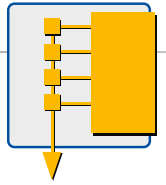


# JTAG / Boundary Scan

Multidimensional JTAG / Boundary Scan Instrumentation



# GOEPEL electronic & JTAG/Boundary Scan

## GOEPEL electronic GmbH

GOEPEL electronic is a global company that has been developing and producing ground-breaking solutions for electronic and optical test technologies since the early 1990s. Already in 1991, the enterprise was the first worldwide vendor of dedicated JTAG/Boundary Scan solutions. Today, a highly qualified team of more than 150 experts takes care to guarantee the best solutions for our customers' test tasks. A consistent innovation management as well as a thorough ongoing quality approach emphasises our claim as technology pioneer in the fields of electric and optical testing. This is validated by a continuous ISO-9001 certification since 1996.



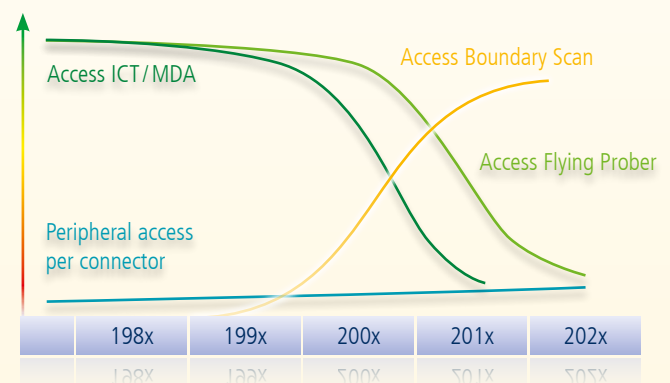
Certificate-Regist.-No.: 09 100 67025



## What is JTAG/ Boundary Scan?

The electric test of assemblies is at the crossroads. Continuously reduced physical test access by more and more complex board structures, the utilisation of new housing technologies and the miniaturisation of ICs (Integrated Circuits) stand opposed to the requirements for cost reduction but unchanged high quality demands.

### Qualitative trend in test access:



JTAG/ Boundary Scan compliant with IEEE 1149.x is the solution!



IEEE 1149.1

Integrated Boundary Scan with ATPG tools

BScan controller with PIO, A/D, D/A Gang-Test

Turbo Flash programming

Anti Ground Bounce

ISO 9001 certified



Plug-in card 64 MB Scan memory

PXI controller

Virtual Scan Pin™ Enhanced

Flying Prober integration

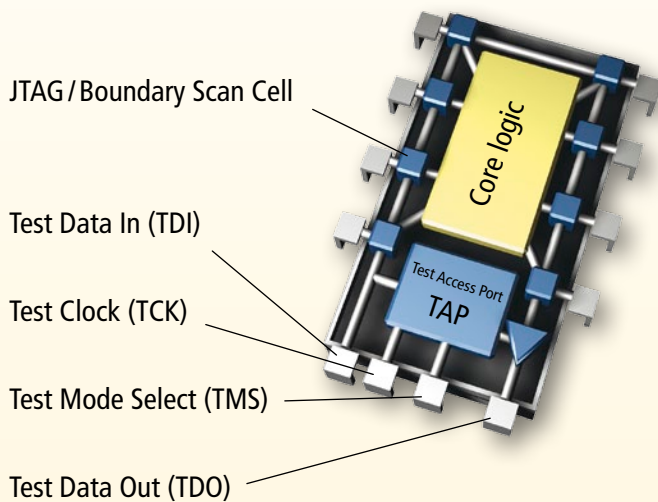
TAP signals

# Functionality and Benefits of JTAG/Boundary Scan

## This is how it works:

Similar to In-Circuit Test (ICT), JTAG/Boundary Scan utilises thousands of test points – with only four test access points. Therefore, expensive bed-of-nail fixtures are redundant.


The following image shows the architecture of a typical Boundary Scan IC. The Boundary Scan cells are integrated between core logic and physical contact pins. They enable the test of connections between the pins of ICs, even those without Boundary Scan cells.



JTAG/Boundary Scan is very versatile and can be utilised in the entire production process, e.g. for emulation, design verification, prototype and production test as well as on-chip and in-system programming.

