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Siemens Fuel Gasification Technology

Fuel gasification technology for integrated
gasification combined cycle and industrial applications

Answers for energy.

Siemens Fuel Gasification Technology



Rising oil and gas prices have led to a resurgence of coal as an affordable energy source. Especially coal-rich regions have increasingly been tapping their local resources. This allows them to reduce their reliance on foreign imports of natural resources and at the same time achieving stable prices to meet ever growing energy demands.

The Siemens gasification technology continues a long-held Siemens tradition of satisfying the needs of our customers worldwide. High availability, low life-cycle costs and multi-fuel capability are among the most important factors for being competitive. The Siemens Fuel Gasification technology (SFG®) addresses all of these key competitive drivers.

With the need to substitute oil and natural gas in many processes, the Siemens Fuel Gasification technology (formerly known as GSP technology) was developed in 1975 with a focus on low-grade lignites. Since that time, the range of usable feedstocks has been broadened to include both conventional fossil fuels as well as recycled liquid chemical wastes and refinery residues, biomass and other waste materials. Environmental requirements are becoming more and more stringent all over the world. Gasification projects are attractive solutions as they can offer environmentally friendly plants with lower emissions and potential future CO₂ sequestration.

Siemens gasifiers are equally suited for power generation in IGCC (Integrated Gasification Combined Cycle) as well as other industrial applications.

Our Siemens service network is available for you when and where you need it – for technical field assistance, training, spare parts supply, or operations and maintenance services.



Siemens Gasification Test Center

With the Gasification Test Center in Freiberg, Germany, Siemens owns one of the most comprehensive gasification test facilities in the world. More than 60 different fuels have been tested so far, which gives Siemens a rich body of experience.

The centerpiece of the Siemens Gasification Test Center is a 5 MW_{th} gasification reactor with operating pressures up to 26 bar. The test gasifier is complemented by a range of feedstock preparation systems and related gas cleaning process units. Further equipment for coal and slag analysis (e.g. fluidization behavior and slag viscosity) is available.

With this equipment, a broad range of tests can be performed to:

- Determine detailed analytical data of feedstock and gasification products
- Optimize feedstock preparation to maximize efficiency and carbon conversion rate
- Determine the optimum gasification process conditions
- Gain valuable information about the expected products and environmental performance.

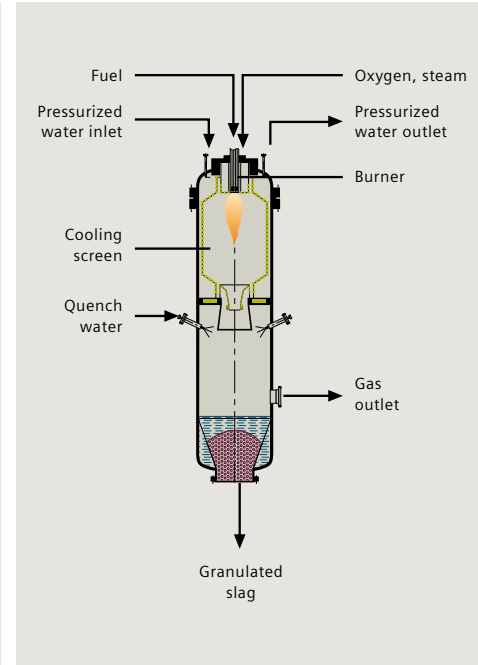
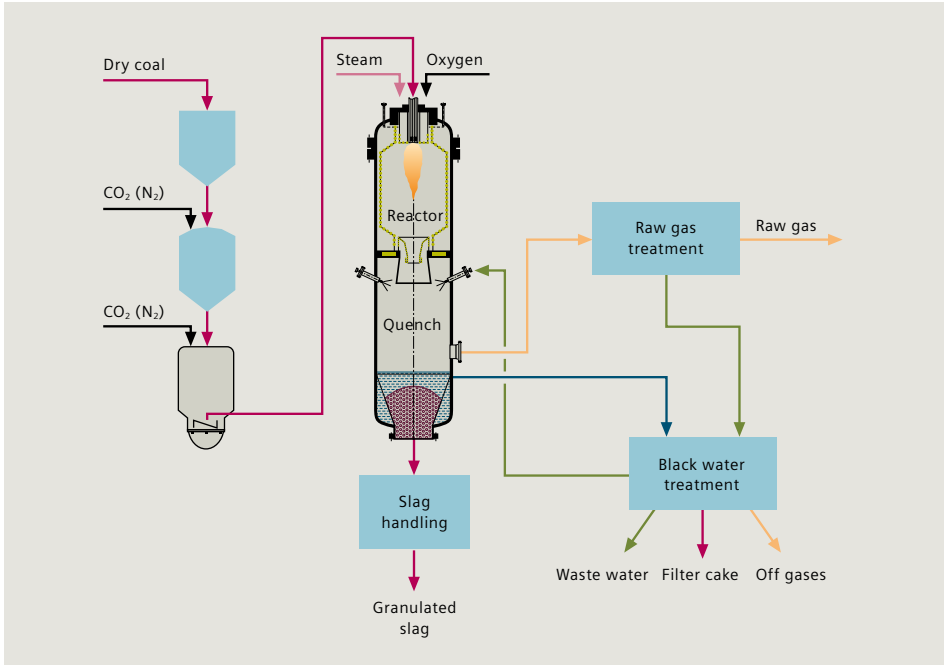
Dry feeding test rig

