Advanced Engineered Solutions

A Global Leader in

Specialty Chemicals
Surface Finishing Equipment
Engineered Powders
Analytical Controls
About Technic

- Technic is a privately held, global company with a belief in innovation and employee empowerment
- Approximately 900 employees worldwide
- Strong financial resources and stability
- Various ISO 9000 approved facilities
- A strong commitment to new product research & development
- Annual Sales volume in excess of $400,000,000
About Technic – *Company History*

Technic is a Rhode Island, USA based private company

- Family owned since inception
- Incorporated in 1944
- Original focus of the business was precious metal supply to the decorative/jewelry industry in the Providence, RI area

Expansion into the electronics industry in the 1950s

Technic has grown to be a leading global supplier of:

- Specialty Chemicals
- Surface Finishing Equipment
- Engineered Powders
- Analytical Control Systems
About Technic - Technic Business Units

- Corporate Headquarters / Specialty Chemicals / Precious Metals, Cranston, RI, USA
- Equipment Group: Pawtucket, RI; Clearwater, FL; and Singapore
- Engineered Powders: Woonsocket, RI, USA
- Plating Services: Suzhou, China
- Semiconductor Applications Lab: Anaheim, CA USA
- Ultra-Pure Chemicals: Paris and Chalon, France
- Metal Concentrates (SCS): Royersford, PA, USA
- In addition, regional sales & service offices provide representation in all major markets
About Technic – *Acquisitions* (Partial list)

1992 – Handy & Harman *(Metal Powders & Flakes)*
1992 – Am. Chemical & Refining *(Silver Salts, Precious Metals)*
1996 – Baker Bros., Micro-Plate *(Reel-to-Reel, Hoists, Web & Wide Strip)*
1997 – Lektrachem Ltd. *(Coventry, England, Process Chemistry)*
1997 – Sotrachem *(St. Denis, France, Process Chemistry & Equipment)*
1998 – Italgalvano s.r.l. *(Milan, Italy, Process Chemistry & Equipment)*
2008 – Air Liquide Hydrogen Peroxide Division *(Semiconductor Chemistry)*
2008 – Kushner Electroplating School *(Technical Training)*
2009 – Metfab *(Equipment)*
2013 – Kemesys *(Semiconductor Chemicals)*
About Technic – *Corporate Offices* Cranston, Rhode Island 80,000 ft² (7,432 m²)

- Executive Offices
- Product Managers
- Accounting
- Inside Sales
- Accounts Payable
- Marketing and Communications
- Human Resources
- IT
- Operations
- Client Meeting Rooms
- Video Conferencing
- Training Facilities
About Technic – **R&D, Chemical Manufacturing** Cranston, RI, USA 120,000 ft² (11,148 m²)

- R&D Laboratories
- Applications Engineering Laboratory
- Analytical Lab
- Quality Control
- Chemical Manufacturing
- ISO Certified Facility

Technic supplies proprietary chemicals and precious metals to over 500 customers globally.
Chemical Manufacturing, R&D, Sales & Service Offices
Rhode Island, Illinois, California, Texas, New York, Canada, Hong Kong, China (2), Taiwan, Singapore, Korea, Japan, Malaysia, Philippines, France (4), Germany, Italy, England
Technic Worldwide

Engineered Powders Division - Woonsocket RI
Technic Worldwide

Plating Services Division
Suzhou, China
Technic offers a wide range of electroplating products for semiconductor applications, including:

Cu, Ni, Sn, Sn/Ag, Au, Au/Sn

Commercialized under the *Elevate*® product family

Applications lab for plating demonstrations (Cranston, RI)

Prototype, small run contract plating line (Anaheim, CA)
Semiconductor Materials - Specialty Chemicals-FEOL, BEOL & Advanced Packaging
Cranston, RI, Paris, FR, Grenoble, FR, Anaheim, CA

Specialty chemicals for critical aspects of the semiconductor manufacturing process

- **TechniClean**: PER removers, PCMPC, ink remover, debonding, etc.
- **TechniStrip**: Liquid resist and laminated film strippers
- **TechniEtch**: Selective barrier, seed layer, stack etchants
Semiconductor Materials – Ultra Pure Chemicals-FEOL, BEOL
Paris, Chalon Sur Saone, Rousset, France

