



White paper

# Accurate hand-held glass thickness measuring device

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## Customer

The customer is a small but specialized European company playing significant role in field of optical scanning for various purposes. Their products vary from wide use optical devices through industrial devices to highly specific scanning devices.

## Project Overview

The goal of the project was a development of an accurate hand-held glass thickness measuring device and, at later stage, its industrial version.

The project deals with software and hardware development of a small in size, but accurate and cost-effective device.

The main challenges of the project were:

- Algorithm development
- Fast and accurate measurements
- PCB development
- High performance and reliability
- Low power consumption
- Low per-unit price
- Competitive to devices existing on the market

The scanning concept was provided by the customer and it is based on laser triangulation. The device contains the following three units: scanning, control and user interface unit. The device scanning unit is provided and maintained by the customer, while control and user interface units are maintained by RT-RK. The control unit is a micro controller, which is in charge of reading and processing sensor data, glass characteristics determination, display of the measurement results, and, as additional feature, communication to a PC. User interface unit consists of few push buttons and a display with goal to be easy to use but functional.

The project started with algorithm development with aim to prove if better results compared to the similar devices on the market can be achieved. The algorithm proved to be very accurate in terms of glass thickness measurement (multiple glass sheets), coating detection

and laminate detection (number of layers, thickness of layers) achieving results better than existing devices. In combination of PCB design and software design it proved that RT-RK is able to develop such device with very high performances.

In addition to regular operation mode, a number of features had been developed, such as:

- Calibration using PC
- Display of raw measuring data in a PC application
- Comparison of measurements from both sides of a glass to achieve more precise measurement
- Displaying result in inches or millimeters

As a next step, a product development was initiated. The device production started with the estimated production quantity of 1k+ per.

The next phase was production of an industrial version of the device. Hardware and software was adjusted to industrial needs and environment. The two versions co-exist and have different targeted users. The hand-held device is aimed to be used for glass verification in post production phase, while the industrial version is to be used for glass verification during production (its measurements are automatically triggered, no operator is required and measuring results are sent to a PC).

The device was intensively tested using a number of glass samples from various glass producers. Its industrial version was also tested worldwide, in many glass factories, in process of glass production.



*Hand-held Glass measuring device*

The development lasted about one year. It involved a hardware engineer for schematics and PCB design, an

engineer for algorithm and software development, a test engineer and a project manager.

## **Benefits**

The project covered the complete development from the algorithm, hardware and software development to the adjustments for industrialized product. The final solution, for both versions, fulfills the customer requirements both in terms of price and performances. The complete development process and costs were transparent to the customer via regular meetings and appropriate reports.

After this first project, cooperation with the customer continued with a number of projects related to optical scanning devices for specific purposes.

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