

PRECISION PLASTICS

Perfection – well grounded

How we optimised plastics injection moulding





Two pillars of success

Flowmetering technology and precision parts made of plastic materials: these are the two pillars on which our company has rested for many decades, yet while being on the move at the same time. In the course of our lively corporate history, we have developed principles which today set standards all around the globe – for the reliable consumption control of fluids and for high-quality plastic precision products operating with ultimate economic efficiency. In 2013, the dynamic vitality of both business fields resulted in the launch of the Business Units METERING and PRECISION PLASTICS.

Our core competences:

- Injection-moulding of plastic precision parts for various industries
- Plastics-compatible development of parts and assemblies
- Mould design and construction
- Metrology water / heat



WEHRLE METERING

We are innovation leaders in flow metrology who enjoy a superb reputation in the mechanical engineering and mouldmaking sector. Offering an extensive product range, we supply market-leading customers in the water metering industry worldwide: single and multi-jet meters, cylindrical piston meters, measuring inserts or customised applications – we offer trend-setting water meters and components as well as volumetric parts for thermal heat meters in outstanding quality.

Learn more about our metering services at www.wehrle.de



WEHRLE PRECISION PLASTICS

We are pioneers in the production of plastic precision parts, having made a profound technological impact in this field. Backed by certified processes and test methods, we develop and produce complex assemblies, precision mechanical parts, metal sheathings and two-component plastic parts. A high degree of automation characterises our capacity. Mouldmaking and assembly are part and parcel of our integrated offering on which renowned customers at home and abroad rely.

By enlarging our production area to 11,200 square metres in 2015, we will create even better conditions for the advance development of our products, materials and processes

WEHRLE: About us

As a family-owned company in the fifth generation, we have always followed the simplest, but most important rule for an enterprise to be successful: our innovations are products which our customers need.

Where progress has a great tradition

We are here in the Black Forest, a mountain region which has shaped us and which is formidable and at times challenging in terms of climate. For centuries, these surroundings have strengthened our spirit of cohesion, at the same time demanding our technological and logistical far-sightedness. This may explain why we are often described as being steeped in tradition and down-to-earth by some, and outward going, cosmopolitan and highly innovative and inventive by others. WEHRLE embodies these characteristics like virtually no other company in the region: We are proud of what we have accomplished in our 170 year history. What we have created has taught us to feel responsible for our actions today. These are the driving forces for our commitment and our ability to shape the future.

Around 250 associates and 18 trainees work at our business location in Furtwangen in the Black Forest

Innovative and rock-solid

The WEHRLE Group includes three enterprises in Germany and Austria: WEHRLE (METERING, PRECISION PLASTICS), Andrae Wassertechnik and G. BERNHARDTs. Together, we generate annual sales of around 35 million Euros. Managing partner is Georg Herth, a direct descendant of the company founder Franz Xaver Wehrle. Under his management, our corporate strategy continues to focus consistently on new technological developments and on process optimisation for maximum quality and efficiency.

Of ambitious garage inventors and successful shakers and makers

Ever since 1842, experience and skills in precision engineering have been associated with the name WEHRLE. It all began with the development and manufacture of special clocks, some of which can still be admired today in the German Clock Museum. It's easy to see that the Black Forest clock and timepiece industry had to satisfy very high expectations in the precision of its products. This competence ultimately pointed the way to a profound change in our enterprise: since the thirties of last century, we have been manufacturing water meter components – and still do so today. The production of flowmeters requires strong quality awareness, coupled with the manufacture of housings, counting mechanisms and gears made of plastic. No surprise, then, that our second important line of business saw the light of day in 1950: plastics injection moulding.



