

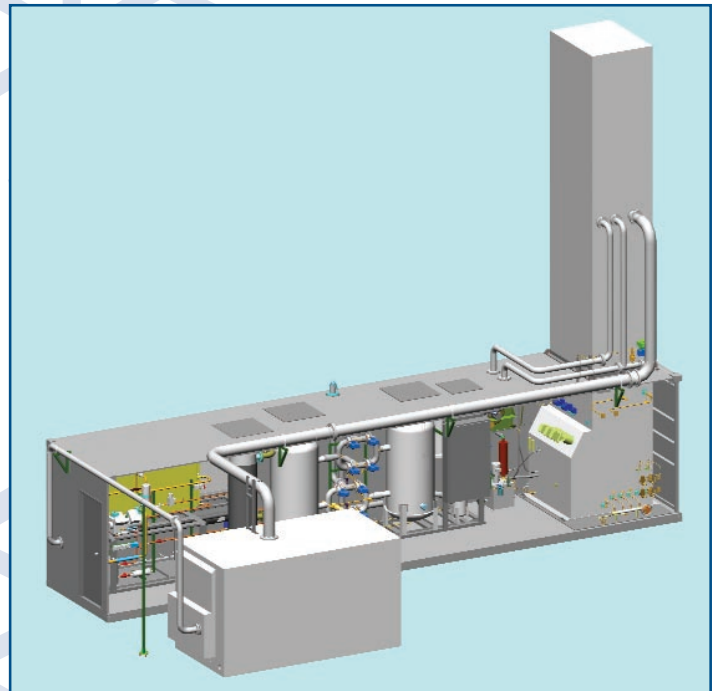
# FrostByte

## Cosmodyne delivers a PED compliant plant

Cosmodyne recently delivered its first European Pressure Equipment Directive (PED) compliant air separation plant. The Cosmodyne GFED is a popular Cosmodyne product due to its prefabricated design, ease of installation and relocation, and overall value. Its users include the major industrial gases companies, oil service companies, and smaller regional industrial gases companies. The GFED is also used for producing medical oxygen in accordance with the European Pharmacopia. (See related article on the Cosmodyne GFED plant in the Spring 2001 issue of FrostByte.)

Shipping the first air separation plant to the PED requirements from the Cosmodyne facility was accomplished earlier this year with the assistance of notified body TÜV Rheinland. The process of demonstrating capability of meeting the PED requirements included, but was not limited to, performing a hazard analysis, choosing a conformity assessment procedure, purchasing materials and components from approved suppliers and with the proper documentation and traceability, and demonstrating Cosmodyne's special processes such as welding, NDE, and pressure testing. Weld procedures and welders were requalified by the notified body to the PED requirements.

*continued on page 2...*



MODEL		GFED 1		GFED 2		GFED 3	
PRODUCTION MODE		OXYGEN	NITROGEN	OXYGEN	NITROGEN	OXYGEN	NITROGEN
<b>PRODUCTION</b>							
LIQUID OXYGEN	<i>Nm<sup>3</sup>/hr</i>	120		160		198	
	<i>tons per day</i>	4.5		6.0		7.5	
LIQUID NITROGEN	<i>Nm<sup>3</sup>/hr</i>		140		200		226
	<i>tons per day</i>		4.6		6.6		7.5