Facility and Operation
- Supplier to the semiconductor industry since 1978
- Acquisition of Air Liquide divisions in 2008
- Acquisition of Kemesys in 2013
- Clean room manufacturing from 1 to 1000 liters

Products
- Chemicals for FEOL and BEOL semiconductor manufacturing: Acids and blends, $\text{H}_2\text{O}_2$, Solvents
Technic’s Advanced Technology Division (ATD) focuses on R&D, process integration, marketing and application support of Technic’s advanced imaging and specialty chemical products.

Technic Advanced Technology Division (ATD)
Plainview, New York  8,000 ft² (743 m²)
Technic’s Engineered Powders Division (EPD) manufactures metal powders and flakes for the photovoltaic, electronics, electrical, jewelry, aerospace, and medical industries. This Division provides powders and flakes for a wide range of applications including PV pastes, conductive adhesives, shielding inks, and electrical contacts. The Division’s products are sold and distributed throughout the U.S., Asia, and Europe.
Applications

- Solar Cells
- LED Lighting
- Touch Screen Display
- Hybrid Electronics
- Electrical Contacts
- Conductive Elastomers
- Antiseptic Products
- EMI/RFI Shielding / Gasket Materials
- Diamond Grinding Wheels
- Conductive Inks, Pastes and Adhesives
- Conductive / Reflective Coatings
Technic operates three equipment manufacturing facilities worldwide;
- Technic Equipment Division (TED)
- Surface Finishing Technologies (SFT)
- Technic Future Automation (TFA)

Processes supported include;
- Electroplating
- Anodizing
- Cleaning
- Electropolishing

Each location offers engineering, fabrication, assembly and service departments. Each group shares core competences, while each takes a lead role in specific equipment configurations.
Automated Hoist Systems (rack and barrel – for all applications)
Reel-to-Reel Plating Systems
SBE™ Systems (patented) for chip capacitors/resistors, small parts > 80 lines sold
Medical Device Manufacturing tools – highly automated processing
Miniature Plating Systems for Lab or Pilot Production
Semi-Automatic and Manual Lines
Surface Finishing Technologies (SFT) – Clearwater, FL 40,000 ft\(^2\) (3,716 m\(^2\))

- MP200 Roll-to-Roll Plating Systems for flexible circuits
- CDP2000 Selective Plating Systems
- MP100 Vertical Continuous Plating Systems for PCB’s
- SEMCON Plating Equipment for silicon wafers
- MP300 Continuous Plating Systems for loose parts plating
- TechniSol Solar Cell Plating Equipment
- Custom roll handling and automated loading equipment design
- Plating clip, rack, and fixture design
Leading Asian producer of cut strip surface finishing equipment for the semiconductor packaging market

Plating (Sn, Ni/Pd/Au) / Mold adhesion enhancement / Deflashing application > 300 lines sold globally

Cleaning system for Semiconductor & Solar Industry

Current focus is surface finishing tools for the advanced packaging market in Asia

Recent expansion in capabilities for high speed (> 10 ASD) Vertical Cu Electrodeposition System
Technic offers a full line of electroplating bath analyzers, from a fully automated, in-tank system (RTA3D – Real Time Analyzer) to a bench-top (EBA - Electroplating Bath Analyzer) unit. Technic monitoring systems combine the power of AC and DC voltammetry with the state of the art chemometric approach.

- **Technic RTA3D**
  - Fully Automatic On-line Chemical Analysis
  - More than 200 units in operations globally

- **Technic EBA3D and Elevate Analyzer**
  - Manual Bench-top Analytical Equipment
Technic’s Industry Leadership