- **1842** the company is established, production of special clocks; water meter components since the thirties of last century

■ **1950** production of precision plastic parts for the water meter industry
- **1972** start-up of the manufacturing section Technical Precision Parts

■ **1981** state-approved test laboratory for water / heat
- **1996** ISO 9001 certification

■ **1997** acquisition of G. BERNHARDT's Söhne Ges.m.H., Vienna
- **2000** takeover of Andrae Wassertechnik GmbH, Villingen

■ **2005** certification under ISO/TS 16949 and ISO 14001
- **2008** water metering category MI001, certification under EU Directive 2004/22/EG

■ **2010** thermal meter category MI004, certification under EU Directive 2004/22/EG
- **2013** launch of the Business Units METERING and PRECISION PLASTICS

■ **2014** certification under EN ISO 50001
- **2015** enlargement of buildings and production area

Precision paying dividends

No wonder our Business Unit PRECISION PLASTICS is capable of providing outstandingly efficient solutions: we draw on many years of experience in precision injection moulding – a technology where we have played a crucial and decisive role.

Plastic parts from a single source: that saves time and money – and calms your mind

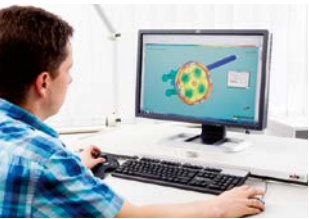
Grown with the tasks

We are an approved supplier for the automobile, electrical and optical industry. Manufacturers of household and healthcare appliances and makers of luxury writing utensils place their trust in WEHRLE products when it comes to precision parts made of technical plastics. Our portfolio of work and services includes the development of single and multiple component solutions for special requirements, such as injection moulding with metallic insert parts. Every year, our mouldmaking department makes as many as 50 tailor-made injection moulds, sampled and approved for volume production in the WEHRLE Technical Centre. Ranging from small to large series, we produce about 150 million precision parts on 60 fully automatic injection moulding machines every year.

For your benefit all round

A competent personal WEHRLE contact is available for every product and service sector

Our company covers the entire realisation chain of an injection-moulded part. The close intermeshing of all departments and the perfectly attuned production lines deliver the essential conditions for the best possible result – like the quality assurance you can always rely on with WEHRLE. There is a good reason why our quality management system is certified under ISO 9001 and ISO TS 16949. Right to the point of automated assembly, we monitor every single production step with computer assistance. But quality has both a technological and a human aspect: an experienced project manager takes on the “sponsorship” for your product and commits to the common, long-term success.



Development

We work hand in hand with you to find the best possible solution to your requirements. The early coordination between development and mould-making leads to short times-to-market. The consistent integration of all considerations and ideas relating to design, functionality and feasibility is the first and elementary step in quality assurance.

More after page 4



Mouldmaking

We are the right people to contact when it comes to innovative and highly efficient mould concepts, with our internal initial sampling process using PPF/PPAP offering one great advantage: detached from your series production, injection moulding machines are available on which we test and advance your moulds right through to the maturity stage.

More on page 6



Production

Right up to large-scale production, we at WEHRLE are equipped for every task. Operating 60 ultra-modern machines, we make injection moulded parts from virtually every kind of thermoplastic material. A high degree of automation guarantees stable and consistent production processes – an essential precondition for consistently high quality.

Find out more after page 8



Assembly

We supply single parts or whole assemblies. Depending on order volume and complexity, we are able to use partial or fully automatic assembly lines. Our robot systems assemble high-volume unit quantities – with ultimate process stability thanks to uninterrupted monitoring. We offer a broad spectrum of options to give your products an attractive design and branding.

More after page 10



Quality and safety

High-class workmanship and reliability don't necessarily begin with highly developed, in-process monitoring systems (which we also use, of course), but much earlier: with cleanliness and care in handling objects and dealing with humans – in other words, with a sense of responsibility.

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Your partner from the start

The demands and requirements involving technical plastic components are on the increase. No wonder, then, that we at WEHRLE often draw on our expert knowledge in material and process techniques at the early stages of your project.

We help you with our advice as early as during the component development phase. Key terms are cost effectiveness, feasibility, moulding quality and process reliability

Keeping an eye on the whole

No matter if it's a new product idea or the optimisation and advance development of existing products: we use the latest CAD/CAM systems to make precision parts and injection moulds in accordance with your technical and qualitative specifications. Our knowledge of the various plastics and their special properties is incorporated in the development right from the start – for the sake of better component and mould characteristics, shorter development times and optimised production processes.

