TS PCB

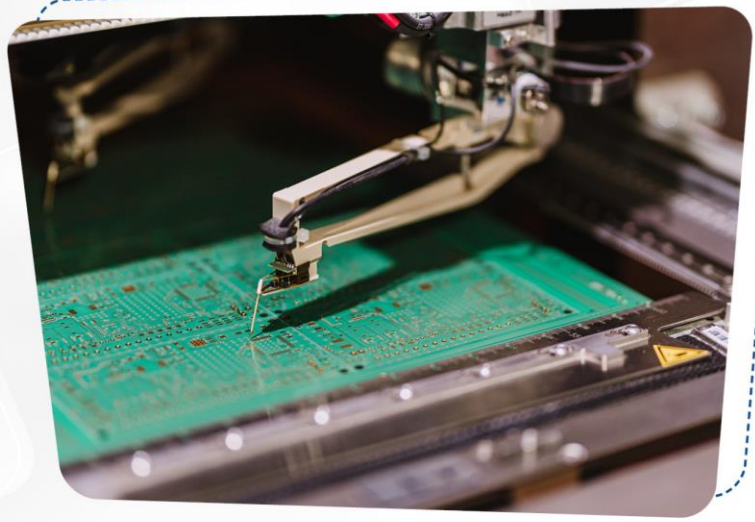
CUSTOM SHAPED SERVICE

Our Mission

Printed circuit boards which we offer are the core of our Clients production. We gain satisfaction from developing custom-made, high quality products.

Our Vision

We value time and money. Our aim is to deliver products as soon as our Clients need them. We have achieved success by regular optimisation of operational costs.



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GENERAL INFORMATION

Our localisation

Production area

approx. 3750 m²

Office area

approx. 727.44 m²

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Benzynowa St. 21
83-011 Gdańsk

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Techno-Service S.A. includes:

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PCB production

established in 1984

LABORATORY OF ENVIRONMENTAL PROTECTION

Research and evaluation of harmful health factors in the work environment.

established in 1982

GENERAL INFORMATION

TS PCB team

4 people	6 people	4 people	7 people	72 people
Quality management	Customer Service Office	CAM support	CAM engineers	Manufacturing Plant

Our team 100 people

GENERAL INFORMATION

Export sales

Export

Important part of company's strategy that includes clients from main European countries. The level of export volume constitiutes **60% of the total sales value**.

