<https://ac.els-cdn.com/S0951832002001795/1-s2.0-S0951832002001795-main.pdf?_tid=60436c86-d887-4d65-839c-5132b60b7f30&acdnat=1520849635_cbdba829686a256891a51dc3475050bd>

Pillay, Wang

* Fuzzy rules in FMEA
* Hydraulic pump failure resulting in lack of steering – high risk
* Loss of pressure in lube oil system
* Hydraulic failure of shaft resulting in no control of thrust

<http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6797871>

Giannoutsos, Manias

* Data driven processor for energy efficient pumping in a marine water cooling system
* Replacing valves with variable frequency drives for pump regulation to reduce pump power
* 19, 20, 21
* PID controller with self-tuning values
* Significant reduction in use of chemicals, energy, fuel leading to cost savings

<http://www.ingentaconnect.com/content/bindt/insight/2009/00000051/00000008/art00007>

Book on fault diagnosis of electro-pump in a marine ship using vibration condition monitoring

<http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=4126323>

Banks, Crow

* Autonomic logistics and embedded diagnostics (“self-managing logistical computing”)
* Health management technology built into military trucks and displayed to a GUI in a format that is easy to understand for inexperienced maintainers
* Pressure and vibration data collected from electrical, mechanical and hydraulic systems in HEMTT and transformed into vehicle “health” information
* “Blue force tracking” that has been implemented by US Marines and US Army
* Clear use of colours – grey for no problem, yellow for health caution indication and red for health warning indication

<http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6423903>

Dai, Gao

* Fault detection and diagnosis (FDD) from perspective of data processing
* Successful use of FDD in Motor Current Signature Analysis (MCSA)
* Smart instruments and Distributed Control Systems (DCS)
* New methods required due to the large amount of information
* “large volumes of data with very little information”
* Machine learning and fuzzy logic form modern FDD techniques
* Complex processes require AI and large amounts of historical data
* Kalman filter for state estimation
* Signal-based data-driven FDD ignores system model and just looks at output data
* Vibration, force, speed, current and magnetic flux density are common measurements
* Useful for motor and rotary machines
* Signal means, variance, trends, instantaneous power, fast Fourier transform (FFT), spectral estimation, wavelet transform, sequence analysis
* Time-domain, frequency-domain and joint-time-frequency methods
* Time-domain: Cross-correlation, negative log-likelihood, transformation of time signal to 2D image using scale-invariant feature transform (SIFT) enabling fault detection with image processing techniques
* Frequency-domain: used to detect, bearing, rotor and eccentricity faults; pattern of dominant frequency components is likely to be signature of fault, peak detection used to identify dominant frequencies; envelope analysis; Gaussian Mixture Model; MCSA has been widely successful
* Joint time-frequency-domain: enables examination of transient features; short-time Fourier transform; 93; wavelet transformation; 5; methods used in combination.
* Fig 5 shows data flow for industrial automation
* Combine time-frequency wavelet analysis with MCSA in frequency domain

<http://journals.sagepub.com/doi/pdf/10.1177/1475921715591873>

Moosavian et al

* Maximum of FFT magnitude, standard deviation of FFT magnitude and Root mean square of FFT magnitude identified as useful features
* Selected training data to train a class (machine learning)
* Found no overlapping for these features for a healthy, misaligned pump and loose operating conditions
* Used ANFIS fuzzy logic system

<https://oaktrust.library.tamu.edu/bitstream/handle/1969.1/163839/T4pg39-46.pdf?sequence=1&isAllowed=y>

John S Mitchell

* Identification of useful characteristics

<https://strathprints.strath.ac.uk/58640/1/Raptodimos_etal_ISOPE_2017_Collection_and_analysis_of_data_for_ship_condition_monitoring.pdf>

Yiannis Raptodimos, Iraklis Lazakis, Gerasimos Theotokatos, Raul Salinas, Alfonso Moreno

* Bearings provide a good place to measure machine vibration as dynamic loads and forces are applied there
* “Tri-axial measurements should be made at each location with rotating components”
* Faults can be identified from their signatures and used to schedule maintenance
* Vibration used for air compressors, sea water pumps, fresh water pumps, fresh water ejector pumps, oil-water separator, stern-tube lube oil pump, bilge pump, feed water oil purifier pump, 2 blowers and diesel engine generator and main engine
* Ultrasound and thermography technologies also used on most of these components

<http://www.diva-portal.org/smash/get/diva2:453447/FULLTEXT01.pdf>

Mahmood

<http://journals.sagepub.com/doi/pdf/10.1177/1475921704047500>

Carden, Fanning

<http://perso.univ-lemans.fr/~jhthomas/25_bonnardot.pdf>

ENHANCED UNSUPERVISED NOISE CANCELLATION, Frédéric Bonnardot1 , Robert Bob Randall2 , Jérome Antoni3 , François Guillet1

<http://web.iitd.ac.in/~sumeet/WaveletTutorial.pdf>

Wavelet Tutorial