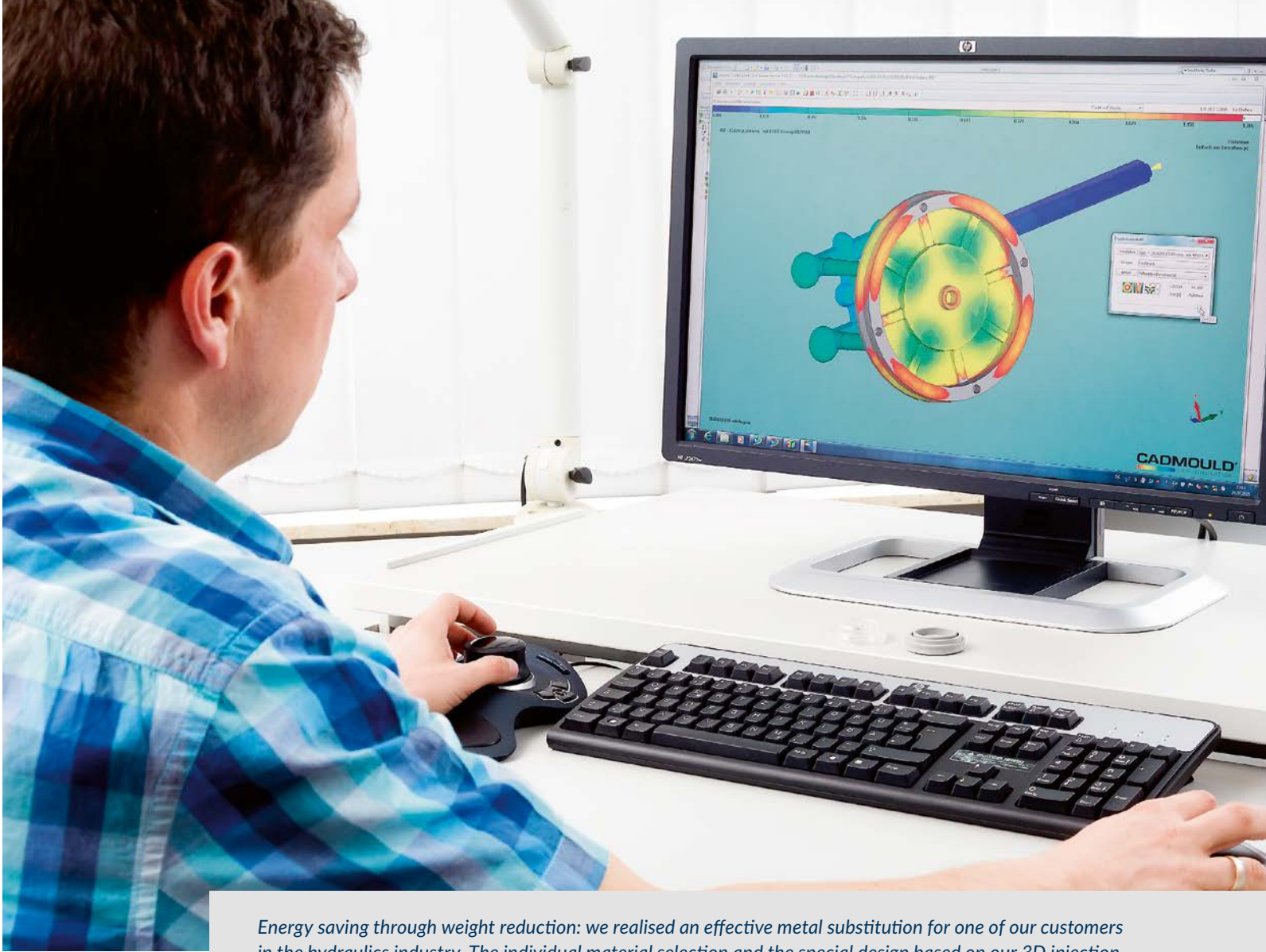
3D simulations for faultless processes

CAD/CAM technology, injection moulding simulations, FEM calculations and 3D printing of sample parts: we use the latest systems and software tools

To avoid iterations in mouldmaking, our costing and computation experts carry out injection moulding simulations as early as during the offer phase which cover the whole of the process: from the design of the cooling to the simulation of the filling and holding phase right through to the shrinkage and warping behaviour. At WEHRLE we are not only capable of using the latest technology (Cadmould®), but we also rely on the fact that our experienced engineers have the necessary understanding of complex rheological flow processes and thermal mould designs.