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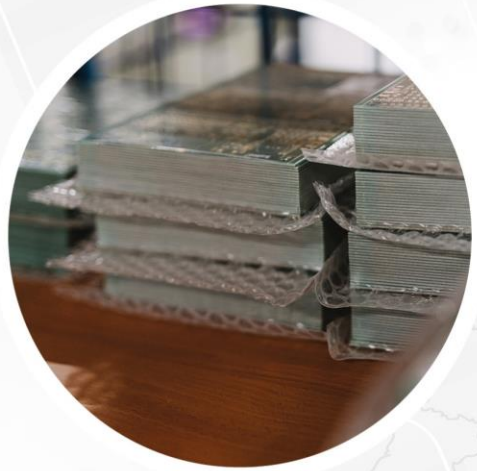
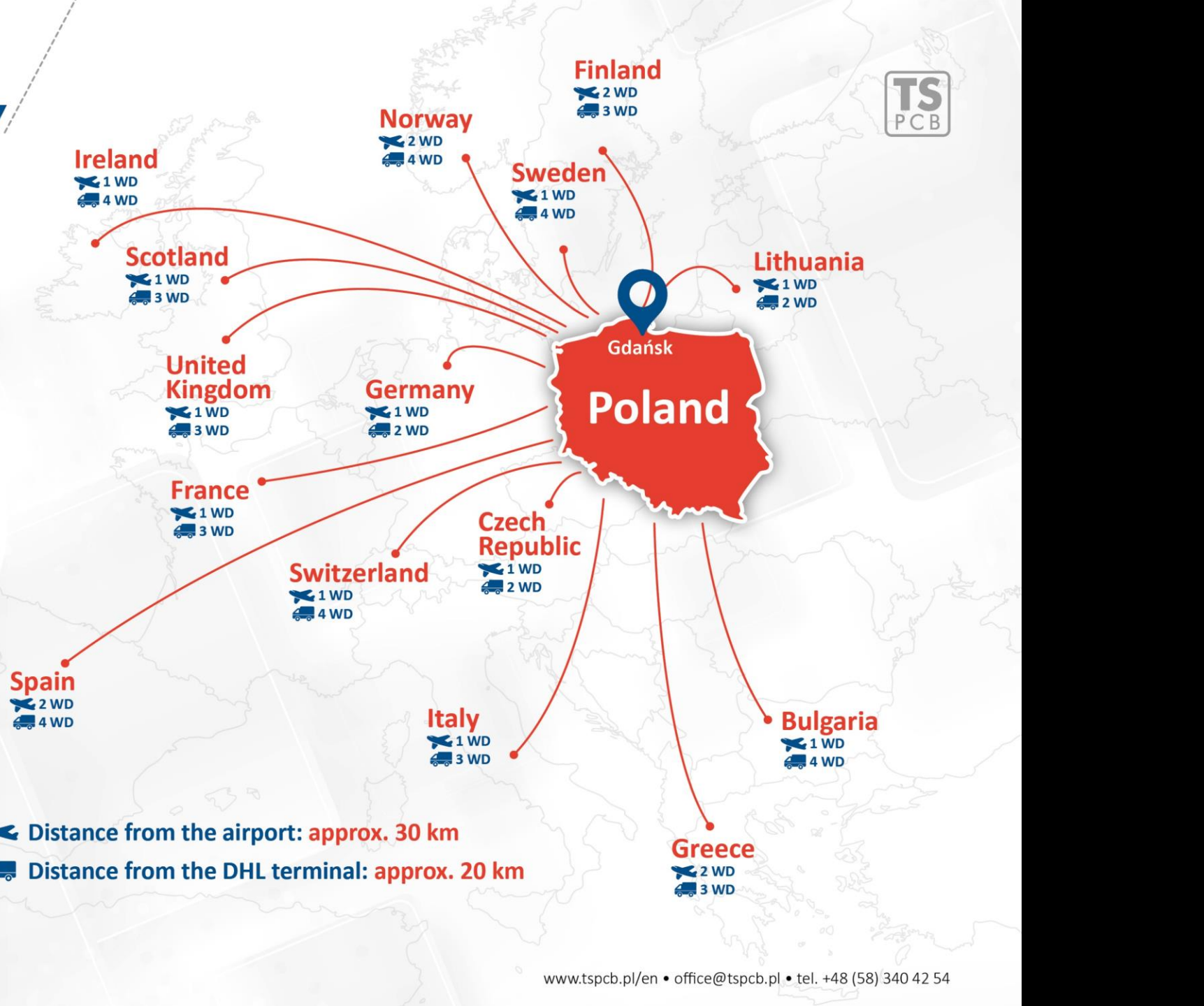
GENERAL INFORMATION

Shipping time





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Benzynowa St. 21
83-011 Gdańsk

Distance from the airport: approx. 30 km

Distance from the DHL terminal: approx. 20 km

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EXPERIENCE

Over 40 years of market experience

1956

Beginnings as student activities (such as production of hula-hoop wheels, elastic ties, management of students' dinners).

1984

Establishment of PCB manufacturing service (now TS PCB).

16.03.1984
Production of the very first PCB called „voltage regulator".

1992

Techno-Service becomes joint-stock company.

1998

Manufacturing plant moves to new buildings at Benzynowa Street in Gdańsk.

2014-2018

Machine park expansion and new machines purchase, for e.g. LEDIA Direct Imaging System, two ATG A5 Neo testers.

2019

Opening of the new part of the plant.

TS PCB

TECHNOLOGY

technology — offer — production — delivery

PCB types:

- **Single-sided PCB**
  - FR-4,
  - ALU MCPCB,
  - Rogers.
- **Double-sided PCB**
  - FR-4,
  - Rogers.
- **Multilayer PCB**
  - FR-4 (up to 8-layers).

