Helping China Breathe a Little *Easier*

China's pollution problems are well documented as images of people wearing face masks to protect themselves from some of the unhealthiest air on the planet become increasingly frequent. Indeed it is estimated that as many as 1.6 million people die each year as a result of the country's air pollution, itself the result of more than three decades of explosive economic growth fueled largely by coal-fired power plants (http://time.com/3997626/china-pollution-study.

The primary pollutant from these plants is PM2.5, particulate matter that is smaller than 2.5 microns in diameter. When inhaled these particles enter the human respiratory system, causing illnesses ranging from asthma to heart disease. Also contributing to the country's air pollution are volatile organic compounds, or VOCs, which can cause chronic, irreversible damage to the body and diseases such as leukemia. As such, these substances have become a prime target in the country's environmental cleanup efforts. (http://usa.chinadaily.com.cn/epaper/2013-09/26/content_16996578.htm)

Beijing smog the day of the awards ceremony.

A key player in these efforts, the Clean Air Alliance of China provides an integrated collaborative platform to improve air quality and mitigate the negative impacts of air pollution on public health. Comprising academic and technical institutions, provinces, cities, non-profit organizations and businesses, it supports national clean air policies, assists with local implementation, promotes clean technologies and helps raise public awareness.

Last December, the alliance organized its inaugural BlueTech International Clean Air Technology Forum in Beijing, which was also the country's first global clean air event. More than 300 attendees from academic institutions, international organizations, government bodies and technology providers heard experts from around the world share experiences, best practices, technology development strategies, and market and investment demands. In addition, 26 finalists and winners of the BlueTech Award were honored for their breakthrough clean air technologies.

Rigorous screening process

After undergoing three months of intensive document reviews, on-site visits and laboratory tests, five winners were selected from a field of 56 global entrants: TOTAL Petroleum and Weifu Lida for diesel engine pollution control; MaxAir, Jiaxing and Sanying Technologies for indoor air purification; and Garlock Sealing Technologies for VOC prevention and control.

Based in Shanghai, Garlock China completed an extensive application, including a description of the technology being submitted for the award, its application area(s) and technical use; availability of documented case studies; commercialization status; intellectual property information; technical principles and process flow chart; and technical core value and differentiators.

Submitted for evaluation was the company's low-emission technology for controlling VOCs from valves, which account for 60% of fugitive emissions of these pollutants from refineries, chemical and petrochemical plants and other industries. The technology is based on carbon and graphite materials that expand radially when compressed axially to seal the space between a valve stem and the packing chamber or box.

Samples of three different types of this compression packing accompanied the application for the award. These included engineered sets of expandable cone-shaped rings of varying densities and geometries to provide low-load, low-emission seals that allow valves to mechanically cycle with ease. These sets are typically custom-made for specific stem sizes and packing box dimensions.

Also submitted were two types of braided packing made of flexible graphite yarn, treated with lubricant and blocking compound to fill any voids, wire-reinforced and braided into continuous lengths. The wire reinforcement strengthens the flexible graphite, prevents it from extruding and acts as a wiper to keep it from building up on the valve stem. Supplied in spools, braided packing is used when the specific dimensions of a packing box are not known.

Performance assessments

Assessments of these materials' performance were provided, including comprehensive test reports from third parties such as Yarmouth Research and other independent laboratories, as well as examples of low-emission valve sealing installations. These included five Texas refineries, an Oklahoma refinery, California refinery, Illinois and Texas chemical plants, a valve repair company, plus major refiners and chemical processors in the U.K. In addition Garlock China supplied a user list including company names.

Rounding out the support documentation for the application were the results of emissions surveys at a South African hydrocarbon processor and Indian refinery, plus field studies of three Texas refineries using engineer packing sets; two Texas refineries and a Canadian refinery using braided graphite packing; and a Texas petrochemical processor using both engineered sets and braided packing.

Garlock's Stan Chen receives the Clean Air Alliance of China's BlueTech Technology Award.

Applications for the award were reviewed by the alliance's Innovation Centre for Clean Air Solutions, (ICCS) which developed a methodology for assessing the technology submissions. This assessment, according to award organizer Tony Xie, focused on practical application results, environmental benefits, economic viability and technological performance. It consists of a quick evaluation based on data provided by the suppler and an advanced assessment customized for each technology. The procedure involved document review, expert evaluation, on-site investigation and laboratory testing.

The committee evaluating the technologies selected Garlock's engineered packing sets for a BlueTech Award based on a number of factors, not the least of which is China's recognition of VOCs as "one of the most important control pollutants." Factors related to the technology itself included allowable leakage of <100 ppmv, potential for reducing fugitive VOC emissions and product losses from chemical plants, and guaranteed low-emission service for five years.

Following the Clean Air Technology Forum, BlueTech Award winners and finalists demonstrated their technologies via match-making tours and workshops in Changzou and Shenzhen. Based on the technical needs of these cities, the ICCS, Energy Foundation of China and international consultants from the Clean Air Alliance arranged these follow-up activities, which have already resulted in agreements of intent with a number of local companies.

Jim Drago, P.E. has worked for Garlock Sealing Technologies since 1983. His expertise is in applications and product engineering, management and business development. He has assisted chemical processors with sealing solutions to meet the demands of the EPA's the new enhanced leak detection and repair (LDAR) programs. He has two patents, one pending, and has authored numerous articles on sealing technology and sealing to meet emissions regulations. He has also presented papers at technical symposia, participated on expert panels discussing LDAR and contributed to the industry standards of API, ASME, EPRI and STLE. He has a B.S. in mechanical engineering from Clarkson University and is a registered professional engineer in the state of New York. He may be contacted at 1-800-448-6688 or jim.drago@garlock.coim.

Stan Chen A native of Beijing, Stan has over 30 years of experience managing businesses in both the U.S. and China. He joined Garlock China in 2007, where he heads a team of sales, engineering and production staff. Prior to Garlock he started and managed two U.S.- owned manufacturing facilities in China. He has a B.S. degree in mechanical engineering from Shanghai Institute of Mechanical Engineering and an MBA from the University of Toledo in Ohio. He may be contacted at stan.chen@garlock.com.