Our product competence includes:

- Precision injection moulding
- Metal substitution
- Hybrid technology (inserts)
- Multiple components (colour, hard-soft combinations)
- Assembly injection moulding
- Gear design
- Assemblies
- Surface treatment and in-mould Inserts (back-injection of films and PCBs)



Energy saving through weight reduction: we realised an effective metal substitution for one of our customers in the hydraulics industry. The individual material selection and the special design based on our 3D injection moulding simulation delivered an outcome with optimum strength and pressure resistance.

Your project in safe hands

Technological competence is one thing, customer-friendly work another. We at WEHRLE are aware of the difference and therefore set ourselves ambitious targets for project management. Short communication channels and clearly defined responsibilities are important elements for smooth and trouble-free processes. What is more: a project manager experienced in many industries adopts the “sponsorship” for your product. This means there will be one personal contact for you, no matter whether this involves development, production, delivery, application or advance development of your component.

Our certified project management (ISO/TS 16949) delivers more:

- Feasibility study
- APQP, FMEA and PPAP
- PPF (product and process approval)

The mould makes all the difference

Precision moulds with a long service life are crucial for the production of plastic parts with process stability. Our company’s strict quality orientation therefore sees the necessity for our own in-house mouldmaking.

One gearwheel engaging with the next

WEHRLE insists on making every step associated with the production of our moulds in-house – certified under ISO 9001. Using CAM systems and the latest CNC machining centres, WEHRLE continues in mould and jigmaking what began with CAD techniques and 3D Simulations in the development phase: ultimate precision with high-tech. The outcome is minimum production tolerances and a maximum of repeat accuracy for substitute and follow-up moulds – for hot runner or two-component engineering, thread forming or other precision form for mass production.

Our mould production in outline:

- Core puller moulds (spindle and sliding split moulds)
- Collapsible core moulds
- Hot runner moulds
- Multi-component moulds
- Multi-cavity moulds
- Gear moulds

We are committed to training our own people because we know that they are aware of our requirements in terms of diligence and technical skills

In jigmaking we provide:

- Assembly
- Removal
- Monitoring

Never mind the latest in technology – we won't lose sight of the smallest of details which still require manual work

Perfectly trained, perfectly equipped

We at WEHRLE are experts in key technologies involving milling, wire eroding, cavity eroding and grinding. To make highly complex precision injection moulds, we draw on our range of machinery which leaves nothing to be desired: besides modern CNC machining centres and measuring facilities, we also have fully automatic cavity erosion machining centres, planar and circular grinding machines and a die-spotting press.



One of our customers in the healthcare industry had its mind set on substantial material savings. The solution we offered was based on resource-saving direct injection using a hot runner with needle valve. The result: material use cut by far more than 50 percent.

Trust is good, our Technical Centre is better

The WEHRLE Technical Centre supports our mouldmaking work not only by running in moulds and by optimising processes on sample machines, but also by carrying out mould tests, for instance in the course of mould acceptance procedures. Your volume business won't be interrupted. Our Technical Centre is also responsible for the successful initial sampling in accordance with PPF/PPAP, the pilot series assessment and measuring first-off-tool parts.

Only perfectly engineered moulds are taken into volume production – on schedule

Short distances for flexibility and safety

As mouldmaking and production interlock at WEHRLE, we are capable of realising new moulds within the shortest of time, helping you to substantially reduce the lead time for your products. We also handle the optimisation and the continuous advance development of your production machinery without relying on external suppliers – fast and adaptable. One more advantage: if requested, we also handle service and maintenance for your moulds to keep downtimes and adjustments times permanently to a minimum.

Reliability in series

When it comes to the material selection for complex system products and components, plastic materials offer by far the biggest potential. Why not use it – with a production partner whose business principle rests on precision.

