

6	Thermal Products	159
6.1	General Information	160
6.2	Designing Heated Systems	163
6.3	Heater Jackets & Flange Insulators	164
6.4	Gas Line Heaters & Insulators	168
6.5	HCS-Series Heaters	169
6.6	Heater Controllers, Thermostats & Accessories	170

7	Chambers & Weldments	171
7.1	General Information	172
7.2	Guide to Vacuum Chamber Design	175
7.3	Bell Jars, Feedthrough Collars & Baseplates	178
7.4	Surface Analysis Chambers	179
7.5	GEC Reference Cell	180
7.6	Custom Weldments	181
7.7	Vacuum Chamber Gallery	182

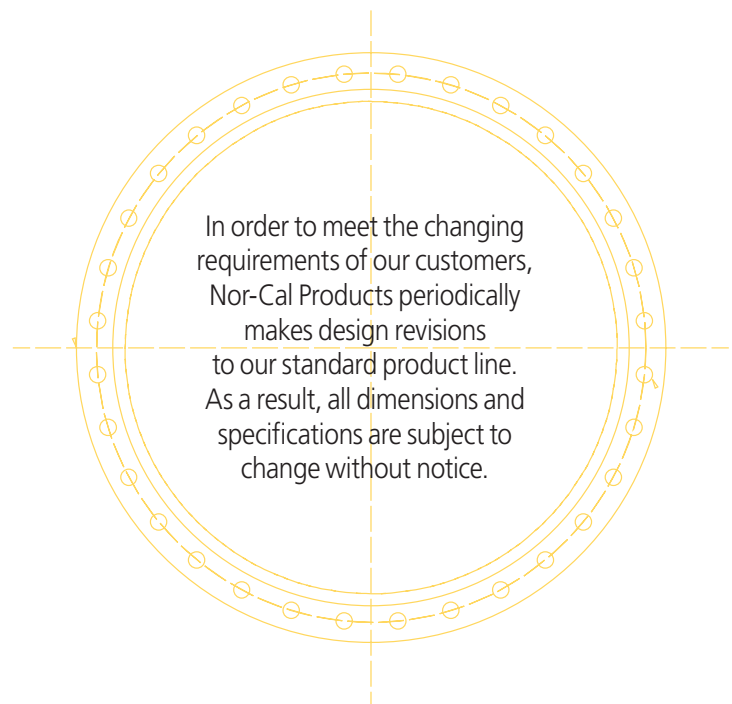
8	Viewports, Shutters & Glass Adapters	183
8.1	General Information	184
8.2	Viewports & Weld Stubs	185
8.3	Glass Adapters & Viewport Shutters	186

9	Sample Transfer & Manipulation	187
9.1	General Information	188
9.2	Sample Transfer System & Load Lock Chamber	190
9.3	Add-A-Doors	191
9.4	Manipulators, Stages & Translators	192
9.5	Utility Hat & Alignment Gimbals	194
9.6	Rotary Motion Feedthroughs	195
	Linear Motion Feedthroughs	197
	Linear/Rotary Motion Feedthroughs	198
9.7	Wobble Sticks	200

10	Liquid & Electrical Feedthroughs	201
10.1	General Information	202
10.2	Liquid Feedthroughs	203
10.3	High Voltage Insulators	205
10.4	Electric Feedthroughs	206

11	Thin Film Deposition	209
11.1	General Information	210
11.2	Deposition Monitors & Oscillators	211
11.3	Crystal Feedthroughs	212
11.4	Crystal Sensors	213
11.5	Cables, Connectors, Crystals & Accessories	214

12	Index & Order Information	215
12.1	Alphabetical Index	216
12.2	Model Number Index	218
12.3	Regional Contacts	228
12.4	Order Information & Warranty	229
12.5	Patents & Trademarks	230





Nor-Cal Products

The Vacuum Experts



Nor-Cal Products, Inc. serves Siskiyou County, California as one of the largest local employers. Joined with Pfeiffer Vacuum, we are approximately 3000 strong globally, and committed to be your source for vacuum solutions.

Our Heritage

Nor-Cal Products, now a division of Pfeiffer Vacuum Technology AG, has interesting origins that date back to 1948 when the company's founder began manufacturing pumping stations for the dairy industry in far Northern California in the shadow of Mount Shasta. We love it here and invite you to visit us anytime!

Incorporation occurred in 1962 and fabrication of stainless steel flanges, fittings, and custom components began to exclusively serve the emerging vacuum science industry. With a strong knowledge of welding, machining, forming and cleaning stainless steel, Nor-Cal Products quickly become the premier supplier to industrial equipment manufacturers, universities and national laboratories.

Nor-Cal Products coauthored the specification for vacuum fittings at Lawrence Livermore National Laboratory that became the standard for vacuum component manufacturers. In 1978, our first product catalog was released in a strong business climate. Today, we remain a premier source for custom chambers, weldments and over 6000 standard components, offering one-stop shopping for almost every vacuum application. Our commitment to providing consistently high quality components and exceptional customer service continue to make us a preferred supplier for OEMs, and industrial and research end users.

