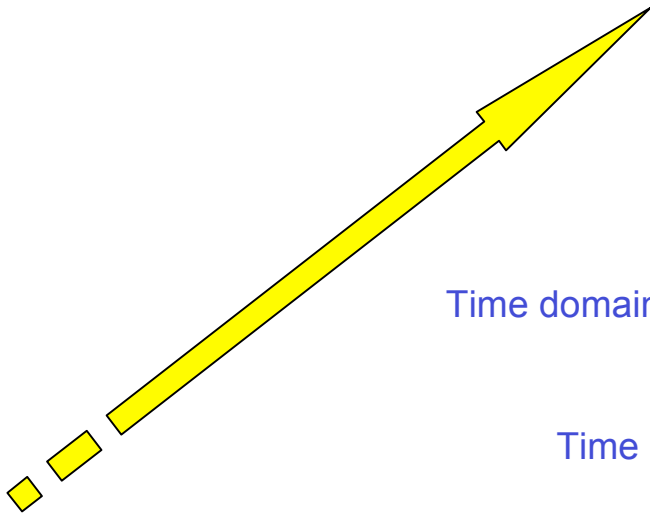


**- GOMSTorque** Online Torque Monitoring and Analysis System

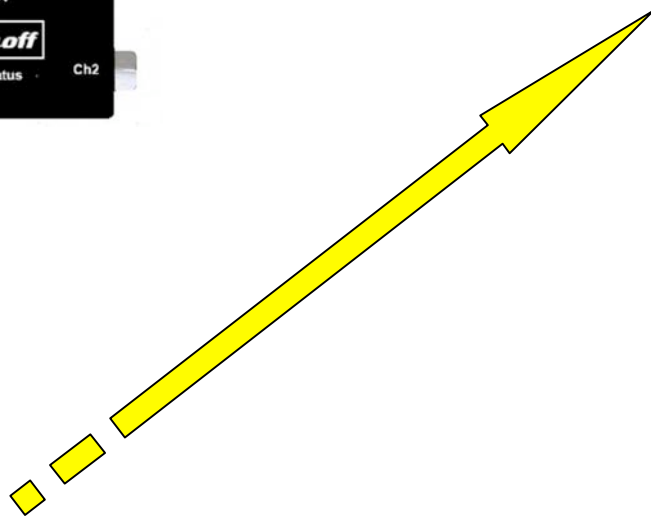
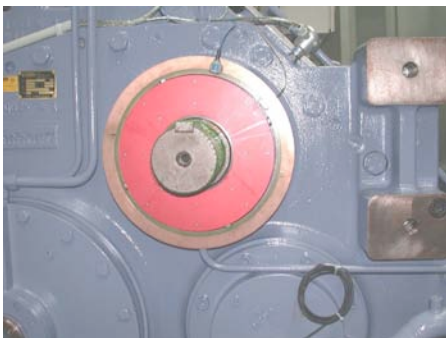
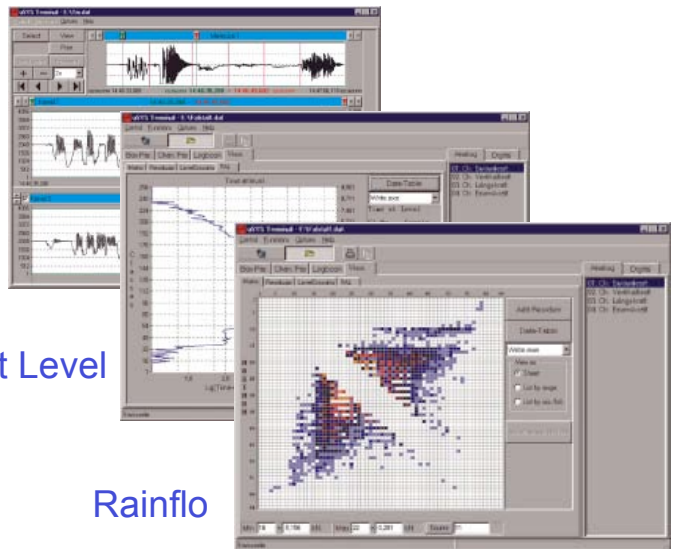
DESCRIPTION AND PRODUCT SPECIFICATION



