CANADIAN GAS TURBINE NEWSLETTER

IAGT Chairman's Corner

Welcome to our second issue of the IAGT Canadian Gas Turbine Newsletter. Although we have not been able to publish this as often as we originally intended, We hope the newsletter provides you with valuable information, and new developments in the industry.

Contributions or suggestions are always welcome and can be sent to IAGT Committee members or the CGA directly.

Our 12th IAGT Symposium was held October 15th through Oct9ber 17, 1997. Based on the attendance and comments we received, the Symposium once again proved to be a great success. Thanks to all who were able to attend; to the IAGT Committee and CGA staff who spent many hours organizing and making the event happen; to the keynote speaker and presenters who provided a very high-quality group of papers and presentations; and finally, a very' special thanks to Dave McWatt of TransCanada Pipelines, our immediate past Chairman, whose leadership and commitment was instrumental to the success of the Symposium.

As we prepare for the next millennium we see the potential for unprecedented activity within the gas turbine industry. The natural gas pipeline industry is seeing proposals for new pipelines on what seems to be a daily basis. Pipelines are in the works to carry western Canadian gas eastward to the Chicago and New York City markets and eastern Canadian offshore gas to United States eastern seaboard markets. All this translates into additional compression, a majority of which will likely be gas turbine driven. In the power industry, gas turbine-based combined cycle plants are becoming proven technology and making more sense economically not only to the industrial facilities they serve, but also to the power grid that they are connected to.

As activity in the industry grows, new applications will develop and competition amongst the gas turbine manufacturers will serve to advance the technology further yet.

With our next Symposium scheduled for October 1999, we will once again have an opportunity to take a fresh look at the gas turbine industry; to see our growth over the next two years, to keep abreast of both current and emerging technologies; and finally to get together with old and new friends in the industry we share. Hope to see you in 1999.

Paul Colwell, P. Eng.,

Chairman, IAGT Committee

1999 *IAGT Symposium* *October* 13, 14, *15*, 1999

Mark your calendars, you're your plans - the 13th IAGT Symposium will be held in Banff, Alberta, on October 13 - 15, 1999. The theme for the Symposium will be "Innovation and Operation 2000 and Beyond". The "Call for Papers" has already gone out and, if you have not received your advance notification, please call any of the Committee members to get your name and company affiliation put on our mailing list. Through our sponsor, the Canadian Gas Association, a block of rooms at the Banff Springs Hotel has been reserved. Details will follow with the preliminary program in the Spring of 1999.

IAGT Committee

The Industrial Applications of Gas Turbines (IAGT) Committee, formed in 1973 under the sponsorship of the National Research Council of Canada, is a Technical Advisory Group to Canadian industry and government. The group provides a forum for the exchange and dissemination of ideas, and the communication of new developments related to the industrial application of gas turbines in Canada.

Presently under the sponsorship of the Canadian Gas Association, the IAGT Committee's. specific functions relate to the organization of a biannual technical symposium for the presentation of technical papers and discussion panels covering all aspects of industrial gas turbine operation, as well as providing a forum for reviewing directives, guidelines, codes and practices, as issued by regulatory agencies, which impact directly on the industrial application of gas turbines.

The IAGT Committee includes the following members who volunteer their time and effort to the success of the Canadian gas turbine industry:

Paul Colwell	*Union Gas Limited*
Lloyd Cooke	*Liburdi Engineering Ltd*
Tom Corscad	*TransAlta Energy*
Glen Dunn	*NOVA Chemicals*
Peter Elder	*Delta Projects*
David Golson	*Petro-Canada Resources*
Lawrence Kaempffer	*Westinghouse Canada*
Shahrzad Rahbar	*Canadian Gas Association*
Manfred Klein	*Environment Canada*
Dave McWatt	*TransCanada PipeLines*
Jim Noordermeer	*Gryphon Int'l Engineering*
Steve Robinson	*Rolls-Royce (Canada)*
Thomas Robinson	*Alberta Natural Gas*
Gordon Rogers	*Gordon Rogers & Assoc.*
Ted Traynor	*Pratt & Whitney Canada*
Ken Walls	*Solar Turbines Canada*

The IAGT Committee acknowledges, the Oil and Gas Branch of Environment Canada toward the production costs of this newsletter.

Last Year's Symposium a Success

The 12th Symposium which was held in Banff in October 1997 was a resounding success with over 120 delegates in attendance. The variety, quality, and technical scope of the papers and presentations were excellent. Papers on a wide range of relevant topics including gas turbine technology and applications; operations and maintenance; performance; cogeneration and combined cycle; and emissions and environmental were presented over the three-day session. The "Best Paper" award went to Jeff Price of Solar Turbines for his paper titled "Ceramic Stationary Gas Turbine Development". Congratulations to Jeff.

WHAT'S NEW

Pipeline

The world's first LM1600 DLE Gas Turbine, powering a natural gas pipeline compressor, and packaged by Nuovo Pignone, entered service in December 1997 at ANG Pipeline's Elko compressor station, in southeast British Columbia.

Alberta Natural Gas (ANG) has purchased two RB211-24G gas turbine packages for installation at its Cochrane, Alberta, extraction plant. The units will be packaged by Cooper Rolls, and will be supplied with Elliott six-stage compressors. The units are scheduled to enter service before the end of 1998.

TransCanada PipeLines has ordered four LM2500+ DLE mechanical drive natural gas compressors, packaged by Nuovo Pignone, for its 1997/98 expansion programs. Scheduled start-up November 1998 will be the North American service launch for the LM2500+ DLE gas generator, as well as the hi-speed power turbine, manufactured by Nuovo Pignone.

Twenty eight LM2500+ gas turbines have been delivered since the end of 1996.

