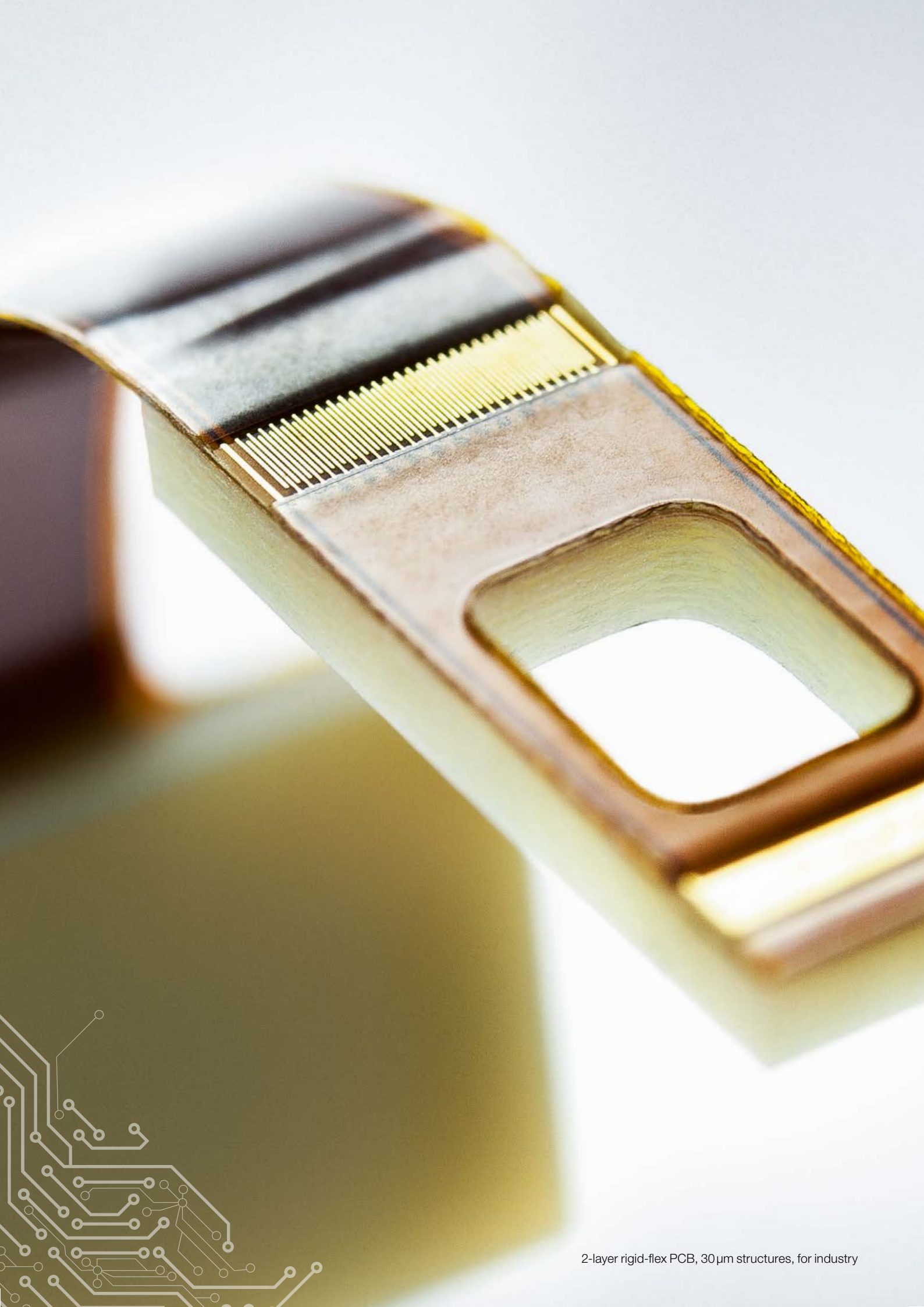


Specialized expertise for **miniaturized printed circuit boards**

Medical | Industry



2-layer rigid-flex PCB, 30 μm structures, for industry

Miniaturized substrates to meet the most stringent demands

GS Swiss PCB AG manufactures highly-miniaturized flex, rigid-flex and HDI printed circuit boards. Its substrates are employed wherever the most stringent requirements have to be met in miniaturization and reliability. GS focuses mainly on these areas:

- Medical applications, in particular implants and body-worn electronics
- Demanding industrial electronics
- Sensors and wafer level packaging

