

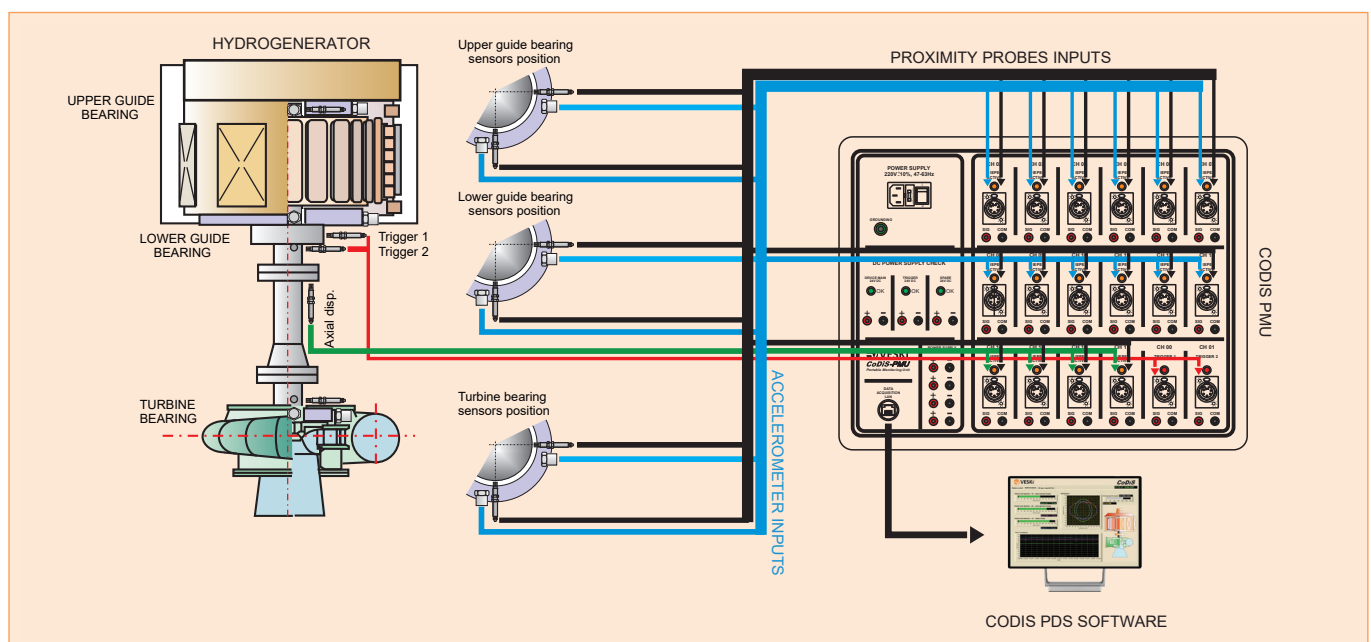
CoDiS PMU Portable Monitoring Unit

CoDiS PMU (CoDiS Portable Monitoring Unit) is a member of the CoDiS family of products related to machine condition monitoring with hardware and software best suited for:

- Application on hydro generator-turbine sets
- Measurements of relative shaft vibration sensors (displacement probes)
- Measurements of absolute bearing bracket vibration sensors (accelerometers or velocity meters)
- Signal connection to digital acquisition unit

CoDiS PMU provides:

- Power supply for sensors, conditioners and digital acquisition unit
- USB connectivity to program module, CoDiS PDS (CoDiS Portable Diagnostic System), running on laptop or PC



CoDiS PMU package includes:

- Sensors
- Sensor mounting accessories
- Signal cables and signal extension cables
- Signal conditioning
- Data acquisition
- USB connectivity to computer based CoDiS PDS software

CoDiS PMU is designed for recommended measurement layout with 16 various analog input channels typically configured as:

- 1 (one) Trigger signal
- 6 (six) Relative Shaft Vibration signals, usually used for measurement on three bearings, two perpendicular sensors in radial directions on each bearing
- 6 (six) Absolute Bearing Bracket vibration signals, usually used for measurement on three bearings, two sensors in perpendicular radial directions on each bearing bracket
- 3 (three) general purpose signal Voltage Analog Inputs for connection of Axial Displacement, or Process parameters

Note: Other types of signals can be connected to instrument inputs (i.e. Air Gap or Magnetic Flux signals) using the same connector interface. For this application please refer to Veski technical assistance.



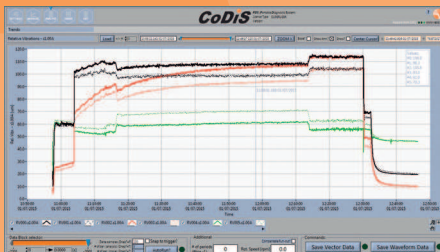
CoDiS PDS Portable Diagnostic System

CoDiS-PDS (Computerized Diagnostic System – Portable Diagnostic System) is a software tool designed for signal analysis of acquired data. CoDiS-PDS is primarily designed for vibration measurements. It's intended to work with CoDiS-PMU hardware unit and is best suited for measurements on hydro-units, but can be used on other types of machines as well. The software is designed to work on Laptop (or desktop) PC. Laptop can be provided with CoDiS PDS on demand.