Base materials:

- **FR-4**
  - material thickness: 0.2 to 3.2 mm,
  - TG values: 135 (standard), 150 (IS400), 180 (IS410),
  - copper thickness: 18 (single-sided) to 240 µm,
  - CTI: PLC0 to PLC3 (standard),
  - IPC class: 2 (standard), 3.
- **ALU MCPCB**
  - single-sided PCBs without vias plating,
  - material thickness: 0.8 to 3.2 mm,
  - thermal conductivity: 1.3 to 5 W/mK,
  - copper thickness: 35 to 105 µm.
- **Rogers**
  - single-sided PCB for RO3000 series,
  - single- and double-sided PCB for RO4000 series.

Technical highlights:

- surface finish: ENIG, LF HASL,
- blind and buried vias,
- plugged vias,
- colored soldermasks and silkscreen layers,
- depth routing, plated edges and sinkholes, castellated holes, peelable mask,
- certificates: UL ZPMV2 94V-0, research report IK Polish Railway Institute,
- advanced technology:
  - minimal clearance: 3 mils,
  - minimal annular ring: 4 mils,
  - minimal finished plated hole size: 0.15 mm.

TS PCB

TECHNOLOGY

PARAMETER	DESCRIPTION	
Number of layers	1 to 8	
Max. PCB dimensions	463.0 x 576.0 mm for 1- and 2-layer PCB	421.0 x 573.4 mm for multilayer PCB
Min. PCB dimensions	5 x 5 mm (up to 30 x 30 mm PCB must be panelised)	
Base materials	ALU MCPCB; FR4 TG135°C to 180°C, CTI PLC0 to PLC3, Isola 370HR; Rogers RO3000 and RO4000 series	
Base material thickness: single and double-sided	0.2 to 3.2 mm	
Copper thickness	**12 µm / 1/3 oz *** 18 µm / 1/2 oz 35 µm / 1 oz 70 µm / 2 oz	105 µm / 3 oz 140 µm / 4 oz 175 µm / 5 oz 210 µm / 6 oz
Prepregs	106; 1080; 2116; 7628	
Blind and buried vias limits	blind via min Ø=0.15 mm, Aspect Ratio 1:1.2 (drilled), buried via min Ø=0.15 mm	
Min. track width outer layer	0.100 mm / 4 mils (max 18 µm base Cu) **0.075 mm / 3 mils (max 12 µm base Cu) ***	
Min. spacing outer layer	0.100 mm / 4 mils (max 18 µm base Cu) **0.075 mm / 3 mils (max 12 µm base Cu) ***	
Min. annular ring outer layer	0.125 mm / 5 mils **0.100 mm / 4 mils ***	
Min. track width inner layer	0.100 mm / 4 mils (max 18 µm base Cu) **0.075 mm / 3 mils (max 12 µm base Cu) ***	
Min. spacing inner layer	0.100 mm / 4 mils (max 18 µm base Cu) **0.075mm / 3 mils (max 12 µm base Cu) ***	
Min. finished plated hole size	0.15 mm / 6 mils	
Min. outer layer pad diameter	0.25 mm / 10 mils **0.20 mm / 8 mils *** } + selected finished hole size	

*** advanced technology**

TS PCB

TECHNOLOGY

PARAMETER	DESCRIPTION		
Min. annular ring inner layer	4-layer PCB	6-layer PCB	8-layer PCB
	0.125 mm / 5 mils **0.100 mm / 4 mils ***	0.150 mm / 6 mils **0.125 mm / 5 mils ***	0.175 mm / 7 mils **0.125 mm / 5 mils ***
Min. inner layer pad diameter	0.25 mm / 10 mils **0.20 mm / 8 mils ***	0.30 mm / 12 mils **0.25 mm / 10 mils ***	0.35 mm / 14 mils **0.25 mm / 10 mils ***
	+ selected finished hole size		
Min. Cu to board edge clearance (for 1.55 mm FR4 material)	Routing: 0.2 mm, V-cut: 0.4 mm		
Surface finish	ENIG, LF HASL		
Soldermask color	green (standard), black, blue, red, white, yellow		
Soldermask clearance	0.05 mm / 2.0 mils **0.01 mm / 0.5 mils ***		
Solder bridge	0.075 mm / 3 mils		
Milling tolerance	± 0.10 mm **± 0.05 mm ***		
Legend color	white (standard), black, blue, green, red, yellow		
Extra options	blind vias; buried vias; peelable mask; via filling IPC 4761 type III and IV; depth routing; plated edges and sinkholes; castellated holes		
Min. slots and cut-outs	0.5 mm		

