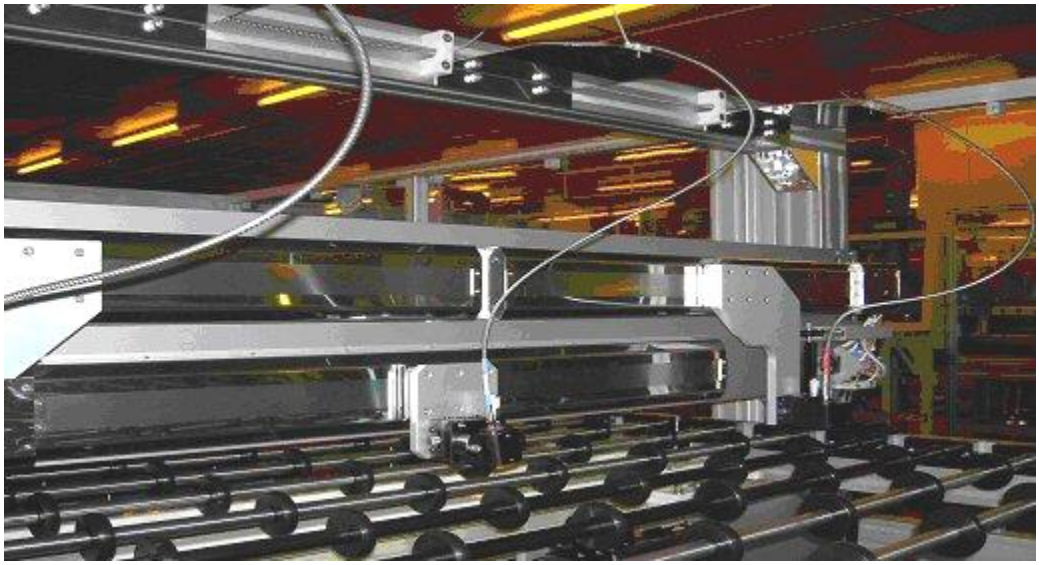
ETA-TCM inline for Web Coatings

Measurement systems for Thin Film Measurement of Web Coatings

ETA-TCM Inline
In-line Quality Control of Web Coatings

High Quality of Web Coatings

The ETA-TCM Inline is a modular spectroscopic measurement system for in-line thickness measurements of thin films.
The web coating process can be tightly controlled thanks to accurate measurement of film thickness and rapid availability of measuring data.



In-line chromaticity and thickness measurement in display production

Simple integration and multi process capability

The design of the ETA-TCM Inline system allows simple integration into production lines, while the software provides advanced communication capabilities suited for web productions.

The ETA-TCM Inline system is based on a modular spectrometer system which can be customized for each measurement task and process.
Thin films with a thickness of 150 nm up to 1300000nm (1.3mm) can be measured up to a line speed of about 50 m/min.

Remark: Measurement systems for measuring very thin layers in the range of 2nm – 1000nm, as well as for measuring the optical constants n&k of thin layers are also available from NXT (please check our "Xelas" product family)

ETA-TCM Measurement station

Traversing Unit for measurement heads

NXT industrial grade spectrometer units

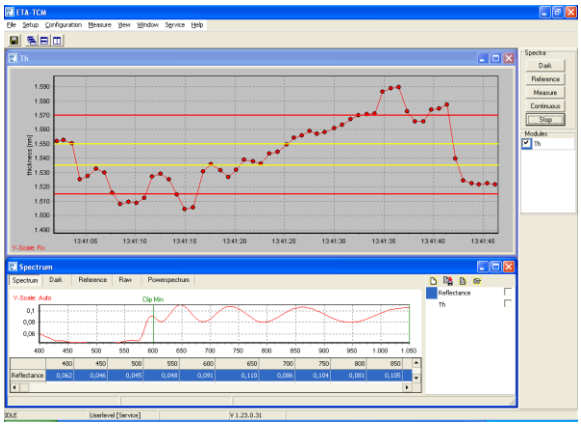
The systems consists of one or more spectrometers and light sources which are connected via fiber optic cables to several measuring heads.
The measuring heads are mounted to motorized linear stages, allowing quick and software controllable left-right scanning over the width of the foil, for an accurate and precise monitoring of the process. Fixed mounting of the measuring heads is possible as well.
In production environments the ETA-TCM Inline systems communicates via a TCP/IP protocol. The software is capable to monitor several spectrometers simultaneously, making the system versatile for web processes

