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R-GAS™

GASIFICATION TECHNOLOGY

GTI is a leading research, development, and training organization addressing global energy and environmental challenges. We're applying energy and aerospace experience to lower energy costs and provide cleaner sources of fuel and power.

R-GAS™

Leveraging decades of rocket engine development, GTI's gasifier utilizes aerospace-inspired injectors and high-temperature materials

GTI is maturing an innovative and compact gasification technology for coal conversion to liquid fuels and chemicals and power generation. This game-changing technology, leveraging decades of investment from both U.S. aerospace and energy sectors, was developed from concept to pilot-scale by Aerojet Rocketdyne and is now owned by GTI. GTI has branded this gasification technology as the R-GAS™ process.

The R-GAS™ technology has been successfully operated at pilot-scale (18 tpd) on sub-bituminous coal, bituminous coal, high ash fusion temperature anthracite coal, and petroleum coke – all with excellent test results. This testing has been conducted at GTI's pilot-scale facility located on an 18-acre campus in metro Chicago, IL with more than 1,000 hours of hot fire testing achieved since commission of the pilot plant in December 2009. The most recent long duration testing was completed in December 2016 with a very high ash fusion temperature anthracite coal (predominant in China). This series of tests validated the robustness of the R-GAS™ process, with performance and thermal environments consistent with a predicted 2-year injector life and a 10-year liner life that would result in 99% availability for this coal.

STATUS: Scaling-up the R-GAS™ technology requires a large-scale demonstration plant to validate long-duration reliability, operability, and capital costs. In June 2017, GTI and Yangquan Coal Industry Group signed an agreement to jointly develop an Industrial Demonstration Project for R-GAS at the largest coal-to-chemicals plant in Shanxi Province, China. Construction is underway and commissioning is scheduled to begin by the end of 2019.

BENEFITS

- High cold gas efficiency:
  - 2-4% > than other dry feed gasification processes
  - 7%-9% > than slurry gasification processes
- Lower capex: ~15-25% plant cost reduction vs. lowest cost entrained flow technology
- 15%-25% reduction in cost of product (power, chemicals, liquids)
- High thermal margins enables operation on coals with high ash fusion temperature (AFT)
- Eliminates black water system
- Reduced water usage

KEY FEATURES

- Dry feed for high-efficiency feedstock flexibility
- Multi-element feed splitter
- Rapid mix injector plus plug flow reactor for 90% smaller volume
- Advanced cooling design for robust thermal margins; long component life
- Rapid spray quench
- Long MTBF, short MTTR for high availability

APPLICATIONS

- Hydrogen for refineries
- Synfuels and chemicals production
- Electric power generation

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