VISIO SYSTEM

Measuring and SPC / FFT Analysis

To expand the verification possibilities and support the quality control of high-performance cables (data transmission cables, aeronautical cables, coaxial cables, etc.), WTM has developed a special signal processing and analysis software completely integrated into the machine. This software is complementary to the WTM Visio System, capable of collecting a pictures of the cable for each rotation of the taping head.

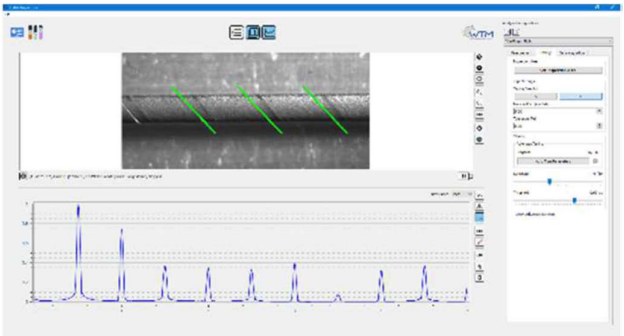
WTM can offer different software packages:

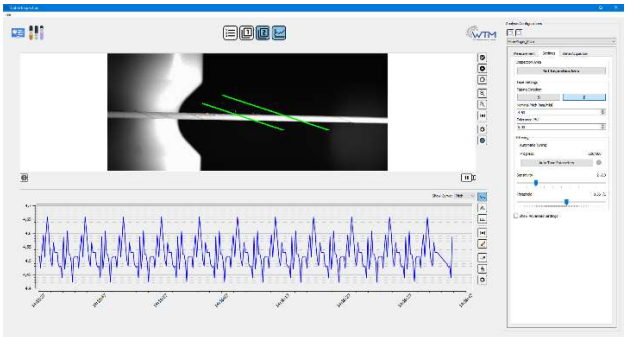
1. ***Basic software*** with magnifying and measurement functions
2. ***SPC package*** software (option)
3. ***FFT package*** software (option)
   3.1. ***Spectrogram*** (option)

The ***Basic software*** is supplied with the Visio System: the user can take advantage of the magnifying function and automatic measurement features.

The ***SPC package*** allows to perform the Statistical Process Control and the analysis on the measures of the taping pitch collected by the system. It is applied on aeronautical and aerospace cables, coaxial and data cables, control cables insulated in PTFE, polyimide, polyester, etc.

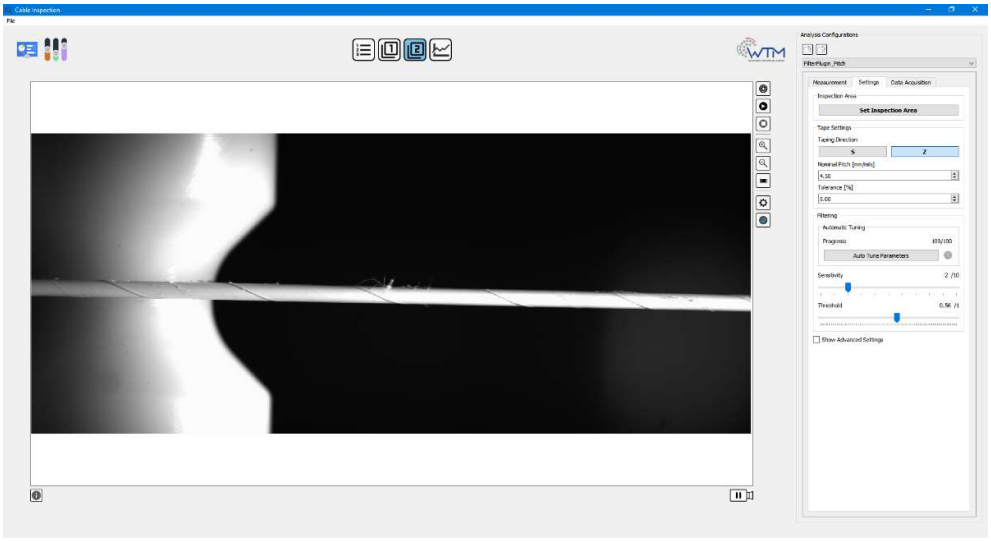
The ***FFT package*** implements the Fast Fourier Transformation on the data set collected by the Visio System and allows to perform the frequency analysis on the measurements of the taping pitch. This solution is recommended for high frequency data cables (coaxial, bi-coaxial) shielded with silver-plated copper tape, alu-polyester tape, etc.