Time domain

Time at Level

Rainflo



# 1 System Overview

■-GOMS<sub>Torque</sub> is a torque and power transmission monitoring system. It is used both as an option of ■-GOMS (Gearbox Online Monitoring System) and as a stand-alone system when vibration monitoring is not necessary or not available yet. ■-GOMS<sub>Torque</sub> is composed of mainly three parts:

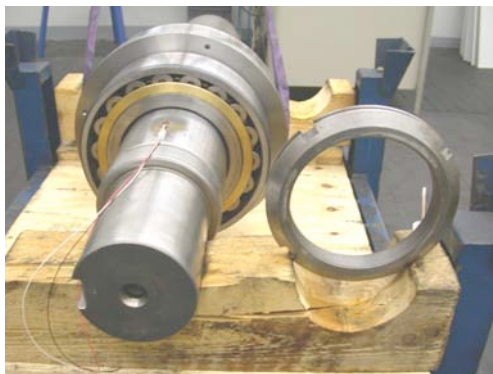
- ■-GOMS<sub>Torque</sub> Sensor and Telemetric System
- Networkable Digital Signal Controller and Datalogger
- Configuration and Data View Software

## 1.1 ■-GOMS<sub>Torque</sub> Sensor

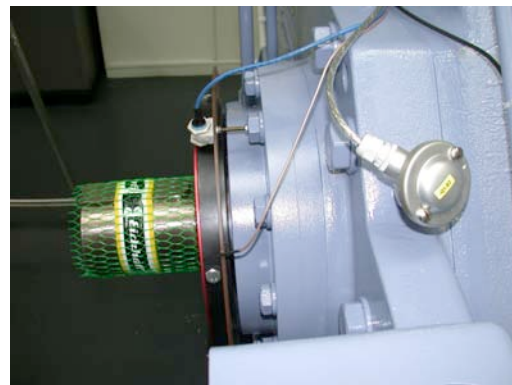
The ■-GOMS<sub>Torque</sub> Sensor is an extremely rugged and reliable torque measurement system capable of permanent industrial use.

The sensor is based on strain gauge technology to measure the torque proportional to the torsion of a shaft. The sensor is in general mounted on the highspeed shaft without any modifications besides the gluing of strain gauges on the surface of the shaft. The use of a telemetric system guaranties a contact-free operation. By means of a specially designed bushing of the labyrinth seal the cables from the strain gauges are guided to the telemetric system. The telemetric system itself is installed in a special ring. This ring is mounted on the high speed haft outside the gearbox. In general the system will be installed during regular assembly of the gearbox. However, the complete system can also be installed in the nacelle of the turbine. This System, originally designed for our wind turbine gearboxes, can easily be adapted to any other gearbox or drive trains as well.

The power supply for the rotating part of the system is realized by means of an inductive circuit between rotating antenna and the pick up. Hence no battery is necessary on the shaft.



High Speed Shaft of a Wind Turbine Gearbox equipped with DMS



Telemetric System including Speed Sensor

## 1.2 Networkable Digital Signal Controller and Datalogger

The E-GOMS<sub>Torque</sub> DSC is a networkable, digital signal controller with data memory for real-time monitoring of drives in the time-domain.

### DSC



### Features

- Two- or four channels
- 1, 2, or 4 MB Memory
- 9 - pin Sub -D-interface for serial data communication
- 16 bit signal processor
- LED indicating Status
- Power supply for DMS-bridges on each analogue input
- 2 digital inputs, 1 digital output
- Communication via serial port, GSM or Ethernet

