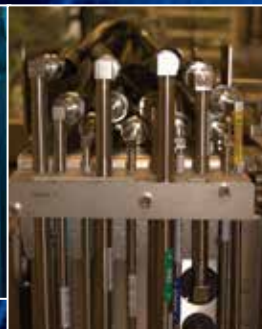


Ultra-High Purity Gas Handling Solutions...
MATHESON's Advanced Technology Center



Equipment. Gas. Purification.



MATHESON

ask...The Gas Professionals™



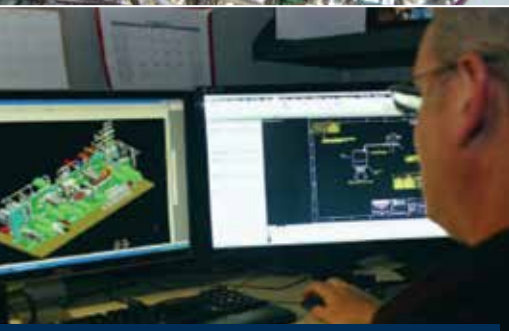
UHP assembly clean room



UHP orbital welding



UHP compact surface mounted manifold



Computer aided modeling



HMI and controller development



Nanochem® Purification

MATHESON's Ultra-High Purity Equipment & Purification Technology Team develops, designs and manufactures custom equipment to solve the most challenging ultra-high purity gas management and purification requirements.

Our core capabilities allow us to deliver prototype systems rapidly and to ramp quickly to production volume.

Whether you require process gas modules or advanced turnkey process systems, MATHESON will collaborate with you from concept - to prototype - to optimized production.

Dedicated Research in a Purpose-Built Facility

MATHESON's Advanced Technology Center (ATC), located in Longmont, Colorado, USA, is dedicated to advanced research and development of pure gases, gas handling equipment, micro-contamination studies, and the latest purification technologies.

If you can't measure it, you can't improve it. MATHESON's ATC has one of the most extensive in-house evaluation laboratories and testing facilities in the industry to assess the quality of gases, purifiers, and gas system components.

UHP Equipment Design and Manufacturing

As a gas manufacturer we understand that producing pure molecules is just the first step. Gas users need to control and move those molecules, and maintain the purity from the source to the point of use.

MATHESON's full complement of skilled professional scientists and engineers will work side-by-side with you to design, test and produce custom gas handling equipment solutions to address your most difficult gas management and purification challenges. Meeting, then exceeding, your expectations is our goal.

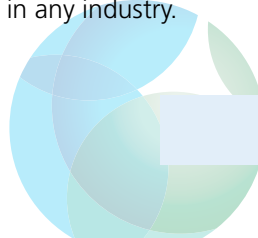
The Advanced Technology Center is ISO 9001:2008 certified, and all employees are rigorously trained in ISO 9001 manufacturing and operations processes, as well as Lean Six Sigma principles for quality improvement and efficiency.

Purity is What We Do

As producers of our own high purity gases, we understand the challenges of gas purification.

Since 1985, MATHESON Nanochem® purifiers have provided best-of-kind purification solutions to the electronics industry, and were the first point-of-use purifiers to deliver up to nine 9's purity gas to the semiconductor industry.

Our ultra-purification technologies may have been born in the semiconductor industry, but they are not confined there. We have built a comprehensive set of solutions for the source, point-of-use, and bulk purification requirements of gas users in any industry.



Let our expertise help you grow.

Our Core Competencies

Design

Engineering

Documentation

UHP Equipment Manufacturing

- Clean Room Operations
 - ▶ Class 10 Welding
 - ▶ Class 1,000 Module Assembly and Test
 - ▶ Class 1,000 Cabinet Assembly and Final Testing
- Kan-Ban Racks for All Gas Modules
- Manufacturing Engineering Supported
- Qualified Test Stations

UHP Equipment Testing

- Dedicated Testing for Gas Systems
 - ▶ Class 1000 Clean Room
 - ▶ PLC/HMI Driven Test Panels
- Helium Leak Testing
 - ▶ 1×10^{-9} atm-cc / sec
- Moisture Testing
 - ▶ < 10 ppb Limit
- Specialize Testing Requirements
 - ▶ TOC Testing
 - ▶ Particle Testing
 - ▶ Surface Cleanliness
 - ▶ UV Black Room

Analytical Technology

- Gas Analysis Methods:
 - ▶ Mass Spectrometry, APIMS, TOF-MS & RGA
 - ▶ FTIR Spectroscopy
 - ▶ Gas Chromatography (GC-PDHID, GC-AED, GC/MS)
 - ▶ Moisture Analyzers (CRDS, Quartz Crystal, P_2O_5 , Chilled Mirror)
 - ▶ Oxygen Analyzers
 - ▶ Inert Gas Particle Analyzers, Corrosive Gas Particle Analyzers
 - ▶ Inductively Coupled Plasma Mass Spectrometry
- R&D Materials Analysis:
 - ▶ Class 100 Clean Room
 - ▶ XRD/XRF Spectrometer
 - ▶ Thermal Analysis
 - ▶ Glove Boxes for Sensitive Materials
 - ▶ Ventilated Walk-In Hoods
- R&D Wafer Metrology:
 - ▶ Reflectometry
 - ▶ Surface Profilometry
 - ▶ Microscopy (Optical and FTIR)

