GE
Oil & Gas

DLN System for MS3002 RC and for MS5001 PA / MS5002 C and D

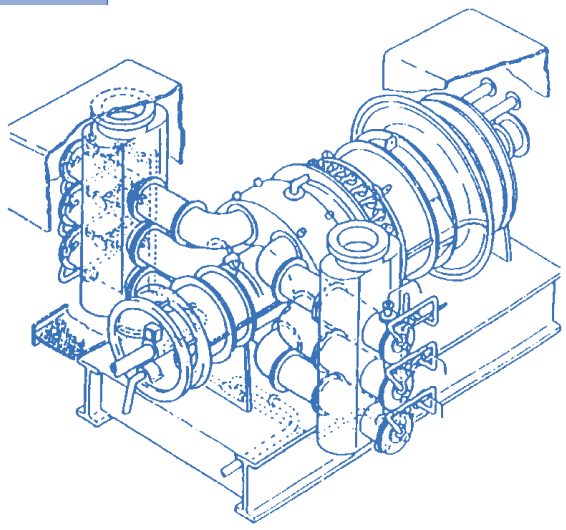
Benefits

- ☐☐☐ Increased production
- ☐☐☐ Higher efficiency
- ■■■ **Compliance with environmental regulations**
- ☐☐☐ Availability and Reliability
- ☐☐☐ Life extension

The benefits include:

- Lower gas turbine emissions
- Potential revenue from NOx credit trading markets in the US and Europe
- Reduced operating costs by eliminating need for water / steam usage
- No need for costly, complex, and large Selective Catalytic Reduction (SCR) systems

To help satisfy revised government regulations and business requirements that demand cleaner emissions, GE Oil & Gas has enhanced the Dry Low NOx (DLN) technology for MS3002 regenerative cycle and MS5001 / 2 gas turbines. This enhanced product builds upon years of GE leadership and experience in combustion technology.
This upgraded combustion system helps you to comply with local regulations requiring NOx reductions in an extended range of operating conditions. It can be easily installed during any gas turbine scheduled maintenance.



DLN combustion arrangement

DLN System Performance
The table below shows the effect of the DLN System on NOx and CO_2 at base load with natural gas fuel.

MS3002 Combustion Systems	GAS ONLY NOx (ppmvd) @ 15% O2	CO_2 (ppmvd)	Diluent	Operating range
Std	121	25	Dry	
DLN	35	80	Dry	70%-100%

MS5001 PA Combustion Systems	FUEL GAS NOx (ppmvd) @ 15% O2	CO_2 (ppmvd)	Diluent	Operating range
Std	142	10	Dry	
DLN	25	25	Dry	50%-100%

MS5002 C and D Combustion Systems	FUEL GAS NOx (ppmvd) @ 15% O2	CO_2 (ppmvd)	Diluent	Operating range
Std	145	10	Dry	
DLN	42	50	Dry	50%-100%

What it is

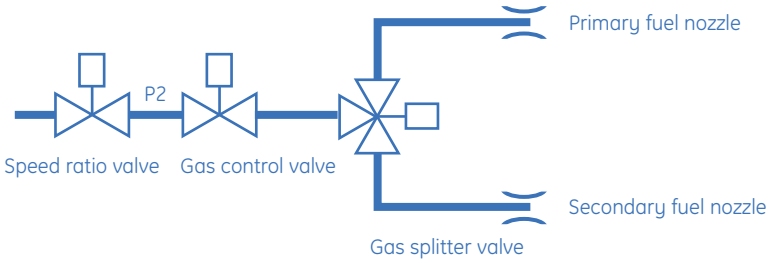
The DLN is a patented combustion system that optimizes emissions across ambient and load range and provide feedback loop for ambient variations (such as, temperature or humidity).

The upgrade includes:

- Liner dilution design based on proprietary performance, emissions, and reliability data from the fleet of MS3002 DLN units
- Unique independently controlled pilot fuel optimizes emissions and stability
- Inlet Bleed Heating provision could increase down capability to 50% of base load for MS5001 and MS5002

