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Expertise in test technology

Functional, endurance and specification testing systems
Test and automation concepts

1. The SOMA organisation

-Partner for test and automation systems 2/3
_Comprehensive solutions 4/5

2. Production testing

-Systems and modules for the automobile industry 6/7
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_Switching devices 10/11

3. Endurance and specification testing 12/13

4. Test and automation concepts 14/15

5. Products tested 16

Satisfied customers!
Flexible automated testing!
Competent service!
Comprehensive solutions!
Innovative concepts!
Reliable partner!
Experienced engineers!

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- Comprehensive solutions

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- Switching devices

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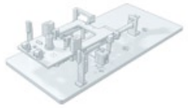
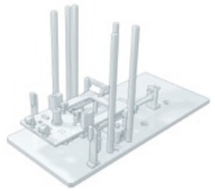
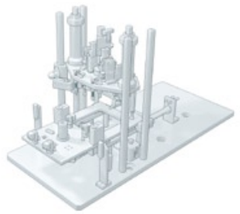
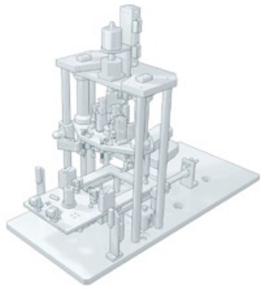
5. Products tested