We use our fully automatic measuring and testing system for large-scale production: for verification and the seamless documentation of the product quality

We define every day what is possible in terms of technology

We at WEHRLE have the technical equipment, the necessary expertise and the required power of innovation to guarantee you smooth, efficient and high-quality production. We have made injection-moulded plastic parts for over 65 years. We are capable of making assemblies and of finishing these with hot embossing, laser and pad printing. In-mould decorating/labelling and sheathing metal parts are also part of our repertoire.

The ecological use of resources marks all our production processes. Waste avoidance and recycling are essentials for us

Uncompromising and dynamic

Our production capacities are demand-driven and flexible right up to large-scale production runs. To be able to ensure maximum efficiency also at high unit quantities, our production is fully automated. From feeding in the pre-dried material via optical quality assurance systems through to the product removal point, we rely on the latest in robotics. The WEHRLE machinery range has been designed for extreme material variety and products of high complexity. Many of our 60 fully controlled injection moulding machines are firmly dedicated to the production of two-component parts. Driers and tempering units are firmly assigned to the machines. Our plants are also equipped not only for using technical plastics and heavy-duty polymers, but also for transparent and fibre-reinforced materials.

We work for the automobile industry and for many other sensitive industry sectors. For reasons of discretion, we will at this point not list names or customer logos

Doing what is feasible

"THE PRECISION PRINCIPLE" is WEHRLE's motto. For a good reason: from the first development steps through to the smallest production detail, we strictly keep to the principle of ultimate repeat accuracy. Two-component parts and precision gearwheels for different types of gears are as much part of our production portfolio as assemblies, housing, coil bodies or number rollers for measuring and control engineering. Part weights between 0.01 and 600 grams can be realised.

Our machinery range in brief:

- 60 injection moulding machines (approx. 20 percent for two-component technique)
- Locking force up to 2,200 kN (closing forces ranging from 25 to 220 tonnes)
- Shot weight up to 0.6 kg

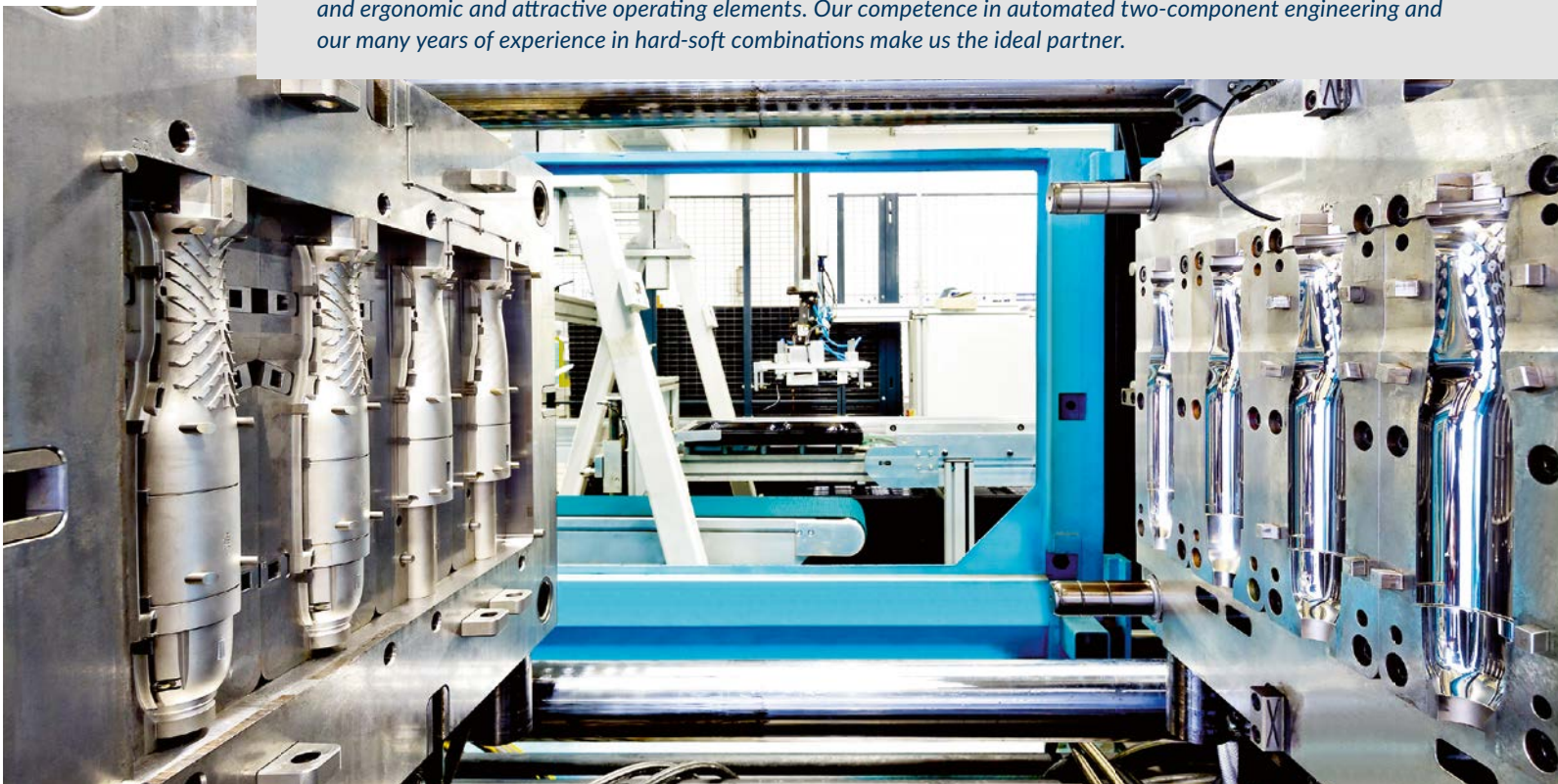
Production examples include:

