



Think Inside The Box

Precision Fluid Handling for Ultrapure Environments

TREBOR[®]

Semiconductor
Flat Panel Display
Hard Disk
MEMS
Solar PV
Optoelectronics





“High Purity.” “Increased Throughput.” “System Uptime.”

Trebor International has been speaking the language of the microelectronics industry for more than 25 years. Yet, as a single part of IDEX Health & Science, Trebor’s innovative and proven product line still only **suggests** the fluidic resources now available to process and equipment engineers.

IDEX Health & Science combines names well-known in the analytical and life sciences where the need for precision and chemical compatibility equals that of semiconductor device manufacturing.

Think Inside The Box

We’re always thinking about what’s inside the box so you don’t need to. Our number-one priority is to free your mind to focus on the big picture of yield improvement, system uptime, and throughput optimization instead of worrying about your critical manufacturing equipment—the “box.”

As IDEX Health & Science, we’ve turned the box inside-out so you can see our broad array of system-enabling components, technologies, and capabilities. Whether your box is a chemical-delivery system, slurry-dispense module, wet-process station or other sub-system—we have high-purity fluid-handling solutions that achieve your big picture objectives.

From manufacturing and materials expertise to high-volume assembly, and industry-leading cleaning and quality practices, IDEX Health & Science is uniquely positioned to solve even the most demanding fluidic integration challenges—Inside The Box.

Brands of IDEX Health & Science include:

Eastern Plastics™ manifolds and precision machined components

Gast® air motors, compressors, and vacuum pumps

Innovadyne™ nanoliter and microliter liquid handling devices

Ismatec® peristaltic pumps, advanced microprocessor controllers, and drives

Isolation Technologies™ advanced column hardware and HPLC accessories

Jun-Air® ultraquiet, clean-air compressors

Micropump® gear and micro-annular gear pumps

Rheodyne® high- and low-pressure fluidic valves

Sapphire Engineering™ precision dispense pumps, ultrahard materials, and flow cells

Semrock® optical filters for fluorescence, Raman spectroscopy, and laser systems

Systec® vacuum degassing and debubbling systems

Trebor® ultra-high purity chemical pumps, mixers, and liquid heaters

Upchurch Scientific® tubing, fittings, and customized assemblies



Products & Capabilities

Air operated diaphragm pumps

Gear pumps

Peristaltic pumps

Pulsation dampeners

Pump and system diagnostics
using fiber optic sensors

Chemical dosing

Fluidic manifold assemblies

Chemical sampling valves

Subsystem integration

Chemical Delivery

We Know Chemical Delivery

As the industry-leading supplier of air-operated diaphragm pumps for the delivery of critical process chemicals, we understand your requirements for reducing contamination risk, dealing with high system pressures, integrating control and diagnostics, and producing the reliability that helps to eliminate line-down situations. Your highest priority is to protect the product you are making as well as the equipment making it. That's why more and more leading-edge fabs and chemical delivery OEMs are standardizing on Trebor-brand pumps.

Product Solutions

Because you demand purity, all of our air-operated double-diaphragm chemical pumps are constructed with virgin PTFE and PFA materials in the liquid path; no coated-metal parts, no reground material, and no elastomer O-ring seals to introduce unwanted sources of contamination.



Innovative free-floating diaphragms help provide unparalleled pump life, typically exceeding 100 million cycles between service intervals—more than 6x the nearest diaphragm-pump competitor. Smart-logic control valves ensure no-stall operation and reliable performance in high back-pressure applications.

To give you complete control of your system operation, we offer a variety of chemical line surge suppressors, pump controllers, and fiber optic sensors for comprehensive performance and diagnostic capability.



Our pump technology offering is one of the broadest in the world. Whether you need precision chemical dosing, consistent metering for inline blending or batch transfer, pulse-free pumps for plating, or portable plug-in pumps for lab use, we have what you need. Give us a call!





Products & Capabilities

Air operated diaphragm pumps

Peristaltic pumps

Pulsation dampeners

Pump and system diagnostics
using fiber optic sensors

Chemical dosing

Fluidic manifold assemblies

Chemical sampling valves

Subsystem integration



Slurry Handling

Slurry Shouldn't be a Dirty Word

The settling, abrasiveness, and agglomeration tendencies of some slurries can wreak havoc on slurry delivery-system components and CMP process results. When system uptime is critical, you want components you can count on for long life and easy maintenance.

How do you prevent your slurry from abusing your equipment? You can't. That's why we engineer our products to withstand the rigors of slurry handling. Orifices are smooth and oversized, slurry traps are avoided, and our products are simple and easy to service to provide you with low cost of ownership.