The Siemens Gasification Test Center furthermore provides a test rig for high-pressure coal feeding. This test rig consists of a fully equipped dry feeding system and can be used to find optimized feeding solutions. In particular, it allows the following aspects to be explored:

- Investigation of fluidization behavior under elevated pressure conditions
- Comparison of different coal density and velocity measurement systems
- Investigation of different feeding gases for solid feeding
- Test of alternative dry feeding systems.

Siemens Fuel Gasification Test Center

Location:	Freiberg, Germany
Commercial operation:	1996
Technical data	
Capacity:	5 MW _{th}
Type of reactor:	5 MW _{th} entrained-flow, cooling screen, retrofittable to cooling wall testing, slurry or dry feed feeding system
Feedstock:	<ul style="list-style-type: none"> ■ Lignite ■ Bituminous & sub-bituminous coal ■ Hard coal ■ Pet-coke ■ Biomass



Siemens Fuel Gasifier Island

The Siemens Fuel Gasifier is the heart of the gasifier island. Process steps like the dry feed system, slag handling system, the raw gas treatment and the black water treatment complement the gasifier island. Siemens offers design and basic engineering of the complete gasifier island process. The process layout ensures efficient design, optimized handling of by-streams and water usage and minimum interfaces to downstream processes and utilities.

Siemens Fuel Gasifier

The entrained-flow Siemens Fuel Gasifier (SFG) is able to convert a large range of fuels and is ideally suited for lower-rank fuels like lignite with high ash and moisture content. The syngas leaving the gasifier island mainly consists of CO, hydrogen and small amounts of CO₂ and is free of any higher hydrocarbons. Noxious components such as particulates, sulfur and nitrogen compounds which are typical of gasification are removed by conventional gas treatment and conditioning processes downstream the gasification process.