- Precision gearwheels
- Housing and switch components for cars
- Multiple part housings for hand blenders
- Shell-type handles and drive components for razors
- Gears for kitchen appliances
- Two-component housings with bored core for ballpoint pens
- Regulating sieves and inserts for water meters
- Front panels with in-mould PCB for EC card readers

Our product range is colourful

To be able to use the whole spectrum of specific material properties, we use virtually all heavy-duty plastics and engineering plastics: from the technical plastics such as PA, PBT, POM and ABS via PMMA, PPO, PPA, PAA, PES, PSU and PEI right through to the heavy-duty thermoplastic materials LCP, PPS and PEEK. We also process all materials in combination with the usual filling and reinforcing agents such as fibreglass, carbon fibres, glass beads, PTFE or mineral.

Producers of high quality household appliances often face the challenge of perfectly matching high-gloss surfaces and ergonomic and attractive operating elements. Our competence in automated two-component engineering and our many years of experience in hard-soft combinations make us the ideal partner.



With power on the home straight

Our customers have high expectations when it comes to finishing and further processing of their products – especially when complex visible surfaces demand a high degree of purity and sophistication.

Allround solutions as we see them

If requested, we will supply injection moulded parts ready assembled, with customised print and packed ready for sale

Inexperience in further processing can easily compromise even the best production result. To maintain a consistently high degree of quality, WEHRLE also keeps all downstream work processes inside our facility. Besides the cutting finishing of plastic components such as milling, lathing, drilling, punching and gear-cutting, various pressing processes and ultrasound welding are also part of our work. Wide-ranging assembly and mounting services, the necessary equipment for finishing, printing and treating, plus highly developed logistics solutions round off our offerings.

Permanent cost cuts were also a major concern of one of our customers operating in measurement engineering: the fully automated assembly of a complex plastic and metal device resulted in a consistently high level of quality which reduced the cost-intensive calibration expense in the final acceptance inspection to a minimum.



Fully automated testing and assembling

Whether partial or full assembly, the assembly of modules and systems, or a ready configured product: WEHRLE accompanies every work step with an uninterrupted chain of quality controls. In mass production, fully automated assembly stations ensure continuous process monitoring with maximum cost efficiency. We also have a central automated assembly centre which is often the perfect choice for medium-sized unit quantities. And for small series, we guarantee rapid response times through machine-oriented manual assembly which includes both an intermediate and a final inspection.