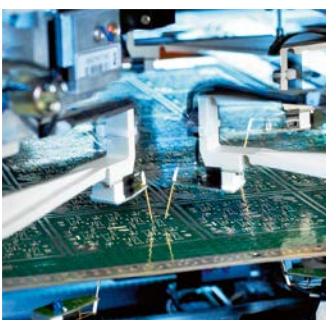
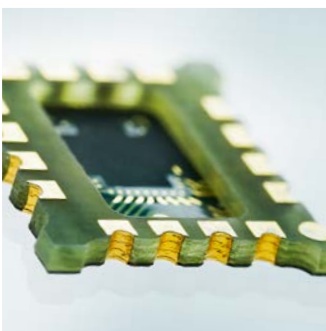
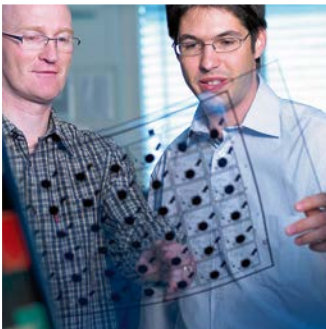
Comprehensive capabilities

GS has capabilities ranging from 15 μm ultra-fine line production with copper-filled stacked vias to the processing of ultra-thin 12.5 μm base materials and the manufacture of complex rigid-flex substrates incorporating bookbinder and window technology.

The company is perfectly equipped to deliver multi-layer, highly integrated and complex flexible circuit boards. Assembly companies greatly appreciate the excellent quality of the surface finish for COB, COF and flip chip substrates.