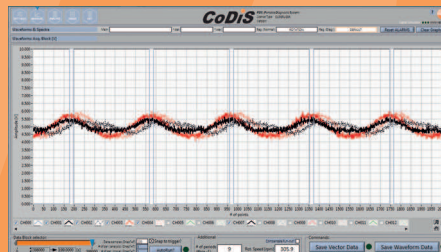
CoDiS-PDS standard features:

- ▶ **Configurable channel sensitivity/offset** (can be changed for different sensors)
- ▶ **History trend analysis** (possible to measure continuously for several days or weeks)
- ▶ **On line short term trends** (with configurable length; e.g. 10 min or days)
- ▶ **Configurable analysis parameters** for each calculated value

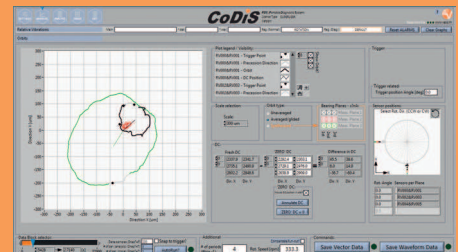
- ▶ **Analysis of waveform (raw) data** acquired on-line from DAQ (data acquisition card) or off-line from an ASCII file, depending on selection
- ▶ **Ability to store raw waveform data** (into ASCII file) manually or on ALARM/ TRIP very long waveforms can be stored in a file (practically up to disk limit)
- ▶ **Spectra calculation** (FFT and Waterfall)
- ▶ **Ability to store condition vector data** (the most relevant parameters calculated from waveforms) to ASCII file
- ▶ **Orbit analysis** (unaveraged, averaged/ glided, synthesized/with or without DC) with compensation for different sensor position in different measurement planes
- ▶ **Bode plot, Nyquist plot, Shaft centerline plot**
- ▶ **Slow-roll module** enabling data analysis down to very low rotational speeds (below 5 rpm)
- ▶ **One- and two- plane balancing software**
- ▶ **Open software architecture** enabling data sharing over TCP network



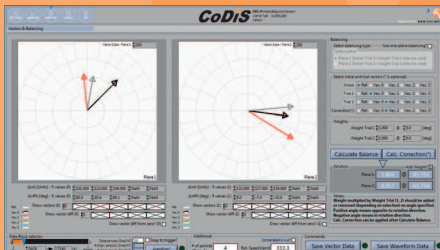
Data trends (1x, 2x, 3x, RPM, DC)



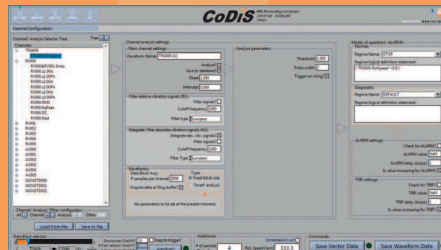
Raw data analysis in real time



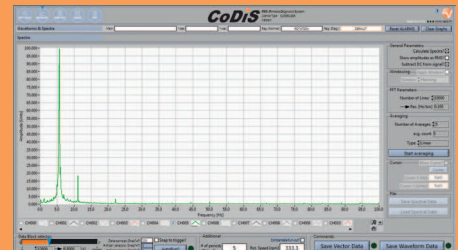
Orbits (real, avgd, 1x, 2x 3x with DC)



Two plane balancing



Configuration and setup

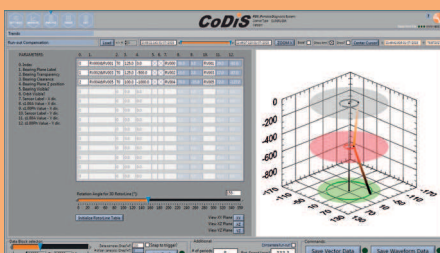


FFT spectrum

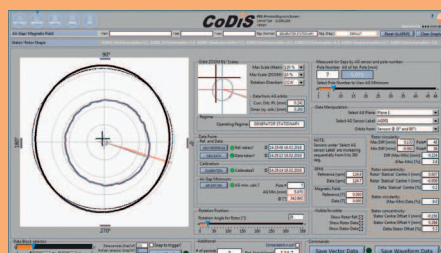
CoDiS-PDS add on features:

- ▶ **Air-gap and magnetic field analysis** (pole profile analysis, stator and rotor shape, shorted turns on rotor poles)
- ▶ **3D Run Out module**
- ▶ **Critical speed/ bearing stiffness module**
- ▶ **Connection of process quantities**

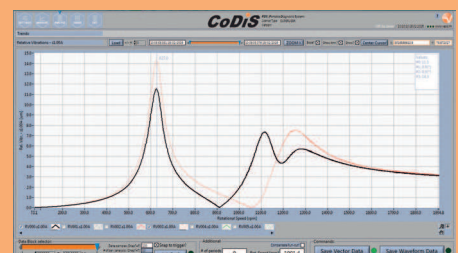
- ▶ **Simulation and signal generation** (with adequate analog output card connected to PC)
- ▶ **Analysis of any data over shared network through TCP/IP** (connection to existing CoDiS on-line monitoring system and additional data analysis)
- ▶ **Statistical analysis of recorded data** (histograms)
- ▶ **Connection to CoDiS-DM on-line system database**



3D shaft Run Out



Air Gap and Magnetic Field



Critical speed and bearing stiffness