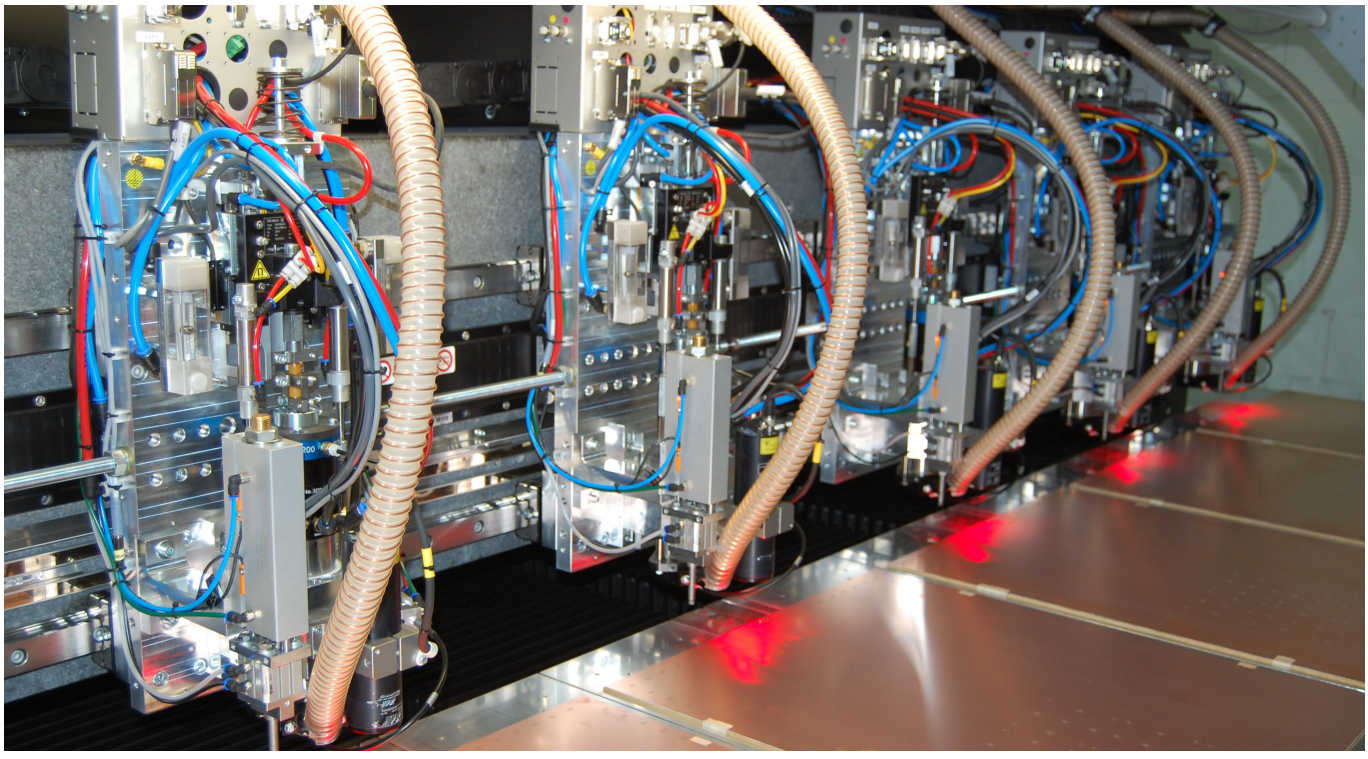


APPLICATION NOTE

Machinery & apparatus

Monitoring coolant on a production machine

- Production machine for drilling PCBs
- Cooling the electric motors for drilling and Z-axis positioning
- Variable area flow measurement for the monitoring of the coolant flow

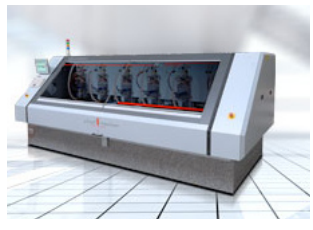
schmoll maschinen
...one step ahead.