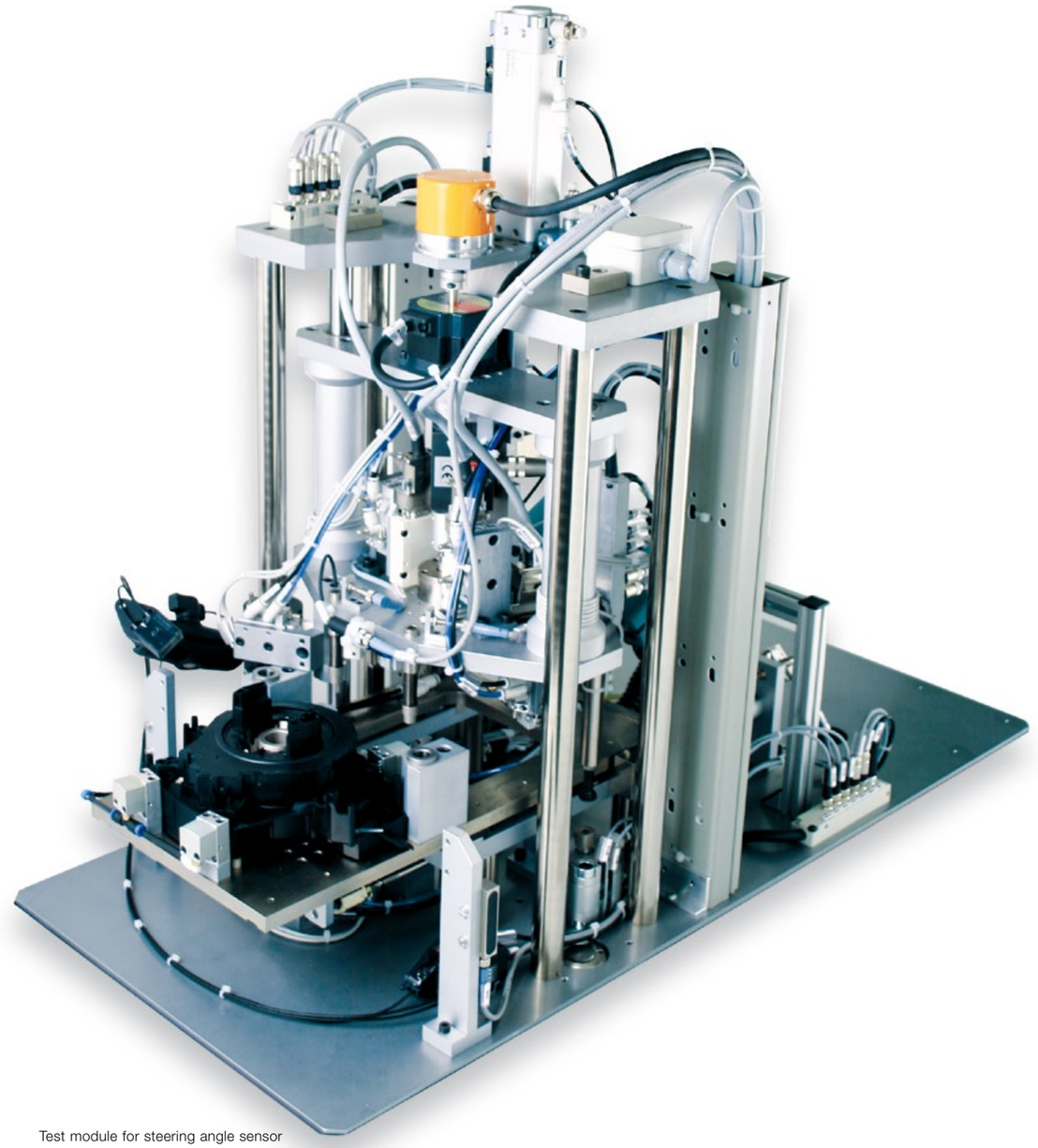
Partner for test and automation systems











Test module for steering angle sensor

Facts and figures in 2005

Established :	1973
Employees :	45
Capital :	0.6 millions Euros
Turnover :	6.5 millions Euros

The SOMA organisation

For more than 30 years, SOMA has acted as a valued and technically qualified partner to well-known industrial companies, providing solutions to challenges involving testing and automation.

Working closely with the customer, SOMA develops concepts, carries out full design and acts as project manager world-wide for test and automation systems involving mechanical, mechatronic and electronic products.

SOMA‘s product range and support facilities range from endurance and specification test systems used in the course of development, through to fully automatic functional test systems employed in full production.

As an independent member of the KOSTAL Group, SOMA benefits from the forward-looking technical innovations generated by a global system supplier to the automobile industry.

Inter-disciplinary co-operation between a highly qualified and experienced workforce, together with the targeted application of technological and physical expertise, form the basis for SOMA‘s ability to provide solutions for test and technical automation requirements.

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Reliable partner!

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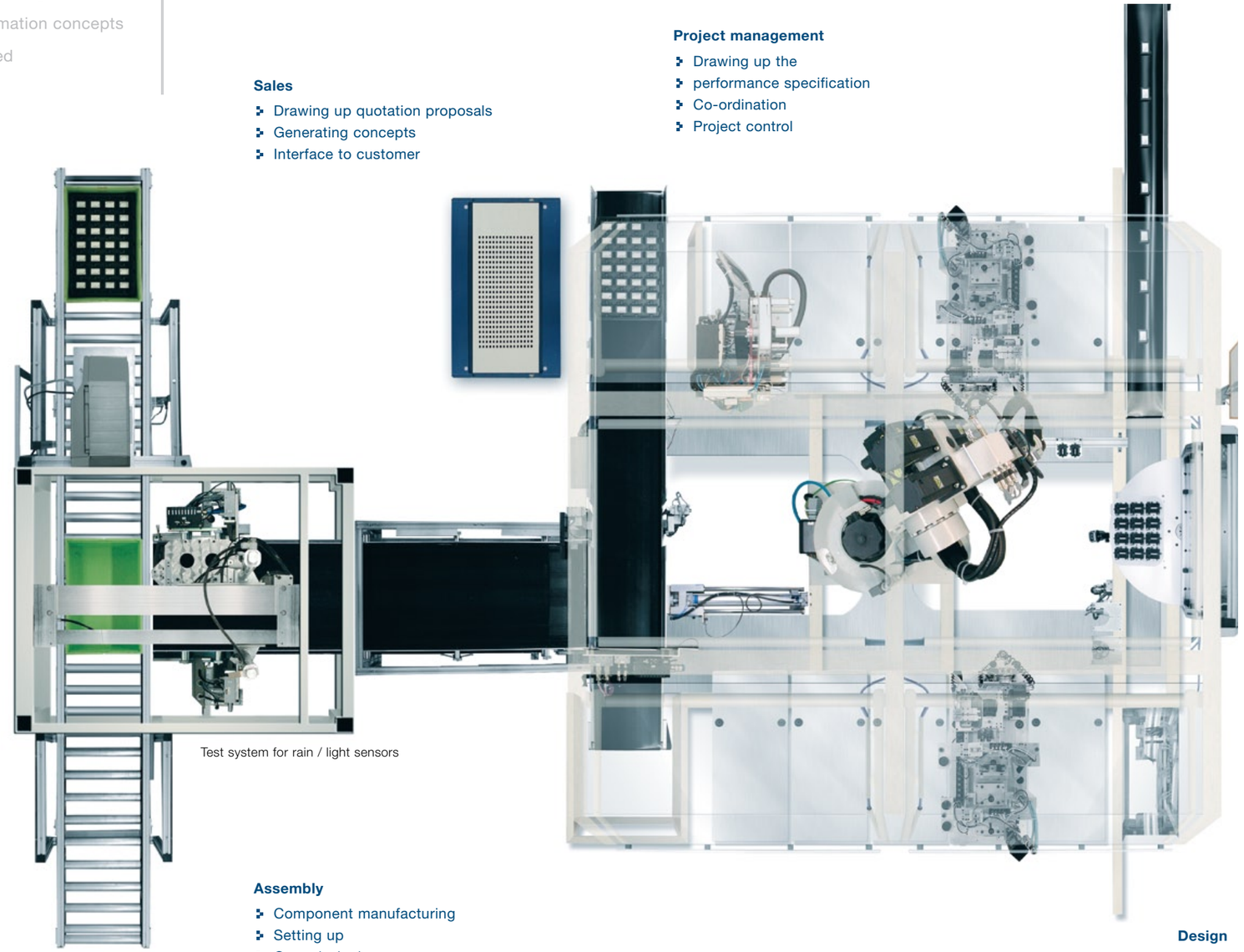
Comprehensive solutions