## Decide for the Technology Leader!

- Most experienced – GOEPEL electronic is the JTAG/Boundary Scan pioneer and highly reputed vendor since 1991
- Global presence – five subsidiaries worldwide and a network of more than 350 sales and support experts
- Innovation – Continuous market introductions of numerous awarded products
- Versatility – Biggest portfolio of more than 250 products for your individual test solution
- Market leader – Over 7,000 system installations
- Flexibility – Integration of JTAG/Boundary Scan in existing systems of all ATE vendors

 More about JTAG/Boundary Scan  
[goepel.com/en/bscan](http://goepel.com/en/bscan)



## Save money with JTAG/Boundary Scan

- Small investment and operational costs
- Extremely short test times but high efficiency/productivity
- Versatile application across the development and production process
- Future-proof and sustainable investment

## More than 20 years of innovations – a time line





# The Software

## Easy Application Development with SYSTEM CASCON™

### Software that sets Quality Standards

The key for successfully utilising JTAG/Boundary Scan is determined by the quality of the applied software – today more than ever. Grown within the innovations across nearly two decades, SYSTEM CASCON™ is the most utilised JTAG/Boundary Scan software platform worldwide.

More than 1,000 design and test engineers, quality managers, service technicians and system diagnosticians use this unique integrated software environment every day.

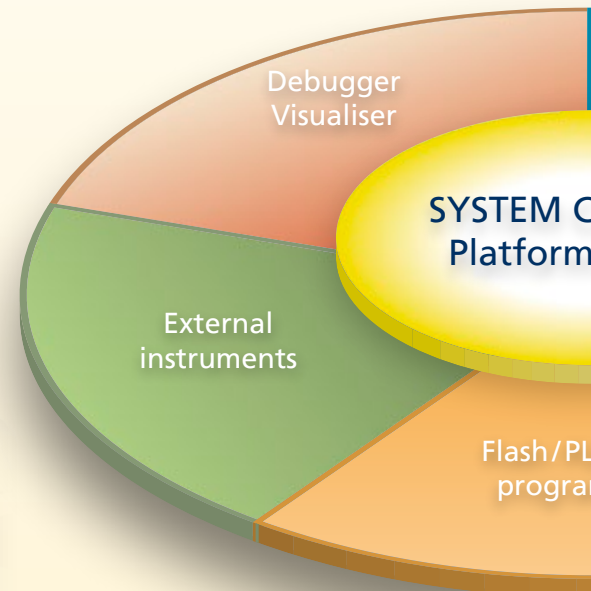


In recognition of the high technological level, GOEPEL electronic's SYSTEM CASCON™ was honoured with the prestigious "Best in Test Award" of the international magazine Test & Measurement World.



Details about SYSTEM CASCON™ features and packages

[goepel.com/en/cascon](http://goepel.com/en/cascon)



### Features that make the Difference



Scalable high-performance platform with more than 40 integrated tools, central project data base and intuitive user interface



Simple, fast and goal-oriented project development by intelligent tools and automated system processes



Integrated safety functions avoid hardware damaging scan vectors and guarantee safe test programs



Interactive Boundary Scan visualisation on layout, schematic and logic level for graphical analysing and debugging