# Using flow swirl for separation

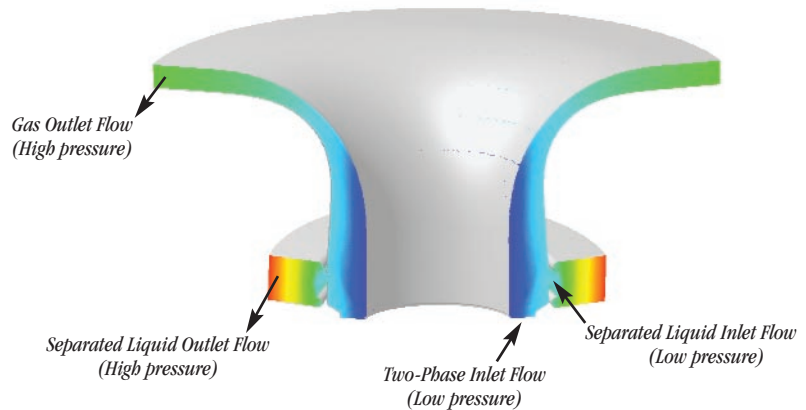
Turbo-expanders are commonly used in the cryogenic industry to extract energy from gas streams as a means of temperature reduction. Swirl is created in the flow by inlet guide vanes and subsequently removed by the rotor and power shaft. In many applications a liquid phase is created in the flow which requires separation. If some swirl remains in the flow, compact, centrifugal separation of the liquid can be achieved.

The Cryogenic Industries group is developing a proprietary technology, "Liquid Extraction and Separation Method for Treating Fluids Utilizing Flow Swirl," U.S. Patent No. 6,592,654 B2, to separate produced cryogenic liquids using the flow swirl. For some applications the swirl can be further utilized to re-compress the separated gas phase.

Figure 1 shows the results of CFD analysis of an integral expander, separator and compressor with no moving parts.

The blue inlet region is at the lowest temperature where liquid has formed. The liquid is separated into the annulus shown by the centrifugal forces in the swirling two-phase flow. The liquid tangential velocity is lowered

Figure 1



**Pressure Field in Liquid Separator Annular Diffuser and in Separated Gas Radial Diffuser**

and the pressure increased to the orange region as the liquid swirls radially outward.

The separated gas forms a vortex flow field and swirls radially outward in a vaneless diffuser. The gas pressure increases as it flows to the green region.

Future applications for the technology include separation of cryogenic liquids from

turbo-expanders. For air separation from turbo-expanders. For air separation plants a significant improvement in compression power requirements and heat exchange control can result.

*For more information contact Dr. Ron Franz at Energent, +1. 949.261.7533, or rfranz@energent.net.*

		TÜV Rheinland Bertelsmannstraße
<b>CERTIFICATE</b>		
(Certificate of Conformity) <b>EC-Unit Verification</b> acc. to Directive 97/23/EC		
Certificate-No.: 01 202 USA/G-031475		
Name and Address of the Manufacturer:	Cosmodyne, LLC 2920 Columbia Street Torrance, CA 90508, USA	
We hereby certify, that the results of tests carried out on the pressure equipment mentioned below meet the requirements of the Directive 97/23/EC. The pressure equipment is marked as follows:		
<b>CE 0035</b>		
Tested acc. to Directive 97/23/EC:	EC-Unit Verification (Module G)	
Test report No.:	3021475	
Description of pressure equipment:	Air Separation Unit GFED-3	
Manufacturing No.:	25558	
Category:	IV	
Manufacturing plant:	Cosmodyne, LLC 2920 Columbia Street Torrance, CA 90509, USA	
Pleasanton, March 31st 2003	TÜV CERT-Certification Body for Pressure Equipment Test Laboratory for Pressure Equipment	
	 Dr. J. Reints Head of Dept. 03ac, 0315	
<small>TÜV Auftragsstelle GmbH Am Oberrain 10 D-51105 Köln, Germany tuevcert.net</small>	<small>TÜV Rheinland of North America, Inc. 3275 Quince Lane, Suite A Pleasanton, CA 94566, USA</small>	<small>Member of </small>

## Cosmodyne delivers a PED compliant plant *continued from page 1...*

The purpose of the hazard analysis is to consider all the modes of failure and to insure that prevention is included in the design. The conformity assessment procedure determines the amount of inspection performed by the notified body, TÜV Rheinland, and the manufacturer, Cosmodyne. The selection is based on the hazardous nature of the fluid passing through the system, the pressure, the volume and size of the components, or piping.