We are a vacuum solutions provider and offer our vacuum science and industry expertise to the benefit of our customers' production and research goals and timelines. During 1998, Nor-Cal Products began the design of downstream pressure control valves and controllers that could reduce time to pressure setpoint and increase tool throughput with over 100,000 control resolution steps and a 20x speed increase. The system was granted patents in 2004, 2005 and 2010 and remains critical to semiconductor manufacturers, OEMs, and other UHV applications. We continue to develop new component lines and services to serve the demands of the exciting and ever emerging applications that require vacuum components.

In 2007, a low-cost region manufacturing facility was established in Vietnam, allowing the Yreka manufacturing headquarters to focus on complex customs while offering great pricing on standard components. In 2019, in partnership with Pfeiffer Vacuum, we are proudly expanding our Vietnam manufacturing facility to over three times its current size to better serve our growing global customer base. Nor-Cal Products continues to increase its global investment and footprint as a leading supplier of chamber critical products and vacuum manufacturing technologies. We proudly support the vacuum science community through memberships and sponsorships to benefit the American Vacuum Society (AVS), Society of Vacuum Coaters (SVC), Association of Vacuum Equipment Manufacturers (AVEM) and Semiconductor Equipment and Materials International (SEMI).

Nor-Cal Products' corporate office and manufacturing facility located in Yreka, California and will be undergoing expansions this year. Sales and service offices are located in San Jose, California; Nashua, New Hampshire; and across Europe, China, the Asia-Pacific, and Korea. We look forward to serving you!



Mt. Shasta is a majestic 14,180 ft. dormant volcano, less than an hour away from Yreka, California, home of Nor-Cal Products.

A Partner to Industry & Research

Innovative Engineering / R&D

New Product Development

Master Machinists & Welders

Exceptional Global Customer Care

Superior Technical Support

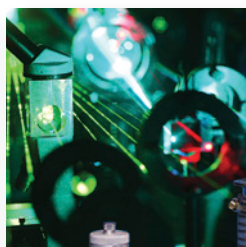
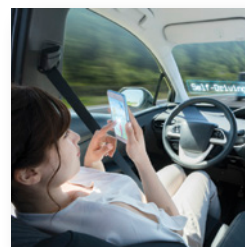
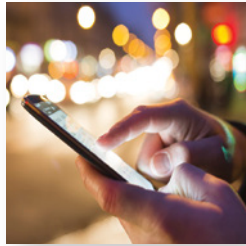
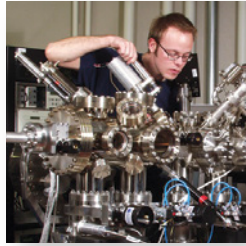
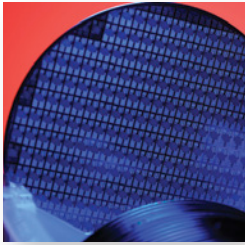
Meticulous Quality Assurance Standards & Procedures

CMM & RGA Inspection

ASME U Stamp BPVC Certified

ISO 9001:2015 Certified





High and ultra-high vacuum components for industry and research

Over the years, Nor-Cal Products' customer base has evolved along with the industrial and research processes and applications that require vacuum. We understand well that even the smallest component can be critical to the integrity of your process or application. Therefore, it is our responsibility to ensure that every component - whether a small flange, valve, or large custom chamber, is exceptionally engineered, manufactured and inspected before shipping. While our components are competitively priced, their true value is measured in their performance and your trust in us.

Our components are used in almost every phase of semiconductor processing. We are a preferred supplier to semiconductor and compound semiconductor equipment manufacturers, also supplying mechanical contractors during fab construction. Industrial and academic researchers are frequent purchasers of standard, modified standard and custom components for physical, chemical and electrochemical experiments.

Markets Served

High Vacuum Processes

Semiconductor - Etch, MBE, PVD & PECVD

Data Storage & Internet of Things

Compound Semiconductor & LED

Energy & Aerospace

Flat Panel Displays & Sensors

Nanotechnology & Engineered Materials

Surface Analysis & Research Applications

Life & Health Sciences Development

Vacuum Pump Manufacturing

Instrumentation Manufacturing

Thin Film Deposition - OLED & LCD



Flanges, Fittings & Hardware

Our flanges are made from 304 stainless steel material, which is specially processed to reduce impurities, grain size and microscopic leak paths. They are available in all commonly used high and ultra-high vacuum flange types, including ASA, NW (ISO-KF), ISO, CF and wire seal flanges. We also offer EVAC chain clamps, tapered flanges and metal seals to convert a high vacuum NW flange to ultra-high vacuum.