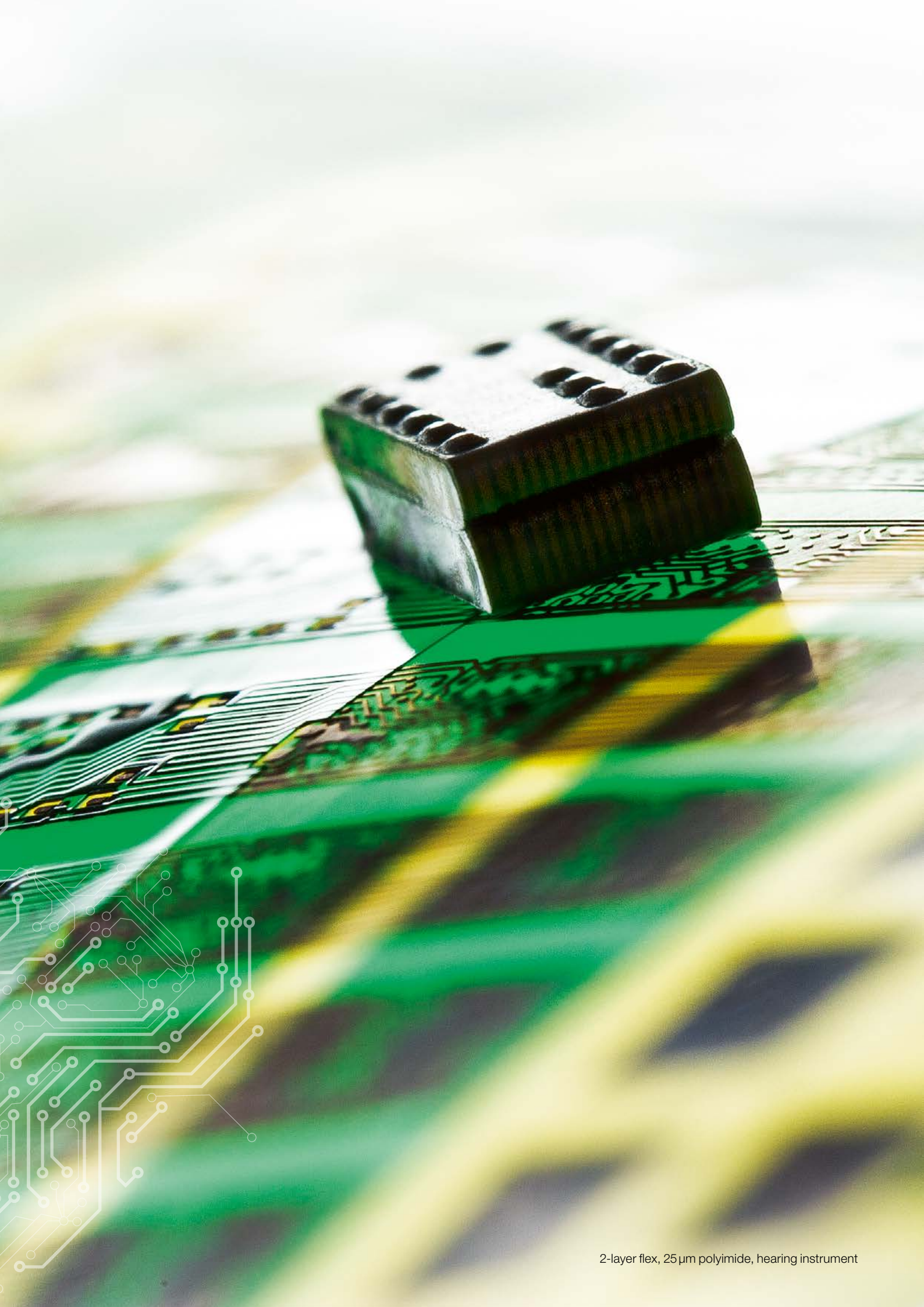
Consistently reliable

An integrated ERP system with document management controls and monitors all processes. This system ensures GS the traceability, repeatability and consistent quality of its products.



Basis of range

- Express service, prototypes and serial production
- Multi-layer flex, rigid-flex and rigid PCBs
- Highly integrated (HDI), chip-on-board (COB) and chip-on-flex (COF) substrates
- Ultra-fine line production (15 μm / 15 μm ; 0.6 mil / 0.6 mil)
- Medical applications, implants, sensors and industry



2-layer flex, 25 μ m polyimide, hearing instrument

Huge capabilities for tiniest miniaturization tasks

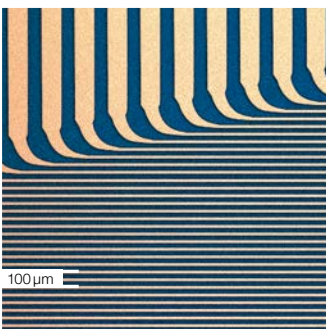
The ongoing market trend toward miniaturization demands ever thinner and ever more highly integrated printed circuit boards. GS Swiss PCB AG is a leading manufacturer of substrates featuring a maximum of miniaturization and integration capability.

Technically feasible

GS is already producing PCBs today with 15 μm line and space, 12.5 μm base materials, \varnothing 22 μm vias and solder masks positioned with an accuracy of 15 μm . It is equipped for the future with an LDI capable of exposing 8 μm structures and with a flying probe test system capable of contacting 20 μm wide pads for the electrical test.