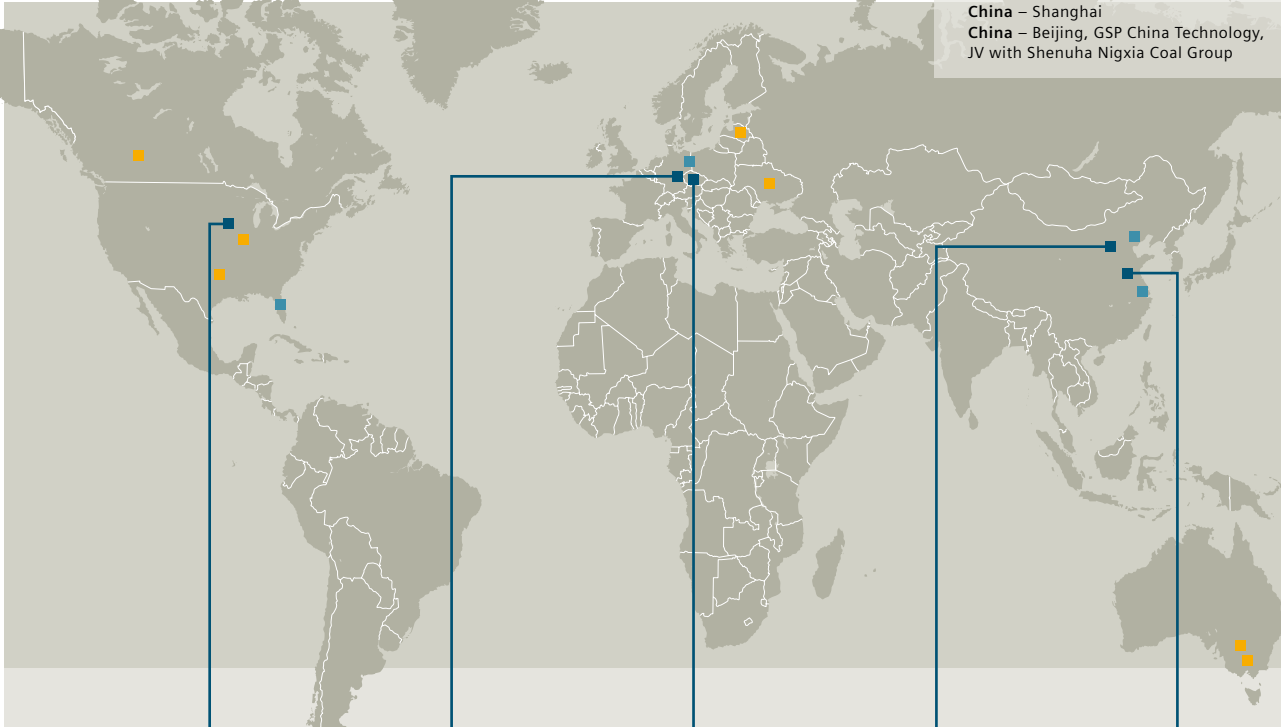
Main features of Siemens Fuel Gasification technology:

- Dry solids feeding for high efficiency and low O₂ consumption
- Top-mounted dust burner with extended burner lifetime
- Cooling screen for high availability and low maintenance
- Full water quench for robust and reliable design.

Benefits of Siemens Fuel Gasifier

- Feedstock flexibility: Suitable for all kind of coal types, especially lignite, biomass, petcoke and liquid refinery residues
- High carbon conversion: > 98 %
- Operating pressures: 40 bar and above
- Shorter start-up times
- Smaller dimensions for reduced equipment costs
- High availability and low maintenance
- Proven experience: More than 20 years of successful operating experience

■ **Main Offices:**
 Germany – HQ Freiberg, Test Facility
 USA – Orlando
 China – Shanghai
 China – Beijing, GSP China Technology, JV with Shenuha Nigxia Coal Group



USA –
 Secure Energy
 Coal to Chemicals



Germany –
 Schwarze Pumpe
 1984–2007



Czech Republic –
 Vresova
 IGCC Liquid feedstock



PR China –
 NCPP I
 Coal to Polypropylene



PR China –
 JinCheng
 Coal to Ammonia



References (operational/hardware supplied)

<p>USA IGCC/CCS Taylorville Energy Center/Tenaska</p>	<p>USA Polygeneration (IGCC/CCS & Fertilizer) Texas Clean Energy Project/Summit Power</p>
<p>Canada IGCC/CCS Genesee IGCC/Capital Power</p>	
<p>Europe Biomass to Liquids Project WoodSpirit/BioMCN</p>	<p>Europe Polygeneration (IGCC/CCS & H2)/CCS Caledonia Clean Energy Project/Summit Power</p>
<p>China Coal to Synthetic Natural Gas (SNG) Yinan Project/China Power Investment (CPI)</p>	<p>China Coal to Liquids (Transportation Fuels) Ningxia</p>

Technology Selected

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Fossil Power Generation Division
Order No. E50001-G240-A102-V1-4A00 | Printed in Germany |
Dispo 05400 | c4bs No. 7432, 7522 |
TH 214-120449 | 431744 | WS | 05121.0

Printed on elementary chlorine-free bleached paper.

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