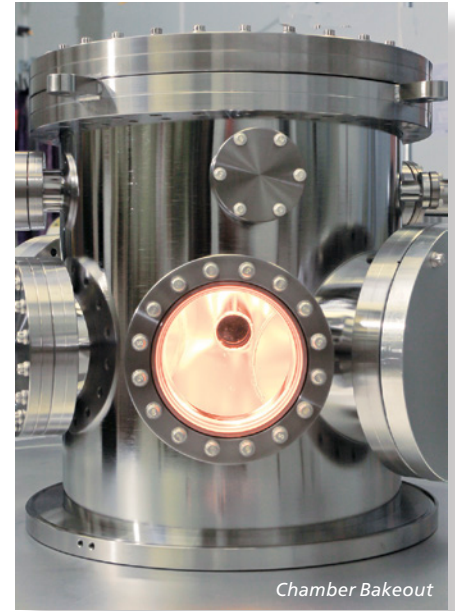
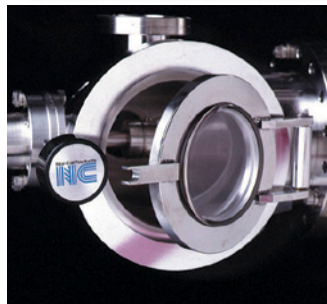
Fittings are available with or without flanges. Weld fittings (without flanges) are typically sold to mechanical contractors for use during the fit up phase of new fab construction. Nor-Cal Products provides a broad range of adapter fittings in order to connect two dissimilar types of components. They are made from 304 stainless steel and are TIG welded, cleaned and leak checked for vacuum service.

Flexible stainless steel hose is available in three thicknesses to accommodate many applications and bend radius requirements. Nor-Cal Products' flexible couplings have more convolutions than comparable products, resulting in greater flexibility and lower spring rates. Plasticized PVC hoses can be used as a low cost rough vacuum line.

Our electrical feedthroughs are manufactured from ultra-high vacuum grade materials, such as high alumina ceramic insulators, OFHC copper and nickel conductors, and 304 stainless steel flanges. Types include thermocouple, instrumentation, medium current, high current, BNC, and MHV feedthroughs.

Liquid and liquid nitrogen feedthroughs are available with or without industry standard Cajon, VCR or Swagelok fittings.

Choose from a complete line of UHV compatible flanged viewports, weld stub viewports and viewport shutters. Shutters prevent buildup of process materials on the inside of the viewport window. Glass adapters are useful for mounting glass accessories to metal high vacuum systems, or to attach flange mounted components to glass systems.



Isolation Valves

Nor-Cal Products offers vacuum isolation valves for a broad range of sizes, pressures and applications. Our pneumatically actuated poppet valves are standard on semiconductor equipment because of their robust design and edge-welded AM 350 stainless steel bellows, which provide full-opening conductance. Copper seal bonnet and manual all-metal valves are available for UHV applications. N-Series and Genesis modular valves were designed specifically for semiconductor equipment that require million-cycle reliability, small footprint and low-cost soft start and heating options. Additionally, Nor-Cal Products provides traditional linear as well as low-particulate pendulum style gate valves for isolation of high vacuum pumps and UHV chambers. We now also offer a selection of leak valves, manual butterfly valves and pneumatic and manual ball valves.

Intellisys Pressure Control Components

Intellisys adaptive pressure controllers and throttle valves reduce time to pressure setpoint, while increasing tool throughput with over 1,000,000 control resolution steps and a 20 times valve speed increase.

- Sealing and non-sealing butterfly valves are available with or without on-board control.
- Throttling pendulum valves provide unequalled pressure control as well as isolation for large bore high vacuum pumps.
- Heated and unheated capacitance diaphragm gauges and heater jackets are available as options.



Welding foreline trap

Foreline Traps

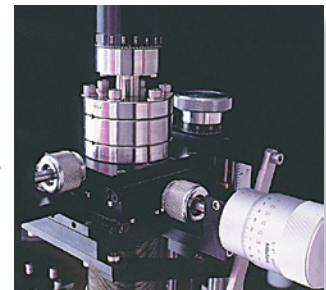
Our traps range in complexity from sealed coaxial traps, which prevent mechanical pump oil from backstreaming to the chamber, to the three-stage LPCVD TEOS trap. We have the largest selection of standard traps, which utilize woven metal, polyester or fiberglass gauze; molecular sieve; a liquid nitrogen reservoir or water-cooled coils to remove contaminants from the vacuum system or chamber.

Thermal Products

Silicone foam and fiberglass insulated heaters with thermostat or PID control are available to heat our components to temperatures up to 200°C. Typical applications are downstream from CVD or metal etch systems, where unreacted by-products condense on the inside of the vacuum lines, valves and other components. Our thermal engineers can provide entire turn-key heater/control systems for the process tool manufacturer or fab installation.

Thin Film Deposition

Nor-Cal Products thin film monitors, crystal sensors and feedthroughs, represent those most commonly used for thermal deposition processes. A variety of feedthrough configurations with NW or CF flanges are available for single or dual crystal sensors, with or without water-cooling and pneumatic shutters. Our standard monitor measures film thickness and rate or frequency from two independent channels.



Sample Transfer & Manipulation

Our sample transfer and manipulation devices offer the researcher a series of complimentary components that are manufactured for demanding UHV bakeouts and environments.

Standard components include XYZ precision manipulators, magnetic linear/rotary feedthroughs, rotary motion feedthroughs, differentially pumped rotary seals, sample transfer systems, alignment gimbals and rotary wobble sticks.