Sales
- Drawing up quotation proposals
- Generating concepts
- Interface to customer

Project management
- Drawing up the performance specification
- Co-ordination
- Project control

Software
- PC-based software creation
- C++, Visual Basic, .net
- LabVIEW, LabWindowsCVI
- SPS software



Test system for rain / light sensors

Assembly
- Component manufacturing
- Setting up
- Commissioning

Service
- Training
- Preventive maintenance
- Calibration

Control systems
- Planning
- Manufacture of control panels
- Installation of facilities
- Electronic development

Design
- 3D CAD for mechanical systems
- E-CAD for switching layouts

Inter-disciplinary know-how

As a full partner in projects involving test and automation technology, SOMA provides support for customers in all the different phases of a project — from initial consultancy to operator training and service.

Supported by the know-how of highly qualified technical staff, SOMA provides effective solutions and total flexibility in processing contracts, with fully documented quality.

Innovation as motivation

Each individual sees himself / herself as a member of the team and brings his / her technical expertise and creativity to the pro-active execution of tasks, in order to achieve innovative, high-quality products meeting market requirements. Short lines of communication and clearly defined areas of activity result in a powerful, capable organisation.

Seeing with the customer‘s eyes

Continuous improvement objectives and strategies are defined and implemented regularly in close co-operation, to ensure that the customer always obtains optimum performance at an economic cost.

Satisfied customers!