Product Solutions

When pumps are your desired method of delivering slurry to the fab, we are here to help. With flow rates of 10 – 100 L/min, our air-operated diaphragm pumps can maintain the system pressure you need and provide the service life you expect.

Plus, because we know that buying your pump is only part of the cost, Trebor pumps are designed for easy maintenance or service for lower overall cost of ownership.



Innovation never stops for us. That philosophy is reflected in the revolutionary pulsation-free SL20 pump designed specifically for slurry. Cross-phase discharge™ drives two independent pump chambers in overlapping strokes to deliver smooth flow to your CMP equipment. Oversized orifices and crevice-free flow paths reduce shear and result in exceptional pump life. Users commonly report two or more years between service!



Precision peristaltic pumps



Products & Capabilities

Point-of-use DI water heating

Inline chemical heating

Chemical pumps for batch or spray process

Pulsation dampeners

Gear pumps for solvent and plating

Chemical dosing

Pump and system diagnostics using fiber-optic sensors

Pressure-relief devices

Onboard air compressors and vacuum pumps

Fluidic manifold assemblies

Chemical sampling valves

Liquid degassing

Subsystem integration



Wet Etch & Clean

We Hear You!

High temperatures, aggressive chemicals, unwanted contamination, system downtime—these are headaches that wet-process engineers deal with on a daily basis. Understanding the “voice of the customer” is what drives us. That’s why IDEX Health & Science products are chosen for the most demanding applications.

Product Solutions

For the most rigorous processes, discriminating OEMs choose our patented DI water and chemical heating technology for precision temperature control and the fastest heat-up available in the industry.

Critical wafer and substrate cleaning operations require ultrapure chemical pumping solutions that are compact, reliable, easy to integrate, and pose no contamination risk. We have what you need.



- Our award-winning, Trebor® Maxim series pumps set a new benchmark for reliability in ultra-critical, high-temperature applications.



- Need accurate dosing for your chemical bath or blend tank? Our Sapphire Engineering™ precision dispense piston pumps are your solution.



- When pulseless flow and quiet operation are needed, our Micropump® gear pumps are just the ticket. These pumps are proven performers in solvent and plating applications.



Machining

- Machining capabilities up to 9 axis
- Ultra-close tolerances to +/- 0.000005"
- Surface finishes of 16 micro inch or better
- Holes as small as 102 μm in plastics and 178 μm in metals
- Long, straight holes with aspect ratios up to 100:1
- Squares, hexes, contours and other difficult-to-turn features

Fluoroplastic Design

- PTFE, PFA, PVDF, FEP, ETFE, and others
- Extensive material selection expertise
- Molding, forming, machining, welding
- Sealing methods
- Cleanroom processing

Ultra-hard Materials

- Sapphire, Ruby and ceramic
- Tolerances to 0.000010 inches, 0.25 μm
- Surface finishes down to 0.25 micro inch, 0.006 μm Ra
- Outside- and inside-diameter finishing
- Flat lapping and polishing

Fluid Heating

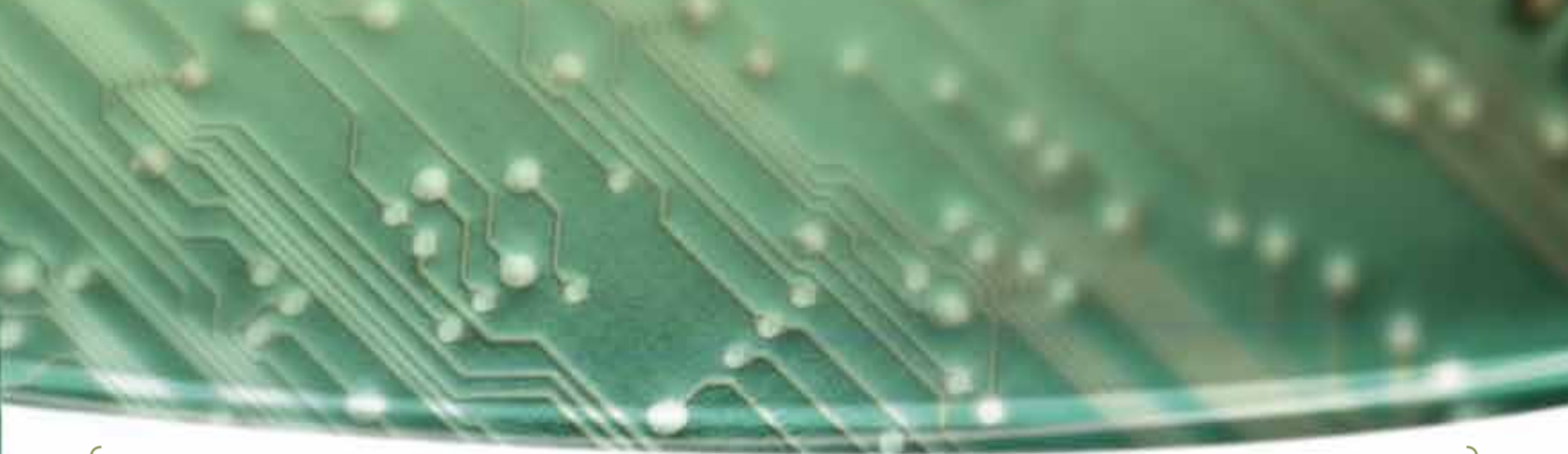
- Patented thin-film-on-quartz heating elements
- Ultra-high-purity DI water heating
- Inline acid heating
- Minimizes bacterial growth and particulate generation
- Maximizes system uptime

