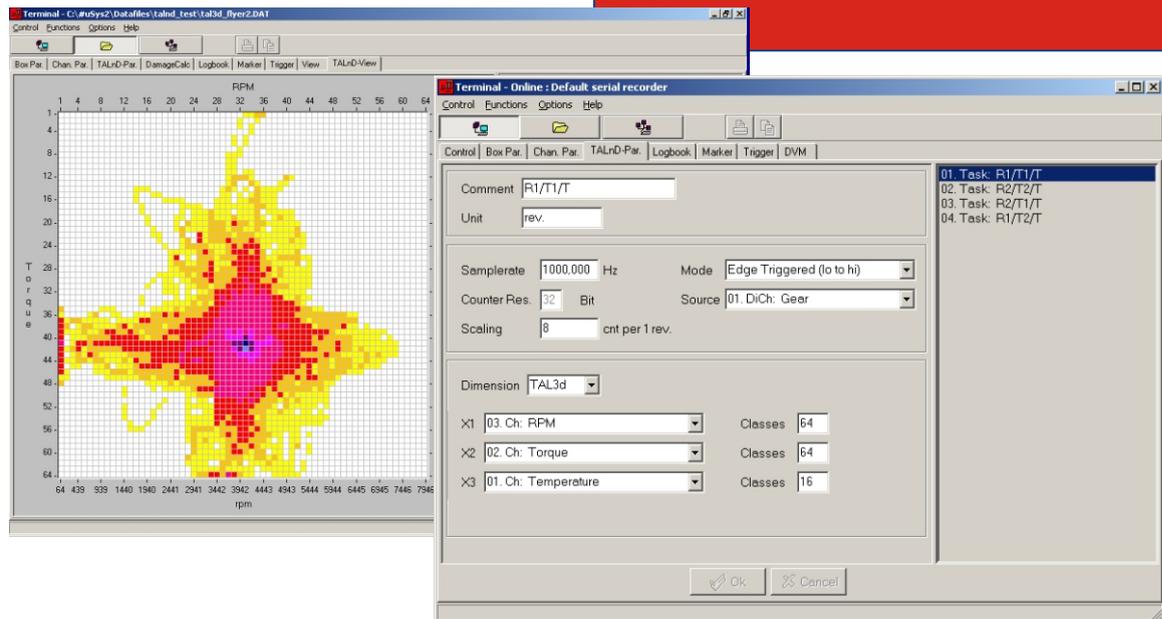


New Version



Description of the Evaluation Method

This multidimensional evaluation method determines the duration that a respective signal of up to three channels stays in a certain class. If the signals run repeatedly through one class during the measurement, the duration of the individual time periods are added up accordingly. Due to the multidimensional recording the time at level of up to three channels can be correlated with each other.

Instead of measuring the time, the number of transition edges of a digital input can be counted.

Since the analogue input channels and the digital channels are freely selectable for each matrix individually, the method is very flexible. Additionally, it may be combined with any other evaluation method which further enhances its merits.

Typical Applications and Features

General statistical tasks to determine the duration related signals have a definite level. For example, the Time at Level of vehicle parameters as temperature, motor speed and torque can be stored in a matrix and so correlated with each other. By using a digital input as counter, this method is suitable for gear boxes analyses.

## Evaluation Method

The TaLnD software has been upgraded by improving several features, which enable many new applications. The most significant innovations are:

### Unlimited Selection of Source Channels

Each analogue channel can be used as source channel for an unlimited number of matrices. The allocation for up to three axes can be independently selected.

All available analogue channels can be used as source channels (one for each dimension) for each TaLnD task. Thus, any analogue channel can be used multiple times for different matrices which is useful if a single channel is correlated to several others. A typical example would be the correlation analysis of different structural forces to the actual temperature. In such a case, one TaL2D matrix could be defined for each force. The appropriate force is defined as the X-axis of each matrix, while the Y-axis of all matrices use the temperature channel. (Of course, the assignment to X- and Y-axes is at the user's discretion).

### Unlimited Selection of the Number of Matrices

The number of available matrices is independent of the number of channels.

Since the number of TaLnD matrices can be user selected, the required storage space is kept to the needs. The remaining storage capacity is available for data recording of other evaluation methods. On the other hand, the number of TaLnD matrices can even exceed the number of channels for example, with four channels one TaL2D matrix can be defined for each of the six possible permutations.

### Combination with RF + TM + TaL

The TaLnD software supports the methods TaL, TaL2D and TaL3D. The methods RF + TM + TaL can all be used simultaneously.

The combination RF + TM + TaL is a powerful tool for monitoring operating loads and stress parameters. It can be used to simultaneously analyse fatigue relevant stress (RF), carry out time at level measurements (TaL) and perform correlated signal classifications (TaLnD). Finally the recording of discrete level triggered time histories can be established by the TM method. Hence, all commonly used methods are available in one single device and may be used simultaneously.

### Combination with SQTMS

The TaLnD software can be used in conjunction with method SQTMS.

The SQTMS method reduces a time signal to those load peaks which are relevant for fatigue life estimations, while keeping the time information. With such reduced data, the Rainflow matrix can be generated offline without losing any information. However, this is not true for the time at level (TaL) information of the data. The possible extension of SQTMS by the TaLnD method (which also includes TaL) now closes this gap.

### Selectable Resolution of the Reference Channel

With TaL3D the resolution of the reference channel is selectable.

Using the new TaL3D version, the resolution of the reference channel (3rd channel) can be selected. The main advantage is the ability to adjust the required memory space according to the users needs:

One single 64x64x64 matrix requires 1Mbyte of memory. By adjusting the resolution of the reference channel, the memory usage can be tailored to the actual requirements. Thereby, more matrices can be stored within the same amount of memory or, alternatively, the remaining memory space can be used for other applications, e.g. for RF and TM. For the same reason, TaL3D was not previously applicable for MATCH-II and MATCH-II-4, since the usual 64x64x64 matrix already required more memory than is available in MATCH-II. By reducing the resolution to 64x64x32, the available MATCH-II memory is sufficient for storing one TaL3D matrix, whilst still leaving memory available for other functions, e.g. for 4 RF-matrices plus more than 250kByte time history data. By further reducing the resolution, e.g. to 64x64x16, 2 TaL3D matrices can be stored in addition to the above mentioned data.

### Digital Inputs

Optionally, each single TaLnD method can be concatenated to a user selectable digital input.

In addition to the standard operating mode of time at level counting, individual TaLnD tasks may be optionally controlled by a digital channel.

Three operating modes are available:

**Timer:** The counting speed is determined by the set sampling rate (standard TaL).

**Gated timer:** The counting speed is still determined by the set sampling rate, but counting takes place only if the appropriate digital input is active. This means that this operating mode still measures the time at level, but the measurement is additionally controlled by an external state. By using several identical matrices with different digital inputs, different matrices can be selected according to different external states. At the end of the measurement one matrix represents the results of one state.

**Trigger:** At each active edge of the digital input signal, a counting impulse for the respective matrix cell will be generated, i.e. instead of counting the time, external events are counted. A typical application for the use of the triggered mode is the analysis of gear boxes, when counting shall be done synchronously to the rotations of the gear.

### Flexible License Policy

The user determines which dimensions and options shall be supported for each matrix individually.

The TaLnD software method is available matrix-wise. The user determines for each individual matrix, which dimensions and options are to be supported. Hence, the user can tailor the system to his needs and budget. A subsequent update is possible at any later time.

Subject to technical alterations  
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