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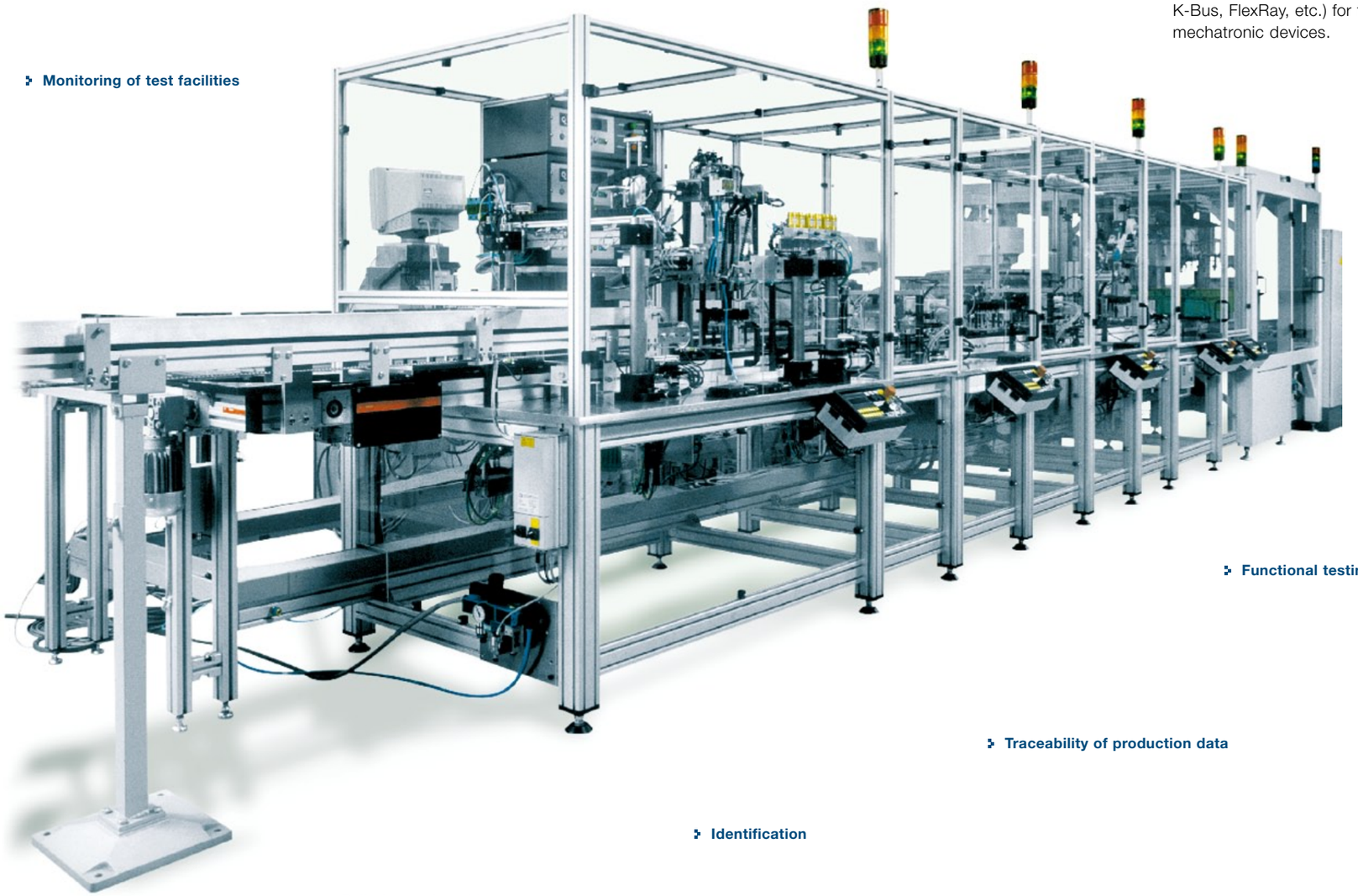
Systems and modules for the automobile industry

- Test results statistics
- Main-frame computer concepts
- Monitoring of test facilities



- Functional testing
- Traceability of production data
- Identification
- Palleting and packing

Test system for door control units

Controlled complexity

Functional testing requirements for automobile systems and modules increasingly demand the integration of different technologies and a wide range of functions in the products to be tested. Electronic modules blend with complex mechanical units to form mechatronic modules.

In addition to expertise in electrical and mechanical interfaces, SOMA handles bus-specific requirements (CAN, LIN, K-Bus, FlexRay, etc.) for testing complex mechatronic devices.

Using automobile sector know-how

The demand for documented quality requires the test equipment manufacturer to have complete technical familiarity with the products to be tested, as well as a profound knowledge of the test methodologies and processes throughout the value creation chain. This applies particularly in regard to the test and production data generated in the course of the various processes.

A significant contribution to quality assurance is made by transparent and consistent data management. SOMA provides this for its clients by providing full traceability of production data and long-term archiving of the critical characteristics of safety-related components.

SOMA the integration specialist

Full integration of highly-automated test facilities with handling, identification and packing systems in the customer‘s production and IT environment (CAQ, PPS, etc.) is included in the SOMA service.

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Innovative concepts!

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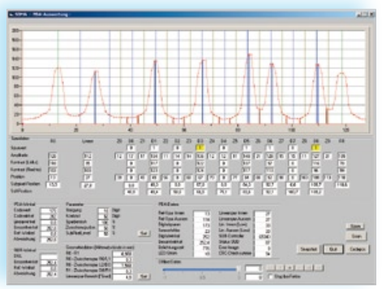
Electronics and Mechatronics

- Variant management
- Complex stimulation
- Adaptable test systems
- Open system architecture

Test system for steering angle sensors



Evaluation software for steering angle sensors

- Logging mechanical data
- High-current applications
- Residual bus simulation

Effective test systems for test specifications

The increasing competitive pressure on volume manufacturers of industrial electronic and mechatronic devices, with ever-shorter innovation cycles, demands standard hardware and software platforms in the field of functional test technology.