Manifolds

- Custom fluidic manifolds and assemblies
- Chemically resistant materials
- Multiple bonding technologies
- Saves space by consolidating plumbing
- Increases system reliability with fewer connections

Pumps

- Air-operated diaphragm pumps
- Gear pumps
- Peristaltic pumps
- Precision dispense pumps
- Vacuum pumps and air compressors



Technologies



Machining



Fluoroplastic Design



Ultra-hard Materials



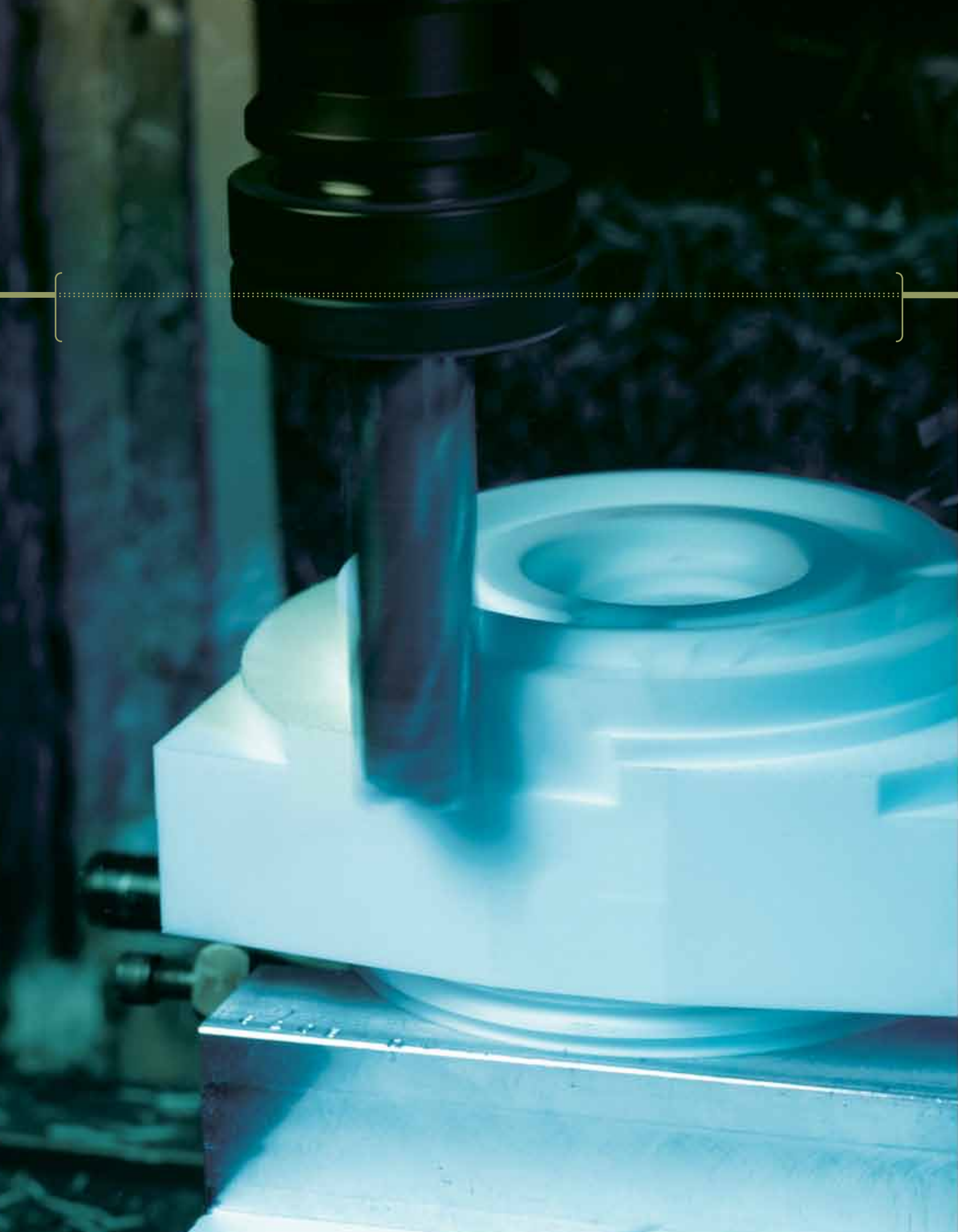
Fluid Heating



Manifolds



Pumps



Capabilities

Manufacturing

- Precision injection molding
- Insert molding options
- Tubing extrusion, including multilumen
- Custom material compounding
- Machining, grinding, lapping, honing, polishing
- Cleanroom assembly, kitting, and packaging
- Process management for critical part cleaning and traceability compliance
- High-volume manufacturing
- Process optimization tools for asset management, cost reduction and high quality production
- Quick turnaround on production and R & D parts

Materials

- Engineering thermoplastics
- High-performance fluoroplastics
- Sapphire and ceramics
- Most other engineered plastics
- Stainless steel, titanium and metal alloys
- Performance-enhancing surface coatings
- Patented, proprietary processes and long-term strategic partnerships with materials suppliers

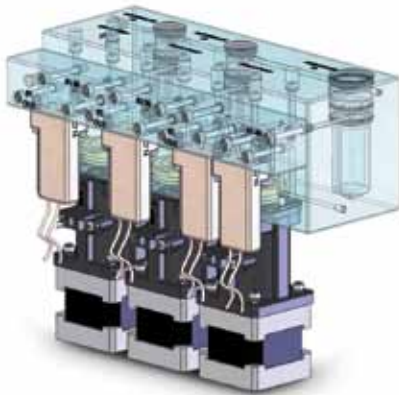
Technologies

- Custom fluidic system and component development
- Integration of liquid and gas handling technologies
- Ultra-pure fluid heating technology
- Broad range of pump technologies
- Fused, multi-layered manifolding
- Pump microcontroller and drive development
- Ceramic and polymer shear valve technologies
- Software/hardware interface expertise
- Pneumatic technologies
- Ultra-hard materials processing for durability and compatibility
- Liquid degassing
- Chemical vapor, flame and mechanical polishing