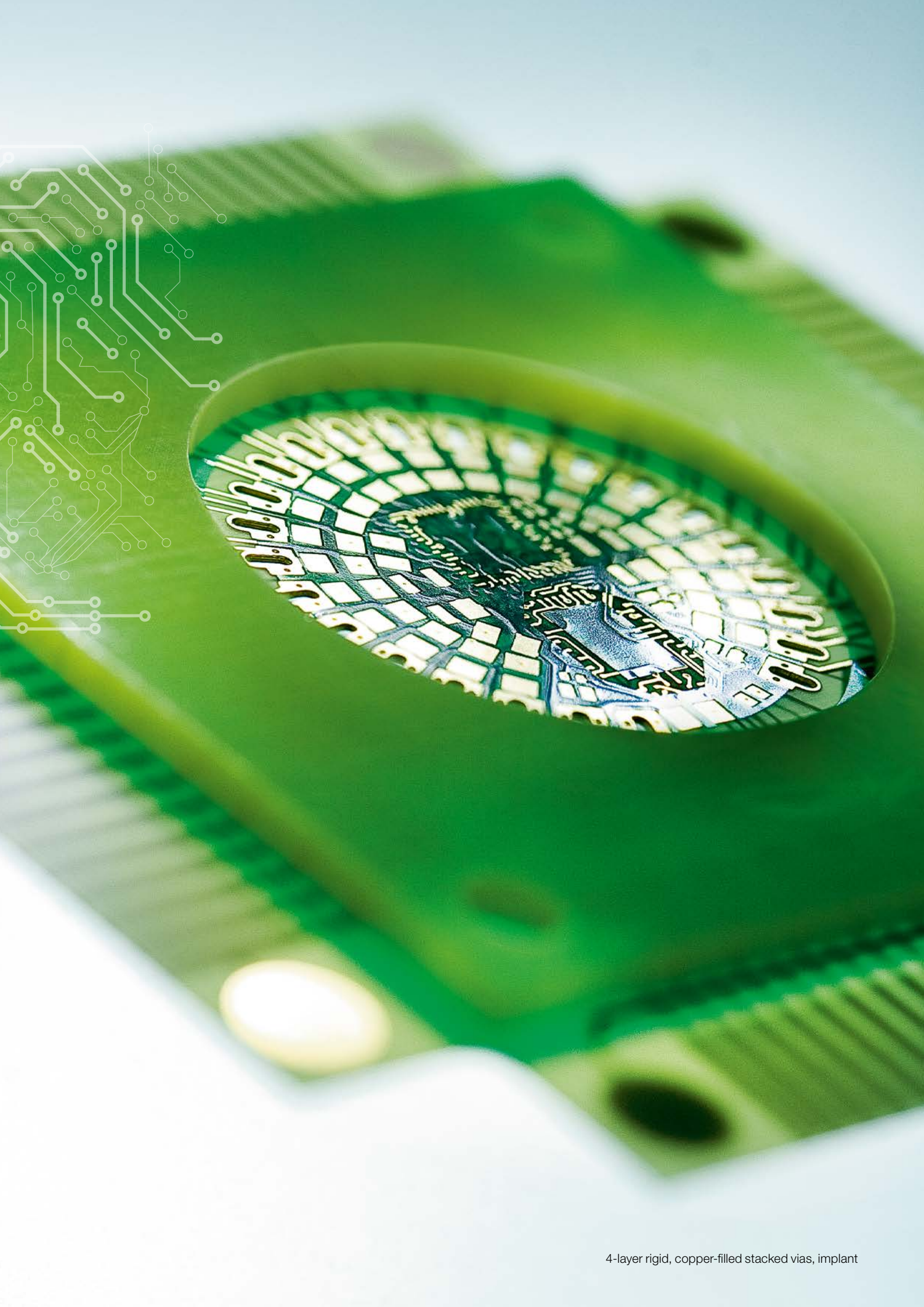
Perfectly integrated

Millions of hearing instruments are fitted with flexible printed circuit boards from GS. The highly integrated substrates are also employed as IC carriers, in digital x-ray machines and at research institutes.



Miniaturization at a glance

- Ultra-fine line production (15 μm / 15 μm ; 0.6 mil / 0.6 mil)
- Laser micro vias with a \varnothing of 22 μm (0.9 mil) and featuring an annular ring of 20 μm (0.8 mil)
- Mechanical vias with a \varnothing of 75 μm (3 mil)
- Copper-filled stacked vias
- High precision, LDI-exposed solder mask
- Base materials as thin as 12.5 μm (0.5 mil)
- Substrates for COB, COF and flip chip
- MCM



4-layer rigid, copper-filled stacked vias, implant

Just the right product for every purpose

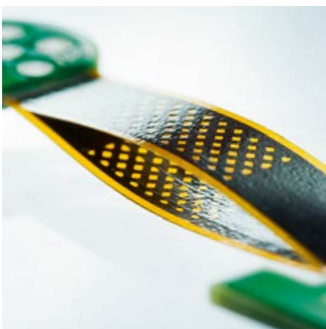
GS works closely with its customers to ensure that the requirements for series production are also met. With its special «**Express production for prototypes**» service, GS speeds up time to market. Manufacturing is carried out with the same processes and machines that are employed in subsequent series production. This approach eliminates the need for a second qualification procedure and saves additional time.