The completed plant was inspected by TÜV Rheinland to verify that piping and major components were in compliance with the PED requirements. The required documentation included a certificate of conformity by the notified body referencing the test reports previously completed, and a declaration of conformity by Cosmodyne stating compliance to the PED and other applicable directives and industry standards.

The overall process was a challenge successfully met by the Cosmodyne design and manufacturing teams working together with TÜV. Cosmodyne is fully prepared to meet PED requirements on all of its air separation equipment installed in the European community.

*For more information contact George Pappagelis at Cosmodyne, tel +1.310.320.5650 or gpappagelis@cosmodyne.com.*

# Cryogenic Industries acquires The Wittemann Co.

The Cryogenic Industries group of companies recently acquired The Wittemann Company, a carbon dioxide (CO<sub>2</sub>) equipment manufacturer and service provider. Wittemann was founded in 1874 in New York, USA. The company grew and prospered and was relocated to its current location in Palm Coast, FL, USA in 1980. In 1996, Wittemann added breadth to its product offerings through the acquisition of Real Cold Systems, a manufacturer of industrial gas CO<sub>2</sub> recovery systems.



**Above: CO<sub>2</sub> Recovery from the fermentation process.**

Wittemann CO<sub>2</sub> Recovery Systems take CO<sub>2</sub> gas from the fermentation process to end use and can either reduce or eliminate outside CO<sub>2</sub> purchase, or be sold as a source of profit.

**Right: CO<sub>2</sub> Systems for the Industrial Gas markets.**

A complete line of purification technologies for treating carbon dioxide gas recovered from processes such as ammonia hydrogen production, fermentation, acid neutralization, flue gases, etc.

Wittemann's entire history has been committed to maintaining its position and reputation as a world leader in the design and fabrication of high quality, technologically advanced, CO<sub>2</sub> systems.

The company offers a broad range of products for the recovery, generation, purification, and liquefaction of CO<sub>2</sub>. These products are normally fabricated as skid-mounted packages to facilitate transport worldwide and fast, efficient installation.

In a direct combustion type CO<sub>2</sub> generating system, a hydrocarbon fuel (natural gas or light oil) is burned to produce a flue gas containing CO<sub>2</sub>. Using an amine technology, the CO<sub>2</sub> is removed from the flue gas, purified, liquefied, and used in the end product (soft drinks).

Wittemann CO<sub>2</sub> recovery systems are utilized in many applications. In breweries and distilleries, CO<sub>2</sub> is a natural by-product of fermentation. In breweries, the CO<sub>2</sub> collected by the recovery system is used in the production process as well as the end product (beer). In distilleries, the CO<sub>2</sub> is captured for resale.

Using the company's technical expertise and licensing agreements for important proprietary technologies, Wittemann's stack gas recovery (SGR) technology is able to extract CO<sub>2</sub> from

diverse industrial processes while meeting all the specifications of the International Society of Beverage Technologists (ISBT).

In addition to complete generation and recovery systems, Wittemann designs and builds a number of skid-mounted sub-systems and accessory equipment such as CO<sub>2</sub> purification and liquefaction systems, deodorizers, reciprocating compressors, dryers, stripping systems, vaporizers, cylinder filling units, and carbonators.

The Wittemann Company has equipment operating in over 100 countries. Its customer base includes industrial gas companies, major breweries, distilleries, soft drink bottling companies, chemical, petrochemical, and food processing facilities. The markets and opportunities for CO<sub>2</sub> are wide-ranging and changing. Most recently Wittemann's business includes significant new CO<sub>2</sub> processing opportunities -- co-generation, CO<sub>2</sub> recovery from ethanol plants, landfill gas purification to produce methanol, LNG, or pipeline quality natural gas.

Wittemann has an experienced staff of personnel to address the spare parts needs of customers, and knowledgeable field service engineers to travel to customer sites to trouble shoot and rectify problems and/or commission equipment.