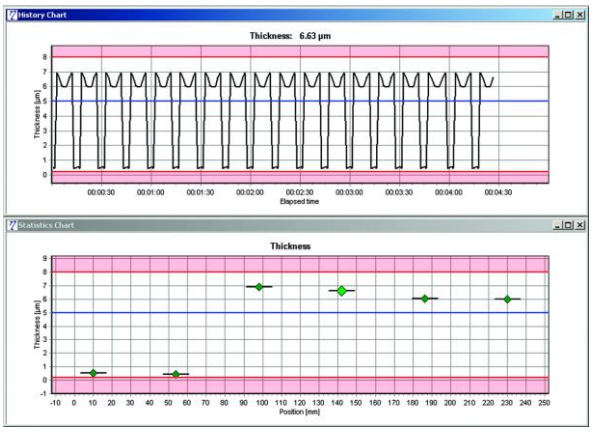
Versatile thin film coating applications for the demanding needs of

- Effect Pigment
- Flexible Solar Cells
- Flexible Displays and lightning
- Flexible Electric components
- TCO-layers
- Barrier layers
- Spacer layers
- Hard coatings
- AR-coatings

User friendly software

The software has been designed for an easy operator control. Simple menus and recipes are used to control web coatings very easily. Push button operations launch the recipe providing in-line information of film thickness and optical properties along with traceable results.
The Software integrates advanced data processing capabilities including: Real-time data monitoring, trend charts and statistics.





ETA-TCM Inline Technical Specifications / Available Thickness ranges

Spectrometer	Module #	Spectral range	Detector	Pixels	Resolution	Thickness range*
290-900	E41000315	290-900nm	Si	512	4.1nm	0.15 - 5µm
380-780	E41000167	380-780nm	Si	512	3.1nm	0.15 - 30µm
380-1050	E41000205	380-1050nm	Si	512	5.2nm	0.15 – 30µm
760-940	E41000216	760-940nm	Si	512	0.7nm	4 – 120µm
800-900	E37000235	800-900nm	Si	256	0.8nm	15 – 300µm
805-830	E37000210	805-830nm	Si	512	0.05nm	60 - 1300µm
850-1700	E41000168	850-1700nm	InGaAs	256	3.3nm	1 – 30µm
1500-1600	E41000231	1500-1600nm	InGaAs	256	0.8nm	15 - 350µm