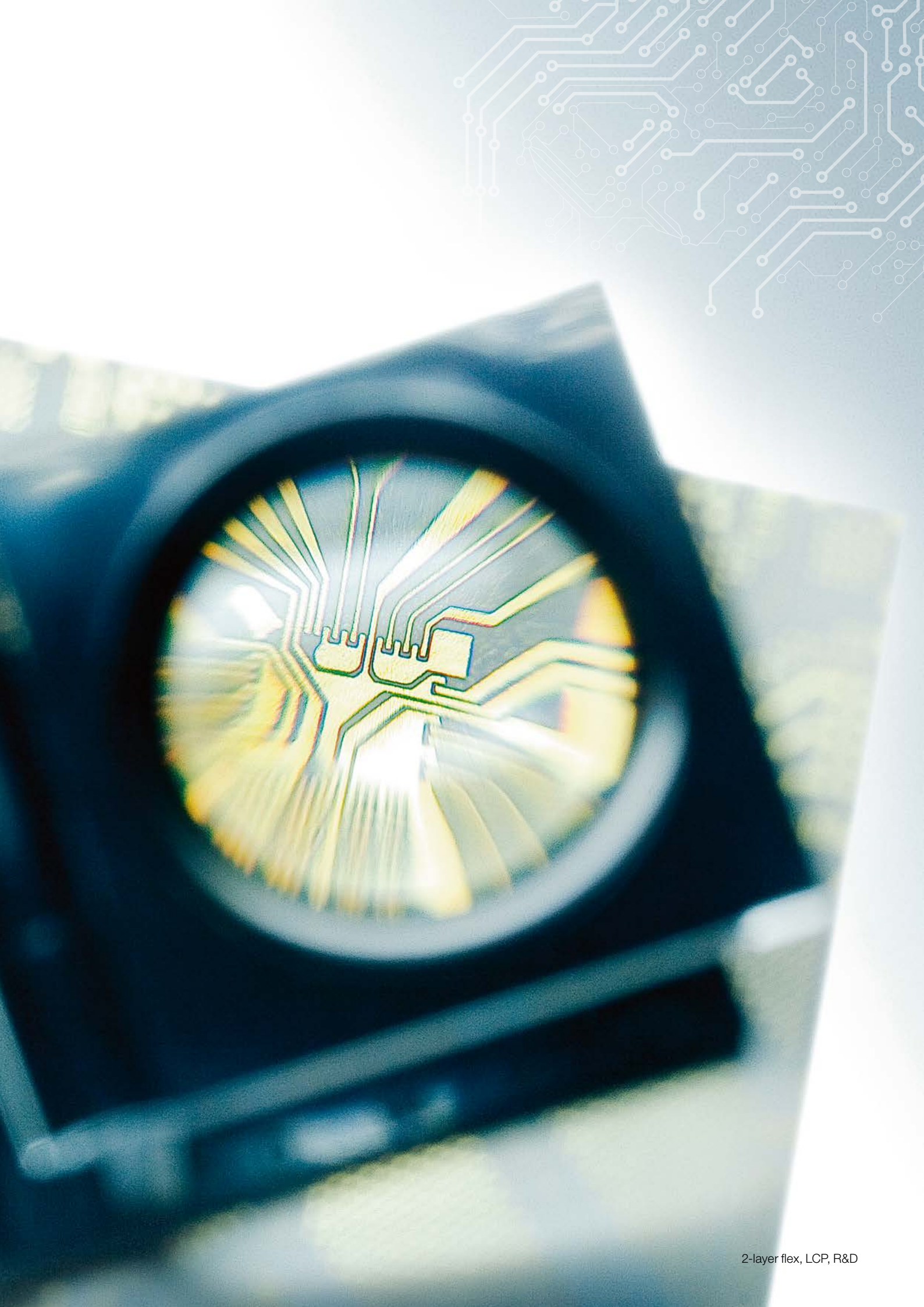
Technical capabilities

		Standard	Limit
Trace width		40 µm (1.6 mil)	15 µm (0.6 mil)
Space		40 µm (1.6 mil)	15 µm (0.6 mil)
Drill diameter	Laser technology	50 µm (2 mil)	22 µm (0.9 mil)
	Mechanically drilled	100 µm (4 mil)	75 µm (3 mil)
Annular ring		70 µm (2.8 mil)	20 µm (0.8 mil)
Aspect ratio	Blind vias	1:1	
	Through-holes	1:11	1:20
Copper-filled vias/stacked vias		ø 50 – 160 µm (2 – 6.3 mil)	ø 20 – 160 µm (0.8 – 6.3 mil)
Via plugging		Solder mask, epoxy	
Solder mask	Positional accuracy	± 30 µm (1.2 mil)	± 15 µm (0.6 mil)
	Minimum dam width	60 µm (2.4 mil)	40 µm (1.6 mil)
Maximum final format	Rigid	468 x 534 mm	Larger formats on request
	Flex and rigid-flex	415 x 549 mm	
Material thickness		25 µm – 4 mm	12.5 µm – 4 mm
Number of layers	Multilayer	up to 20	up to 30
	Rigid-flex	up to 20	up to 24
	Flex	up to 8	
Base materials	Rigid	FR4, BT, G11, Nelco, Terra Green	Further materials on request
	Flex	PI, LCP	
Automatic optical inspection (AOI)		100 %	
Electrical test	Short circuit	up to 25 MΩ	2 GΩ / 500 V
	Open circuit	1 Ω bis 10 kΩ / 10 V	1 mΩ / 10 V
Impedance-controlled PCBs		10 %	5 %

