



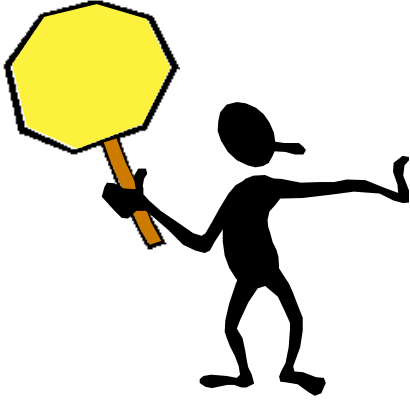
# TRYING TO MEASURE BEARING VIBRATION....?



Here are some things you should know.

Done properly-Time based analysis can be more user friendly and effective than frequency spectrum analysis!

# *IF YOU'RE TRYING TO MEASURE BEARING VIBRATION....?*



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# *Measuring Crest Factor (CF)?*

*CF = peak vibration /RMS vibration*



*The magnitude of CF is influenced by:*

- The measurement parameter used.*
- The Frequency range used.*
- The sample, capture and decay time.*
- Extraneous Gear mesh noise.*
- Extraneous VFD (switching) noise.*



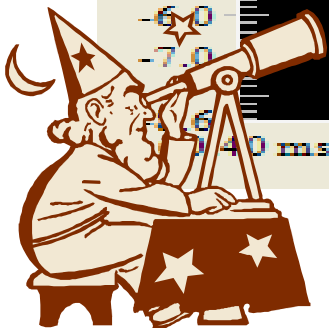
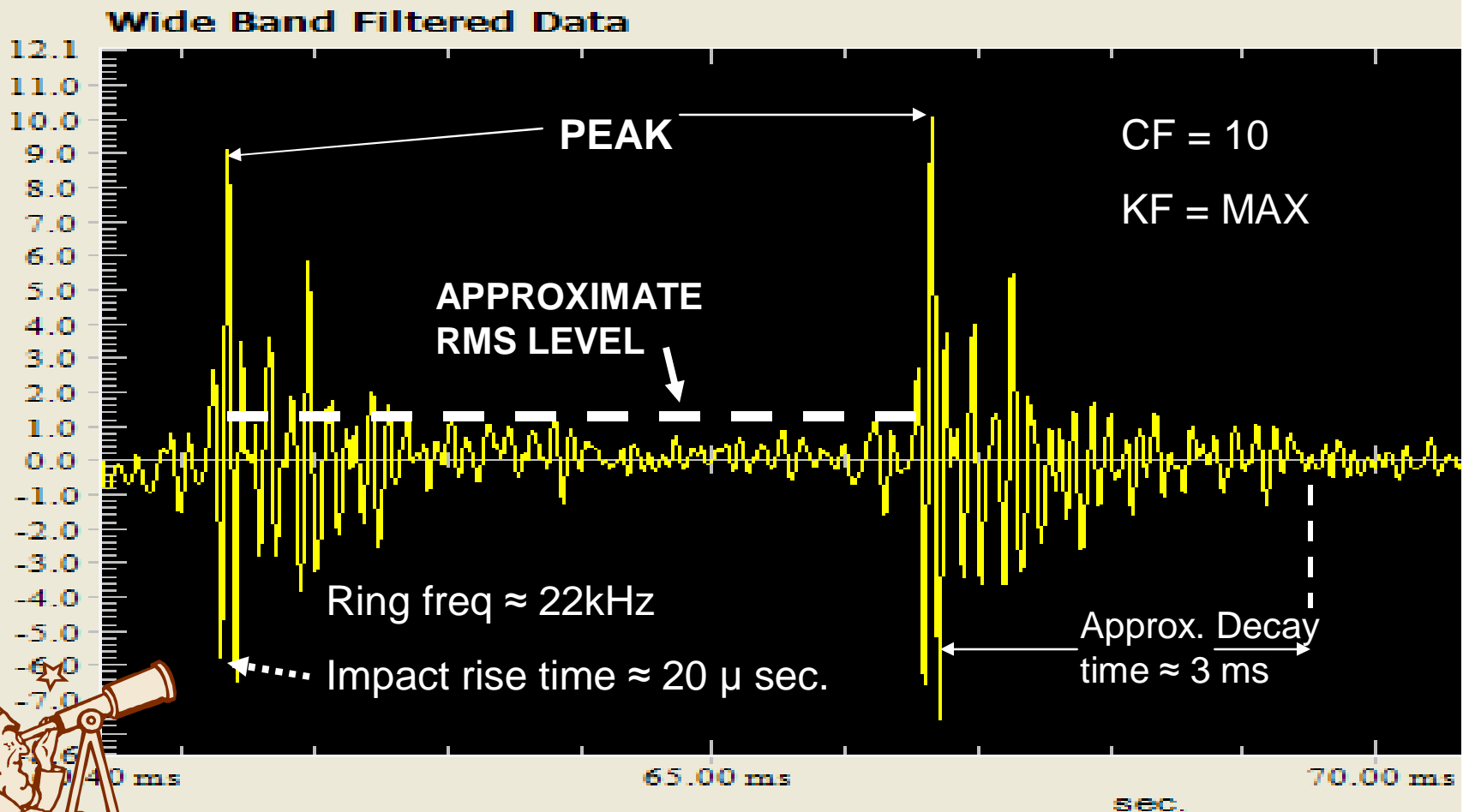
## Crest Factor-Choice of Parameter. *[When using accelerometers!]*