1. Background

For over 60 years, Schmoll Maschinen GmbH has been manufacturing production machines for electronics production, including drilling systems for PCBs. Depending on the configuration, machines with 5 or 6 parallel spindles may be used. Production machines basically consist of a granite chassis to guarantee stability, and a table with the PCB intake as well as the positioning and drilling system. A CNC controls the drives and runs a stored drilling program.

2. Measurement requirements

Linear motors are used to drive the transverse axes in the XY direction. The linear motors for the Z-axis (drilling depth) execute up to 1000 strokes per minute and the drill spindles reach up to 300,000 rpm. The heat created in the motor during this process must be dissipated using a liquid coolant. For monitoring purposes, it is necessary to measure the coolant flow to permanently guarantee motor function and to minimise wear. The coolant consists of demineralised water which contains additives to protect against corrosion.

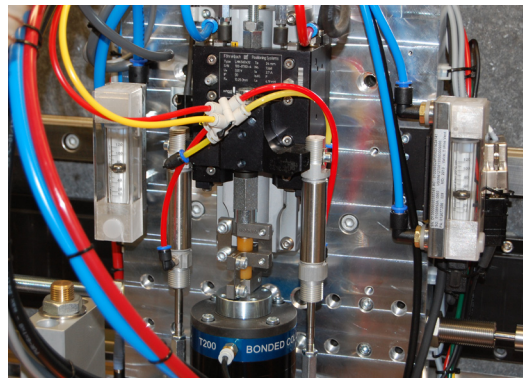


Schmoll Maschinen GmbH production system

KROHNE

3. KROHNE solution

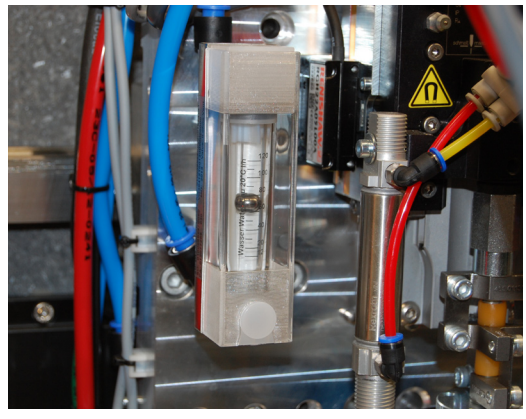
DK46 variable area flowmeters are used to measure the cooling liquid. The KROHNE devices require no power supply. At the height of the float, the current flow rate can be read directly off the 12-120 l/h / 3.2-32 GPH scale, which is attached to the glass cone. 2 devices are used to measure the flow of each drilling system, one for the drilling motor and one for the positioning motor in Z-direction. The devices are fastened directly to the drilling systems with a mounting bracket. This way, the operator can immediately see if the system is being cooled sufficiently or whether there is a leak or blockage in the coolant line.



Variable area flow measurement of coolant

4. Customer benefits

The DK46 flowmeters measure extremely small flows and offer a very cost-effective solution, measuring with sufficient accuracy and a maximum measuring error of 4% from the measured value. As the flow rate is set centrally via the system pressure, there is no need for the otherwise common, integrated needle valve. And since the pressure remains under 4 barg / 58 psig, plastic can be used for the fitting instead of stainless steel. The flexible device design makes it possible for the DK46 to be reduced to the bare minimum in this application (technically as well as economically) and the monitoring of the conditions of the cooling system can take place by the simplest of means. No straight inlet and outlet sections are required and no electric power supply is necessary. That, combined with using a mounting bracket for installation, significantly simplifies both installation and integration.



DK46 with glass cone and plastic fitting

5. Product used

DK46 variable area flowmeter

- Reliable measurement and dosing of low flows of liquids and gaseous media
- Space-saving installation thanks to rear mounting bracket or panel mounting
- Electric limit switch for automated flow monitoring (optional)
- Suitable for use in hazardous areas

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