Surface finishes

- Electroless Nickel/immersion gold (ENIG)
- Ni/Pd/Au (ENEPIG)
- Electrolytic Nickel/Gold
- Hard Gold
- Direct Immersion Gold (DIG)
- Immersion Silver
- Immersion Tin
- OCC (Entek)
- HASL





Swiss precision you can rely on

Quality is a matter of course. Every order complies with the specified customer requirements. However, the most demanding applications such as implants or those in the aerospace field require reproducible processes that are demonstrably verifiable. The traceability of products and materials must also be assured.

Integrated quality

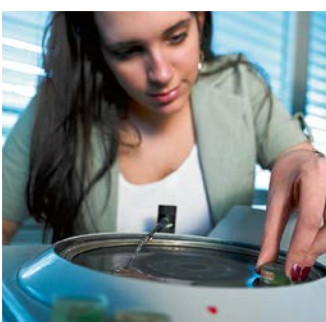
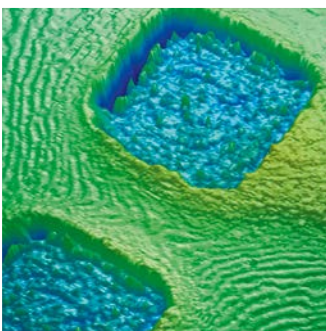
To meet all requirements, GS Swiss PCB AG employs a fully integrated software system with ERP, document management, workflow management, measuring equipment management, process monitoring and employee qualification monitoring.

Consistent monitoring

All machines and processes are subject to installation, operation and regular performance qualification monitoring (IQ/OQ/PQ) and undergo regular maintenance. The measuring equipment is qualified based on gauge-R&R studies and constantly calibrated. GS conducts training for its staff to ensure that they always have a modern level of training and are verifiably qualified at any time to perform the tasks they are given.