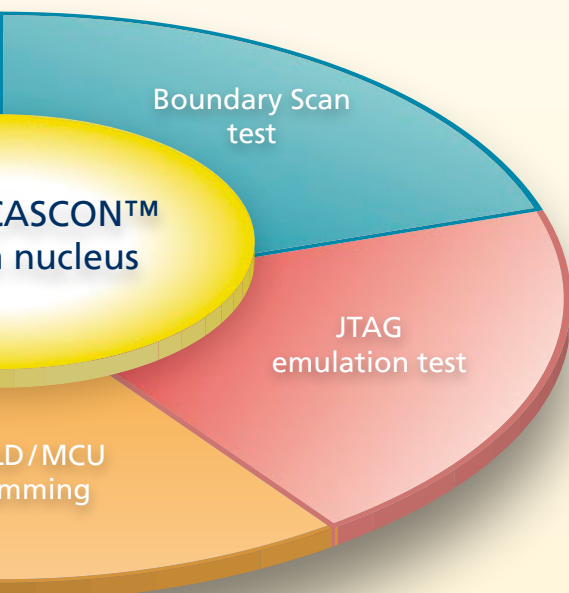
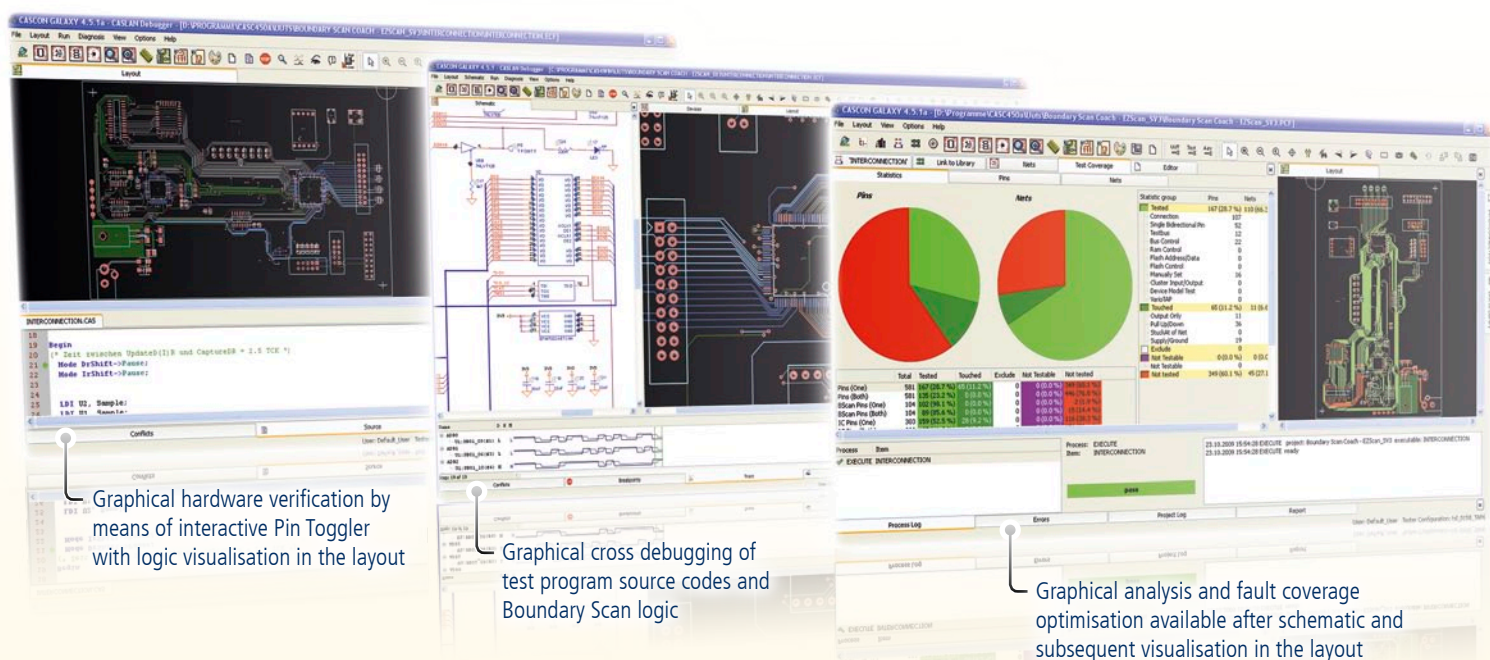


Support of test and programming strategies for internal and external instrumentations beyond Boundary Scan



Extended test coverage and precise fault diagnostic by complete inclusion of non-Boundary Scan circuits

# JTAG / Boundary Scan Software from GOEPEL electronic

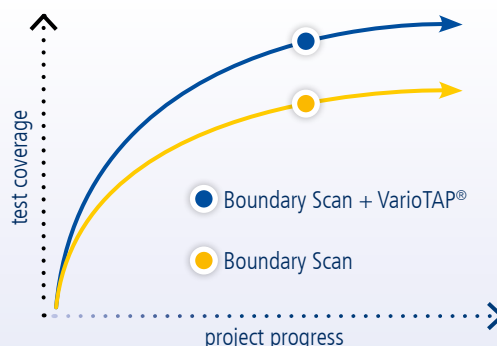


**i** More about VarioTAP®  
goepel.com/en/variantap

## VarioTAP® increases Test Coverage by Emulation Tests

**NEW**

**VARIO TAP**



At-speed functional test  
Gigabit connection  
Dynamic memory access  
Highly complex cluster

Infrastructure  
Interconnections  
Static memory access  
Complex clusters

## Unlimited Applications

SYSTEM CASCON™ enables more than 50 different utilisations – for example

### Extended Boundary Scan Test

- Standard tests (infra, intercon, cluster, memory)
- Advanced AC network test (IEEE 1149.6)
- Advanced algorithmic cluster test (Waveform, HLL)
- Test and diagnosis through simulation (IEEE 1445)
- Built-in self-test (BIST) for chips/boards/systems
- Analogue network test (IEEE 1149.4)
- Advanced algorithmic mixed signal test (scripts)
- Interactive tests for sensors and actors
- Control of FPGA based test instruments

### Dynamic Emulation Test (ET)

- For memories (SRAM, dRAM)
- For bus devices
- For system interfaces

**NEW**

### Flash/PLD/MCU Programming

- Boundary Scan high-speed Flash programming
- Emulation based Flash programming
- On-chip Flash programming of MCUs
- Serial Flash programming by external access
- PLD programming (JAM/STAPL/SVF)
- Parallel PLD programming (IEEE 1532)