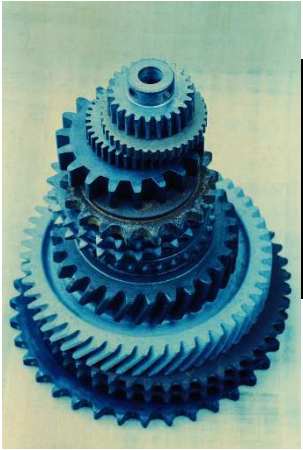
*The peak capture value is influenced by:*

- *capture, sample/decay time.*
- *Upper frequency range.*
- *Analysis parameter.*
- *Displacement and Velocity attenuate higher frequencies.*
- *Displacement acts as a second order filter ( $1/f^2$ )*
- *Velocity acts a first order filter ( $1/f$ )*
- *Bearing impacts have rise times in the microsecond range and durations under one millisecond.*
- *Suggest acceleration-frequency range of 15kHz.*

# TIME HISTORY OF BEARING DEFECT

## Exponential decay times





# Unwanted Vibration

- *Variable Frequency drives (VFD) and Gears create digital switching and gear mesh vibration.*
- *These vibrations have little to do with bearing condition, but may affect rms and peak g readings.*
- *This can contribute to errors in CF readings.*
- **The LifeGuard system allows the user to suppress this effect.**



## *Use of RMS Vibration!*

- *The RMS vibration level may be increased by gear and VFD noise.*
- *Low frequency vibration may affect the peak and RMS level.*
- *Although not caused by bearings, these two can reduce bearing life!*
- *LifeGuard provides a measure of dynamic force levels related to alignment, balance, shaft or gear eccentricities or foundations.*



# Kurtosis

- *Kurtosis is a fourth moment process that measures the difference between peak  $g$  and RMS  $g$ .*
- *It is a reliable indicator of bearing defects.*
- *VFD and gear mesh noise may cause errors in Kurtosis readings. LifeGuards allows correction of these*