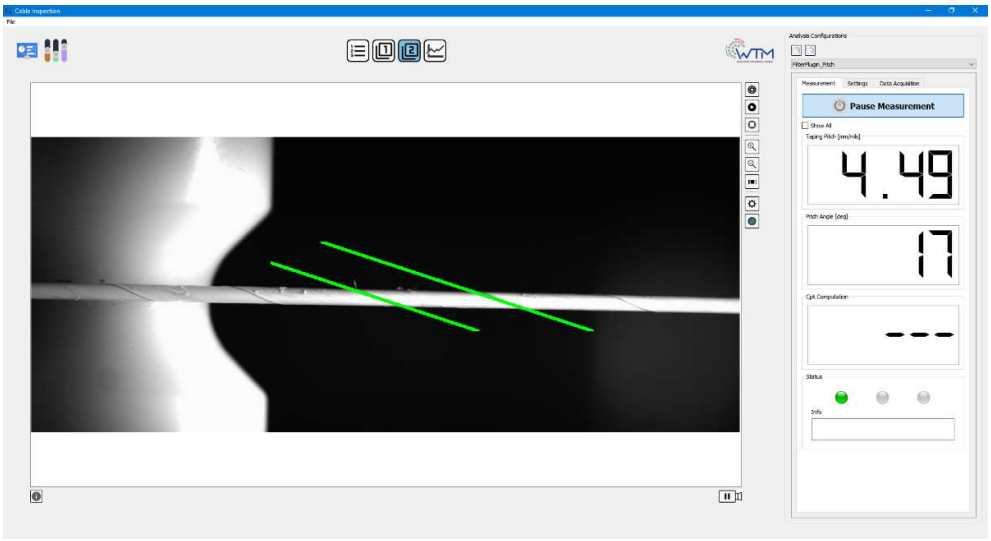
Magnifying function

It is used to visually check the enlarged taping process on the screen during the manufacturing process. Like a magnifying glass with special illumination, it allows for better visual detection of cable defects. The image is frozen at each turn of the head and recorded in the database.



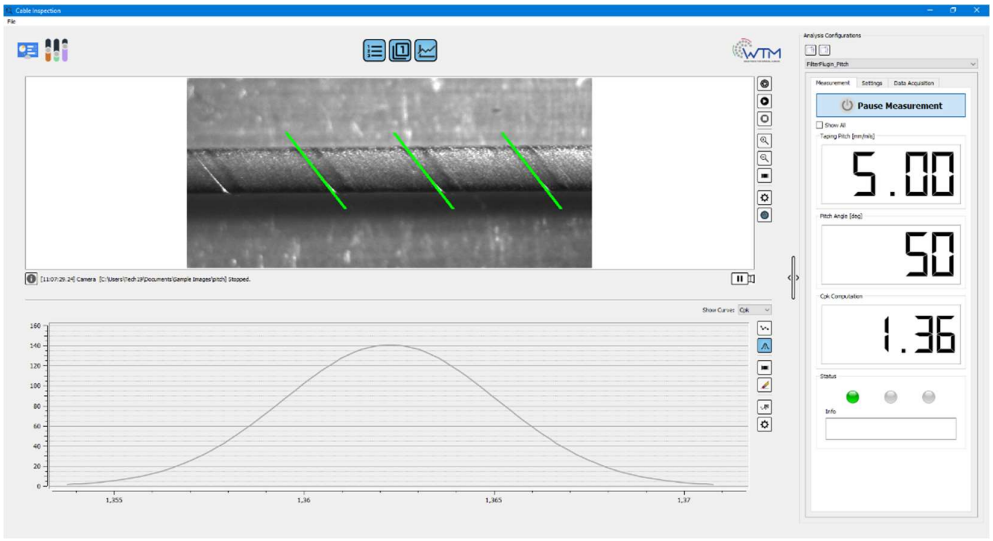
Measuring features

It is complementary to the magnifying function, **it is used for continuous multi-frame data collection**. The measurement is managed online on each taping pitch.
The data (taping pitch and taping angles) are logged and collected in a file that can be exported in various format.

