

Layer thickness measurement of anodized coatings on aluminium plates and tapes

Lab and on-line measurements

INTRODUCTION

The coating of aluminium with aluminum oxide or other protective or design coatings must be kept in controlled quality limits during the coating technology, in order to guarantee the functionality of the layers and thus to comply with the customers' requirements.

The testing of samples from the on going production process can be performed as random sampling or on-line measurement. The coating parameters of the coating plant can therefore be reset very quickly and, as a result, at low cost (quality and material consumption). However, this measuring procedure is only suitable for transparent layers, not for diffusely scattering layers.

THE METHOD

Coated tapes or plates are measured using reflected light. Interferences (white light) are generated from the reflection signals. The optical layer thickness is reliably evaluated by means of FFT algorithms. (Fig.1) The geometric layer thickness is determined on the basis of the mathematical relationship between the optical and the geometric thickness, and the refractive index function $n=f(\text{wavelength})$.

Results are provided with utmost reproducibility and absolute accuracy which is due to the superb optical and thermal stability of the ZEISS diode array polychromators.

Thin layers between $<500\text{nm}$ and a few nm can be measured, calibrated and integrated in automatic processes by means of special evaluation algorithms. These methods are generally applicable to all other coatings which are physically suited for being measured with our systems.

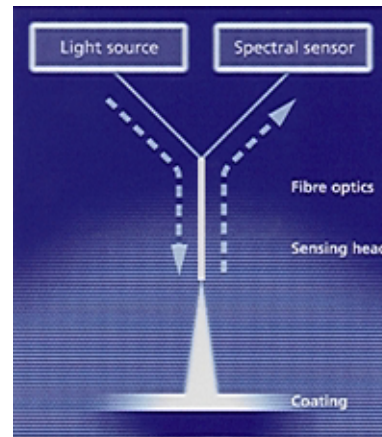


Fig.1

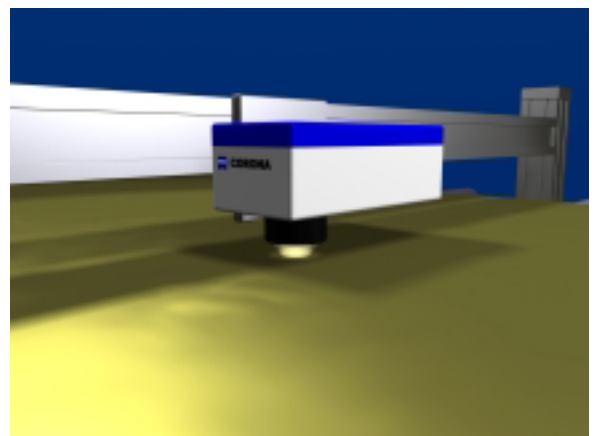
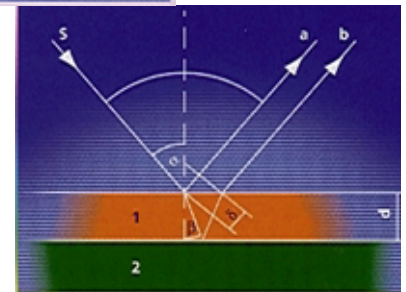


Fig.2 CORONA in use



〒164-0011
東京都中野区中央4-4-5第一小林ビル
Tel: 03-5328-2858 Fax: 03-5328-2859



THE SYSTEMS

There is the possibility to use fibre coupled (MCS 500) or fibreless systems (CORONA Fig.2). The diode array spectrometer systems are based on the time-tried ZEISS MCS polychromator technology. The multi-channel spectrometers provide spectral information with a resolution of 0.8nm/pixel and 3.3nm/pixel, respectively. An RS422 interface, 4-20mA, and shortly an RS232/alternatively RS485, or a trigger input and output can be used as interfaces, for example.

PCs are used for controlling the systems. The spectrometers can be cascaded, e.g. so that the visual spectral range and the NIR spectral range are measured simultaneously. This permits the measurement of different multi layer systems.

THE SOFTWARE

A possible software option is our ASPECTPLUS Windows standard software (supported by Windows 3.11/ 95/ 98 and Windows NT) in conjunction with the software module Layer Thickness.

For special, customized applications we recommend a solution under LabVIEW.

DLLs for C++ and LabVIEW drivers allow the user to program his own software interfaces, or to integrate our measuring systems in overall procedures

THE BENEFITS

- ◆ Fast high-precision measurement
- ◆ Excellent reproducibility of layer thickness data
- ◆ Time-tried measuring systems and techniques
- ◆ High reliability and low maintenance requirements, as no moving parts are use
- ◆ Easy software operation
- ◆ Detailed spectral information provided at high speed
- ◆ Flexible installation due to fibre-coupled or fibreless technology and a wide range of accessories
- ◆ Measurement of several measuring points by combination with optical multiplexer or traversing unit
- ◆ Fibreless systems directly driven over traversing unit

SPECIFICATION

Wavelength range	200 – 1020 nm (900 – 1700 nm optional, or cascaded)
Wavelength resolution	0.8nm/Diode (2.4 nm Raleigh) / 3.3nm/diode (10nm Raleigh)
Wavelength reproducibility	<0,05 nm
PC interface	RS 422; RS 232 res. RS 485 for CORONA
Distance between PC and system	up to 80 m with standard cable up to 2.5 km with light guide transmission
Optical fibres	quartz, 600 µm core, SMA connections
Housing	19" housing or 19" rack mount 19" protective housing Corona (fibreless) in cast housing