

Ball Aerospace Delivers Pollution Monitoring Instrument to NASA

The Tropospheric Emissions: Monitoring of Pollution (TEMPO) spectrometer will measure air quality

BOULDER, Colo., Dec. 7, 2018 /PRNewswire/ -- Ball Aerospace has delivered the Tropospheric Emissions: Monitoring of Pollution (TEMPO) spectrometer to NASA after a successful final acceptance review. Once launched, TEMPO will be a space-based ultraviolet/visible light air quality spectrometer in geostationary orbit over greater North America.

"Ball Aerospace has more than 30 years of innovation in advanced spectrometers and expertise in producing cost-effective solutions for Earth observation and remote-sensing missions," said Makenzie Lystrup, vice president and general manager, Civil Space, Ball Aerospace. "Data gathered from TEMPO will advance air quality research, helping to assess and forecast air pollution, by identifying sources and distribution of pollutants in the atmosphere."

The TEMPO instrument will provide hourly daylight measurements of ozone, nitrogen dioxide and other key elements of air pollution across North America, from Mexico City to Canada and from coast-to-coast. TEMPO's high resolution will allow pollution tracking at micro urban scales every hour and is expected to improve air quality prediction accuracy by 50 percent.



Ball is a part of a team that has extensive experience in measuring the components of air quality. Ball built the TEMPO instrument at the company's Boulder, Colo. facility in tandem with the Geostationary Environmental Monitoring Spectrometer (GEMS) in order to capture design efficiencies between the two instruments, which share the same technology. GEMS is a joint development effort by Ball and the Korea Aerospace Research Institute (KARI), South Korea, and is part of a global air quality monitoring constellation that includes TEMPO. The [TEMPO team](#) includes the Smithsonian Astrophysical Observatory; NASA's Langley Research Center; NASA's Goddard Space Flight Center; the U.S. Environmental Protection Agency; and several U.S. universities and research organizations.

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This release contains "forward-looking" statements concerning future events and financial performance. Words such as "expects," "anticipates," "estimates," "believes," "targets," "likely," "positions" and similar expressions typically identify forward-looking statements, which are generally any statements other than statements of historical fact. Such statements are based on current expectations or views of the future and are subject to risks and uncertainties, which could cause actual results or events to differ materially from those expressed or implied. You should therefore not place undue reliance upon any forward-looking statements and any of such statements should be read in conjunction with, and, qualified in their entirety by, the cautionary statements referenced below. The company undertakes no obligation to publicly update or revise any forward-looking statements, whether as a result of new information, future events or otherwise. Key factors, risks and uncertainties that could cause actual outcomes and results to be different are summarized in filings with the Securities and Exchange Commission, including Exhibit 99 in our Form 10-K, which are available on our website and at www.sec.gov. Additional factors that might affect: a) our packaging segments include product demand fluctuations; availability/cost of raw materials and logistics; competitive packaging, pricing and substitution; changes in climate and weather; competitive activity; footprint adjustments and other manufacturing changes; failure to achieve synergies, productivity improvements or cost reductions; mandatory deposit or other restrictive packaging laws; customer and supplier consolidation, power and supply chain influence; changes in major customer or supplier contracts or a loss of a major customer or supplier; political instability and sanctions; currency controls; changes in foreign exchange or tax rates, including due to the effects of the 2017 U.S. Tax Cuts and Jobs Act; and tariffs or other governmental actions in any country affecting goods produced by us or in

our supply chain, including imported raw materials, such as pursuant to section 232 of the U.S. Trade Expansion Act of 1962; b) our aerospace segment include funding, authorization, availability and returns of government and commercial contracts; and delays, extensions and technical uncertainties affecting segment contracts; c) the company as a whole include those listed plus: changes in senior management; regulatory action or issues including tax, environmental, health and workplace safety, including U.S. FDA and other actions or public concerns affecting products filled in our containers, or chemicals or substances used in raw materials or in the manufacturing process; technological developments and innovations; litigation; strikes; labor cost changes; rates of return on assets of the company's defined benefit retirement plans; pension changes; uncertainties surrounding geopolitical events and governmental policies both in the U.S. and in other countries, including the U.S. government elections, budget, sequestration and debt limit; reduced cash flow; interest rates affecting our debt; and successful or unsuccessful joint ventures, acquisitions and divestitures, including with respect to the Rexam PLC acquisition and its integration, or the associated divestiture; the effect of the acquisition or the divestiture on our business relationships, operating results and business generally.

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