DIAPHRAGM GAS METERS "MADE BY ELSTER KROMSCHRÖDER"

Inspiring technology

We are all familiar with them, the famous carmaking shops that manufacture car body parts, one after the other and non-stop. Volkswagen's famous "Shop 54", set up in the year 1983, was the first fully automated production line. We shall not discuss the question as to whether increasing mechanisation enhances the quality of our life and work or whether we are gradually making ourselves superfluous at this point.

In this connection, we shall simply mention that, in Japan, the industrial robot density, i.e. the number of industrial robots per ten thousand employees, is far higher than in Germany even though jobless figures are far lower. But one thing is sure: without automated processes, diaphragm gas meters from Germany would not be competitive either on national or international markets. And another thing is also sure: the human factor is essential, and this will remain so here at Elster Kromschröder even in future, regardless of the level of automation.

Automated production of diaphragm gas meters starts well before the actual Production Department, as early as the development phase of the individual components. This is where attention is paid to designing components so that they can be transported, assembled and attached in line with the demands of production at a later point. Most components of a diaphragm gas meter look fairly unspectacular. But let us assure the reader at this point that virtually all components used incorporate over 140 years of experience and a decent share of know-how. It is not for nothing that our meters have been performing their work reliably and precisely for 20 years or more. Carmakers have a lot to beat when it comes to this.

The measuring unit of a diaphragm gas meter consists of 27 single parts. Workholding fixtures in the Production Department transport the measuring units to the various assembly stations at which the individual components are assembled, both manually and automatically. If a size is ever incorrect or if a press-fit force is excessive or inadequate, these incidents do not go unnoticed. For such cases, the workholding fixtures feature transponders written with process information. Defective components are thus precisely identified and removed at the end of the process chain. Incidentally, a barcode system that is also linked to the customer's owner number allows the most important components fitted in the meter to be traced, right back to our suppliers' characteristic process parameters. After all, we leave nothing to chance, which is one of our special qualities. The end of the measuring unit production process is formed by an automatic pre-calibration test bench. This is where the measuring unit is prepared for the rough "outside world" and where its error margin is adjusted at the two test points $0.2Q_{max}$ and Q_{max}. A patented pointer system allows adjustment to be performed manually or automatically.

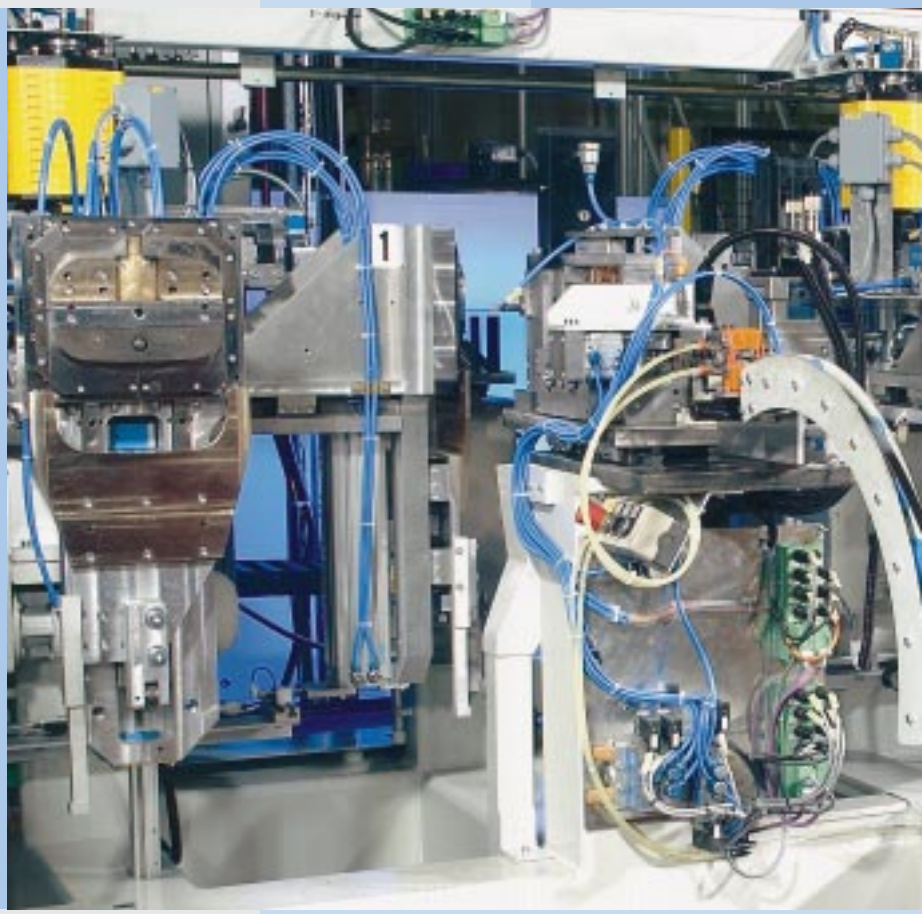

Fig. 1: Meter band manufacture

The meter housings are manufactured on a parallel production line. A plate unwound from the coil is punched out, deep-drawn, trimmed and powder-coated in a very short time. The powder coating medium – incidentally with no solvent share – is applied automatically with a coating thickness in the region of one hundredth of a millimetre. Excess powder is extracted by a local suction system and reused.

of these processes. This is why the capability of individual process steps is determined at regular intervals with the aid of process capability analyses. New production systems and optimised production systems are analysed using FMEA as early as the development phase. Here another of Elster Kromschröder's strengths comes into play: many of the production systems are own developments, manufactured in our own Toolmaking Department.

Fig. 2: Transport along the production line for measuring units

Fig. 3: Automatic pre-calibration of measuring units

After assembly of the measuring unit in the housing, the meter is sealed. This involves placing the stainless steel meter band around the housing halves with a contact pressure of 280 bar. Each meter is then tested for leaks. External tightness is a significant feature of a diaphragm gas meter, and we have a special test owing to its importance. The tightness test is conducted with helium while the meter is located in a vacuum chamber. This is how we can reliably detect every leak, even if it is only a microscopic leak.

Automated production also means a high level of quality assurance. This ranges from incoming inspection of the supplied components to random inspections in production. Automated production requires a knowledge of the processes and control

Overall, we will manufacture around 1.4 million diaphragm gas meters this year at our Osnabrück site. Approx. 1.2 million of these will be domestic diaphragm gas meters of Type BK-G4. We require 5,000 metric tons of sheet metal to produce this number of housings, approximately corresponding to an unwound sheet length of 1,500 kilometres. This technology that we work with inspires us and sustains us and we shall work incessantly on further developing it in order to construct high-quality diaphragm gas meters.

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