- Micro- and nano-fluidic technologies
- Rigorous program management for integrated system development



3-D Modeling

Our engineers utilize state-of-the-art 3-D modeling software for advanced part design to quickly validate system form and fit.

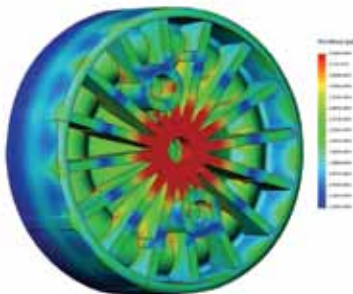


Six Sigma

When problems arise and the solutions aren't so obvious, our team of certified Six Sigma Black Belts go to work to analyze the data, identify the issue, then implement and control the fix.

FEA & CFD

Finite Element Analysis and Computational Fluid Dynamics ensure that parts are designed right the first time.



Cleaning Processes

OEM-authorized cleaning methods backed by rigorous third-party testing to validate effectiveness.

Cleanroom Assembly

Multiple cleanroom locations for critical part manufacturing, product assembly, and packaging means parts arrive ready to use.

Rapid Prototyping

In-house fused deposition modeling equipment produces prototype parts in hours instead of days or weeks to speed product development time.



ISO 9001:2000

For quality management in meeting the high-purity demands of semiconductor manufacturing, many IDEX Health & Science business units are registered to ISO 9001:2000 standards.

Lean/Kaizen

Our businesses employ the latest lean manufacturing practices to drive continuous improvement in cost containment and product quality.

Trademarks

The following Trademarks and Registered Trademarks appear in this brochure:

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Cross-phase discharge™ is a Trademark of Trebor International.

U.S. Patents

7,134,849 • 7,081,602 • 7,021,062 • 6,957,952
6,749,331 • 6,695,593 • 6,674,053 • 6,663,914
6,580,061 • 6,554,583 • 6,479,094 • 6,433,319
6,402,486 • 6,106,246 • 5,979,477 • 5,971,402

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