Open system architectures form the basis for efficient implementation of the relevant test specification.

Open hardware and software architecture

SOMA's modular in-house tester contains a variable number of measurement and stimulation systems, which can be adapted to the test product hardware, using innovative multiplex and load modules with product-specific „front-end" plug-in units.

This test system, which can be scaled in terms of the number of channels and is based on standard components and bus systems, has been thoroughly proven many times over in production since its initial development. Its open architecture and the flexibility associated with this, makes it superior to earlier proprietary solutions. The entire operation of the tester is handled by modular software components, which are summarised in libraries and can therefore be integrated in a wide range of development environments, as they are required for the creation of automatic test processes.

A single source for all the interfaces

Particularly where mechatronic modules are to be tested, the interplay of mechanical, electronic and software factors demands a wide range of expertise on the part of the test technology supplier.

As the partner for system solutions, SOMA supplies complete function testing systems which include both, the hardware and the software. In addition, the company handles the mechanical and electrical adaptation, as well as integration in the production process.

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Comprehensive solutions!

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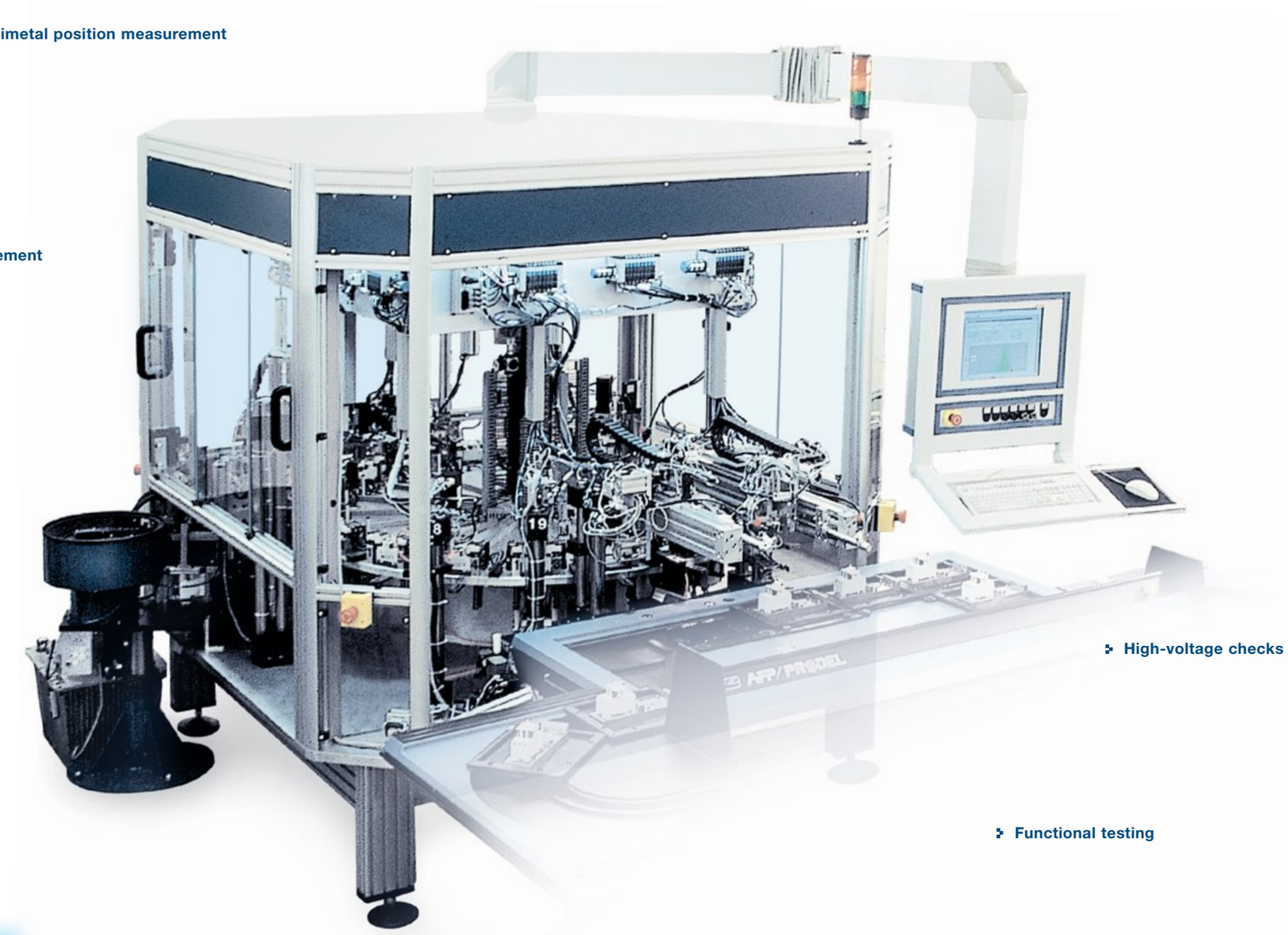
Switching devices

