

Possibilities for the application of the microwave resonator measurement in a drawframe

Since the measurement of moisture and mass of a material can be realised very fast and exactly by use of the microwave resonator method, there are several possibilities to apply the measuring method in the textile industry. The measuring method is especially suitable for the application in drawframes. The measurement is independent of the colour and the shape of the material. In contrast to electrical measuring methods working at a low frequency, it is independent of the content of minerals in the measured material. This is important for the measurement of natural products, e.g. cotton. The mass of the material can be measured independent of a varying moisture content, because the influence of moisture fluctuations can be compensated. As the measuring device developed by TEWS ELEKTRONIK produces 10000 values of mass and moisture per second, the measurement can be realised at fast moving material (e.g. 1000 m/min). In the following, the application in drawframes is discussed.

Fig. 1 shows a diagram of a drawframe and the positions, where resonators can be applied. A resonator can be used for the mass measurement of the fibre slivers which enter the drawframe, so that the drawing ratio can be set appropriately. The speed of the rollers can be regulated by use of the mass signal. Suitable for the mass measurement of several slivers at the same time is a so-called 'fork resonator', that is shown in Fig. 2 schematically.

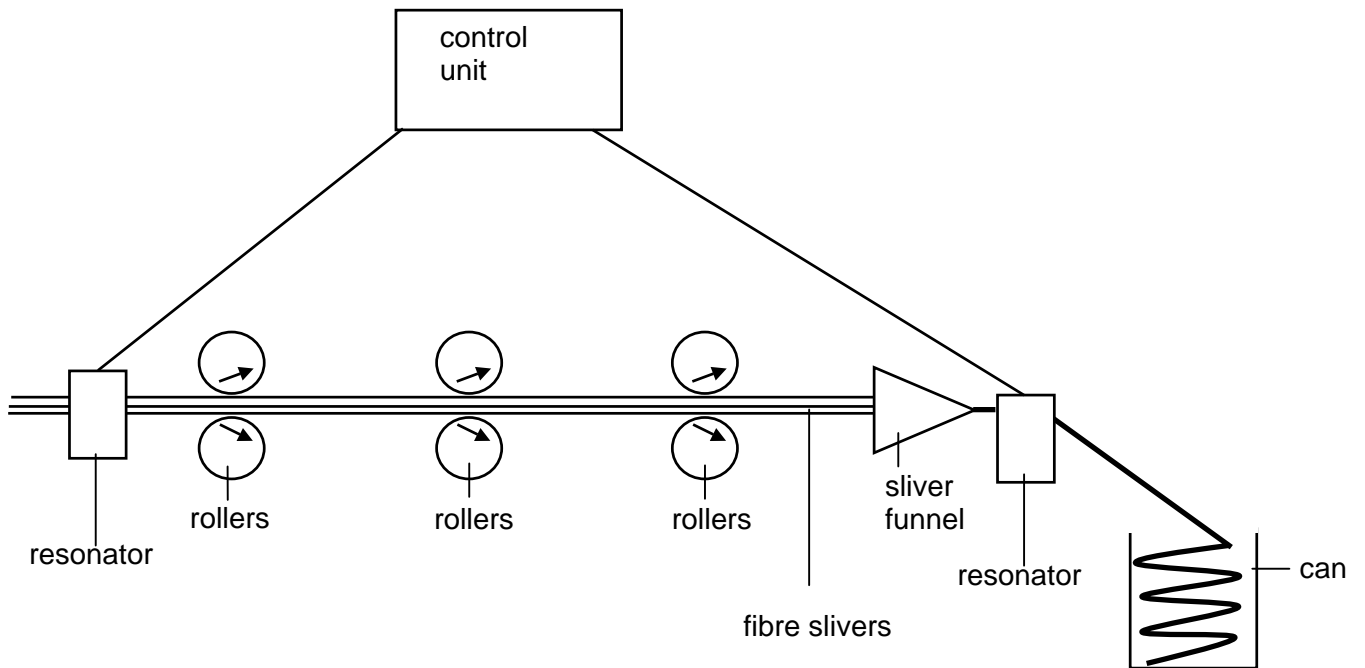


Fig. 1: Diagram of a drawframe

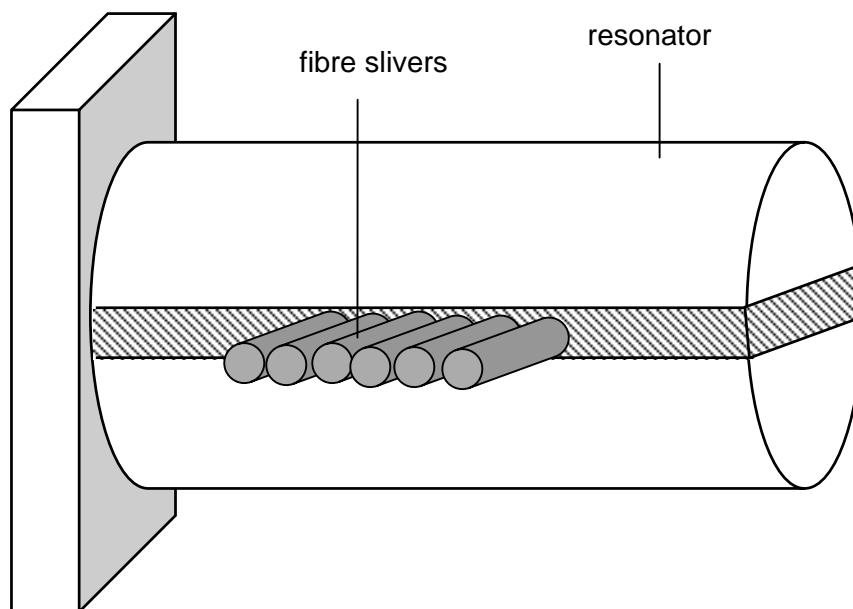


Fig. 2: 'Fork resonator' for the measurement of several slivers at the same time

The fibre slivers are combined in the sliver funnel to a single sliver. If a resonator is placed after the sliver funnel at the exit of the drawframe, the effect of the drawing can be checked here. Suitable for this measurement is a cylindrical resonator, that is shown in Fig. 3 schematically.

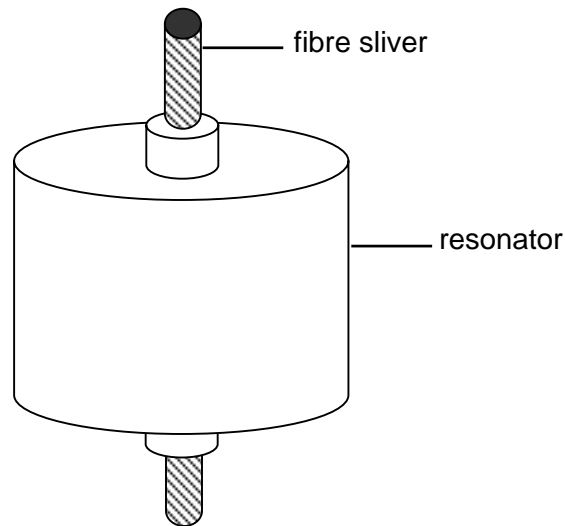


Fig. 3: Cylindrical resonator for the exit of a drawframe

The suitability of a microwave measuring system for controlling a drawframe has been proven by comparison between common mechanical measuring systems for the mass measurement and the microwave measuring system. Fig. 4 shows the application of a fork resonator to a drawframe, with six fibre stands crossing the resonator.

Fig. 5 shows the fork resonator placed on a drawframe directly in front of a mechanical measuring system. The mechanical measuring system consists of a pair of rollers as applied in many drawframes. The output signals of the mechanical measuring system and the microwave measuring system had been synchronised to analyse the correlation between both signals dependent on time. Fig. 6 shows the signals of the two measuring systems during a period of about 1,5 h. The two signals are nearly identical.

