PROJECT CAPABILITIES

SINGLE COMBUSTOR
BIOMASS GASIFICATION TECHNOLOGY

Advanced Combustion Technology

JANSEN's single combustor biomass gasification technology is based on the application of two elements of advanced combustion technology, namely:

1. **The use of our patented High Energy Combustion Air Nozzle™ for the second stage of combustion.** The unique nozzles provide efficient conversion of static pressure into high velocity jets that provide exceptional penetration and mixing for the complete combustion of the gases driven off in the gasification stage.

2. **The use of Computational Fluid Dynamics (CFD) modeling.** JANSEN has developed sophisticated CFD modeling capability of solid waste fuel combustion. CFD modeling for each installation allows variation of combustion parameters and selection of certain design features and operating characteristics of fuel and air supply that optimizes the gasification and combustion processes in the single combustor.

Features of Single Combustor Biomass Gasification

- **Two or more stages of oxidation**
  - Gasification stage – pyrolyzation and volatiles release
  - Second stage – burnout of combustible gases
- **Complete combustion**
  - Lower carbon monoxide (CO) and volatile organic compounds (VOC) than conventional biomass combustion
- **Reduced nitrogen oxides (NO_x) emissions**
  - Staged combustion – reduced local temperatures
  - Lower excess air requirements
- **Reduced particulate emissions**
  - 30% to 50% reduction in fly ash carryover out of the furnace
  - Essentially complete burnout of soot
- **Low auxiliary equipment horsepower required**
  - No high powered forced draft fan required as for fluidized bed
  - Better overall plan efficiency – more power per pound of fuel

- **Reduced landfill costs**
  - No spent bed material as in fluidized bed technology
  - Superior carbon burnout compared to conventional technology
- **Lower operating and initial capital costs**
  - More attractive to power systems developers
  - Lower capital costs for either OEM or retrofit/upgrades
  - Shorter shutdowns for retrofits c/w FBC and others
  - Less ash system related maintenance costs
- **Higher equipment availability/reliability to produce power**
  - More bottom ash generation/less fly ash to cause downstream wear and tear, pluggages, load reductions
  - More even grate metal temperatures due to more even fuel and ash coverage – less alarms and load reductions to stabilize
  - Equally flexible to fire a wide range of solid fuels c/w FBC
- **Summary: This is not conventional Stoker Firing Technology**
  - Traveling grate is retained for continuous ash removal
  - Lower UFA/OFA ratios for lower particulate carryover
  - Lower fly/bottom ash splits for lower M&O costs
  - Increased lower furnace heat release rates for lower UCL
  - Lower CO, NO_x, VOC, and particulate emissions
  - Higher net power generation and availability & reliability