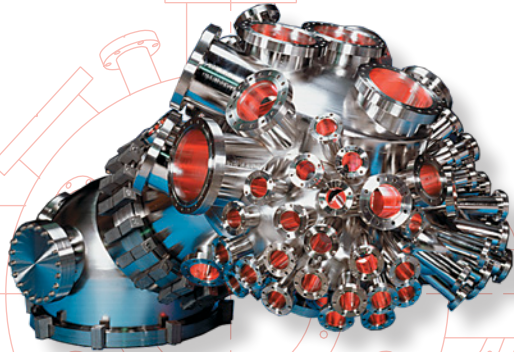


Heated foreline system



Nor-Cal Products

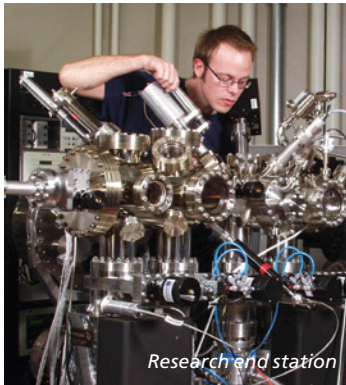
Custom Components & Capabilities



Custom Chambers & System Integration

We have developed a reputation at national laboratories, universities and UHV equipment manufacturers for being the premier vacuum chamber fabricator. The quality, appearance and performance of our chambers are unequalled. Our engineering staff can design a chamber from customer sketches or specifications and supply complete manufacturing drawings for customer approval.

On request, Nor-Cal Products assembles entire systems including chamber, frame, pumps, gauges, valves, manipulators and other components to customer specifications. Our vacuum technicians can complete a thorough qualification of system performance, including time to base pressure and RGA scan, before the system is back-filled with nitrogen and shipped to the customer.



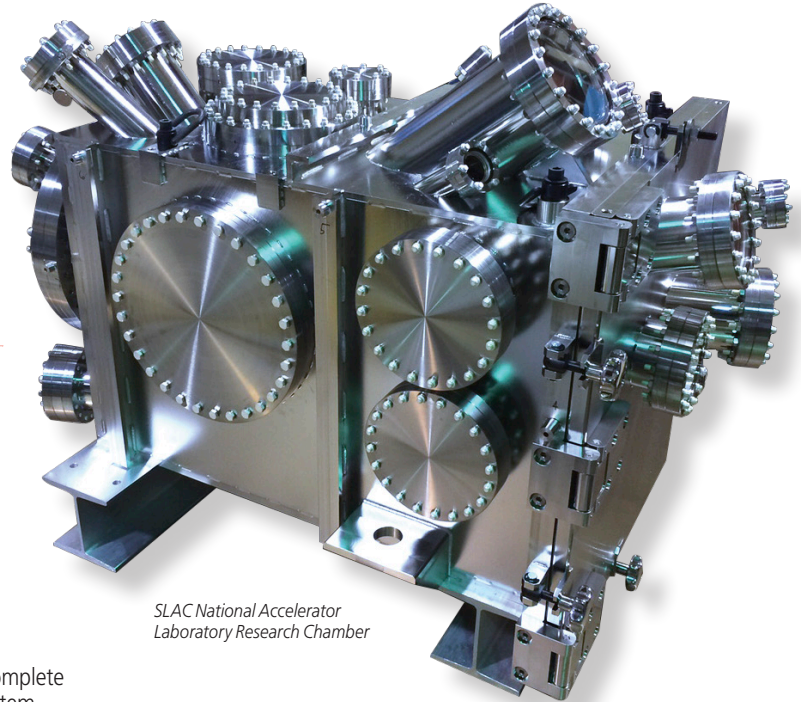
Research and station

Weldments

Nor-Cal Products manufactures tees, elbows and other weld fittings in-house, making fabricating exhaust weldments for semiconductor equipment from a single piece of tubing possible. Welds and other manufacturing steps are eliminated, improving cleanliness and fit while reducing cost. We have demonstrated as much as 30% savings to our customers using this technique.



Custom Manifolds and Weldments



SLAC National Accelerator Laboratory Research Chamber



System integration



Water-cooled / particle trap for CVD

Comprehensive Downstream Solutions

Our experience coupled with a broad product offering enables us to integrate components, providing comprehensive solutions to semiconductor fabs and equipment manufacturers. To improve overall system performance and achieve customer defined goals, a thorough evaluation of the system is conducted. A cost of ownership model can be provided showing payback as a result of increased tool utilization and decreased planned and unplanned maintenance costs.

Traps, thermal products, weldments and isolation and pressure control valves can be integrated as turnkey foreline modules. Thermal and vacuum characterization can be performed at Nor-Cal Products before the assembly is supplied leak checked, blanked off and clean room packaged.

Process Specific Foreline Traps

We have years of experience designing and building custom foreline traps to protect pumps and eliminate buildup of condensable by-products in forelines and exhaust lines. Examples of these include water cooled and particle traps for LPCVD/TEOS, PECVD, metal CVD, MOCVD and metal etch. Others are particle traps for crystal growers, liquid traps for reclamation of photo resist and oil reclamation traps for industrial applications. Often times our customers see a 200% increase in preventative maintenance intervals after the installation of one of these traps.