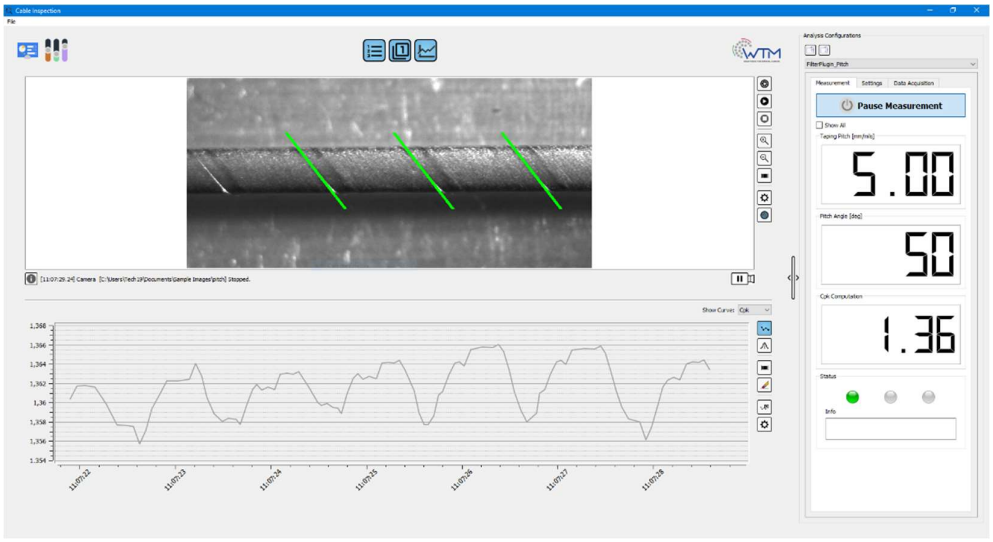


SPC package software (option)

The SPC package adds a data monitor, that displays the data trends of the acquired measures.
The system also allows the extraction of statistical information from the data in real time, with possibility to represent it as a Gaussian curve.



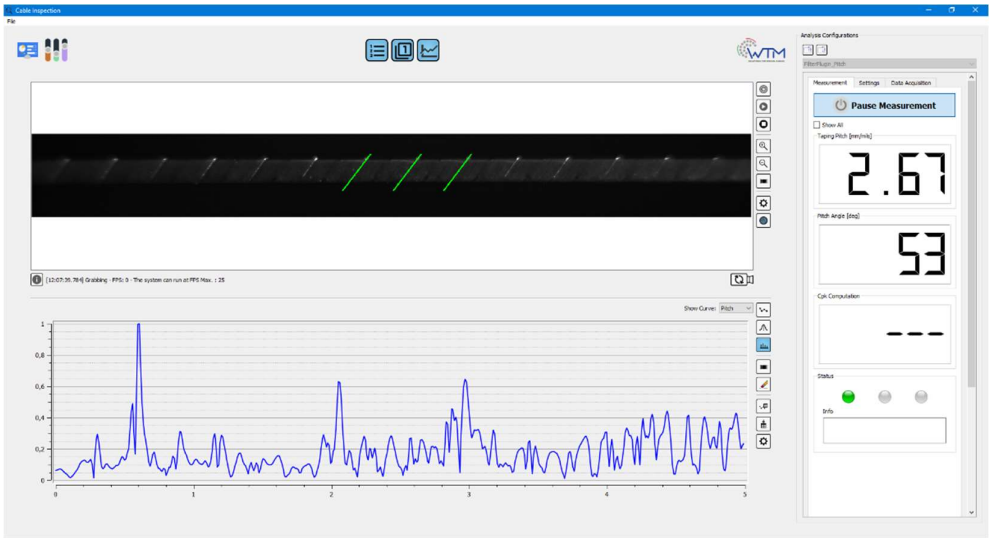
Moreover, this software package allows the computation of Cpk index over the measures collected and its inspection by trending.