**NEW**

### Control of External Instruments

- Interactive test with In-Circuit Tester pins
- Interactive test with Flying Probes
- Interactive test with Functional Test I/O
- Interactive control of software interfaces

### Graphical Analysing and Debugging

- BSDL verification via graphical device library
- Adaptive analysis of fault coverage in layout
- Cross debugging in schematic and layout
- Test program debugging with hardware monitoring
- Hardware analysis per interactive layout Pin Toggler



Details about SYSTEM CASCON™ applications  
goepel.com/en/cascon



# The Hardware

## Performance and Reliability with SCANFLEX® and SCANBOOSTER™

### Hardware Solutions without Compromise

Just like the software, GOEPEL electronic's hardware traditionally meets highest quality and performance demands throughout the entire product life cycle.

The available product lines of SCANFLEX® and SCANBOOSTER™ are the fourth generation of GOEPEL electronic's Boundary Scan hardware solutions. Coupled with intuitive software, they enable applications far exceeding standard Boundary Scan to be quickly realised. The support of external instrumentations plays a key role.



SCANFLEX® received the prestigious "Best in Test Award", rewarded by Test & Measurement World magazine, for its outstanding architecture concept.



Details about SCANFLEX® and other hardware products

[goepel.com/en/scanflex](http://goepel.com/en/scanflex)

### Hardware Examples



**SFX/ASL1149-x**

SCANFLEX® controller for Gigabit-LAN, USB 2.0 and Cabled PCIe



**CION Module™/FXT114s**

For testing differential IEEE 1149.6 and single ended IEEE 1149.1 signals



**SFX-TAP6 & SFX-5296**

SCANFLEX® TAP transceiver with six independent ports and SCANFLEX® I/O module with 96 digital I/Os



### SCANFLEX® redefines Boundary Scan

**80 MHz**

**Powerful**

Scalable high-performance platform for scan operations of 80 MHz with up to eight parallel independent TAP interfaces



**Flexible**

Separately controlled I/O modules with VarioCore® technology for reconfigurable analogue, digital and Mixed-Signal functions



**Adaptive**

Best TAP signal transmission quality also over long distances of up to ten metres with full signal delay time compensation



**Universal**

Broad support of a multitude of test, emulation and programming strategies complementing Boundary Scan



**Modular**

Freely configurable controller, I/O modules, TAP transceiver and TAP Interface Cards (TIC) enable scalable system configurations

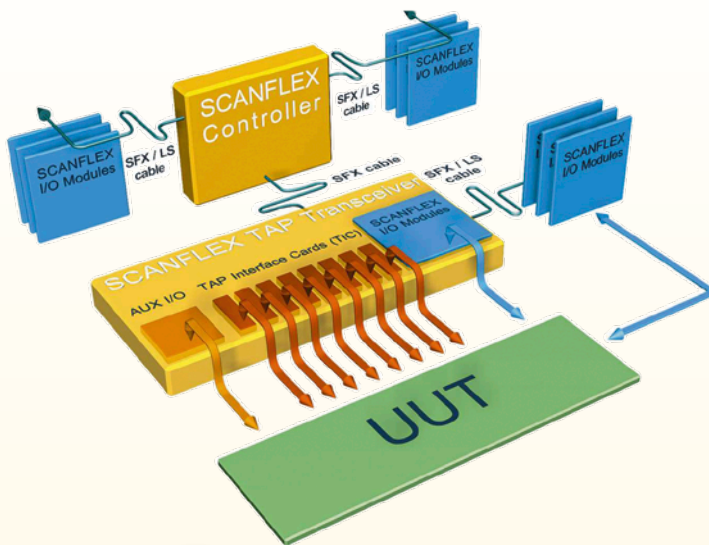


**ATE ready**

Special front-end hardware ensures seamless integration into In-Circuit Testers, Flying Probe Testers, Functional Testers and other ATE

# JTAG / Boundary Scan Hardware by GOEPEL electronic

## SCANFLEX



**SFX/PXI1149/C4-x**

SCANFLEX® controller for PXI with integrated TAP transceiver for four independent ports

**SCANBOOSTER™/USB**

Controller for USB 2.0 with two independent Test Access Ports



### New to SCANFLEX® Architecture:

**NEW**

Bus Access Cables (BACs) are able to functionally test various interfaces at speed. The BACs are controlled by commands embedded in the normal Boundary Scan test program by means of a SCANFLEX® multiport module with VarioCore® technology.

BACs are available for the following interfaces:

- RS232, RS422, RS485
- 10/100-Mbit-LAN
- CAN, LIN
- USB 2.0 Master/Slave, Bluetooth

**i** More about BACs  
[goepel.com/en/bac](http://goepel.com/en/bac)

Additional BACs are under development.