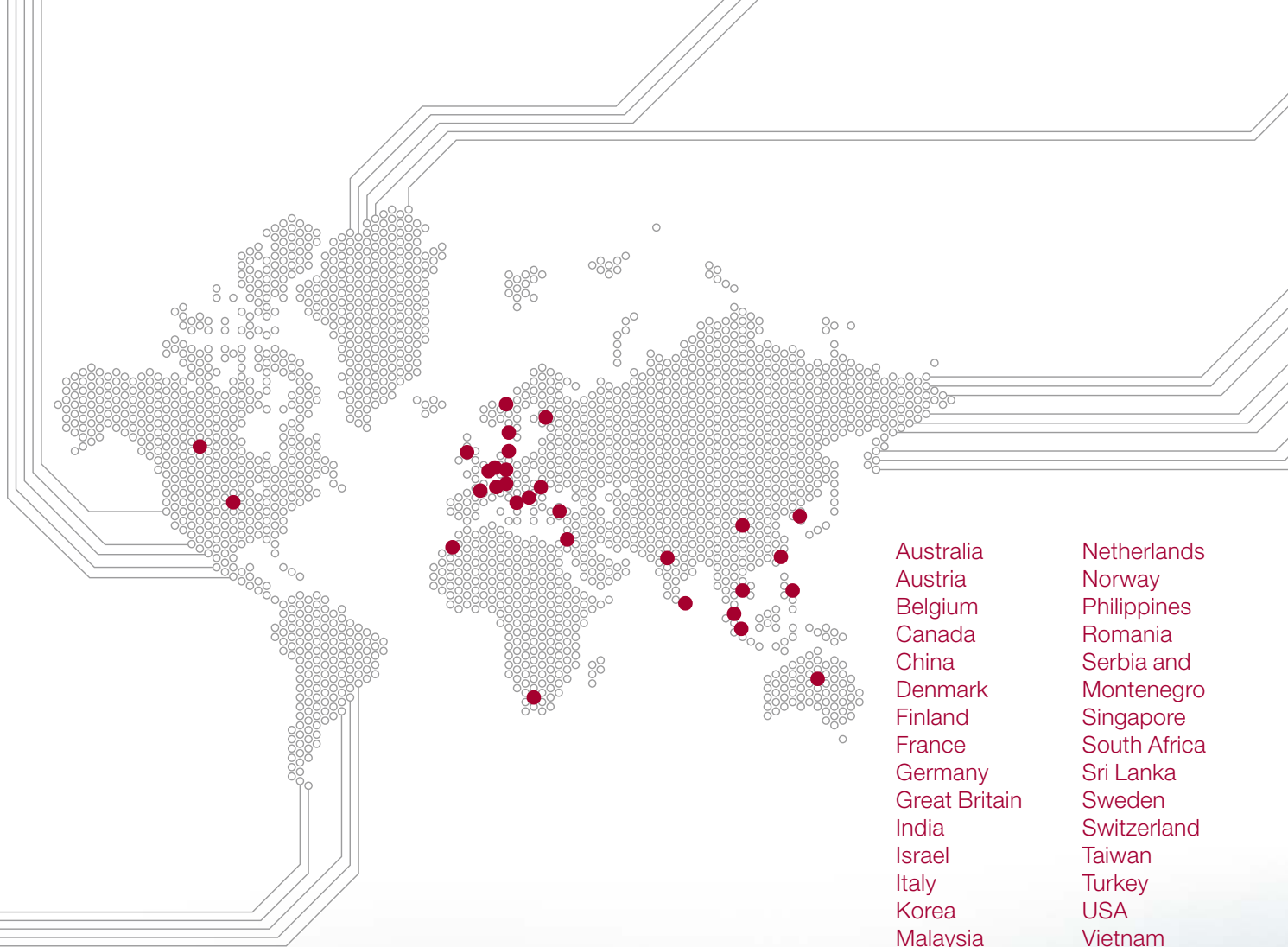
Tested safety

All PCBs are tested electrically and all layers undergo AOI testing to guarantee maximum quality control. GS checks the thickness of the surface finishes in an x-ray fluorescence measurement. To check the correct metallization bonds in the vias, GS uses microsections. GS has high-precision coordinate and 3-D measuring machines that allow precise measurement of dimensions in the submicrometer range. The final inspection is conducted with a microscope. Employees entrusted with testing and measuring are IPC-certified. A thorough report is available on the measuring and testing results.