For more information contact Bill Geiger at Wittemann +1.386.445.4200 or [billg@wittemann.com](mailto:billg@wittemann.com).

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# Compact laser gas skids developed by Cryoquip-Australia

Cryoquip-Australia, partnering with one of the largest gas companies in that country, has developed a unique compact laser gas skid to meet the stringent demands of laser assist gas applications for a reliable high pressure/high volume inert gas stream. The application demands a foolproof solution with little or no operator involvement, small footprint to minimize space required, 100% reliability, minimal regular maintenance, and automatic “set it and forget it” controls.



The skid comprises a reciprocating cryogenic liquid pump, a high pressure vaporizer, a control system, all necessary valves and instrumentation, and a high pressure manifold to connect cylinder packs all mounted on an easy to install compact skid. It is entirely automatic in operation maintaining high pressure in cylinder packs which are utilized as a buffer volume for supplying gas to the process. At pre-determined pressure levels the system is started. A number of discrete timed steps are followed to cool down the pump and commence pumping liquid to a high pressure vaporizer producing gas to refill the cylinder pack buffer volume. The system maintains the required volume of high pressure gas at

all times to meet the continuous flow requirement of the application. The system requires no operator and minimal maintenance. Typically as many as ten systems can be maintained by a single technician.

The advantage of the laser skid is that it can handle major changes in demand and is able to sustain high flow rates easier than a cascade tank system. It has minimal gas losses when operating from a thermosyphon tank, and it is also capable of providing much higher pressure than liquid based systems which are limited by the critical pressure of the gas. The system incorporates a number of process alarms designed to alert the operator to possible problems and an optional remote telemetry based monitoring device is available.

The skid is designed to operate on all the atmospheric gases and is suitable for use in other applications where a source of high pressure gas is required, including systems for small cylinder filling plants.



*For more information contact Ralph Day at Cryoquip-Australia , +61.3.9791.7888 or [sales.au@cryoquip.com](mailto:sales.au@cryoquip.com).*

A laser is a device that produces and amplifies light. The word laser is an acronym for Light Amplification by Stimulated Emission of Radiation. Lasers come in many different types; solid state, gas, liquid, and semiconductor are all common types. Today lasers are used in guidance systems, rocketry, eye surgery, metal cutting, CD players, and document printers. Industrial gases and equipment play their role in making lasers a reality and enabling their practical use in many industrial applications. One common application is the use of lasers in the manufacturing industry for metal cutting.

One of the most powerful gas lasers is the carbon dioxide laser which is very efficient at turning the energy used to excite their atoms into laser light. They are the most powerful continuous wave lasers that emit light in a stream rather than in pulses. This type of laser is powerful enough to melt metal, but alone the laser is not able to cut the metal. The molten metal melted by the laser has to be removed from the path of the laser in order for a cutting process to take place.

A reliable source of high pressure inert gas, normally nitrogen, has to be provided to blow away the molten metal. This gas is known as an assist gas and it has to be available continuously, for some lasers are set up with automatic feeders and operate nearly 24 hours a day, seven days a week. Manufacturers also operate as many as six lasers simultaneously demanding a continuous high flow rate of the assist gas.

