

ORDER ANALYSIS

In rotating and reciprocating machines, varying load conditions and imperfections of the moving parts cause vibrations and associated sounds. The vibrations are shaped by the structural properties of the moving and stationary parts of the machine. Relating spectra and time histories to the RPM of the rotating parts, Order Analysis is the tool that reveals the vibration and sound mechanisms:

- Critical speeds
- Excited resonances (weaknesses)
- Instabilities
- Varying load

Brüel & Kjær offers a comprehensive selection of Order Analysis methods:

- Order Analysis, based on frequency spectra, FFT
- Order Analysis, based on order spectra, i.e., tracking

These methods, operating in real-time, provide spectra (waterfall, colour contour), individual

order and structural slices versus RPM of one or more rotating parts.

- Vold-Kalman Order Tracking Filter






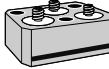


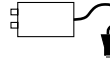





Based on captured time histories, this method extracts individual orders in terms of magnitude and phase; (PAS) or wave signal versus one or more RPM.

The standard configurations provide related analyses such as:

- 1/n-octave spectra versus RPM
- Weighted sound pressure level versus RPM
- Loudness and Articulation Index versus RPM
- Speed profile, RPM versus time

With PULSE Auxiliary Parameter Logging Type 7769 all data can be tagged with temperature, oil pressure, position, wind speed, etc., and all results can be shown versus auxiliary parameters.



Calibrator	Uniaxial Accelerometers	Triaxial Accelerometers
 4294 Calibration Exciter	 IEPE TEDS 4507B-00X	 IEPE TEDS 4506B-00X
 DV 0460 DV 0459 Calibration Clips	 PE 4393	 PE 4326A
Tacho Probes  MM 0012  MM 0024  WQ 2350 Cigarette Lighter Tacho	 IEPE 4394  8329 Laser Doppler Vibrometer	 IEPE TEDS 66A11 66A12
 UA 0801 Lightweight Tripod	 2647A, B, C TEDS PE to IEPE Converter	

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HARDWARE ACCESSORIES

- UA 1407, UA 1408 Set of 100 Mounting Clips
- UA 1563, UA 1564 Set of 5 High Temp. Mounting Clips
- UA 1077 Set of 5 Mounting Magnets, M3
- UA 0642 Set of 5 Mounting Magnets, 10/32
- UA 1473, UA 1478 Set of 100 Swivel Bases
- UA 1480 Spirit Level Set

- UA 1216 Set of 10 Insulation Studs, M3-M3
- UA 1215 Set of 10 Insulation Studs, 10/32-10/32
- WA 0224 Set of 5 Insulating Mechanical Filters, M3-M3
- UA 0553 Set of 5 Insulating Mechanical Filters, 10/32-10/32
- YJ 0216 Beeswax

TYPE 3560 C-S36

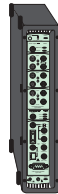
Order Analysis FFT (4 In / Ω4 Tacho)

3560 C
7702-N2
7533
3032-A
7770-N4

FFT-based Order Analysis is an attractive solution when:

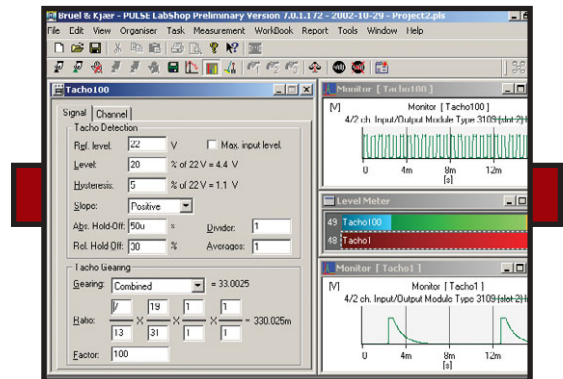
- Only lower orders are of interest
- Orders are well separated
- RPM ranges are limited
- Slew rates are moderate
- Processing resources are scarce

The configuration provides frequency spectra and individual order and structural slices versus RPM. Order Tracking on 2 channels.