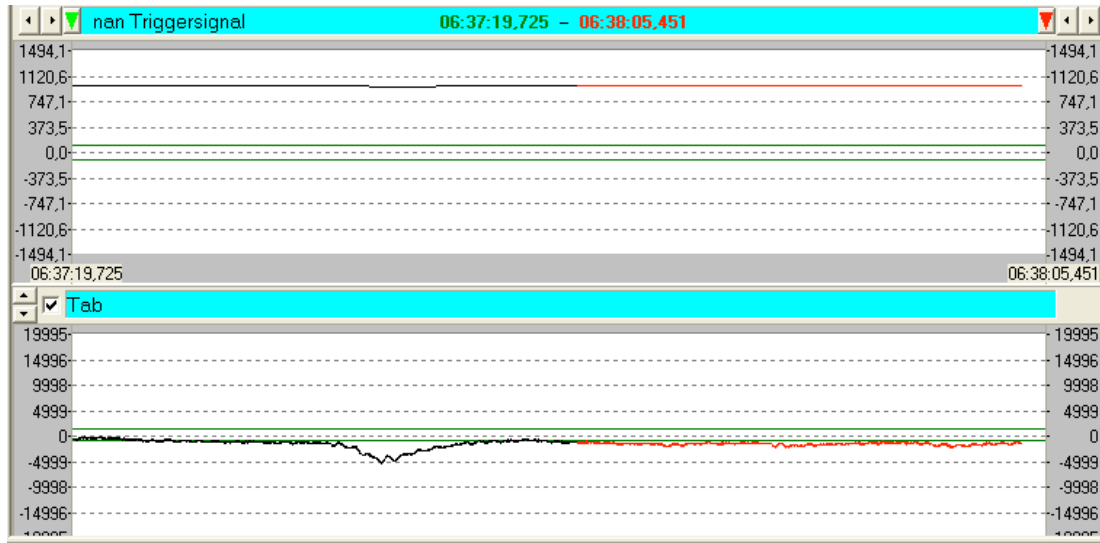
The DSC monitors torque and speed as analogue signals. Beside this basic function it offers the following features.

#### Signal memory

Torque- and speed- signal are monitored according to alarm thresholds. These limits can be defined for the

- time domain signals of torque, speed ,
- gradient of the torque or speed time curve,

A digital output enables the current alarm status to be forwarded to an external device e.g. to stop an engine after a limit transgression. In case of a limit transgression the time domain signals are stored. The signals are saved in two stages to enable a reconstruction of damage events, the so-called pre and post-history of the alarm trigger. All stored data as well as the system configuration are retained even after a power failure.

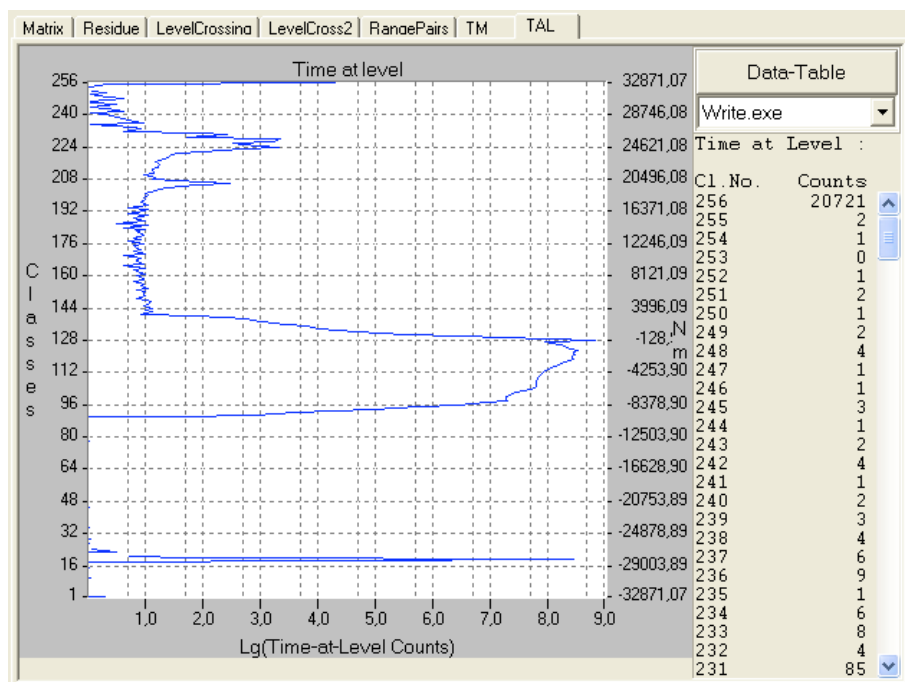


storage of pre- and post history after limit transgression (here  $-5\text{kNm}$ )