The data monitor is fully customizable, allowing the user to set design styles (line/thickness/colour/marker), grids and customizable graph scales.

FFT package software (option)

The FFT package adds an additional plot showing the frequency representation of the signal.
This type of representation provides more detailed information about the process, and can help to identify anomalous behaviour on the machine setting or on product selection (cores, cables, tapes, etc).



The peaks in the curve correspond to periodic phenomena of the signal (for example the perturbation of the rotation of a motor or others).
By allowing the visualization of unexpected frequency peaks, this graph can be used to identify mechanical resonance that can be responsible of the faults on electrical frequency of the high frequency signals.

The curves processed by the system can be loaded simultaneously, with design styles (line/thickness/colour/marker), grids and customizable graph scales.

```
bool GraphWidget::setFFTScrollingWindow(const bool enable, const double overlap)
{
    bool res = true;
    if(overlap >= 0 && overlap <= FFT_OVERLAP_MAX){
        m_fft_scroll_overlap = overlap;
    }
    else {
```

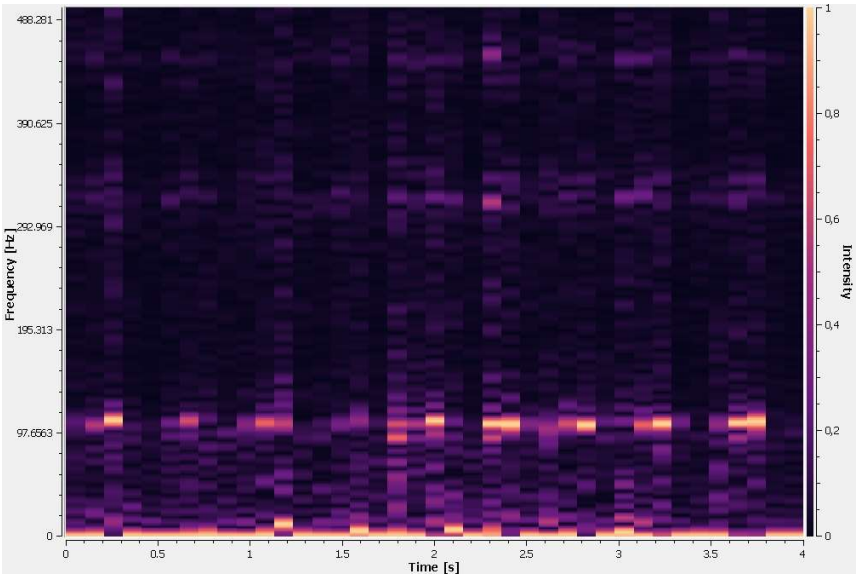
Spectrogram (option)

The spectrogram shows the trend of the frequency analysis over time.

This 3-dimensional graph shows:

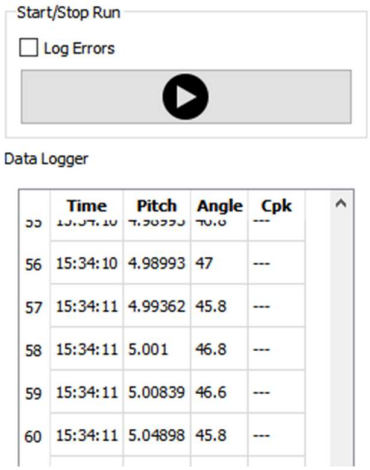
- the time on the horizontal axis
- the frequency on the vertical axis
- the intensity as a colour scale with which the graph is painted

The spectrogram allows to analyse the behaviour over time of the periodic phenomena highlighted by the frequency analysis, providing even richer information on the analysed signal.
The operator is free to choose the colour map to use in the graph, and can create custom maps.



The frequencies (vertical axis) in which the graph appears clearer are those at which the peaks were found in the frequency analysis.

DATA COLLECTION



The acquired measures are listed in a data logger, and can be streamed to a .csv file for offline inspection. File name and save location are customizable, allowing the data to be saved even to external and/or network devices.