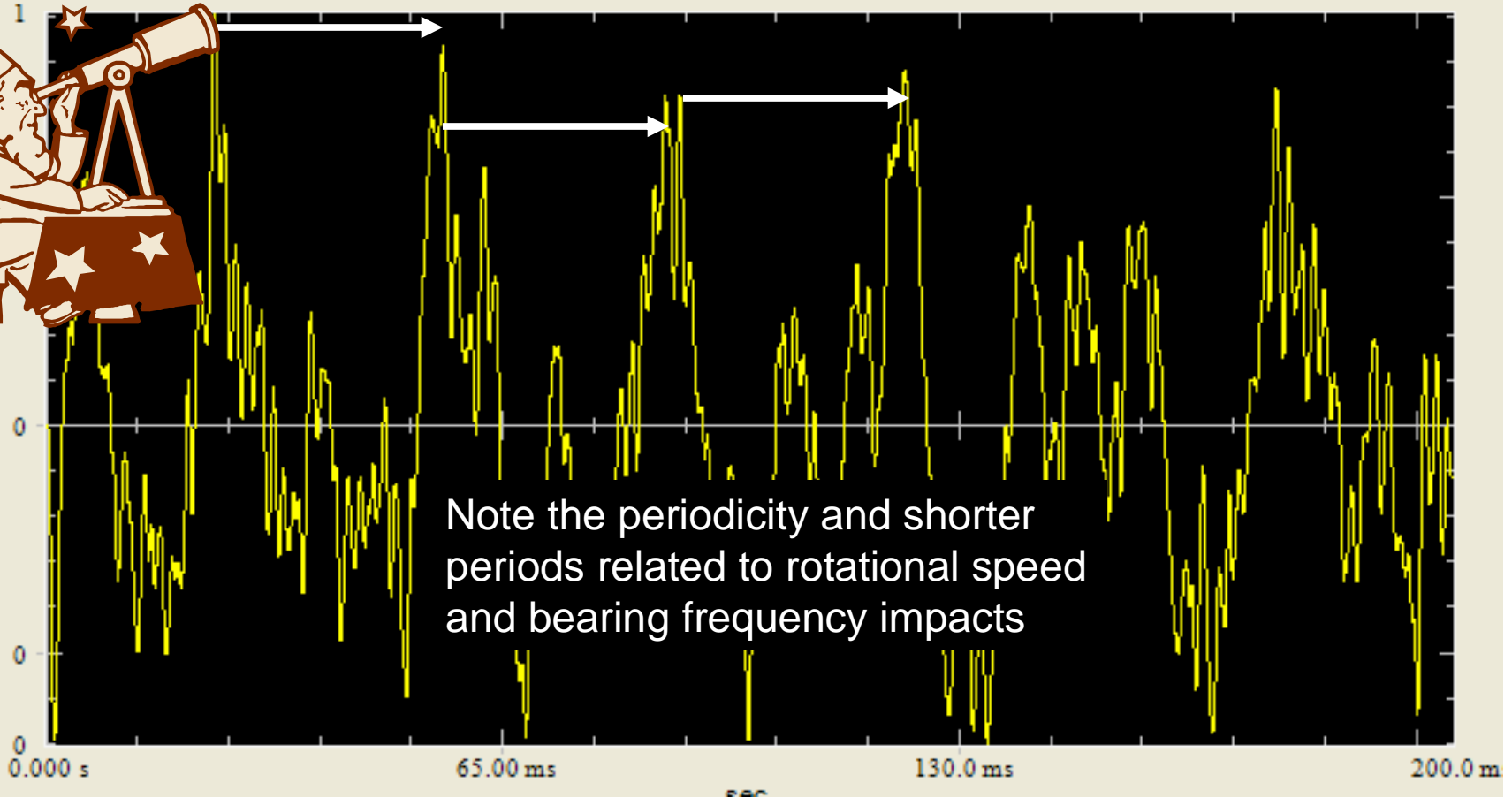
# *Envelope Demodulation Detection (EDD)*

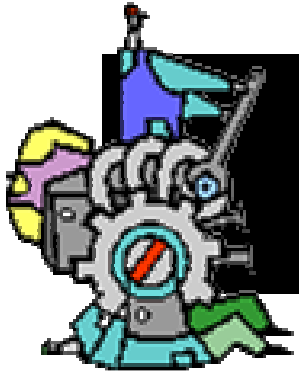
- *EDD is a very powerful bearing defect indicator.*
- *It responds almost exclusively to bearing impacts and is not significantly affected by gear and VFD noise.*
- *It is not a good general analysis tool.*
- *It responds to impacts in the range of  $1/f_n$ , the resonant frequency being used as the impact detection carrier.*
- *It is also important that accelerometer have consistent  $Q$  and stability.*

# Demodulated Time Impacts



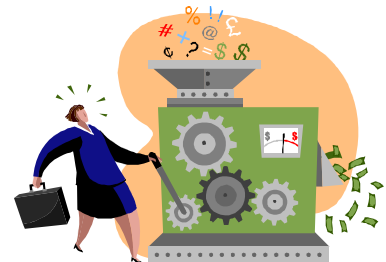
DEMOM Filtered Data





# Recommendations!

- *Use time based rather than frequency based analysis approach.*
- *Be aware of the effects of VFD noise and gear mesh frequencies in the analysis.*
- *Remove low frequency effects from bearing diagnostics.*
- *Use hard mounted or rigidly bonded accelerometer with mounted  $18\text{kHz} < f_n < 25\text{kHz}$ .*
- *Do not use hand probe or horseshoe magnets!*
- *Use acceleration signal and  $< 20$  micro second peak capture times.*
- *The BearingLifeGuard © w/MDA <sup>tm</sup> multiple discriminant analysis system considers all factors to optimize results.*





# More Information?

- Contact [Sales@bearinglifeguard.com](mailto:Sales@bearinglifeguard.com)
- Last updated 12-18-2006



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