Cold and current calibration

Bimetal position measurement



Switching point measurement

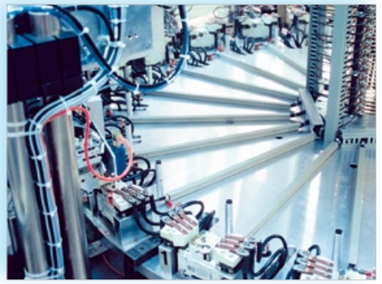
Calibration processes

High-voltage checks

Functional testing

Rapid initiator testing

Test and calibration system for motor protection switches



Test system detail

Test and calibration

Testing the switching and release functions of switching devices sets extreme demands on the accuracy of test processes and systems. In addition, complex alignment and calibration processes are required.

The number of systems developed and installed world-wide makes SOMA an experienced partner in the implementation of test systems for switching devices.

Broad test spectrum

Test requirements include safety-related checks, such as testing the high-voltage resistance of products in the course of functional testing, through to the measurement of switch operation points. The reliable control of switching, change-over and contacting of voltages up to ca. 20 kV and currents of up to ca. 3000 amps is a crucial requirement in this context for the achievement of rugged solutions which can be used in the production environment.

Aligning process tolerances

In switching devices, calibration is mainly achieved by the use of bimetal triggers, with different procedures such as cold and current calibration being used, depending on the product and the customer‘s requirements.

The data gathered for each product by measuring the bimetal position and switching points, are used in subsequent modification processes involving stamping, milling, etc.

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Competent service!

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Endurance and Specification testing

Monitoring quality

Unvarying quality over the complete life of the product is an important factor in achieving customer satisfaction. For manufacturers of electromechanical, mechatronic and electronic products which must be available at all times, this means continuous monitoring of all the phases of the product creation process – from the validation of performance capability to the execution of in-production testing.

For requirements of this kind, SOMA provides complete laboratory testing systems, characterised by the use of adaptable, tailor-made modules covering software, measurement technology, drive systems and test mechanics, which can be used in the widest possible range of applications.

