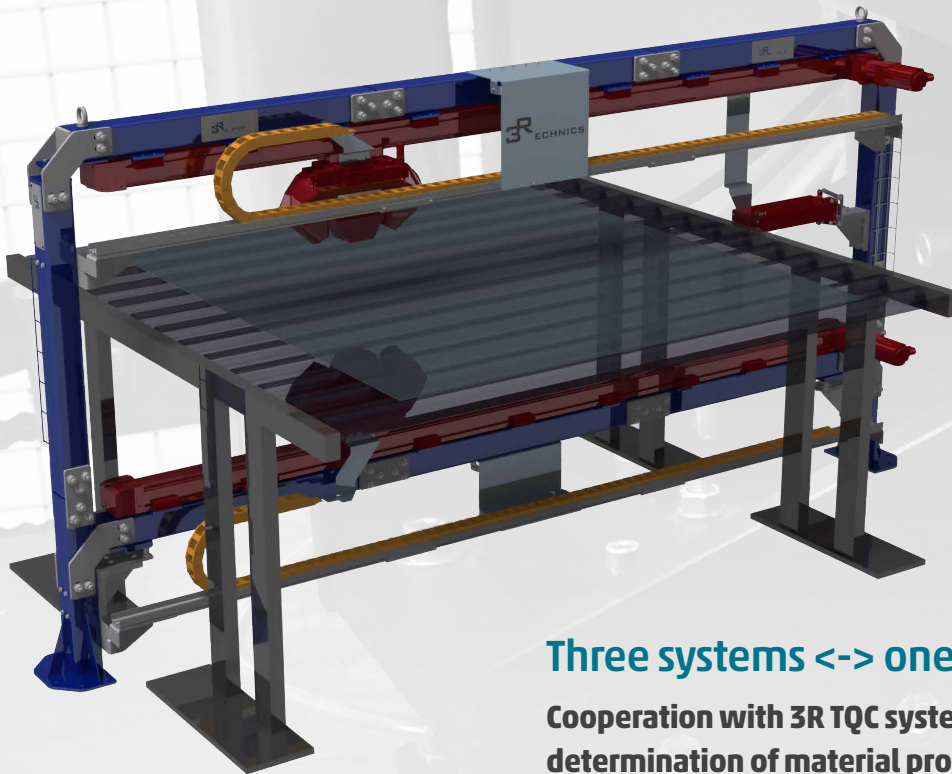


3R LLT

In-line Lubrication-Layer-Thickness-Sensor



ACCURACY



SPEED



CONNECTIVITY

Three systems <-> one interface

Cooperation with 3R TQC system for the non-destructive determination of material properties and with 3R STM for strip thickness measurement.

3R LLT benefits:

- highest sensitivity
- lowest noise
- highest measuring frequency
- highest traversing speed
- long cleaning interval
- more wavelengths -> special applications possible
- larger sheet distance
- larger distance variation
- full line integration
- **various data backup options** MS SQL® or MS Access® database, HTTP communication with a database
- different **display options** of the measured values
- **IP65** - measuring head