- Currently Technic is the #1 supplier of precious metal plating processes in North America (Silver, Gold, Palladium, Platinum, Rhodium, Ruthenium)
  - > 400 gold process customers
  - > 300 silver process customers
- Technic EPD is the world’s largest supplier of Ag powder for PV applications
- Leading edge surface finishing equipment design
  - First high-speed cut strip “magazine-to-magazine” plater (>300 units)
  - MP-100/200 reel-to-reel flex circuit board plater (>100 units)
  - Spouted Bed Electrode (SBE) plater for MLCC (>80 units)
  - SEMCON wafer metallization benches
- Automated Bath Analysis - Real Time Analyzer equipment (>200 units) for semiconductor wafer Cu plating, EBA for PWB and electronic component markets
- Leading edge chemistry for “green” manufacturing, including non-cyanide precious metal processes
- Technistrip, TechniEtch, Elevate series of semiconductor processes
Field Service and Support

- Substantial global assets in support of complex manufacturing initiatives
- Troubleshooting of chemical, electrical, mechanical or control problems
- No-charge analytical and metallurgical analysis*
- Available service personnel 24 hrs./day, 7 days/week – through our worldwide service network
- Proactive customer service program
  - Process / line audits before installation
  - Startup review with engineering & mfg. departments
  - Technical personnel training in chemistry / equipment
  - Ongoing preventive maintenance programs
- Regular system performance audits and adjustments
- Ongoing commitment to on site customer support

*To qualified customers
Service & Technical Support Infrastructure

**North America**

*Customer Service Labs in six locations*
- Cranston, RI; Plainview, NY; Dallas, TX; Chicago, IL;
- Anaheim, CA; Toronto, Canada
- >20 technical field support personnel

**Europe**

*Customer Service Labs in five locations*
- Coventry, UK; Paris, France; Grenoble, France; Milan, Italy;
- Solingen, Germany
- >15 technical field support personnel

**Asia**

*Customer Service Labs in seven locations*
- Yokohama, Japan; Seoul, Korea; Hong Kong, China; Suzhou, China;
- Donguan, China; Taipei, Taiwan; Singapore
- >50 technical field support personnel
Technology Overview

- Development of innovative technology is and always has been the heart of Technic
- Technic holds a significant IP position (US and overseas patents and proprietary formulations/designs) in electroplating chemistry, equipment design, and related fields
- Technic performs fundamental R&D and materials process development in six (6) global locations:
  - Cranston, RI, USA
  - France / 2 Sites (Semiconductor)
  - Plainview, NY, USA
  - Woonsocket, RI USA (Engineered Powders)
  - Hong Kong (Applications Engineering / R&D)
- Product availability and support from UK, Italy, and joint development partners
- Technic has prepared for the future by investing heavily in R&D infrastructure, technology development, and support capability, while competitors are downsizing
Technology Overview

- Technic employs a staff of over 90 high level scientists and engineers working in research, product characterization, and materials/equipment engineering.

- Equipment List includes:

  AFM, SEMs, EDX, ICP/MS, ICP/AES, Ion Chromatography, UHPLC, HPLC, GC, GC/MS, AA, ICP, UV/VIS, FTIR, RTA, EBA, CVS, XRD (outside service), TGA, TMA, DSC, chemical synthesis and reaction vessels, surface tension analyzers, solderability testers, reflow ovens, wetting balances, wear and contact resistance testers, ductility and elongation test equipment, viscometers, conductivity testers, cross sectioning equipment, surface profilometers, etc.

Large variety of lab scale and prototype process application equipment for many applications.

- Applications Engineering Lab in Hong Kong
Technic’s Continued Commitment to Innovation

- Internal formulation of advanced metallization, electroplating, imaging, engineered powders, photoresist stripping, and ancillary processes/products.
- Licensing or joint development programs
  - **Stapleton Technologies** – *Wafer level packaging tools and chemistry*
  - **Technic Italy (Italgalvano)** – *Industrial finishing processes*
  - **Arizona State University** – *solar LIP tools and processes*
- Product development and application specific equipment development.
- Collaboration with leading research universities (MIT, Arizona State, Hong Kong Polytechnic, Harvard, Fraunhofer, others)
- Technical support on a global basis.
- Integration of plating processes, analytical controls, and equipment for complete solutions to our customers’ processing requirements.
Technic’s Strengths

- Advanced Engineered Systems
- Technology Innovation
- Superior Technical Support
- Global Infrastructure
- Flexibility
- Global Manufacturing Capabilities
- Leading Edge Process Performance
Thank you