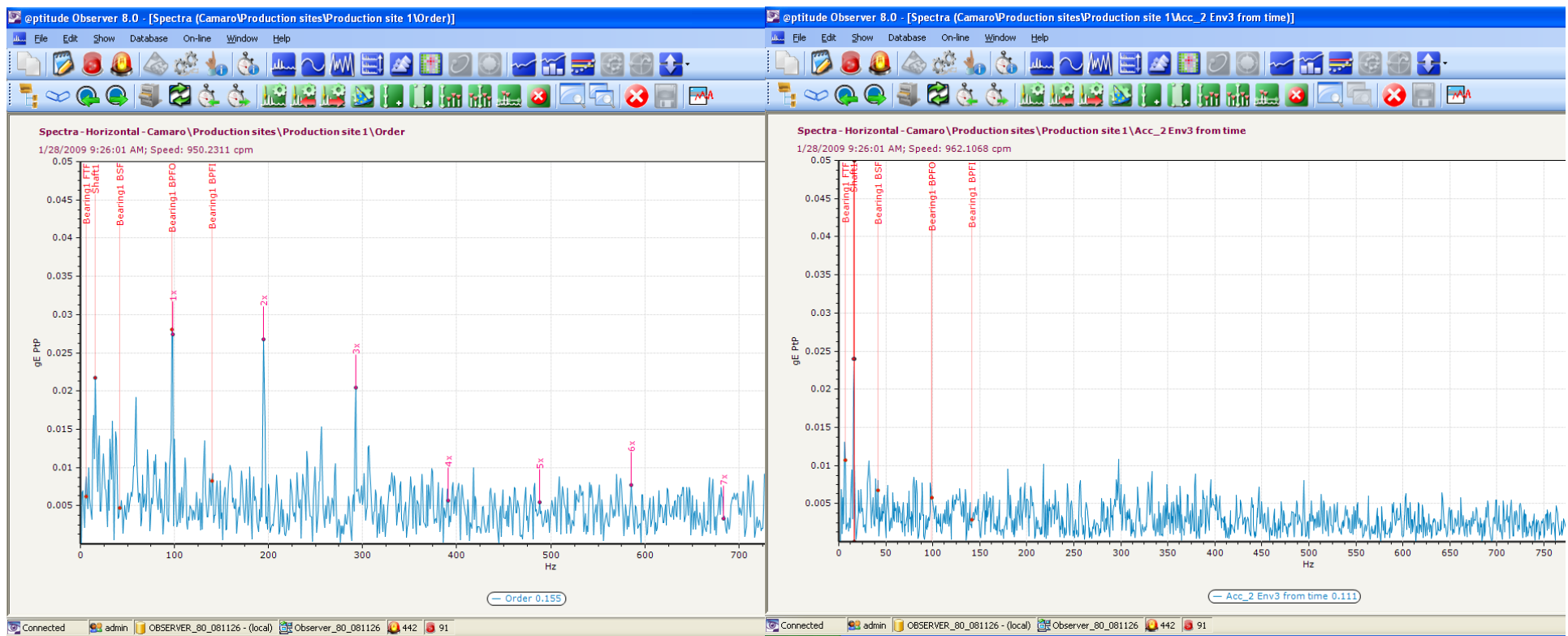
# 4

Results from Order Tracking in a  
Real Application



# Order Tracking in a Real Machine

- Left picture is with an Order Tracking in env3 and right picture is without
- Both spectrums are taken at the same time during a speed variation from 900 to 1100 rpm. The speed variation took 5 seconds
- Left picture shows a BPF0 problem



# Order Tracking in a Real Machine

- This is two spectrums from a machine which rolled out from 3000 rpm to 1000 rpm
- Both spectrums are in mm/s
- The upper one is with Order Tracking and the lower one is with a normal FFT
- The spectrum with Order Tracking have a clear unbalance peak at 40 Hz and the normal vibration spectrum have only a smeared out peak from 35 Hz to 50 Hz