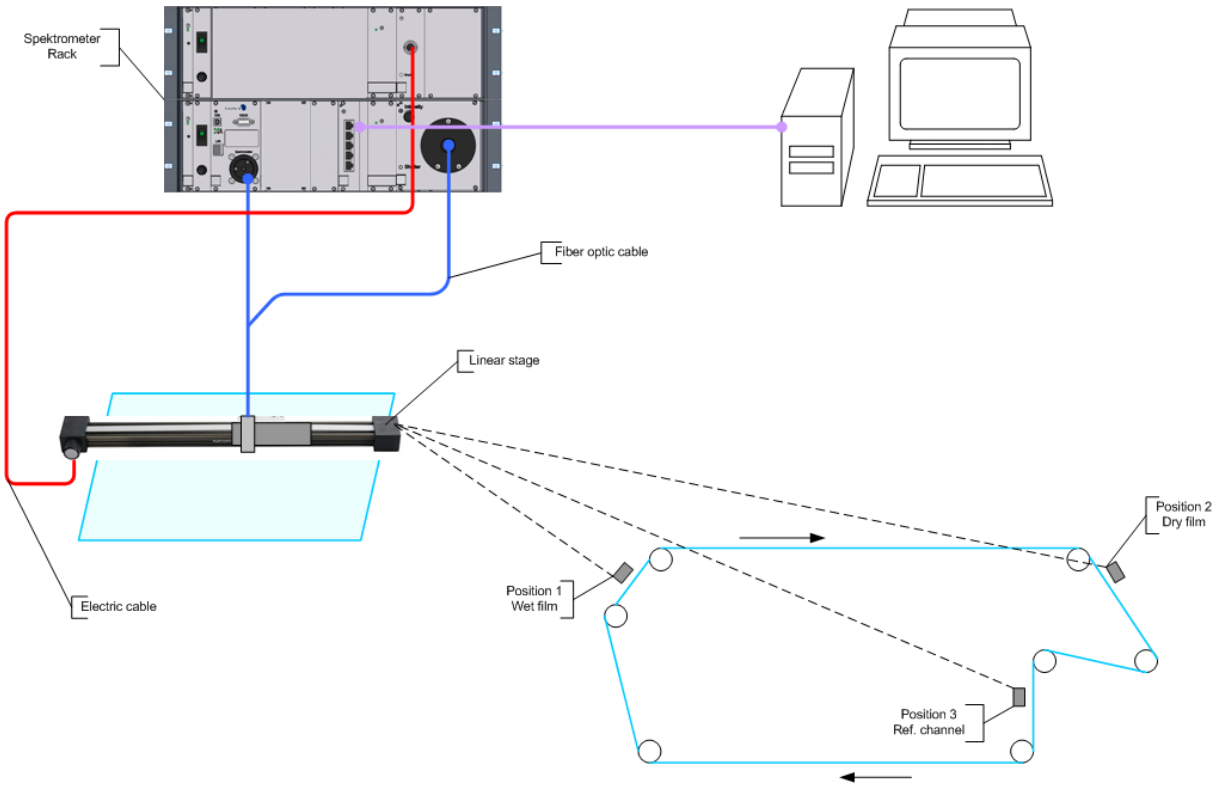
Table 1

* Evaluation of optically thick layers (with n=1.5) using FFT. Thin layers can be measured using curve fit and stack fit algorithms. The 380-1050 spectrometer will allow thickness measurements down to 20nm, depending on the type of layer(s).

Installation examples

Reflectance

Reflectance measurement geometry will be used for monitoring the reflectance and thickness of thin films. Depending to the layer type(s) and thickness(es), one or more of the above listed spectrometer (see table 1) are selected for the measurement.