*** advanced technology**

TS PCB

OFFER

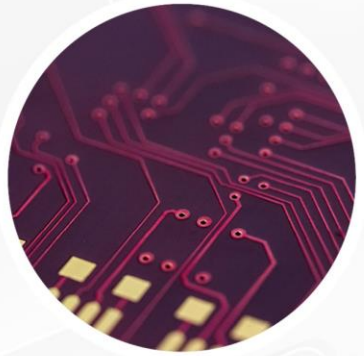
technology — **offer** — production — delivery

TSka Prototype

Fast production and low-cost prototypes on 1 mm and 1.55 mm FR4 laminates.

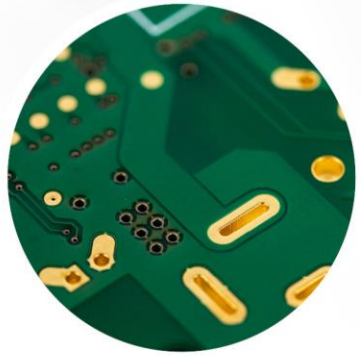
Production batch

Advanced technology, fast delivery.



5LT

Possibility of online ordering with the surface between 1 and 5 m^2 with the lead time of 5 WD.



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MACHINERY PARK

technology — offer — **production** — delivery

Machinery park of: ~3750 m²

Direct Imaging System LEDIA — 1 pcs.	PENTA HAL — 1 pcs.	ULTIM8 probe machine — 1 pcs.	POLA-MASSA brushing machine — 1 pcs.
Milling machines LM2 — 3 pcs.	LOC8 probe machine — 1 pcs.	SCHMID stripping machine — 1 pcs.	CIMS Galaxy AOI Systems optical tester — 1 pcs.
EVOLUTION probe machine — 1 pcs.	SPRINT description printer — 1 pcs.	Screen printing machine Grundig G-Coat 404 plug&coat — 1 pcs.	Optical microsection microscope VHX7000 Keyence — 1 pcs.
Plotter Silver Writer — 1 pcs.	ATG A5 NEO probe machine — 5 pcs.	ENIG plating line — 1 pcs.	Film developing machine Colenta 66 PCB NG — 1 pcs.
SCHMID etching machine — 1 pcs.	Punching machine MIE with a vision system — 1 pcs.	ARGOS automatic optical inspection machine — 1 pcs.	X-RAY RTX112 — 1 pcs.
Pumice scrubbing machine IS Pumiflex SHD/A-A24 — 1 pcs.	Electroplating line — 2 pcs.	OLEC automatic exposure machine — 2 pcs.	MODUL drilling machines — 5 pcs.

Our machine park already has over 200 machines and is still growing

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MACHINERY PARK

technology — offer — **production** — delivery

Ledia 5S

- machine for direct copper and soldermask layers exposure with UV-LED,
- direct print of copper and soldermask images without use of film.

Drills Modul

- maintenance-free linear motors XY with 80 m/min – guarantees high productivity,
- high speed drilling spindles up to 250 krpm,
- toolchain for 2200 tools and intelligent tool management.

OLEC exposure lamp

- process include: inner layer, outer layer, soldermask,
- data collection and real time registration feedback,
- process tolerance control,
- dual trays for optimized production.

Sprint 200 printer

- cost-effective, top quality industrial inkjet printing for a consistently accurate production of even the most advanced legend designs in DotStream Pro Technology,
- advanced LED-based UV for a perfect ink drop pinning on-the-fly.

Tester A5 Neo

- tester has 8 fast moving measuring probes (flying probes) for testing printed circuits with use of the resistance, capacitance and mixed method,
- the production format is located in the draw and tested in the horizontal orientation.

SCM 411 scoring machine

- 2 moving cutters for linear cutting of the printed circuits surface,
- measuring system that uses integrated camera, which enables automatic reference positioning of the mechanical system for circuit diagrams.