Nor-Cal Products

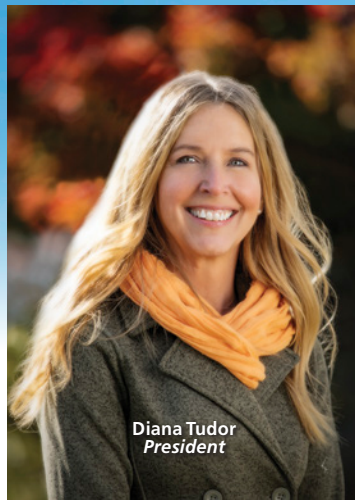
Mission Statement



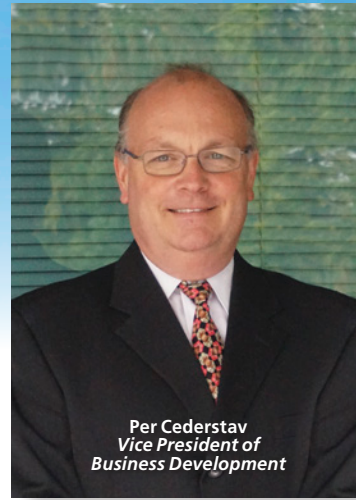
OUR MISSION To provide high quality, innovative vacuum products dedicated to the advancement of science and technology.

OUR VISION To be the first choice supplier of vacuum products, to consistently grow faster than our competitors, and to have the reputation of being a great place to work.

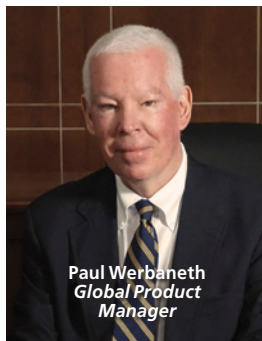
OUR VALUES Nor-Cal Products delivers confidence. Exceptional customer service is our culture. Every employee contributes to our success. Positive attitudes are infectious. Give respect and earn respect.



Diana Tudor
President



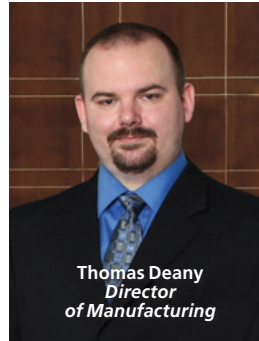
Per Cederstav
Vice President of
Business Development



Paul Werbaneth
Global Product
Manager



Bob Butterfield
Director
of Engineering



Thomas Deany
Director
of Manufacturing



Lisa Campbell
Marketing
Manager



Nor-Cal Products

Customer Satisfaction & Technical Support

Your satisfaction is our most important goal

Nor-Cal Products' global customer service and sales specialists, sales managers, product managers and technical support teams stand ready to provide prompt, honest answers to your component and application requirements, answer technical questions, and recommend components for your particular vacuum application. Your satisfaction is our most important goal.

Our experience designing and manufacturing industrial and research vacuum process equipment make Nor-Cal Products a preferred source for the design and manufacturing of comprehensive solutions to optimize application performance, decrease downstream preventative maintenance intervals, and increase application throughput. Our sales engineers, technical support experts, and stocking distributors are located strategically around the world and stand ready to serve your vacuum component needs.

Allow us to earn your trust . . . one order at a time.



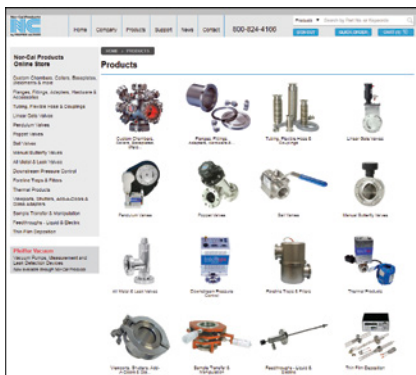
www.n-c.com

Nor-Cal Products' easy to navigate website is your 24/7 source to order over 6000 standard components, download catalogs, component and services information, 3D models, operator's manuals, and training videos.

Visit www.n-c.com to find corporate and industry news, component and service spotlights, our trade show schedule, and register to receive an occasional newsletter and follow us on LinkedIn. Request a Quote, Return Material Authorization, Ask a Question, and Request a Catalog online forms are located at the bottom of every page. All inquiries are directed promptly to the appropriate personnel.

Our large global sales and technical support teams look forward to hearing from you! Chances are we have a sales engineer located near you. Easily access their contact information from the CONTACT tab at the top of every page.

Thank you for your patronage!