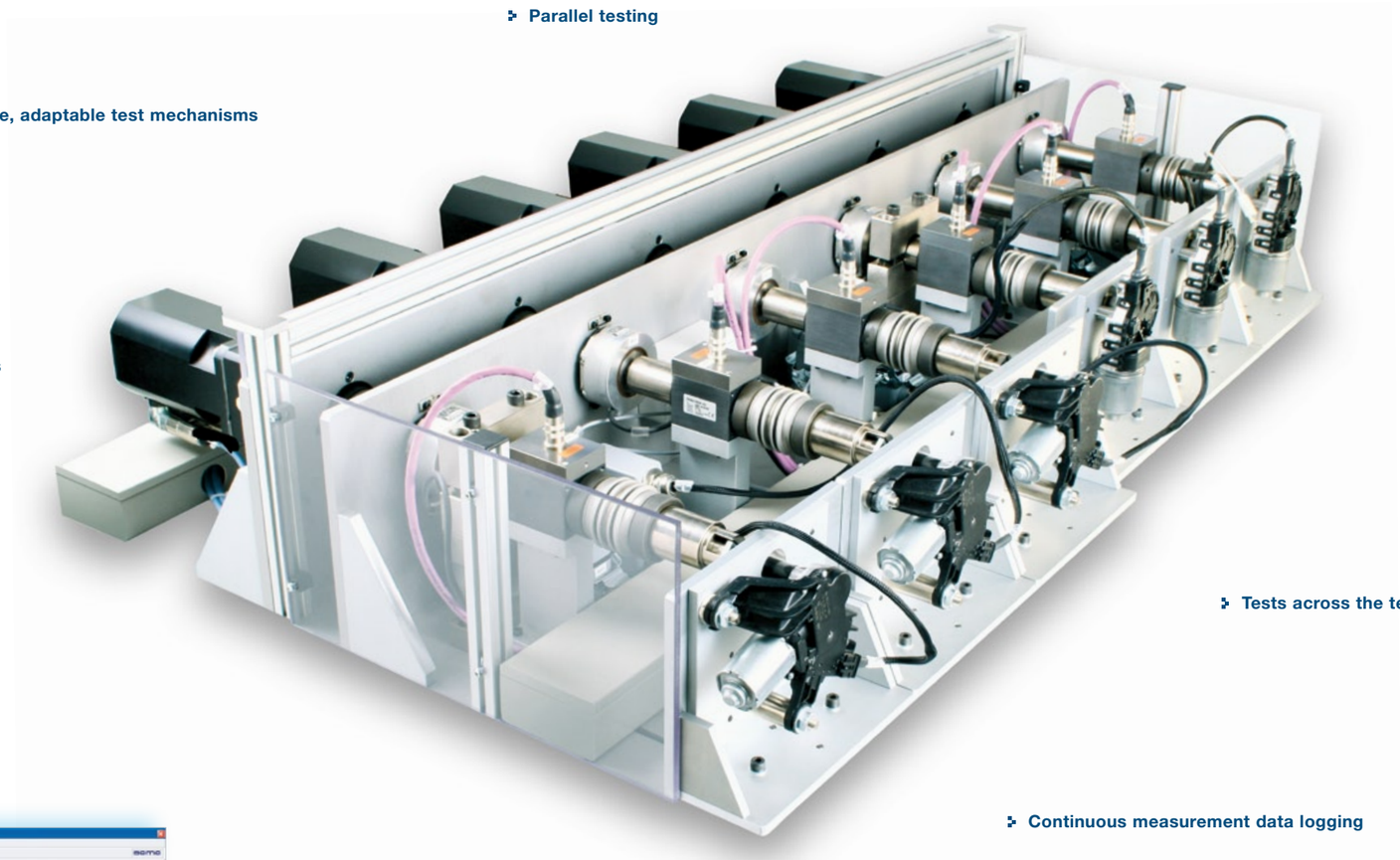
Defined test procedures

The software used in test-rigs is of crucial importance in ensuring the efficient and rapid creation of test procedures, as well as making it possible to adapt to changing or additional requirements.

The software platform developed by SOMA is based on the dialog-led definition of test sequences, which are assembled by the careful use of stimulation and measurement commands in order to establish test operations as part of automatic test procedures. These are independent of the hardware involved. A test procedure and sequence editor is used to assist the development engineer in structuring the development of the test program, without the need for detailed programming expertise.

Features such as freely definable error sequences, the allocation of test results to different data channels or the definition of temperature profiles are also an integral part of the platform, which will store data in file formats required for importing information into widely distributed statistical programs or test report generators.

- **Parallel testing**
- **Flexible, adaptable test mechanisms**
- **Parametered test procedures**
- **Tests across the temperature range**
- **Continuous measurement data logging**



Test mechanism for windscreen wiper motors

Control software endurance testing

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Experienced engineers!

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Test and automation concepts

*flex*TAC® – a *flex*ible test automation concept

SOMA has developed *flex*TAC® as a test automation concept which — based on the use of modular and standardised test and process modules — enables the creation of a practically unlimited range of test and assembly systems. These must take full account of production cycles which fluctuate in line with the capacity requirements of the automobile industry, while at the same time guaranteeing a high level of assurance in terms of investment.