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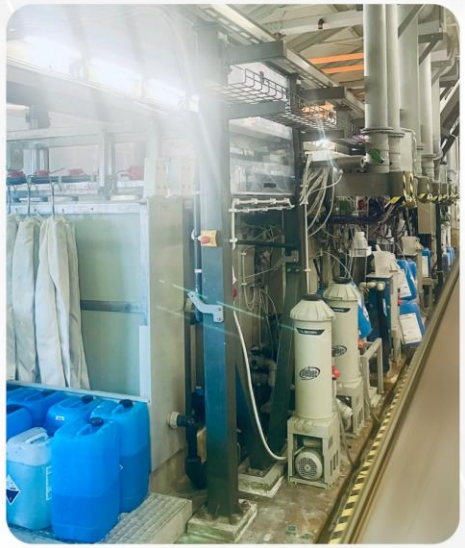
Our latest investments

One of the most important elements of our business strategy is to continuously improve our processes and enhance the quality of our products through regular investments in machinery.

The most important investments in recent years are:



Year 2023:
IGAL electroplating line with Pulse Plating system
Chiller for conductive layers and soldermask
exposure machine OLEC

Year 2024:
HML two vacuum press system for production of multilayer boards
Multibond line for surface preparation of conductive layers in multilayer boards

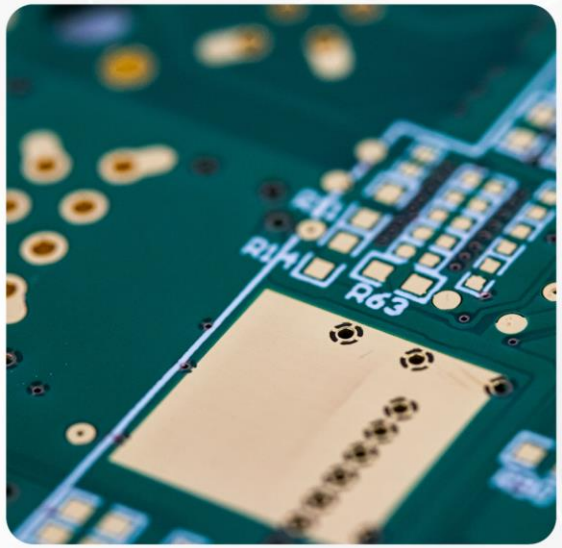
Planned and ongoing investments

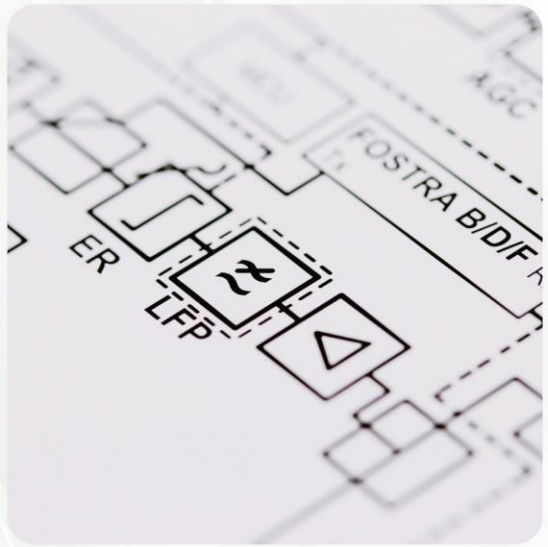
Ongoing investments:

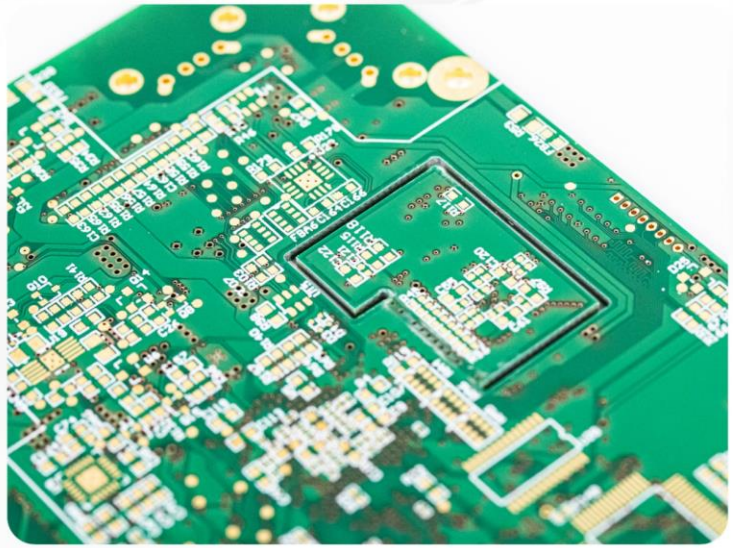
1. Implementation of impedance control
   – planned completion date: Q4 2025
2. Expansion of multilayer circuit offerings to include PCBs with 10 and 12 conductive layers
   – planned completion date: Q4 2025