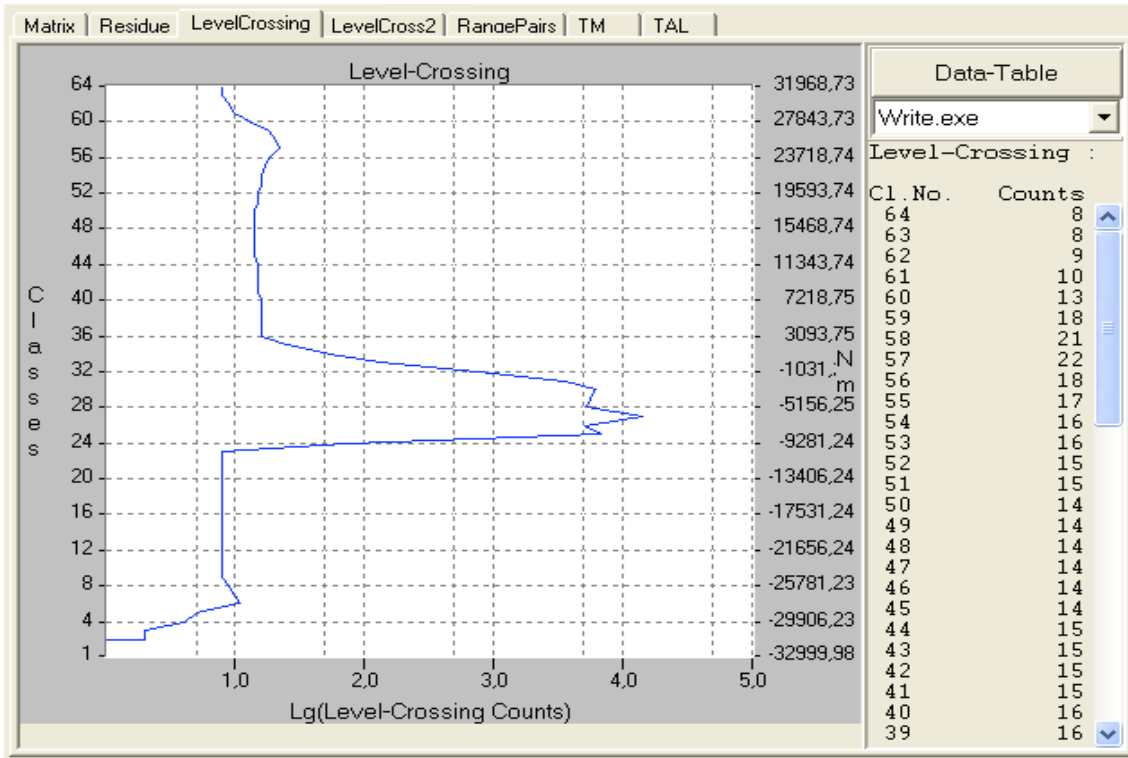
### Load collective

The classification process in the E-GOMS<sub>Torque</sub> DSC calculates the load collective according to the following methods:

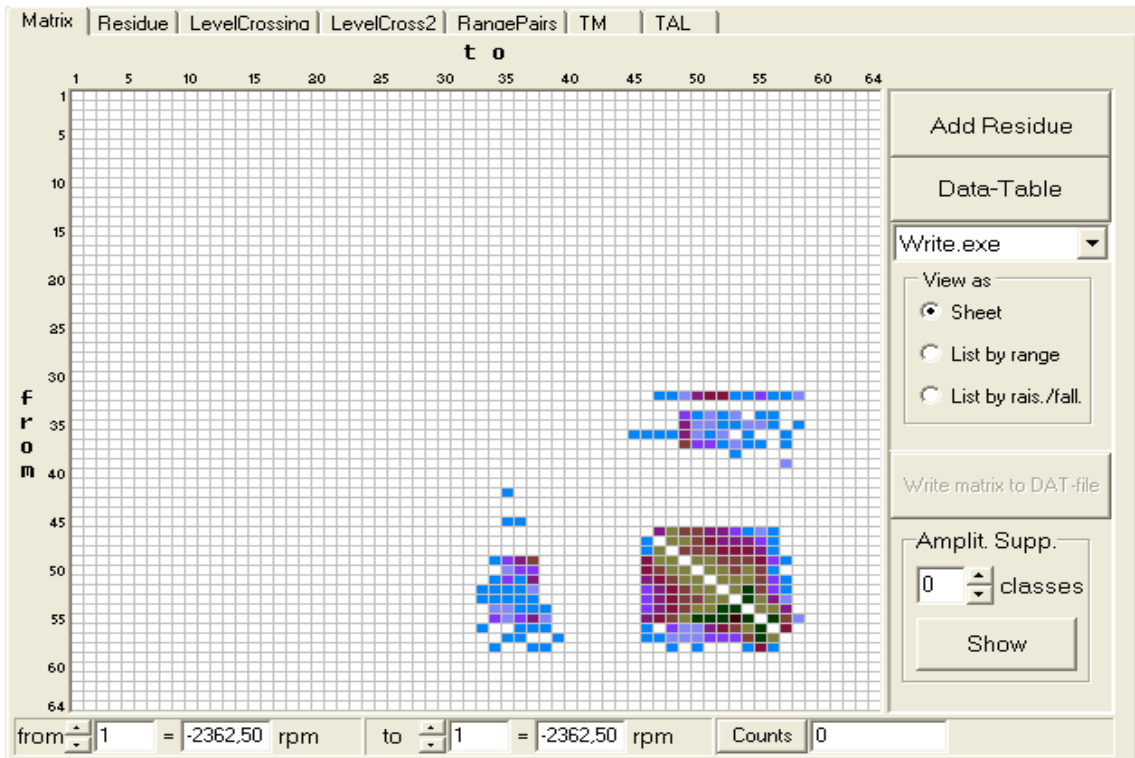
- Time At Level
- Level Crossing
- HCM-Rainflow method.
- Range Pairs



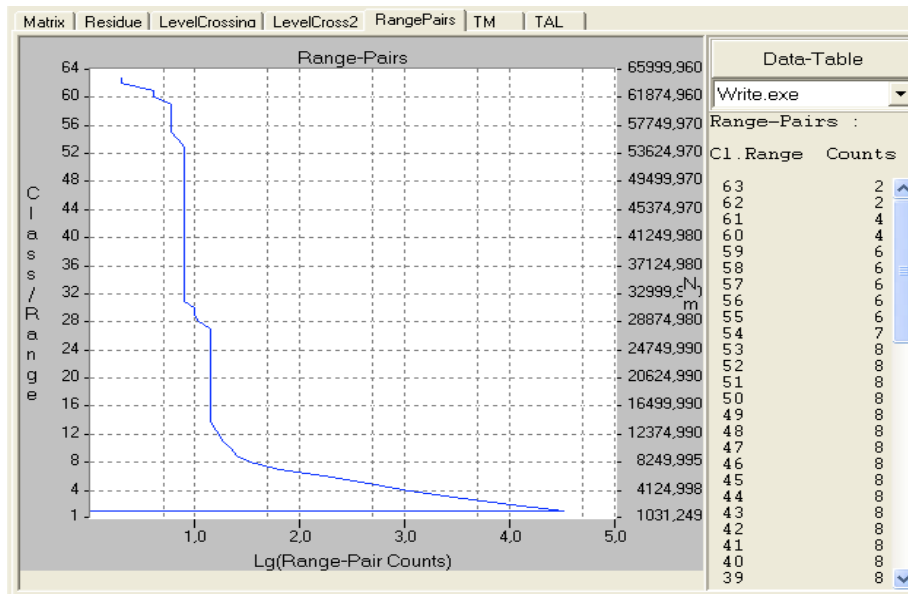
load collective according to Time At Level Method