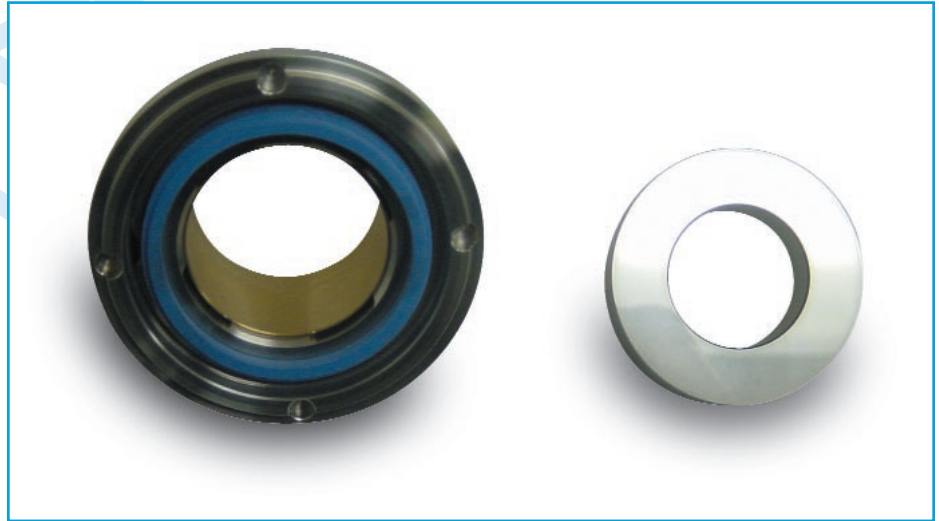
# ACD releases new composite face seal kits

ACD recently released their new Composite Face Seal (CFS) featuring a proprietary P.T.F.E. blue nose piece and bellows assembly with a built-in bronze sleeve. ACD's new CFS is sold in kit form and provides all necessary items for a seal assembly exchange.

The company's beta test program included several hundred seals being installed in various cryogenic pumping applications through their global service center network. No operational failures were recorded as a result of the seal's design.

The proprietary P.T.F.E. nose piece provides an improved tolerance to cavitation and other operating characteristics that destroy traditional mechanical seal faces. The CFS has proven successful in these types of applications, especially in trailer pumps.

The CFS is available for existing seal kit part numbers: 16676, 10018, 46721, 46726, 3500220, and 13680. The new CFS will also be available for ACD CRYO's popular CP-160/180 pump line for off-loading and transfer applications throughout Europe.



The CFS has significantly increased seal life and outperformed existing mechanical seals used today. CFS kits are available through any of ACD's sales & service locations or purchased conveniently from ACD's internet Webstore at [www.acdcom.com/webstore](http://www.acdcom.com/webstore).

The CFS technology is also used in ACD's new TOP 260 Pump Series being released later this year. ACD's new pump line series

will not only improve pump performance and durability, but also revolutionize how pumps are designed utilizing out-of-the-box ideas to add real value to end customers.

*For more information contact Richard Young at ACD +1.949.261.7533 or [ryoung@acdcom.com](mailto:ryoung@acdcom.com).*

## Cryoquip-Europe triples manufacturing capacity



Cryoquip-Europe has been a supplier to the industrial gas industry in Europe since 1996 and has been manufacturing in-country for three years. The company has secured a number of long-term supply contracts and has supplied all the major European gas companies with equipment. To handle the continued market expansion a new purpose-built facility has been designed and is now under construction. The new facility will provide over three (3) times the existing manufacturing area and an equal amount of secure external storage area for raw materials and finished product.

The company's primary product is cryogenic ambient air low and high pressure vaporizers. It also distributes electric, steam, and direct gas fired shell and tube water bath vaporizers in sizes ranging from 25 Nm<sup>3</sup>/hr to over 100,000 Nm<sup>3</sup>/hr manufactured by its parent company Cryoquip Inc. designed specifically to meet customer specifications.

Cryoquip Europe is a fully accredited manufacturer for all types of pressure vessels in accordance with the PED using TÜV as its notified body. All equipment and process systems can be designed and built to either ASME, TÜV, and other relevant European codes.

*For more information contact Brent West at Cryoquip-Europe, tel + 44 1795 438433 or [sales.eu@cryoquip.com](mailto:sales.eu@cryoquip.com).*

# RIX and Cryoquip sign representation agreement

Cryoquip- Australia, Europe, Malaysia and India will represent RIX Industries' wide range of oil-free compressor products under a recently-signed agreement. RIX's line of air-cooled and water-cooled compressors will make an excellent addition to Cryoquip's wide range of cryogenic products. Both companies see large potential for RIX's compressors for gas separation plants, cylinder-filling facilities, hydrogen filling stations, and other oil-free gas applications.