Investment planned for 2026-2027:

1. Implementation of a new vias plugging process: introduction of plugged type VII vias according to IPC 4761 - vias that are filled all over with dielectric material and then plated with copper (so-called plated covers of filled holes)
2. Increase the efficiency of the mechanical treatment section by purchasing new drilling machines







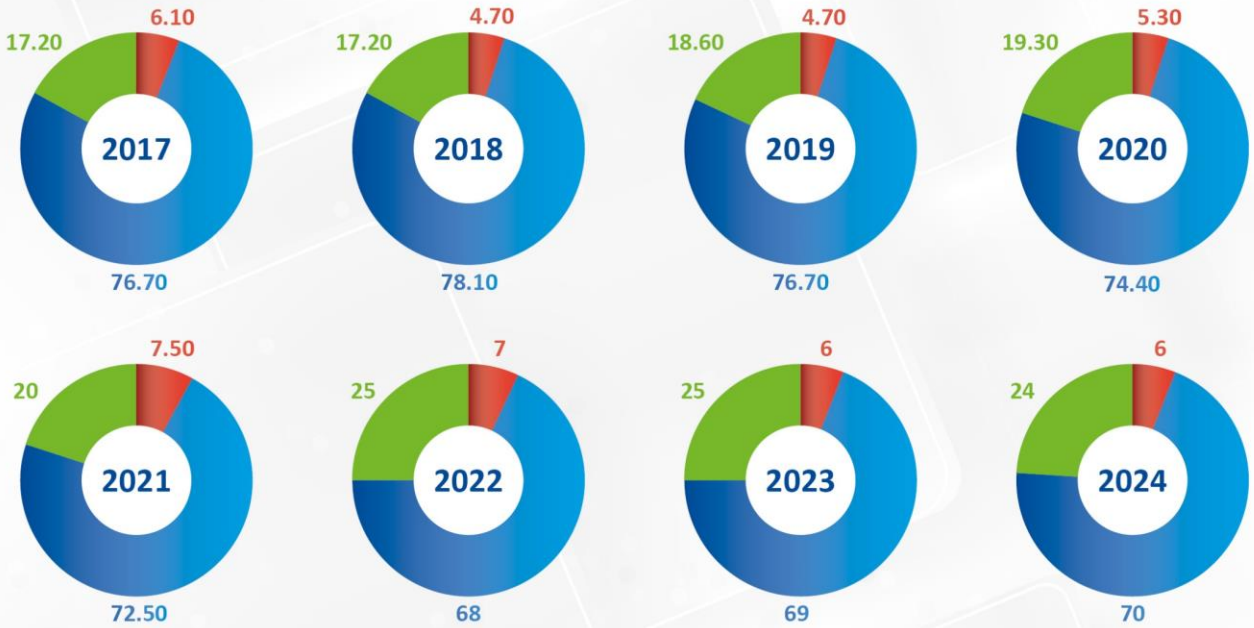
TS PCB

PRODUCTION

technology — offer — **production** — delivery

Single-sided, double-sided and multilayer PCB production in 2017-2024

(% of total sale)