Multiport module  
SFX-9305

## Platform of highest Flexibility

SCANFLEX® offers the unique opportunity to use various kinds of instrumentation based on a flexible platform.

### In-System Instrumentation<sup>1</sup>

- Digital Boundary Scan test (IEEE 1149.1/6)
- High-speed Flash programming via IEEE 1149.1
- PLD programming (JAM/STAPL, SVF, IEEE 1532)
- Analogue Boundary Scan test (IEEE 1149.4)
- Functional emulation test via JTAG debug port
- High-speed Flash programming via emulation
- Control of on-chip verification and test IP
- Control of Built-in self test (BIST)

**1**

Partly support also in the SCANBOOSTER™ economy product line  
[goepel.com/en/scanbooster](http://goepel.com/en/scanbooster)

In-system instrumentation with external instrumentation is the key for highest fault coverage and nearly unlimited flexibility within the definition of a test strategy.

### External Instrumentation<sup>2</sup>

- Digital I/O (static/dynamic)
- Digital functional modules
- Analogue I/O (static/dynamic)
- Analogue functional modules
- Programmer for serial Flash (SPI/I2C)
- Protocol based bus interface tester
- Control of reconfigurable IP (VarioCore®)
- Control of third-party I/O (ICT, FPT, FCT)

**2**

Partly support also in the CION Module™ economy product line  
[goepel.com/en/cionmodule](http://goepel.com/en/cionmodule)



### Flexibly defining Production Tests

Nowadays, testing is an important integral part of any quality assurance strategy. But each production environment and every product put different demands on the test equipment.

We have consistently taken up this challenge and developed flexible system solutions, which adapt to the production process and can be integrated in existing environments without performance loss. Tests, already developed in the lab, can be directly taken over into the production process for fast New Product Introduction (NPI).



### Perfectly equipped by all Means



Shortest test time and high-speed programming of Flash/PLD provide full in-line capability also at very high beat rate



Detection, pin accurate diagnosis and layout display of all defects such as shorts or open BGA solder joints within one application



Complete interaction of Boundary Scan patterns with test vectors of other ATE or AOI systems for highest fault coverage



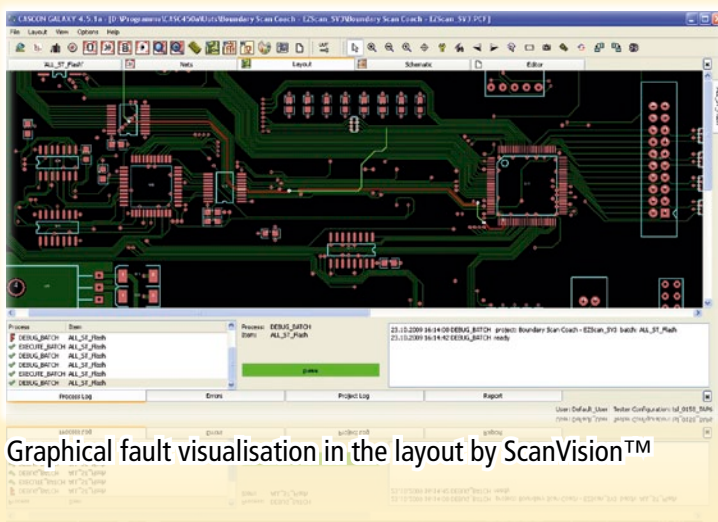
Standard interface control via LabVIEW®, TestStand, C / C++, Basic, Tcl / Tck, Python etc. down to vector level



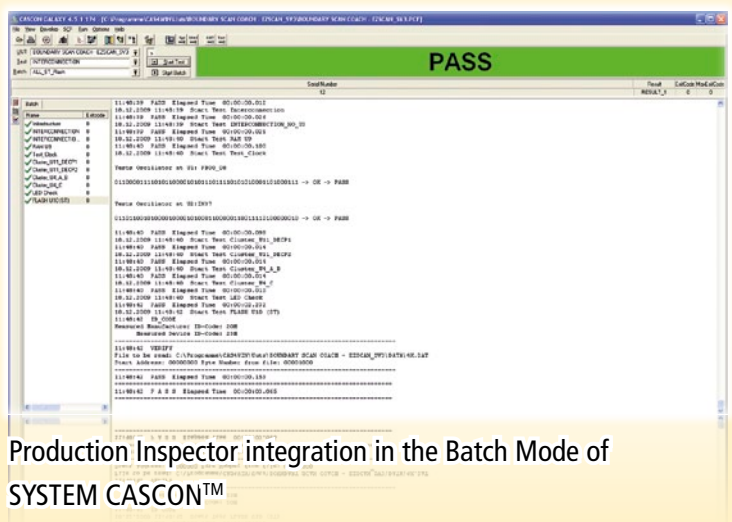
Efficient system utilisation by means of Floating License, fast project transfer through archive files and online fault data tracing



Availability of custom JTAG / Boundary Scan systems incl. adaptation based on platforms such as PXI or JULIET



Graphical fault visualisation in the layout by ScanVision™



Production Inspector integration in the Batch Mode of SYSTEM CASCON™



# Integration

## Integrated Productivity on Command

### Stand-alone or Integration?

It doesn't matter what variant you decide for, our product portfolio covers it.