Alliance Pipeline has selected GE Marine & Industrial Engines LM2500 and LM2500+ dry low emissions gas turbines to power natural gas pipeline compressors packaged by Nuovo Pignone for 14 mainline compressor stations for the greenfield Alliance Pipeline, from northeast British Columbia to Chicago. Start-up is planned for the second half of 2000.

TransCanada PipeLines has received NEB approval for an application to construct and operate a number of new pipelines and facilities in Canada**,** including 11 **n**ew compressor **s**tations and 308 km of pipeline looping that will provide an additional 10 million m3/d of gas to customers in Manitoba, Ontario and Quebec, as well as to the United States.

Environmental Issues

Gas Turbines and Energy Sustain ability

Environment Canada reports that the recent Kyoto agreement, and other environmental energy initiatives, can only be achieved through energy conservation and cleaner fuel choices for the future. With new low-NOx systems and innovative heat recovery, modern gas turbine cogeneration and district energy plants are considered to be part of a solution to reduce both air pollution and greenhouse gas emissions.

Canada's cogen and utility repowering potential of some 30 000 MW can contribute up to one third of our required GHG reductions by 2020. Large and small units are also consistent with energy deregulation, and a reduced need for power transmission lines. These benefits are being recognized today by energy users, and by all levels of government.

Westinghouse Canada facility in Hamilton, Ontario for the manufacture and support of gas and steam turbines. Earlier Siemens had acquired the Parsons steam turbine products from Rolls-Royce and continues to operate the facility in St. Catharines, Ontario.

TransCanada Turbines Ltd. (TCT), a joint venture between TransCanada Pipelines Ltd., and Wood Group Gas Turbines Ltd., has been formed. The new company will be OEM-authorized to repair and overhaul both Rolls-Royce and General Electric aero derivative gas turbines. This concept is very innovative in that it will be the first time that an operating company's overhaul facility is joint owned by an independent overhaul company. The new company plans to support six product lines, the Rolls-Royce Avon, RB211andRB211 DLE, and General Electric LM2500, LM2500+ and the LM 6000. It is on target to open its doors on June 1 1998, and plans to have commissioned a gas fueled Category l test bed by early 1999.

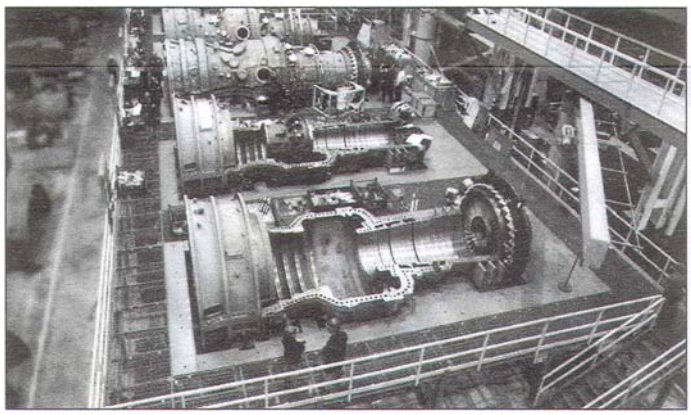
Liburdi Engineering of Hamilton, Ontario has completed the purchase of the welding products division of Hobart Brothers of Troy Ohio. The Hobart line of "Dabber" automated welding systems has been used extensively throughout the industry by gas turbine component repair and overhaul facilities and will be added to Liburdi's existing family of LAWS aerospace welding systems for engine repair and manufacture. The company will be consolidated with Dimetrics and Merrick Engineering welding businesses purchased last year by Liburdi and operated out of their Charlotte, North Carolina plant.

Liburdi Engineering has been selected by Westinghouse and Solar Turbines as part of the design/manufacture team for ATS advanced turbine systems. This program was initiated by the US Department of Energy to produce the next generation of high efficiency engines. Liburdi will use its patented LPMTM powder metallurgy process for both programs. The LPMTM process has been used by Liburdi for high-strength

Engine Manufacture and Overhaul

Siemens announced the acquisition of the Gas Turbine Division of Westinghouse during the past year. Siemens is continuing to operate the repairs for several years. It will now be used to manufacture high-temperature abrasive blade tips for the Solar ATS Mercury 50 engine, and to join vane segment sections for th~ Westinghouse ATS engine. First engine tests of the Solar engine are scheduled for mid 1998.

The ***Westinghouse Power Generation*** Hamilton, Ontario, facility builds a complete line of combustion turbines. About 15 of these machines will enter commercial operation in 1998. Currently, most of the units being manufactured at Hamilton are the model 501F, which is ISO rated at approximately 177 megawatts.



Five W501 engines are in the process of being built in the main assembly bay at *Westinghouse Canada*

In 1998, the Hamilton facility passed a new milestone when construction began on the model 501G, Westinghouse's most advanced gas turbine. ISO rated at approximately 235 megawatts, the 501G will achieve 58% efficiency in combined cycle operation. In March 1998, pre-stack of the entire unbladed rotor assembly was completed at the Hamilton facility.

Westinghouse has received two contracts for the 501G, and the first one will enter commercial operation in July 1999 in Lakeland, Florida.

Pratt* 8' *Whitney Canada's new ST30 3MW gas turbine engine has been announced for delivery in mid 1999. The new engine is based on the PW 150 turboprop aero engine and will join ST18 in P&WC's line of advanced industrial aeroderivative engines.

Pratt* 8' *Whitney Canada and Catalytica have announced an agreement whereby the companies will co-develop advanced, clean combustion systems for P&WC's industrial engines. Catalytica's Xenon technology is planned to be available for the 2MW ST18 in 2001, and for the 3MW ST30 in 2002.