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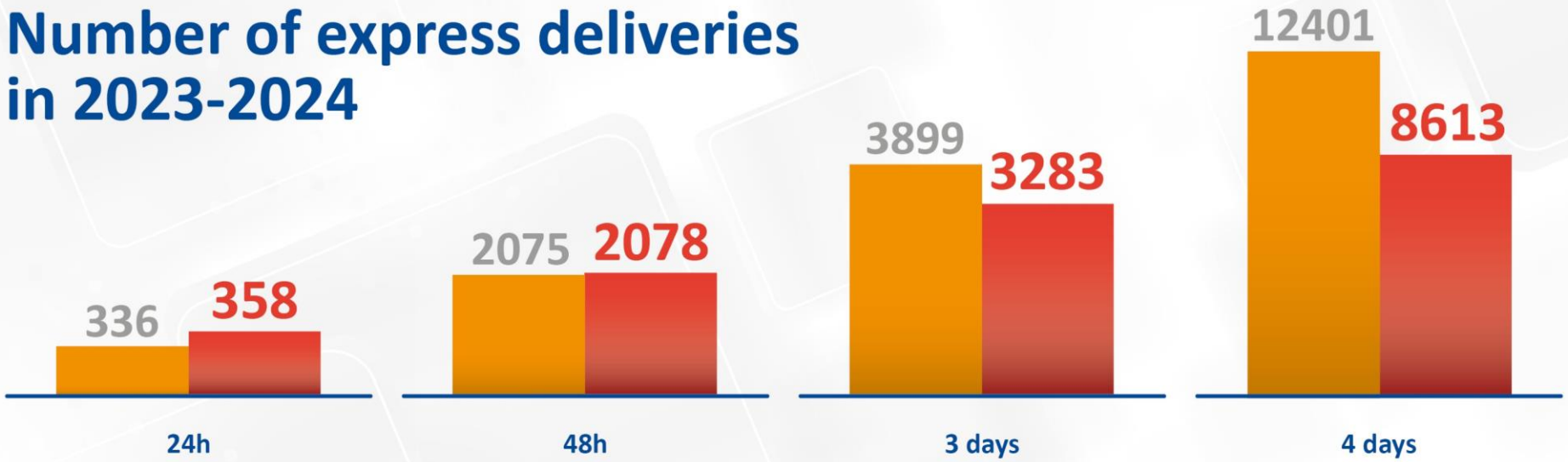
PRODUCTION

technology — offer — production — **delivery**

Number of express deliveries in 2023-2024



Standard delivery:

Production batch

9 days - single- and double-sided PCB,

10 days - multilayer PCB.

TSka prototypes

7 days - single- and double-sided PCB,

9 days - multilayer PCB.

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TS PCB

INDUSTRIES

Solid Client Base

- Test & Measurement
- Medical equipment
- EMS
- PCB distributors
- Rail
- Automotive
- Army
- Telecommunication and data transmission

We cooperate

with over 500 business partners.

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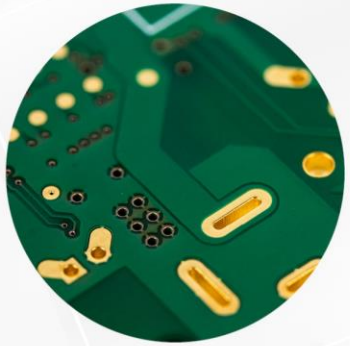
OUR VALUES