Give us a new challenge

All WEHRLE products show our handwriting – but not always our name. To make sure that high quality injection moulded parts become our customers' successful products, we stand ready to give the brands a high-grade finish: with hot embossing, engraving and laser or pad printing. At our customers' request, we also realise in-mould decorating/labelling.

Our work and service at a glance:

- Automated removal and packaging
- Fully automated assembly with integrated process monitoring
- Milling, lathing, drilling, punching and thread-cutting
- Ultrasound welding
- Planning, constructing and producing devices and fixtures for system assembly
- Module and system assembly with integrated function test
- Hot embossing, engraving, laser or pad printing
- In-mould decorating/labelling) Intelligent warehouse and storage management, holding materials and parts available

Quality for peace of mind

If requested, we ship our customers' products packaged ready for sale. Highly evolved concepts for the automatic removal from the machine and placement in the final packaging ensure that contact and damage is ruled out. When it comes to us supplying parts for customer production, WEHRLE also scores highly with reliability and strength of service. Our intelligent warehouse and storage system guarantees timely and uncomplicated shipments – just-in-time or just-in-sequence. You can count on us: we have the necessary logistics and sufficient storage capacity to hold adequate quantities of your plastic parts in store.

A matter of course? Not everywhere: only a clean machine environment like WEHRLE's offers the best condition for quality

Taking the right decision with confidence

Our certifications are proof of ultimate precision and quality, efficient management and thoughtful use of resources. Nonetheless, we are determined to enhance our economic performance even further.

The systematic WEHRLE energy management is ISO 50001 certified – a quantum leap in efficiency we pass on to our customers

Process optimisation – nothing new to us

A familiar and trusting works atmosphere has always made sure that everybody working for WEHRLE makes their daily active contribution when it comes to improving the quality of our products, processes and services. Today, our ability for steady further development manifests itself in highly developed systems for process control, modern quality management and high environmental standards.

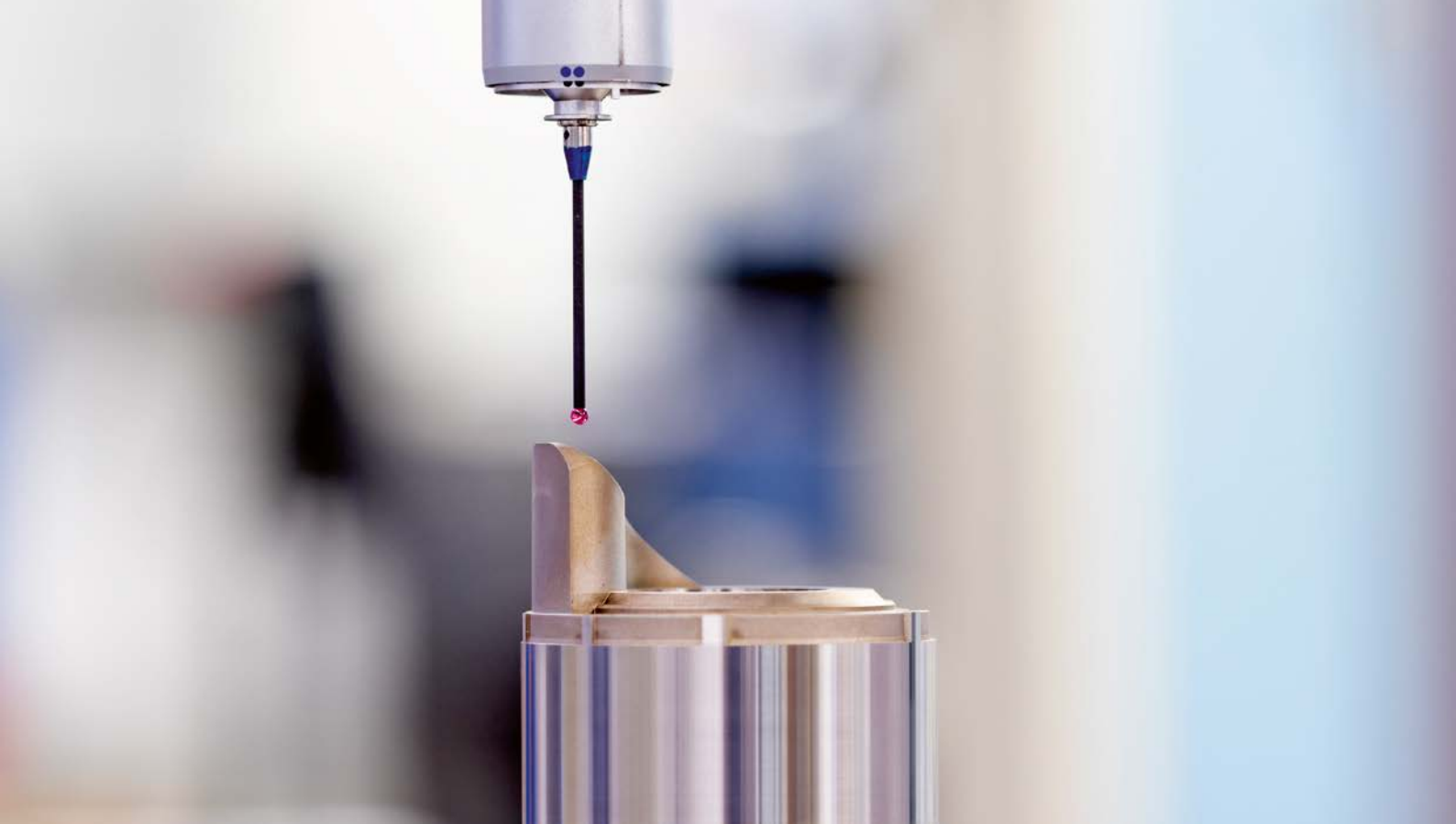
Our "Quality Assurance Manual" specifies all the actions involved in quality management. This allows us to avoid misunderstandings and delays with the help of clearly defined responsibilities