RIX manufactures a wide range of oil-free compressors for oxygen, breathing air and other gases, and is a major supplier to industrial gas companies, process plants, manufacturing facilities, and the U.S. Navy. RIX has large compressors for industrial plants (sizes up to 500 HP) as well as a range of smaller compressors for OEM's and low-flow situations in sizes from fractional up to 10 HP. RIX has been manufacturing compressors for over 100 years and has plants in California and Nevada, USA.

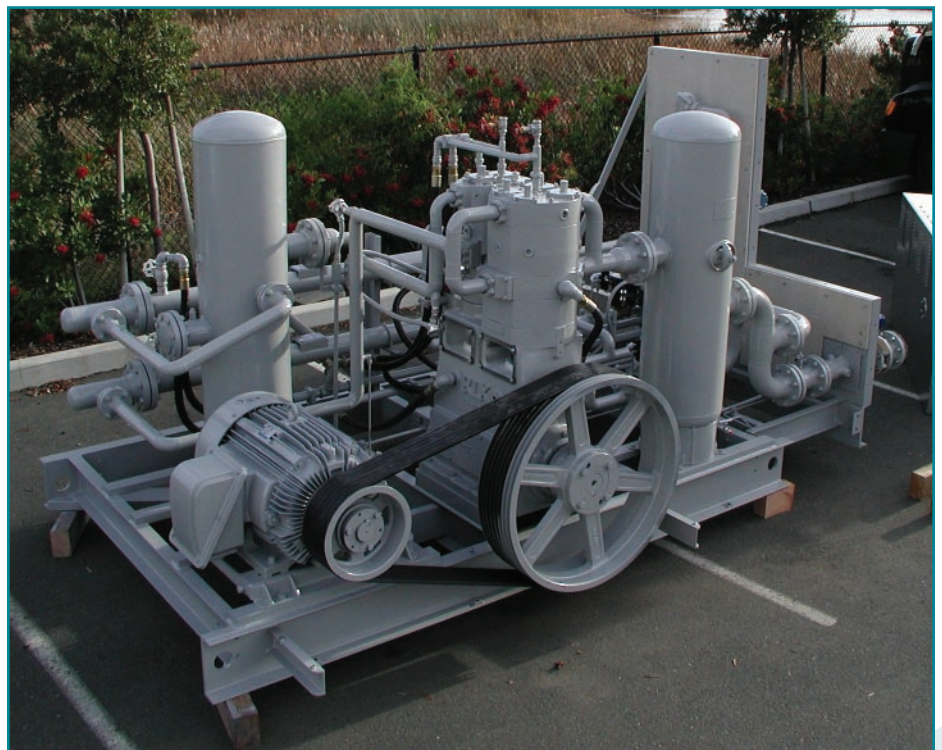
For more information contact David Savidge at RIX, tel +1.707.747.5900, [info@rixindustries.com](mailto:info@rixindustries.com) or Bryan Smith at Cryoquip, tel +1.909.677.2060, [sales.us@cryoquip.com](mailto:sales.us@cryoquip.com).



*This 350 HP RIX compressor is boosting oxygen to 220 psig for a steel plant in the U.S.*



*The MicroBoost is RIX's smallest compressor- a 3-stage, 2,200 psig compressor that will fit in the palm of your hand.*



*A 100 HP RIX oxygen compressor running in Mali, Africa.*

# Cryoquip expands into China

Cryoquip has opened a sales office and distribution center in Hangzhou, China. “We have been selling vaporizers into the Chinese industrial gas sector for a number of years, but the industrial liquid gas market in China, though still relatively young, is growing very rapidly” comments Bryan Smith, International Operations Manager at Cryoquip-Headquarters, Murrieta, CA USA. “By increasing our involvement in this market now and providing a local point of contact, we can grow and develop with the industry.”