Experience

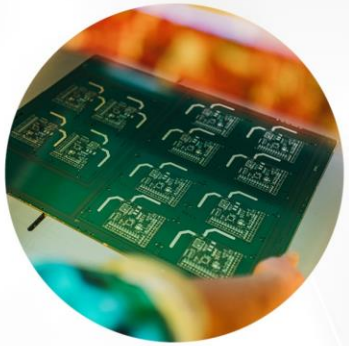
Over 40 years
of market experience

Quality

Advanced
Technology

Customer-oriented approach

Flexibility in customer
service



Production

Constant investments
in machinery park

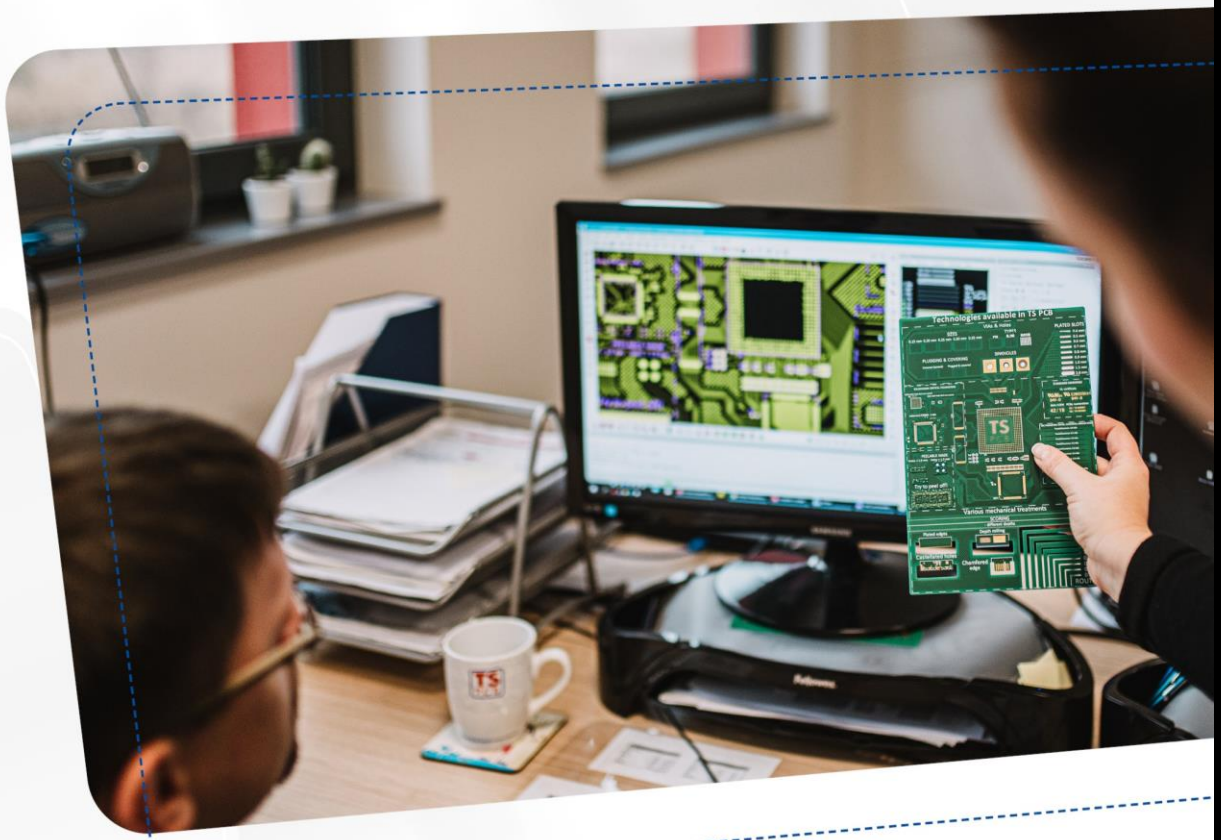
Expert knowledge

Technical client
support

OUR VALUES

Pro Client **values**

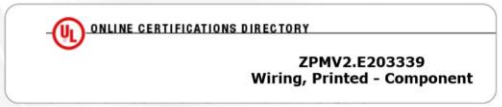
- Support during end-to-end production process,
- fast offers,
- express delivery terms,
- complex services based on cooperation with EMS companies,
- on-line service:
  - prototypes calculator,
  - client account on website,
  - client order tracking.



Production **values**

- Constant production optimisation (processes and products quality supervision),
- Quality management system ISO 9001:2015, ISO 14001:2015.

Certificate
ISO 9001:2015
ISO 14001:2015.



Flammability certificate UL
- Underwriters Laboratories Inc., USA.

Flammability IK Polish Railway Institute Report.

We are members of:

IPC

IPC - Association Connecting Electronics Industries

TS PCB

EXPERT KNOWLEDGE

Sharing our expertise
https://tspcb.pl/blog

We organise trainings
on the optimisation of the printed
circuit boards design and their production
process with elements of IPC-A-600H standard.

We support our clients at each and every stage of order realisation
(Customer Service Office and CAM support).

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IN NUMBERS

100 people	~3750 m²	3000 m²	24000
Our team	Machinery park	Production capacity in 1 month	Number of express deliveries in 2024

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Thank you!

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