How it works

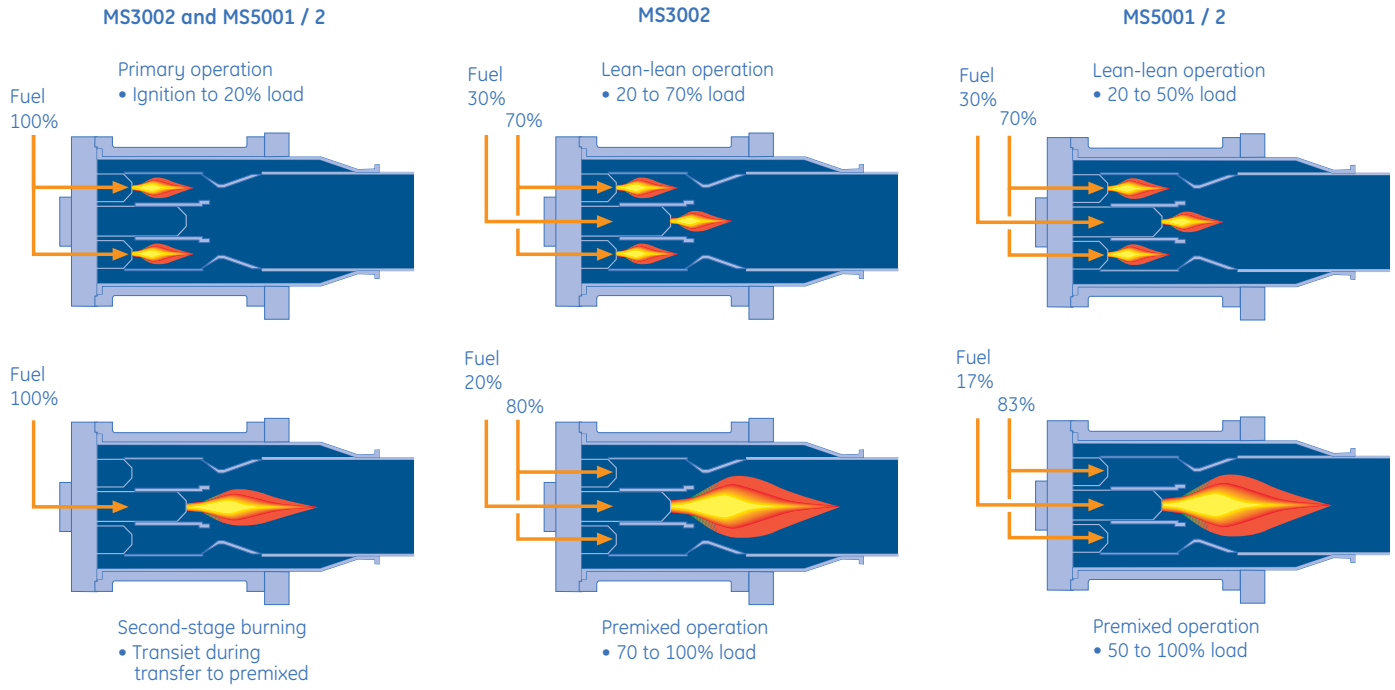
Dry Low NOx (DLN) combustion system yields low emissions while operating in the dry premixed mode on natural gas fuel. The Dry Low NOx combustion system reduces NOx and CO_2 emissions without steam or water injection on gas fuel units, through lean-premixed burning in multi-zone combustion liners, and by control equipment which directs fuel to the different liner zones depending upon the mode of operation.



DLN gas fuel system

How it works

The picture reports indicative values for load range and fuel split



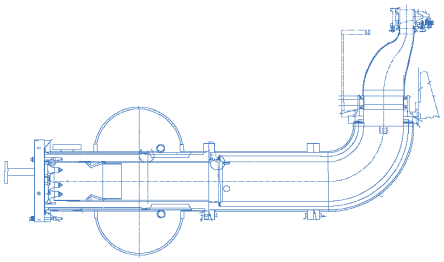
Fuel-staged DLN operating modes

Scope of Supply

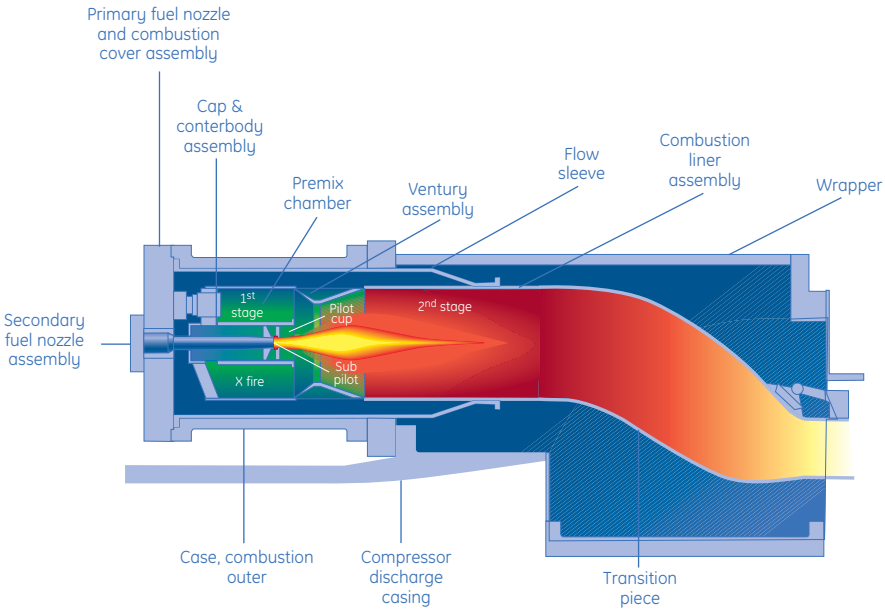
This modification includes the following:

- New combustion casings
- New combustion liners
- New combustion chambers
- Primary and secondary fuel nozzles
- Spark-plug and flame detectors
- Fuel gas system valves and piping modifications
- Upgrade to Mark VI turbine control system to support the advanced control algorithms.

For more detailed evaluation, please contact your GE Oil & Gas representative.



DLN Transition piece and combustion chambers



GE imagination at work

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COMK/MARK 839/II - Designed by: Studio Tre Fasi
Printed by: Sagraf - 1-2008