Back L to R: Monica Coupens, *Inside Sales Manager*; Julie Styers, *Inside Sales Specialist*; Sarah Slabaugh, *Inside Sales Specialist*; Vanessa Walton, *Inside Sales Specialist*; Rachelle York, *Inside Sales Specialist*; Front L to R: Tami Kohlmann, *Inside Sales Specialist*; Logan Koher, *Inside Sales Specialist*; Melissa Jensen, *Inside Sales Specialist*



Back L to R: Jim Crowley, *Business Unit Manager*; Todd Wilkins, *Business Unit Manager*; Paul Werbaneth, *Global Product Manager*; Steve Greuel, *Sales Manager for Research & University Markets*; Front L to R: Adriane Fiorucci, *Business Unit Manager*; Donovan Rogers, *Business Unit Manager*;

“The value of our components is measured by their performance and your trust . . .”



Bob Butterfield, Director of Engineering discussing chamber fabrication details with Kevin Smith and Linda Fiorucci, advanced engineering specialists

Engineering

Nor-Cal Products innovative and experienced engineering staff can design custom components from customer specifications, sketches or drawings and oversee production with in-house tooling and equipment. Our customers benefit from the combined experience of our engineers, whose input during the design phase often results in cost savings during production and a superior product. For our customers who do not have drafting personnel available and require a complex assembly, we will provide complete CAD drawings for approval upon receipt of order.

Our engineering department employs the latest versions of SolidWorks™ drafting and solid modeling software. Drawings and specifications may be emailed to our engineering department at ncsales@n-c.com or submitted online at www.n-c.com.

Acceptable file formats are IGES, SAT and STEP. You may also request CAD drawings and download 3D models of our most commonly used standard components from our website.

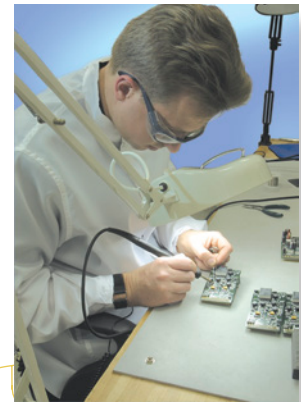
Research & Development

In addition to developing new standard products and improving existing ones, our Research and Development departments design and test customer specified products for equipment manufacturers. Nor-Cal Products in-house research and development facility has prototype machining capabilities.

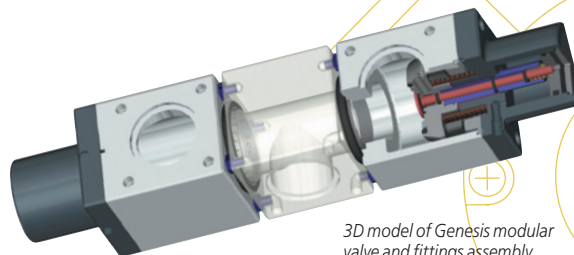
We can also perform pressure, conductance and thermal characterization as well as software and electronic development and testing.



3D modeling of foreline trap



Calibration of Intellisys adaptive pressure controllers



3D model of Genesis modular valve and fittings assembly

Precision Machining

Exceeding your expectations is our goal. Nor-Cal Products employs machining procedures that are consistent with good UHV practices. Machine coolant is sulfur free to reduce outgassing. All components are designed to minimize entrapments, which cause virtual leaks under vacuum. Master mechanics using state-of-the-art CNC machining equipment produce parts with consistently high quality.



Ball pulled ports

Nor-Cal Products pulls ports for fittings, weldments, trap and valve bodies and weldments. This eliminates sharp inside corners that can entrap contaminants, and allows faster pump-down and lower outgassing. Nor-Cal Products can pull ports for 1/2 to 8-inch (12.7-203.2 mm) diameter tubing, while holding the true position of the port within .030 inch (0.762mm).



In-house
CNC tube
bending for
weldments fabrication

Nor-Cal Products employs a CNC tube bender to form 1/2 to 2 inch (13-50mm) diameter elbows and custom exhaust weldments. This allows us to quickly make multiple compound angle bends in a single piece of tubing, while holding .010 inch (0.254mm) tolerance between two bends.

Alternate methods of fabrication require welding of several prefabricated parts, resulting in greater incidence of leaks and cumulative tolerance buildup. Using our method, welds and other manufacturing steps are eliminated, improving cleanliness and fit while reducing cost.



Our master welding and machining teams take pride in applying their experience with aluminum and stainless steel fabrication to the unique requirements of industrial and research applications that utilize vacuum science

Stainless Steel & Aluminum Welding

GTAW fusion welding is used exclusively for a vacuum-tight metal bond. Purging with an inert gas reduces or eliminates oxygen entrapment and carbide precipitation, which cause outgassing. Whenever possible, welds are made on the inside or are full penetration to eliminate entrapments and virtual leaks.

Inert environment orbital welding is also available for full penetration flange-to-tube bonding. Orbital welding can be performed on any length tube with diameters from 1/8 to 2 inches (3-50mm).