With the help of our powerful software and hardware, every PC can be transformed into a JTAG/Boundary Scan tester with extended fault coverage.

However, ready-made testers like JULIET include Unit Under Test (UUT) power supply and are preconfigured professional solutions for adapting the UUT.

As far as the analogue circuit parts are concerned, the highest possible fault coverage can be achieved by combining JTAG/Boundary Scan with other methodologies. Numerous integration packages of various performance classes are available for such purposes. Typically, they have been developed in close cooperation with, and are authorised, by the respective ATE vendor.

### New to the product line: JULIET

**NEW**

JULIET (JTAG Unlimited Tester) is suitable for the testing of small production batches and prototypes. All electronics are integrated inside the system. The system is based on exchangeable adaptors and can be quickly converted in a few steps to handle different projects.



**i** More about JULIET  
[goepel.com/en/juliet](http://goepel.com/en/juliet)

### Increased Test Coverage by Combination of



#### Boundary Scan and Flying Probe

High flexibility without bed-of-nails for high-mix



#### Boundary Scan and In-Circuit Test

High throughput with best diagnosis for high-volume



#### Boundary Scan and Functional Test

High fault coverage also in dynamic domain



#### Boundary Scan and AOI

Assembly test and optoelectronic tests



#### Boundary Scan and HASS/HALT<sup>1</sup>

Dynamic monitoring for tests in environmental chamber



#### Boundary Scan and Gang Test

Parallel programming and test of several boards

1 - High Accelerated Stress Screening / High Accelerated Life Test

### Our ATE Partners (excerpt)



Agilent Technologies



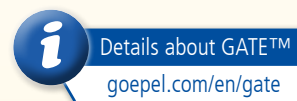
## Support from the very Beginning

The credo of excellent customer and product support has been part of GOEPEL electronic's overall corporate philosophy since the very start.

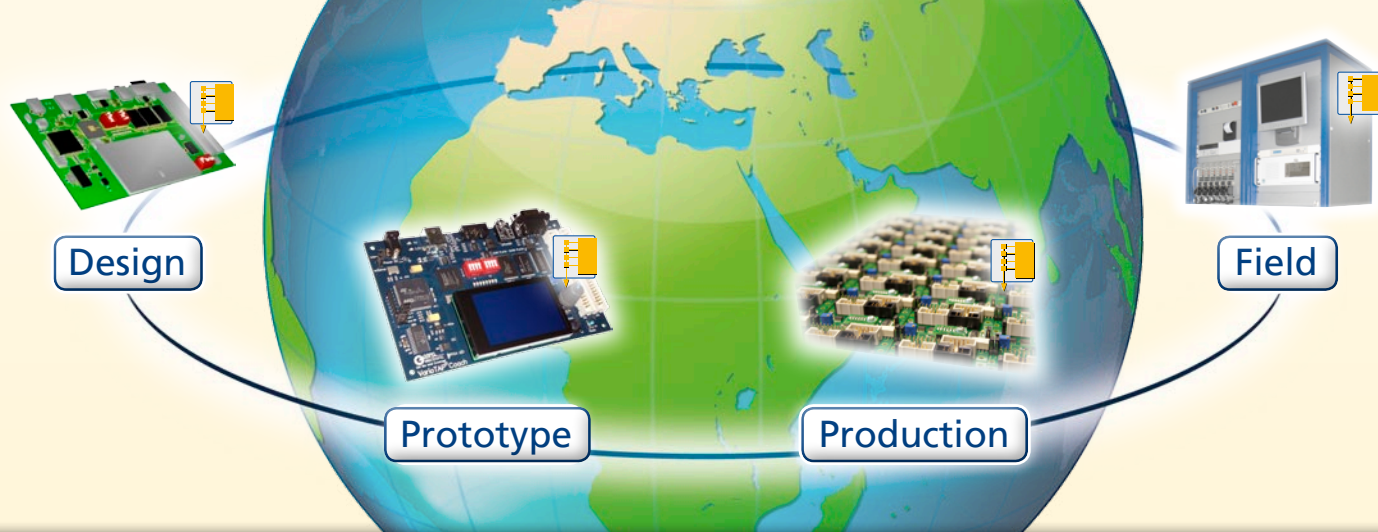
Five technology centres in Europe, the USA and Asia as well as a global network of highly qualified and experienced application engineers are available for support and service at any time. The scope of services extends from pure Boundary Scan applications to turn-key solutions, complete process integrations and hardware/software developments.