load collective according to Level Crossing Method



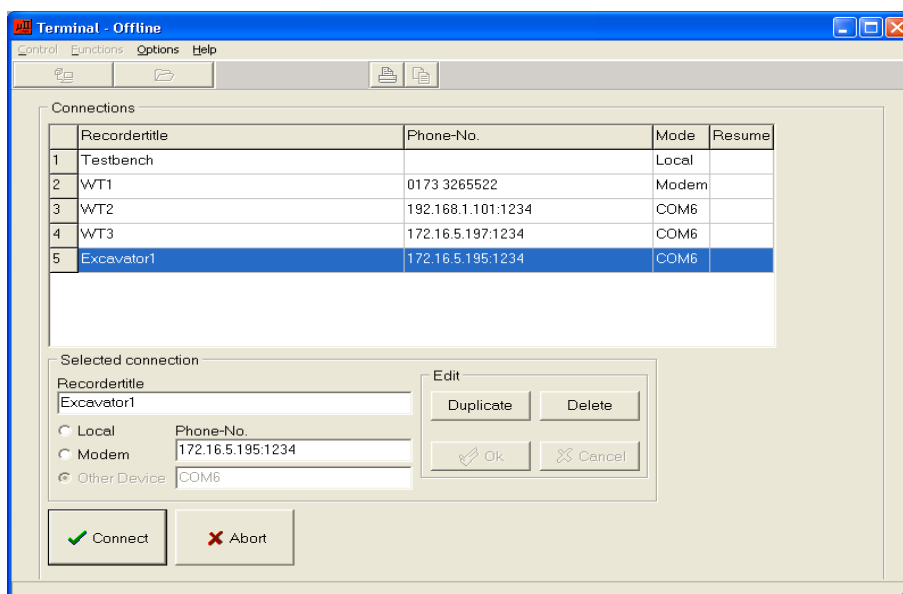
load collective according to HCM-Rainflow Method



load collective according to Range Pair Method

### 1.3 Configuration and Data View Software

E-GOMSTorque comes with the Configuration and Data View Software for PC/WindowsNT / Windows2000. This is a comfortable tool for the configuration of the system and for the download of the stored data. To do so the E-GOMSTorque DSC can be connected via the RS 232 interface to a PC, Laptop or alternatively to an appropriate GSM- or Ethernet communication module. Hence the E-GOMSTorque DSC can be operated within a network and via remote access. The signals are saved on hard disk in a standard data format so they can easily be displayed using standard software (e.g. MS EXCEL) after they have been transmitted from the DSC to the Administrator.



Screenshot of the communication register

## 2 Technical Specifications

<b>Inputs/Outputs</b>	
2 or 4 Input channels for analogue torque signal	analogue -10...+10 V, 5V stabilized power supply for DMS bridges
Signal amplification	Gain: 1-32; 12bit resolution
1 digital output channel	Schmidt Trigger, 2.1V threshold
2 digital input channels	Schmidt Trigger, 2.1V threshold
Sampling rate	up to 2000 Hz per channel
<b>Signal Conditioning/Data Storage</b>	
Calculation of signal gradient	$dM(t) / dt ; dn(t)/dt$
Signal storage	864kByte, 2MB or 4 MB data storage, number of samples infinite variable
Adjustable pre and post-history for signal storage	number of samples of pre- and post - history infinite variable
Calculation of the Time at load collectives	Time at Level Method Class Transgression Method HCM classification Method Range pairs Method
<b>Physical Specifications</b>	
dimensions	100*65*42mm
weight	400g
material	Aluminum
Protection class	IP65
Temperature range	-30°C - +65°C
Humidity range	0% - 80%
<b>Power Supply</b>	
Input Voltage range	6,5V – 26V
Current consumption	< 90mA, without sensors
Reverse voltage protection	up to -15V





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