Gas Purification

- Gas-Dependent Purification Media
 - ▶ 12 Different Media
 - ▶ 40 Different Gases Purified
 - ▶ O_2 Species to 100 ppt
 - ▶ H_2O / CO / CO_2
 - ▶ Halocarbons & Hydrocarbons
 - ▶ Volatile Metals
- Ultra-High Purity Hardware
 - ▶ Flow and Pressure Dependent

Core R&D Focus

FROM SOURCE TO POINT OF USE



Ultra-Pure Process Gas Manufacture

- New gas product synthesis, purification and pilot scale up



Trace Gas Analysis

- Trace impurity detection and in-situ process monitoring



Gas Packaging and Delivery Technology

- Cylinder materials & preparation, micro-contamination studies



New Process and Equipment Development

- Novel UHP equipment, mixtures and precursors for next generation processes



Point-of-Use Purification

- New media / equipment for removing critical impurities

Installation. Start-up. Support.

About **MATHESON**

MATHESON is a single source for industrial, medical, specialty and electronic gases, gas handling equipment, high performance purification systems, engineering and gas management services, and on-site gas generation. Our mission is to deliver innovative solutions for global customer requirements.

MATHESON (founded in 1927) is the largest subsidiary of the Taiyo Nippon Sanso Corporation Group (founded in 1910). Taiyo Nippon Sanso Corporation (TNSC) is the largest supplier of industrial gases in Japan, and one of the five largest suppliers of industrial, specialty, and electronics gases in the world. MATHESON became a subsidiary of TNSC in 1984.

We have a depth of technology and resources that can come only from a global enterprise.

MATHESON *and Safety*

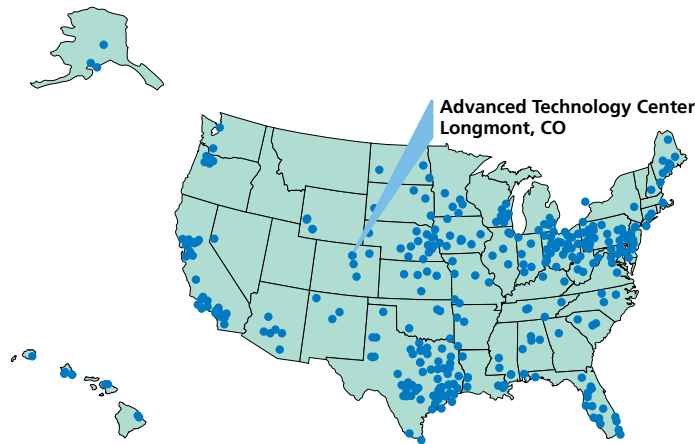
MATHESON places the highest value on Safety – every day. We value our safety record, and we've received many industry awards for our safe operations. All of our employees are thoroughly trained on an ongoing basis to deliver MATHESON's safety standards.

MATHESON *and Quality*

MATHESON also places the highest value on Quality. Our plants are certified to ISO 9001 standards, and we employ Lean Six Sigma principles to measure and improve our quality results on a basis of continuous improvement

MATHESON *and Sustainability*

MATHESON is committed, at all levels, and in all locations, to principles of Sustainability and Corporate Responsibility. Our principles embrace Environmental Sensitivity, Community Support, and Financial Performance. Our aim is to ensure uninterrupted access to our products and services. The Advanced Technology Center (including equipment) is ISO 9001:2015 certified.



Over 300 locations coast-to-coast

Our Mission:

The UHP Equipment & Purification Business Unit develops, designs and manufactures custom equipment to solve the most challenging ultra-high purity gas management and purification problems in any industry. Our core capabilities allow us to deliver prototype systems rapidly and to follow up with production units, which exceed customer expectations – consistently.

Copyright 2020 Matheson Tri-Gas, Inc. All Rights Reserved.

All contents of this document are subject to change without notice and do not represent a commitment on the part of Matheson Tri-Gas, Inc. Every effort is made to ensure the accuracy of this information. However, due to differences in actual and ongoing operational processes and product improvements and revisions, Matheson Tri-Gas, Inc. cannot guarantee the accuracy of this material, nor can it accept responsibility for errors or omissions. This document is intended to serve as a general orientation and cannot be relied upon for a specific operation. No warranties of any nature are extended by the information contained in these copyrighted materials.

All names, products, and services mentioned herein are the trademarks or registered trademarks of their respective organizations and are the sole property of their respective owners. Matheson and the Matheson logo are registered trademarks of Matheson Tri-Gas, Inc.

BR-218 04/20
Printed in USA



MATHESON

ask. . .The Gas Professionals™

www.mathesongas.com

Advanced Technology Center
1861 Lefthand Circle
Longmont, CO 80501
800-416-2505
info@mathesongas.com