Our GATE™ alliance partners (GOEPEL Associated Technical Experts) also play a decisive role in technology transfer. They include design and test houses as well as system integrators with special knowledge that supply valuable complementary services for successful project implementations. In summary, we are well positioned to individually support any type of customer such as OEM, ODM or EMS.



## Product Life Cycle Support



## Competence is our Passion – Services at a Glance



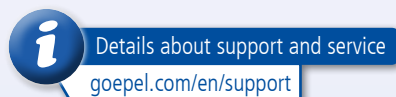
**Knowledge transfer in workshops, seminars and training – on-site, in our technology centres, at our partners' premises, or via internet**



**Performance transfer by project engineering – in our technology centres or our partners' premises**

- Boundary Scan basics
- Advanced JTAG / Boundary Scan (incl. emulation)
- Design-for-Testability / in-system programming
- Test strategies in practice (incl. AOI, AXI, ICT)
- Project related application training
- System training for test and repair personnel

- Hierarchic Design-for-Testability analysis
- BSDL file development / verification
- Development of complete test programs
- Definition of test strategies (incl. AOI, AXI)
- System integrations for ICT, FPT, MDA and FCT
- Custom development (hardware, software)



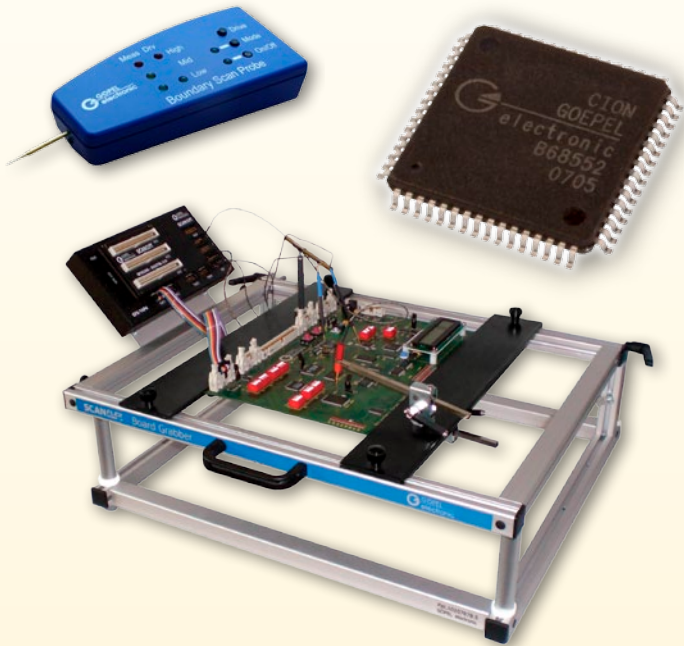


# Support & Service

## ... throughout the entire Product Life Cycle!

### BSDL File Verification in the Focus

BSDL (Boundary Scan Description Language) describes the Boundary Scan structures in a chip and hence is of fundamental importance. Unfortunately, these files are not always correct. For this purpose, GOEPEL electronic provides a special service to verify the BSDL files against the chip, utilising standard products such as SFX Board Grabber, Boundary Scan Probe or our CION™ ASIC for specific test adapters.



### Benefits as a Customer:

Have you already purchased our JTAG/Boundary Scan equipment? Then you have full access to all customer benefits such as

- GENESIS, our support website with library models, manuals, application notes, software updates and much more
- Library model development for new flash, RAM and additional non-Boundary Scan devices
- Support hotline via phone, video via internet (Skype), desktop sharing (WebEx) and email
- Attendance at our worldwide organised Boundary Scan Days®
- Information about product roadmap and influence on new developments
- Special maintenance contracts for hardware and software
- Extended hardware warranty of 36 months



Details about Accessories

[goepel.com/en/accessories](http://goepel.com/en/accessories)

### What do satisfied Customers say about GOEPEL electronic's Support?

„We have been successfully applying GOEPEL electronic's Boundary Scan test systems in our production since September 2003. The performance of the systems and the support by GOEPEL electronic have impressed us. We are able to process the test application regarding the technical and time specifications to the complete satisfaction of our customers.“

Ernst Neppl  
Zollner Elektronik AG  
Germany

„Since 1999 I have been using GOEPEL electronic's Boundary Scan systems to test and on-board program our electronics products in the AVIONIK division of EADS in Friedrichshafen/Germany. I am always very satisfied with products and support. Because of the long-term contact to GOEPEL employees, a pleasant atmosphere has developed. They have never left me alone with my test problems!“