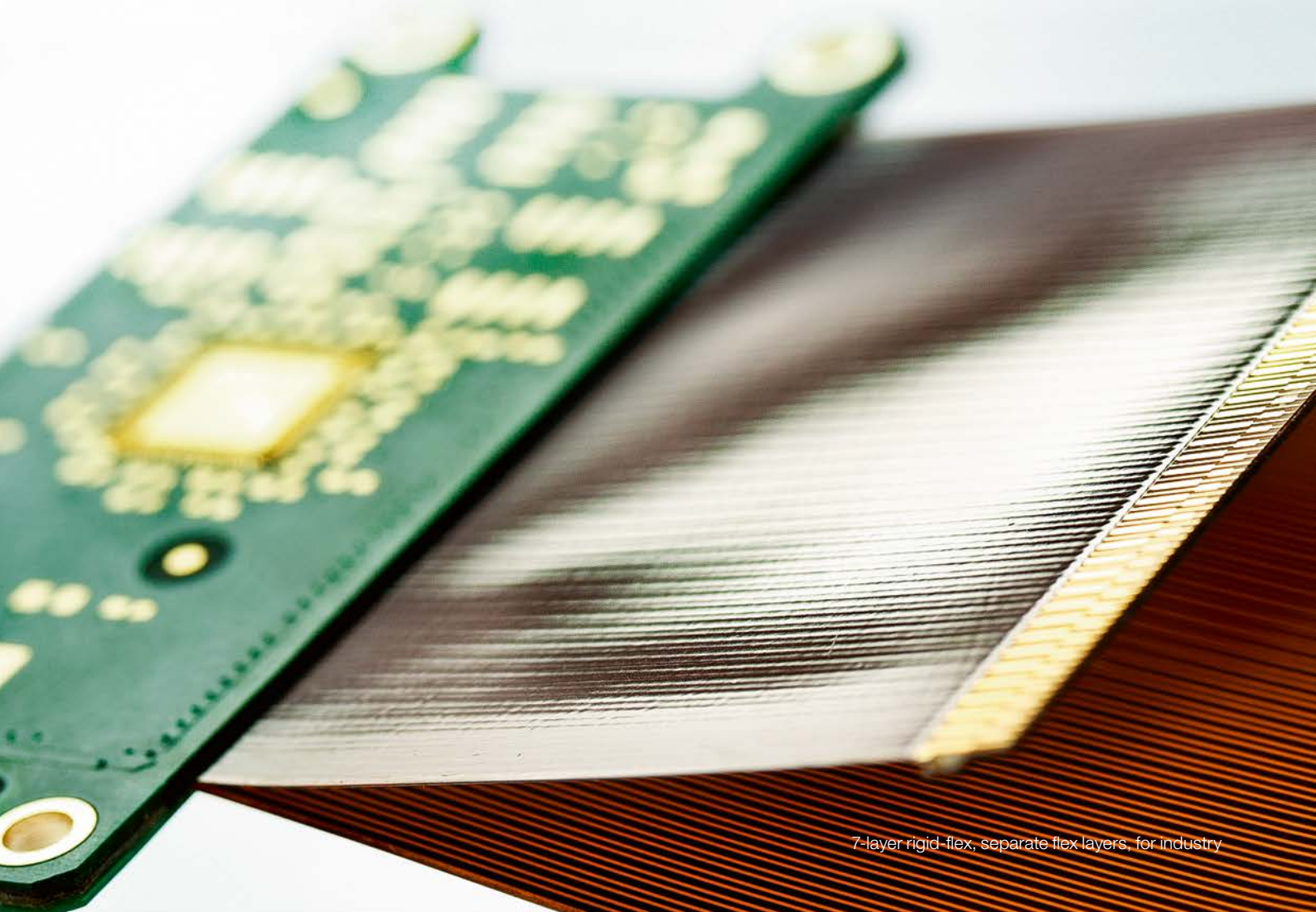


Overview of quality

- Verified, validated and reproducible processes (IQ, OQ, PQ)
- Critical process steps in clean room
- End-to-end traceability of products, materials and test results
- IPC-certified employees
- Test according to IPC 600 – Class 2, Class 3 or as required by customer
- Interconnect stress test (IPC approved temperature cycle test)
- ISO 9001 certified



- Australia
- Austria
- Belgium
- Canada
- China
- Denmark
- Finland
- France
- Germany
- Great Britain
- India
- Israel
- Italy
- Korea
- Malaysia
- Marocco
- Netherlands
- Norway
- Philippines
- Romania
- Serbia and Montenegro
- Singapore
- South Africa
- Sri Lanka
- Sweden
- Switzerland
- Taiwan
- Turkey
- USA
- Vietnam



A reliable partner now and in the future

GS Swiss PCB AG has conducted business successfully for years in the difficult market environment for PCB manufacturers and is growing internationally. In fact, this PCB producer achieves seven percent of its sales in Asia with its numerous customers there.


As a solid Swiss company, GS Swiss PCB AG is a competent and reliable long-term partner for its customers. GS cultivates a forward-looking corporate culture based on openness and trust. GS plows about ten percent of its sales back into machinery and new technologies. Its aim is to continue meeting its customers' needs in the future as perfectly as it does today.

GS manufactures and tests ultra-complex substrates using the most modern precision machines such as lasers, LDIs, high-speed and x-ray drilling machines and flying probe testers as well as a 3-D high-precision measurement machine.



Company facts

- Founded in 1981
- 165 employees
- Production area of 50,000 square feet (4,800 m²). Three-shift operations
- Clean room for critical process steps
- Most modern machinery
(7 UV-lasers, CO₂-laser, 4 LDIs, high-speed drilling machines, x-ray drilling machine, AOI, 4 flying probe testers, 3-D high precision measurement machine, electron microscope)
- Principal markets: Medical 85 %, Industry 5 %, Telekom 5 %
- FC, COB, MCM: 76 %.
- Flex: 60 %, Rigid-flex: 20 %, Rigid PCBs: 20 %
- Annually reinvests about 10 % of its sales
- Solid financial base and profitable



GS Swiss PCB AG is located between Lucerne and Zug in the heart of Switzerland. From the airport Zurich it can be reached by train or car in just under an hour.

- Specialising in demanding miniaturized PCBs
- International, seasoned and capable partner
- Swiss precision and reliability

Disclaimer: Any technical information provided is to be considered as suggestion or recommendation only. In no case the technical information provided shall be considered as guaranteed features. In particular, GS Swiss PCB AG is not liable for errors as a result of inadequate information provided by the Purchaser or incorrect releases of drawings or test specimens. The Purchaser's duties of care include the examination of the offered products for their suitability for the intended application and use.

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