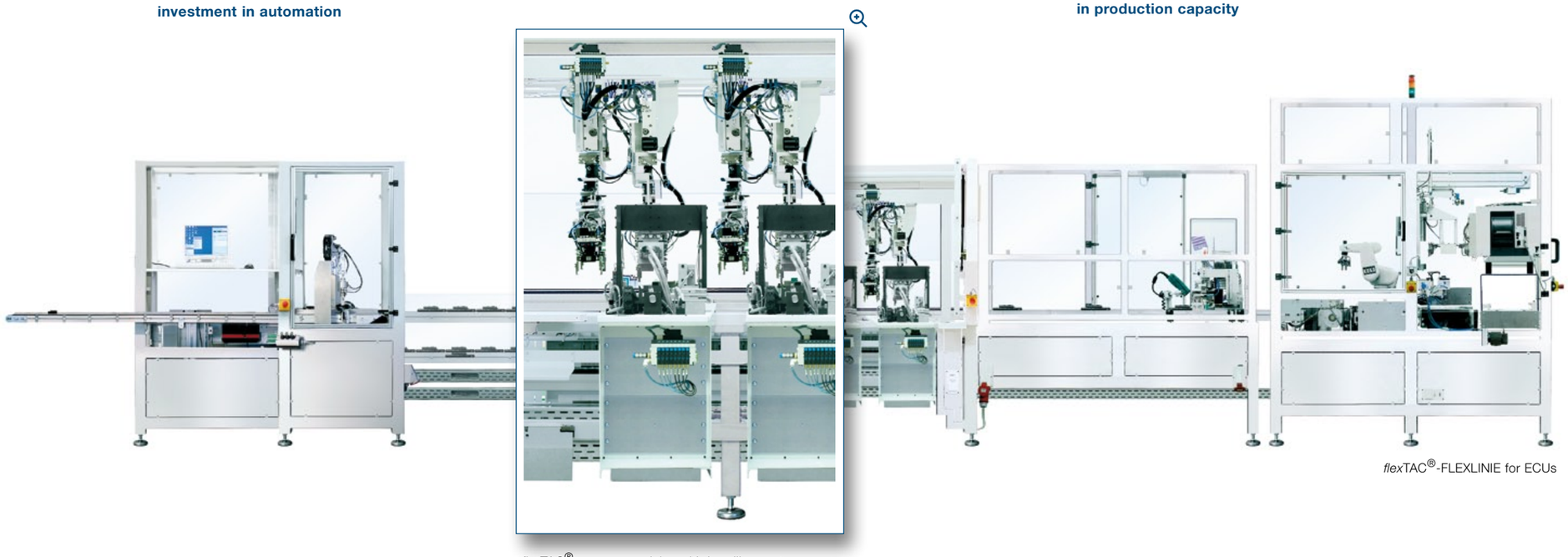
Modularity means flexibility

The test and process modules developed by SOMA form the building blocks which go to make up *flex*TAC®. As an essential unit of a test or process cell, each *flex*TAC® module is constructed on a standard base-plate, on which the mechanical, drive and adaptation components for the specific test application are installed. The module also contains a protected installation space below the base-plate and a module interface in the form of a standard terminal connector strip.

Flexibility increases productivity

The intelligent linkage of different process modules creates a flexible system, adapted to match the specific application and offering many advantages for the customer.

- **Re-usable modules ensure security of investment**
- **Optimum time-based investment in automation**
- **Flexibility to cover fluctuations in production capacity**



*flex*TAC® process modules with handling system

*flex*TAC®-FLEXLINIE for ECUs

- **Level of automation can be adapted to suit the production cycle**
- **Rapid integration of new process modules**
- **Optimised processes without stopping production**

Top view *flex*TAC®-FLEXLINE

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Flexible automated testing!

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Products tested

Vehicle systems and modules

- bodywork and comfort control units :
  vehicle electrical system control units,
  door and roof modules,
  seat memory control units,
  Keyless-Go, etc.
- driver assistance systems :
  rear view camera,
  adaptive cruise control, etc.
- steering column modules
- individual switches
- control panels
- locking systems
- sliding/tilting roof controllers
- seats
- steering wheels
- PTC heating control units
- sensors :
  steering angle sensors,
  rev. speed sensors,
  current sensors,
  battery sensors,
  rain sensors, etc.

Switching devices

- wiring protection and earth leakage circuit breakers
- motor protection switches
- contactors, relays
- full power switches
- vacuum mercury switches
- remotely-controlled actuators, auxiliary switches
- safety switches

Industrial Electrics

- Frequency inverters
- inverted converters
- transmission control devices
- safety electronics
- laser-operated distance measurement systems
- access authorisation systems
- vacuum cleaner nozzles
- solar connector modules
- ceranium fields

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