Orbital welding



CNC vertical lathe



CNC Machining Center with dual spindles, live tooling and robotic gantry



Highest Grade Materials

Nor-Cal Products uses only the highest grade materials for the manufacturing of vacuum components. Vapor pressure, corrosion resistance and permeability are important considerations taken into account during the material selection process. We start with select grade 304 stainless steel tubing, spheres or roll-ups to fabricate the vacuum vessel. If required, 304L, 316, 316L or 316LN can be supplied. Normally our standard material is in the low carbon range for 304. Flanges and baseplates are made from 304 that has been specially treated to remove impurities inherent in 300 series steels. Special UHV flanges 4 1/2 inches (150mm) OD and smaller can be made from 304 electroslag remelt (ESR) bar stock. ESR is a refining process that produces stainless steel with higher purity, fewer inclusions and more uniform grain structure to eliminate microscopic leak paths.

Our standard flange material is certified to meet ASTM A-240 and has less than 0.01% sulfur to prevent sulfur stringers. Grain size is 3 to 6 per ASTM E-112. Maximum inclusion size is 2.5 per ASTM E-45. As specials, 304L and 316L material can be supplied in roll-forged rings.



GTAW fusion welding



CNC machining center

An independent study ranked Nor-Cal Products number one in price and availability out of the five major vacuum component manufacturers.

Orders for stock items received in the morning can be shipped that afternoon. Guaranteed overnight delivery is available throughout the continental United States from our corporate headquarters, and also from our stocking distributors' locations. Exceptional service has won us many loyal customers who have had an assembly line down and been surprised to find that we would weld, clean, leak check and ship a non-stock item the same day.

Nor-Cal Products employs a lean manufacturing technique that combines bottleneck management and KANBAN with traditional MRP for production scheduling and capacity planning. Small lot sizes and standardized routings maximize scheduling flexibility and increase visibility of jobs in the manufacturing stream, while reducing manufacturing cycle time.

Over the years, we have added in-house capabilities, such as chemical cleaning and electropolishing, in order to eliminate dependence on outside suppliers. Additionally, this has allowed us to shorten lead times and reduce overall manufacturing costs.



Cleaning

All stainless steel parts are passivated in a light acid solution to remove weld scale and oxide. A biodegradable detergent is used to remove machine lubricants before the parts are washed and rinsed with deionized water. Special cleaning recipes can be provided to customer's specifications. Chemical cleaning is typically used for production parts such as valve bodies or "process critical" parts fabricated for semiconductor equipment manufacturers. The component is immersed in a series of controlled chemical baths before deionized water rinse and filtered hot air dry. Chem cleaned parts are immediately packaged in sealed clean room bags.



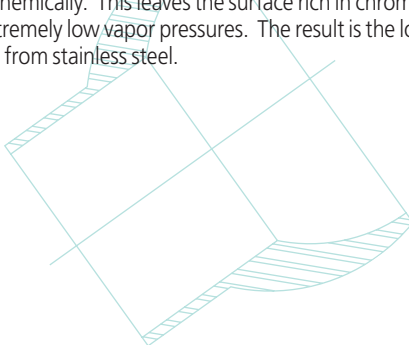
Chem cleaning vacuum chambers

Surface Treatment

Nor-Cal Products offers tumbling, bead blasting, chemical cleaning and electropolishing of vacuum components in-house. Tumbling in ceramic media deburrs components, such as weld fittings, while providing a uniform finish. Glass shot cleans, hones, polishes and peens while removing scale. Some customers request bead blast on exterior surfaces with electropolish on the interior.

Electropolishing is by far the most desirable cleaning process for stainless steel vacuum components. This electrochemical process benefits the finished part in a number of ways simultaneously. Deburring, passivation and stress relieving are achieved while the machine produced surface roughness is eroded. Electropolishing attacks the microscopic "peaks" of the surface more rapidly than the "valleys", thereby maintaining critical dimensions while improving surface finishes. Normally .0003 to .0004 inch (0.008-0.01mm) is removed to lower the microfinish from 32 to 8 RMS. Electropolishing results in a 90% friction decrease over a similar microfinish achieved mechanically, while surface area is reduced by a similar amount. This is most important for vacuum chambers because it produces faster pumpdown and higher conductance.

In addition to improving the mechanical properties of the surface, iron is removed electrochemically. This leaves the surface rich in chromium and nickel, which have extremely low vapor pressures. The result is the lowest outgassing rates possible from stainless steel.



Electropolishing vacuum chamber





Pendulum valve leak testing in Class 1000 clean room



Large Chamber leak testing after mechanical inspection on chamber qualification test bench



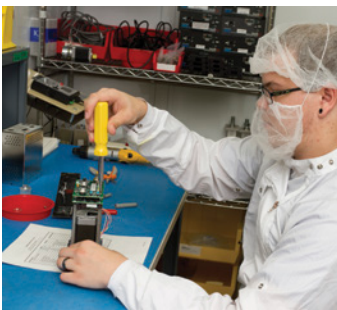
Clean room storage of valve subassemblies