Example of a Reflectance ETA-TCM system

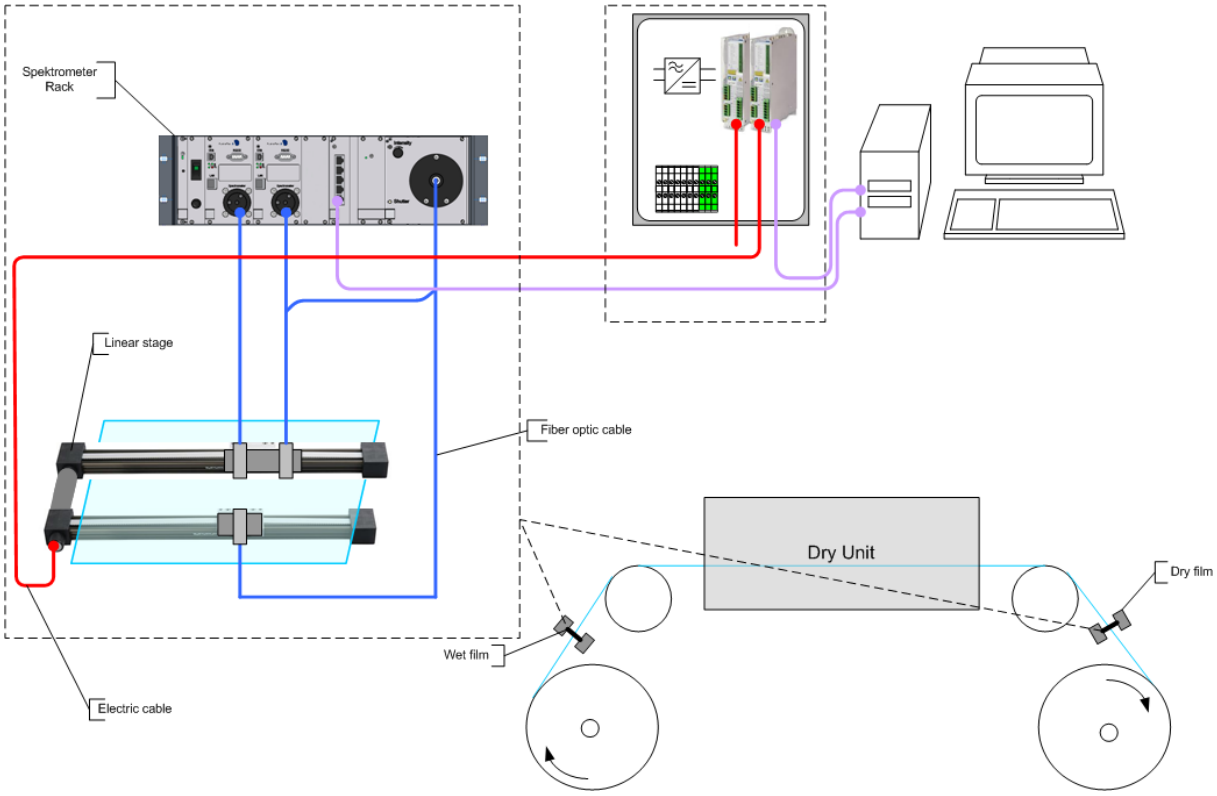
Typical Configuration (example)

System Specifications		
Spectrometer type	380 – 1050 / 512 Pixel	850 – 170 / 265 Pixel
Spectral range	380-1050nm	850-1700nm
Layer type	Transparent	non-Transparent
Thickness range *	0.1 - 30 µm	1 – 30µm
Accuracy	± 0.01 µm (0.1-1µm) ± 0.04 µm (1-30µm)	± 0.1 µm (1-30µm)
Thickness repeatability	3σ < 0.001 µm (0.1- 1µm) 3σ < 0.005 µm (1- 20µm)	3σ < 0.005 µm (1- 30µm)
Light source		
Illumination type	50 Watt Halogen	
Life time	> 2000 hours	
Shutter	Integrated mechanical shutter for automatic dark current measurement	
Linear stage		
Stage type	Belt driven	
Size	Customized length up to 5m	
Speed	Max. 5 m/s	
Position repeatability	± 0.05 mm	

* Evaluation of optically thick layers (with n=1.5) using FFT. Thin layers can be measured using curve fit and stack fit algorithms. The 380-1050 spectrometer will allow thickness measurements down to 20nm, depending on the type of layer(s).

Reflectance and Transmittance

A combined system with a reflectance and transmittance channel is used for monitoring the thickness, the reflectance as well as the transmittance of the layer. Measuring the optical density of the substrate or layer is also possible.
Depending to the substrate the layer type and thickness, one of the above listed spectrometer (see table 1) are selected for the measurement.



Example of combined reflectance & transmittance ETA-TCM system

Typical Configuration

System Specifications		
Spectrometer type	380 – 780 / 512 Pixel	380 – 1050 / 512 Pixel
Spectral range	380-780nm	380-1050nm
Chromaticity accuracy / Thickness accuracy	x,y ± 0.002 Y ± 0.4	± 0.01 µm (0.1-1µm) ± 0.04 µm (1-30µm)
Chromaticity repeatability /Thickness repeatability	x,y 3σ < 0.001 Y 3σ < 0.1	3σ < 0.001 µm (0.1- 1µm) 3σ < 0.005 µm (1- 30µm)
Light source		
Illumination type	50 Watt Halogen	
Life time	> 2000 hours	
Shutter	Integrated mechanical shutter for automatic dark current measurement	
Linear stage		
Stage type	Belt driven	
Size	Customized length up to 5m	
Speed	Max. 5 m/s	
Position repeatability	± 0.05 mm	

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