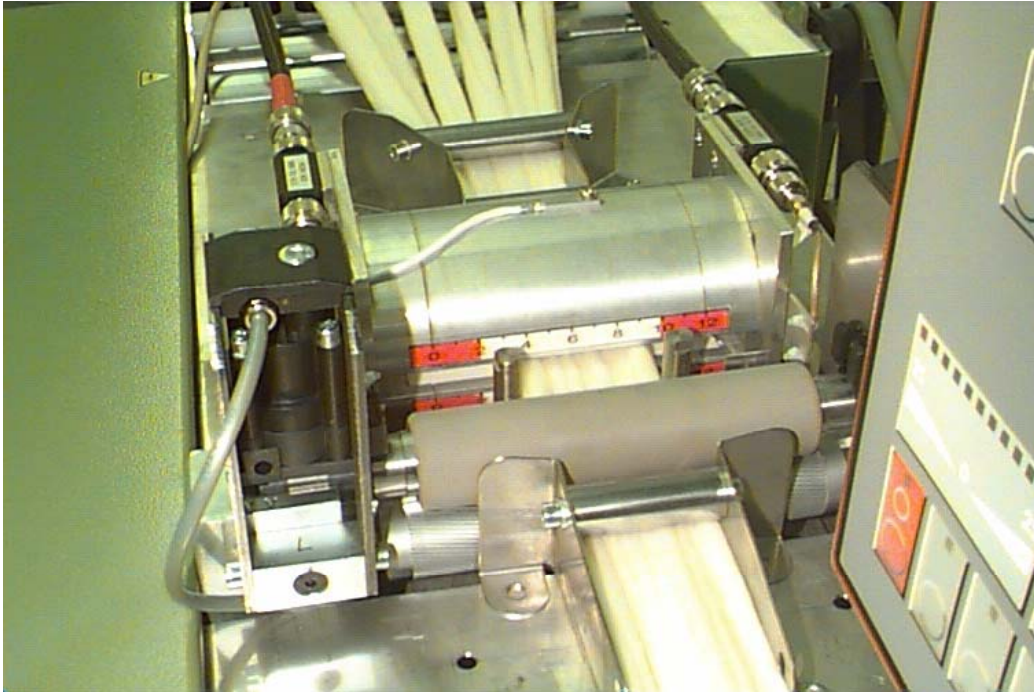


Fig. 4: Fork resonator applied to a drawframe



Fig. 5: Microwave measuring system and mechanical measuring system on a drawframe

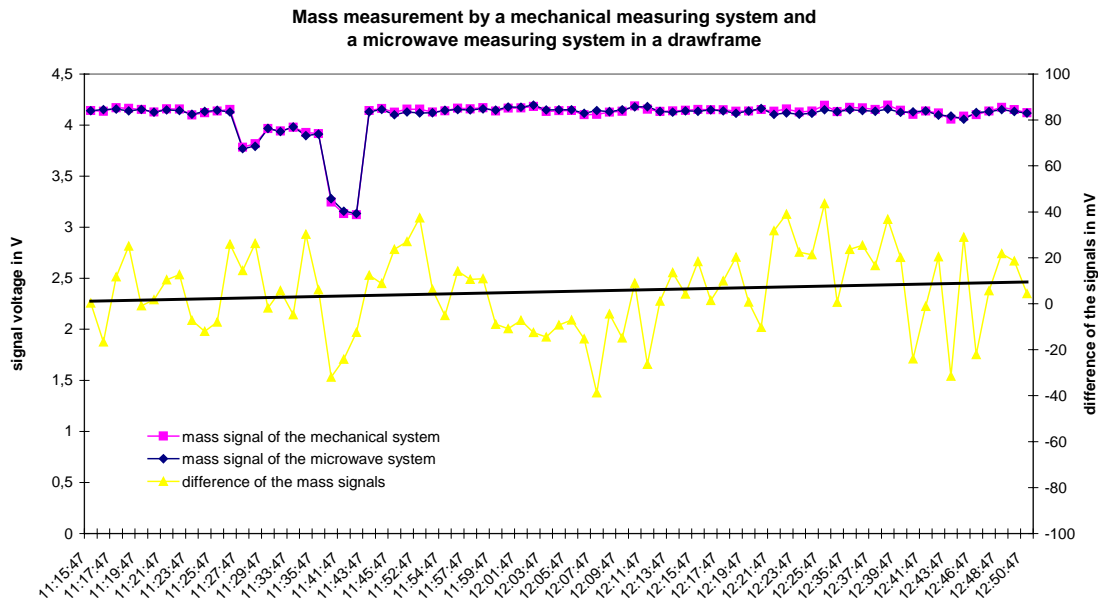


Fig. 6: Signals of the microwave measuring system and the mechanical measuring system, period: about 1,5 h

Thus, the microwave measuring system produces mass signals, that are very similar to the signals of a well-established mechanical measuring system. The microwave resonator can measure without having contact to the textile material. So the measuring system does not apply any force to the textiles. As the microwave measuring system can be situated directly in front of the drawing rollers of the drawframe and a complex mechanical measuring system is not longer necessary, a drawframe using a microwave measuring system could be constructed very compactly. Furthermore, a drawframe using a microwave measuring system could run much faster than one equipped with a mechanical measuring system.

Dr. Udo Schlemm,
 Rainer Herrmann
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