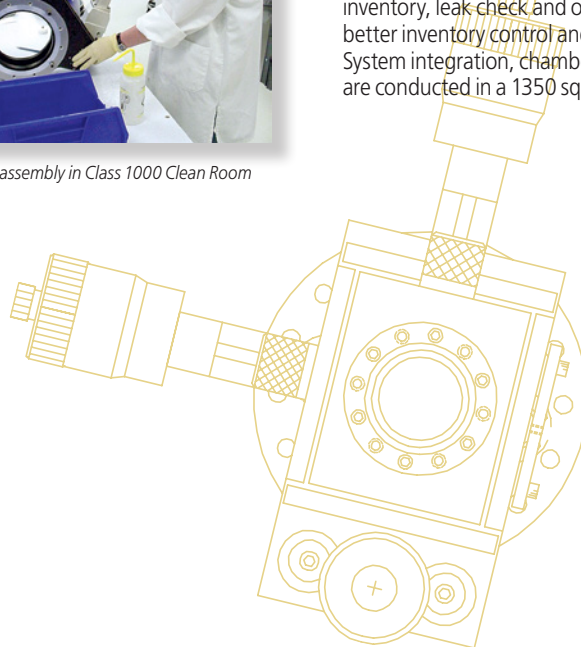
Valve assembly in Class 1000 Clean Room

High priority is placed on controlling and improving our manufacturing process

Nor-Cal Products has two clean rooms for assembly and packaging of semiconductor valves, UHV systems and components. Pressure control and isolation valves as well as sample transfer and manipulation devices are assembled, leak checked, tested and packaged in a 2500 square foot Class 1000 clean room, which is subdivided into five areas for assembly, inventory, leak check and other testing. This allows greater visibility, better inventory control and compresses assembly lead times. System integration, chamber final assembly, testing and packaging are conducted in a 1350 square foot Class 1000 clean room.



Controller assembly in cleanroom.





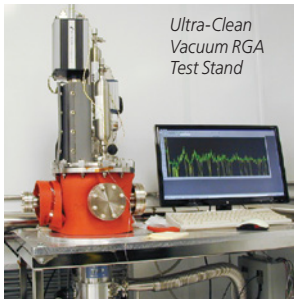
Nor-Cal Products

Quality Assurance

Exceeding your expectations is our goal

Periodic defect analysis results in process improvements with narrower acceptable limits on subsequent production runs. Nor-Cal Products' quality system is ISO certified, SSQA certified and MIL-Q-9858 and MIL-I-45208 compliant.

Every weld is leak checked with a helium mass spectrometer to insure a leak rate of 1×10^{-9} mbar ls^{-1} He or less. Our chamber qualification test benches, which contain vacuum pumps, gauges, RGA, quartz heaters, nitrogen back fill and a leak detector are used on components requiring lower leak rates. Once water and other background are eliminated by the 150°C bakeout, we can provide customized scans to detect the slightest contamination enabling us to attain the highest possible cleanliness for your application.



Ultra-Clean
Vacuum RGA
Test Stand

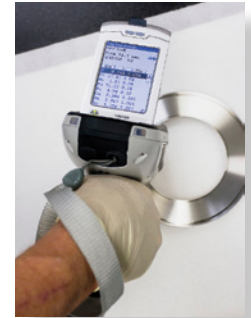
At Nor-Cal Products, nearly all custom weldments and vacuum chambers receive a final coordinate measuring machine (CMM) inspection to confirm that port lengths, flange centerlines, theoretical targets and other features are within dimensional tolerances. A portable CMM, with a 2.5 meter reach, is used to perform in-process inspections of large chambers while still on the machining center to increase machine center utilization and eliminate manufacturing bottlenecks.

ASME U Stamp Certification

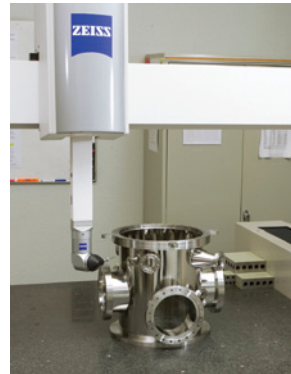
Nor-Cal Products is ASME U Stamp Certified. Stamped components are fabricated to the latest edition of the ASME BPV Codes. The ASME BPVC Certification Program conforms to the rules governing the design, fabrication, materials, assembly, and inspection of boiler and pressure vessel components during construction. ASME certification is recognized in the United States, Canada and an estimated 100 countries around the world.



Manual CMM (coordinate measurement machine) inspection



XRF inspections provide precise chemical makeup of materials



CNC CMM (coordinate measurement machine) inspection



In process inspections with portable CMM

We build quality into our components and customer confidence into our service.

All Nor-Cal Products employees take responsibility for our "quality ethic." While quality improvements are implemented by senior management, each employee builds quality, service and productivity into their particular responsibilities. Nor-Cal Products use of statistical methods in manufacturing, training programs and continuous improvement of equipment are evidence of our commitment to our goals of excellence and accountability.

Our Quality Assurance guidelines and goals are:

- to eliminate defects by reducing process variables relating to manufacturing.
- to foster an atmosphere of cooperation with customers and suppliers.
- to foster creative solutions to our industries' manufacturing problems.
- to deliver 100% customer satisfaction and the best possible customer service.



Dry leak detector for valve inspection

Thank you for your interest in Nor-Cal Products.

We'd appreciate the opportunity to discuss your next project!