Willi Gröber  
EADS Deutschland GmbH  
Germany

„It's the best Boundary Scan system available that we have seen and GOEPEL electronic seem intent on continually taking it forwards. We've always been satisfied. Anyway why would we use equipment from anyone else but the European market leader?“

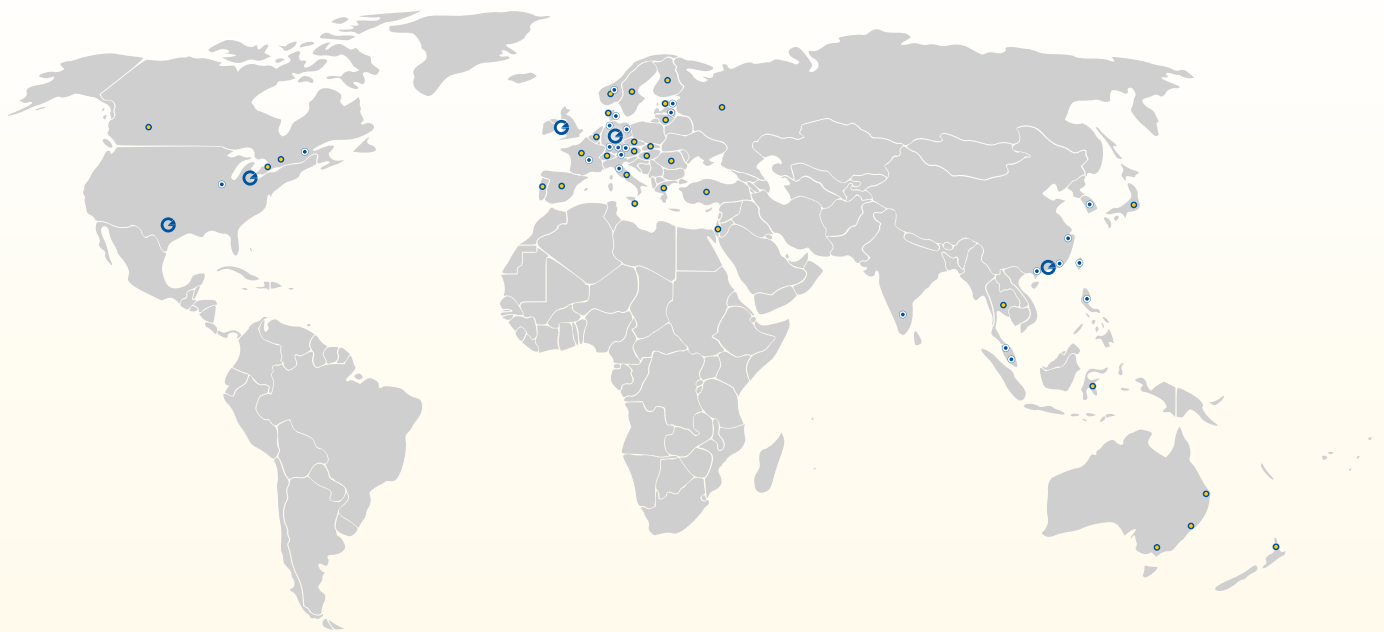
Phil Randall  
ACW Technology Ltd.  
United Kingdom


„Up to now we are very satisfied with this Boundary Scan equipment (we have been using it in the series production): because of the application of Boundary Scan we were able to reduce the initiation time for the control electronics of our latest printer model by more than 30%. That's why we will use this technology for new developments. The main criterion to decide in favour of GOEPEL electronic was the possibility to extend the tests by self-programmed parts.“

Jörg Falkenberg  
cab Produkttechnik GmbH & Co. KG  
Germany


# Contact

## Global Presence



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 Distributor

 GATE™ Partner

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Fax: +852 - 28 10 - 44 94  
sales@goepel.asia  
www.goepel.asia




You will find your local contact for product availability and support:

[goepel.com/en/contact](http://goepel.com/en/contact)

JTAG / Boundary Scan Support – contact us directly:

	Europe	USA	United Kingdom & Ireland	China
<b>Hotline</b> Toll-free	+49 (0) - 36 41 - 68 96 - 699	+1 - 512 - 782 - 25 00 +1 - 888 - 4GOEPEL	+44 (0) - 12 23 - 858 - 298	+852 (0) - 65 72 - 88 17
<b>Email</b>	bscan_support@goepel.com	support@goepelusa.com	bscan.support@goepel.co.uk	support@goepel.asia

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electronic  
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ISO 9001 certified

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