Cryoquip-China will provide all aluminum low and high pressure vaporizers with capacities from 50-4500Nm<sup>3</sup>/hr capacity, initially manufactured in the USA, with an ex stock availability from the distribution facility. The sales office, headed by Sales Engineer Wang Ting, will also provide a local point of contact for Cryoquip’s larger water bath, steam and direct fired systems for plant back up and large process demands, which will become readily available to the industry as it develops. By the end of the year Cryoquip’s range of natural and forced draft, high and low pressure, stainless steel lined and electronic grade vaporizers will be manufactured in China.

“Our new facility will manufacture the same high quality, high performance products as our other five global facilities, utilizing commonality of design and components, state of the art assembly techniques and equipment. Because the equipment is manufactured locally our Chinese customers will receive the added benefits of lower prices, quicker deliveries, model flexibility, and local assistance with installation and technical design issues. This is another step in Cryoquip’s planned global manufacturing expansion begun back in 1996,” said Smith.

For more information contact Wang Ting at Cryoquip-China, tel +86.571.882.19929, sales.cn@cryoquip.com or Bryan Smith at Cryoquip-Headquarters, tel +1.909.677.2060, sales.us@cryoquip.com.



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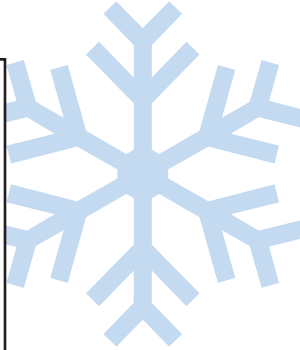


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# Calendar of Events

- SEP 2-5 EUROPEAN HYDROGEN ENERGY CONFERENCE • Grenoble, France  
tel: +33 1 53 59 02 11 • fax: +33 1 45 55 40 33 • afhparis@aol.com • www.afh2.org
- 
- SEP 18-19 SPACE CRYOGENICS WORKSHOP • Alaska, USA • melora@squid.jpl.nasa.gov
- 
- SEP 22-26 CEC/ICMC – Cryogenic Engineering Conference/International Cryogenic Materials Conference • Anchorage, Alaska, USA  
tel: +1.303.499.2299 • fax:+1.303.499.2599
- 
- OCT 4-8 GAWDA 59<sup>th</sup> ANNUAL CONVENTION – Gases & Welding Distributors Association, formerly NWSA • Vancouver, BC, Canada  
tel: +1.215.564.3484 • fax:+1.215.963.9784 • gawda@gawda.org • www.gawda.org
- 
- OCT 20-23 HYFORUM 2003 – Clean Energy for the 21st Century, The International Hydrogen Energy Forum 2003 • Beijing, P.R. China  
tel: +86-10-62180145 • fax: +86-10-62180142 • hyforum2003@chinahydrogen.org  
www.chinahydrogen.org • www.zukunftsengerien.de
- 
- OCT 25-30 IOMA – International Oxygen Manufacturers Association • Scottsdale, AZ, USA  
tel: 202-521-9300 • fax: 202-833-3636 • ioma@iomaweb.org • www.iomaweb.org
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- OCT 28-NOV 1 RESCHEDULED ICCR '03 – The 3rd International Conference on Cryogenics and Refrigeration • Hangzhou, China  
tel: +0086.571.87951771(0) • iccr2003@cme.zju.edu.cn • www.cmee.zju.edu.cn/ICCR2003.htm
- 
- NOV 11-14 WELDEX 2003 • Birmingham, UK  
tel: +44 (0)1322 660070 • fax: +44 (0) 1322 616350 • nichola.mitchell@nexusmedia.com • www.weldexpo.com



*"For the things we have  
to learn before we do them,  
we learn by doing them."  
–Aristotle*

*Quote*



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