Quality begins in the mind

"Acting instead of reacting": this could be seen as the principle underlying our forward-looking and anticipative maintenance. WEHRLE safeguards stable processes by generating and strictly observing maintenance and service schedules. First sampling in our own Technical Centre gives us the opportunity to use only those moulds and tools in production which have been approved for series manufacture. Technical injection trials and related material tests are also among the work and services which can be realised at short notice. A computer-assisted system for quality assurance (CAQ) accompanies every product from the planning stage to final inspection. Processes can be monitored both with respect to parts and to customers – important preconditions to account for individual needs and requirements. We use optical and tactile measuring machines to permanently monitor all product features and properties. Different methods for gearing measurements are also in use – the two-flank rolling test, among others.

The WEHRLE quality management in brief:

- Zero error philosophy
- SPC production
- Batch tracing
- IMDS, ROHS, REACH, BOMcheck
- 8D report management



Deep-rooted performance

The well-regulated control of inspection, measuring and test equipment and test methods using the latest technologies is everyday practice at WEHRLE. As a company which has for many decades internalised quality and responsibility, our steering actions go even further: everybody at WEHRLE'S – from trainee to managing director – regularly uses the wide-ranging programmes for training and advanced training. We work together in a well-coordinated way on our processes which we align along clearly formulated targets. We take decisions based on measurable data and closely follow the principles of a customer-focused organisation.



- DIN EN ISO 9001 certification
- Qualification under ISO/TS 16949
- DIN EN ISO 14001 certification
- Energy management system certified under DIN EN ISO 50001
- Approved by the Physical Technical Federal Institute (PTB) under EU Directive 2004/22/EG Schedule D (Water and Heat)

Every partnership begins with a personal meeting

Do you have any questions on our offers in development, mouldmaking and assembly?

We'd be pleased to help – and we always have an open ear for your ideas and suggestions.

E. WEHRLE GMBH
Obertalstraße 8
78120 Furtwangen

Postfach 1159
78113 Furtwangen

Telephone: +49 (0)7723 940-0
Telefax: +49 (0)7723 940-178

info@wehrle.de
www.wehrle.de