* One year SW maintenance

Comprehensive selection of tacho settings for detection of tacho pulses contaminated with noise. Any channel can serve as a tacho channel. Multiple tacho signals. Multiple reference order analyses



TYPE 3560 D-S16

Order Analysis FFT (18 In / Ω17 Tacho)

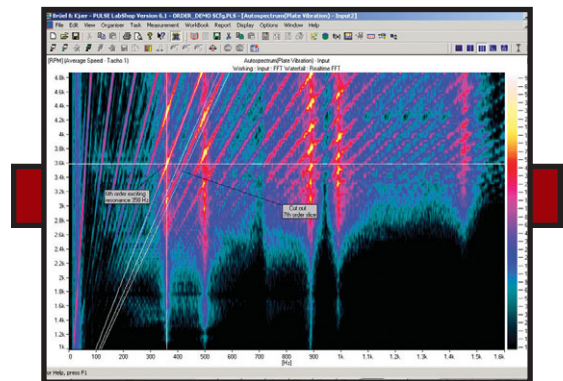
3560 D-S2
7702-N2
7707
7536
3 x 3032-A
7770-N16

This configuration has the same properties as the configuration above. It is equipped with an additional Analysis Engine facilitating FFT-based Order Analysis on 18 channels. The high processing power may alternatively be used for a variety of simultaneous analyses on fewer channels. Order Tracking on 2 channels.



* One year SW maintenance

Run-up/down analysis based on FFT-spectra. Spectra as function of Averaged RPM. Easy identification of orders and structural resonances. Basis for extraction of order and resonance post-slices



TYPE 3560 D-S9

Order Analysis Tracking (18 In / Ω17 Tacho)

3560 D
7701
7702-N16
7707
7536
3 x 3032-A
7770-N16
7767 B

This configuration provides FFT-based as well as Order Tracking on 18 channels.

Useful when:

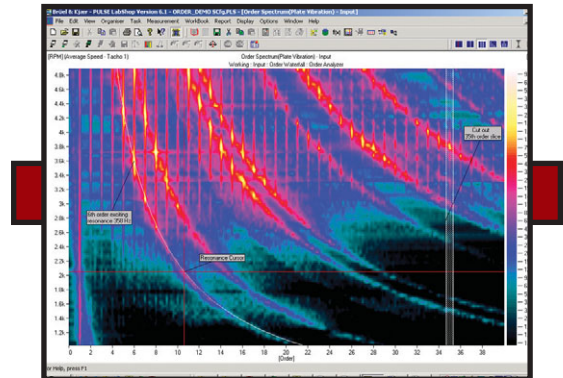
- Higher orders are of interest
- Orders are not well separated
- RPM ranges are wide
- Slew rates are high

Frequency smearing will compromise the FFT-based analysis and order tracking is the solution.



* One year SW maintenance

Run-up/down analysis based on order spectra. Accurate measurement (no smearing) of even very high orders. Basis for extraction of high order post-slices. Comprehensive selection of Auxiliary Cursor readings



TYPE 3560 C-S37

Advanced Order Analysis (4 In / Ω4 Tacho)

3560 C
7702-N4
7703
7705
7533
3032-A
7700-N4

This configuration has Order Tracking on 4 channels. On top of this it has Vold-Kalman Tracking Filter (V-K) and Time Capture for V-K pre-analysis. (Time Capture comprises STFT, suited for analysis of transients).

Vold-Kalman is the solution for:

- Very high slew rate, gear shifts
- Close or crossing orders
- Extraction of order waves
- Tacho drop outs



* One year SW maintenance

Slices, i.e., orders or structural responses versus RPM. Slices and colour contours tagged with associated parameters like time, temperature, oil pressure etc., or as function of these parameters



SW ACCESSORIES

- 7773 Envelope Analysis
- 7701 Data Recorder
- 7705 Time Capture
- 7767 PULSE Data Manager
- 7769 PULSE Auxiliary Parameter Logging

7789
7755 B

PULSE Time File Management
Bridge to MATLAB®

SW UPGRADING ACCESSORIES

- 7707 Unlimited Analysis Engine
- 7700-Nnn Noise and Vibration Channel Licenses
- 7770-Nnn FFT Analysis Channel Licenses
- 7771-Nnn Order Analysis Channel Licenses