**BEST
ACCURACY**

**HIGHEST AREA
COVERAGE**

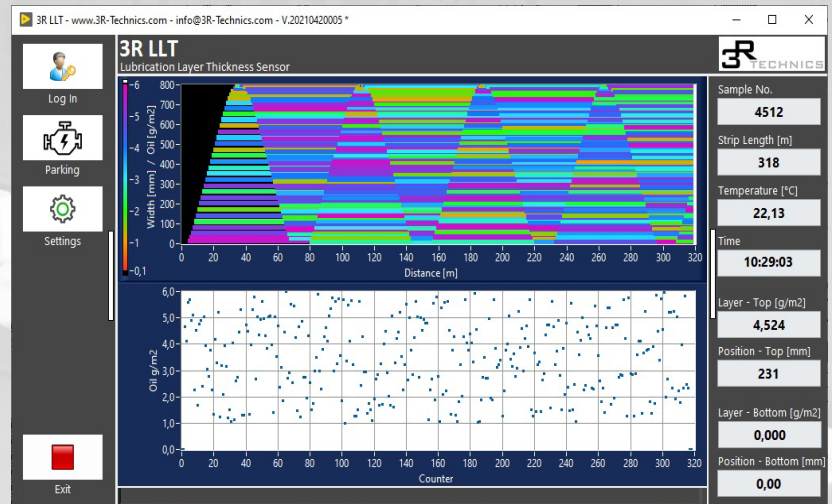


NGO3 Measuring head of the latest generation

3R LLT Software

The 3R LLT system is an in-line measuring system, which operates on the principle of infrared spectroscopy and is used to measure the amount of lubricant on the material surface, usually at the strip surface. With this system, the lubricant quantity can be very precisely recorded, displayed and documented.

Typically, this system is integrated into cutting lines or press lines. Communication and synchronization with the line is guaranteed. Fully automatic or semi-automatic operation is possible, depending on the customer's requirements. The modern software fulfills the complex tasks in communication with the line, communication with databases and also ensures the data processing. In addition, the software is responsible for a very important task - communication with the operator. The operation is very simple and comfortable. The measured values can be displayed in three different ways. The quantity of lubricant can be displayed in color in a 2D diagram i.e. as a strip area or the individual values can be displayed in an XY graph. As a further display method, the measured values can be shown depending on the measured value number, the time or the strip length. Parallel to this, important information can be seen on the right side of the visualization as digital display. The software is designed for one or two measuring heads and the display can be adapted accordingly e.g. the measurement from the top and bottom is possible at the same time.



The 3R LLT system can be coupled with other measuring systems, e.g. the 3R TQC system for non-destructive measurement of the material properties or with the 3R STM system for in-line determination of strip thickness, or with both systems simultaneously.

The 3R Technics Company is specialized in data acquisition in difficult production environments and has many years of experience with the integration of measuring systems in production lines. This is the guarantee of reliable data that can be transformed into know-how.

Parameters of the measuring head

Measuring method	Infrared spectroscopy
Measured value	Mass per unit area of the lubricant quantity in gm^{-2}
Measuring range	0.1 – 6 gm^{-2} (Measurements from 0.02 gm^{-2} possible with a special calibration)
Measurement accuracy / Absolute accuracy	Measuring range 0.1 – 0.5 gm^{-2} : $\pm 0.025 \text{ gm}^{-2}$ with special calibrations only Measuring range 0.5 – 2.0 gm^{-2} : $\pm 0.200 \text{ gm}^{-2}$ with production line independent group calibrations $\pm 0.030 \text{ gm}^{-2}$ with production line specific calibrations * $\pm 0.100 \text{ gm}^{-2}$ with inhomogeneity compensated group calibrations *** Measuring range > 2.0 gm^{-2} : $\pm 10\%$ of measured value
Repeatability (1 Sigma noise-equivalent)	1 mgm^{-2}
Measurement resolution	0.01 gm^{-2} (adjustable)
Measuring distance	200 mm
Allowed distance variation	$\pm 20 \text{ mm}$
Measurement frequency	120 Hz
Window cleaning interval	Up till 12 months (depends on the surroundings)
Ambient temperature	0 °C to + 55 °C (extended temperature range possible on request)
Traverse speed	0 till 2 ms^{-1}
Lubricants	Mineral oil, thixotropic mineral oil, Hotmelts, waxes, synthetic oils
Measurable materials	All metallic and non-metallic surfaces with a low gloss level, e.g.: <ul style="list-style-type: none"> ■ Cold strip / steel stripe, electrolytically galvanized, hot-dip galvanized, ZnMg-surface, aluminized, all with or without passivation / phosphatation ■ Aluminum alloys – uncoated, pre-treated ■ Copper alloys – uncoated, pre-treated

* important for measuring hot melts
** under development



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