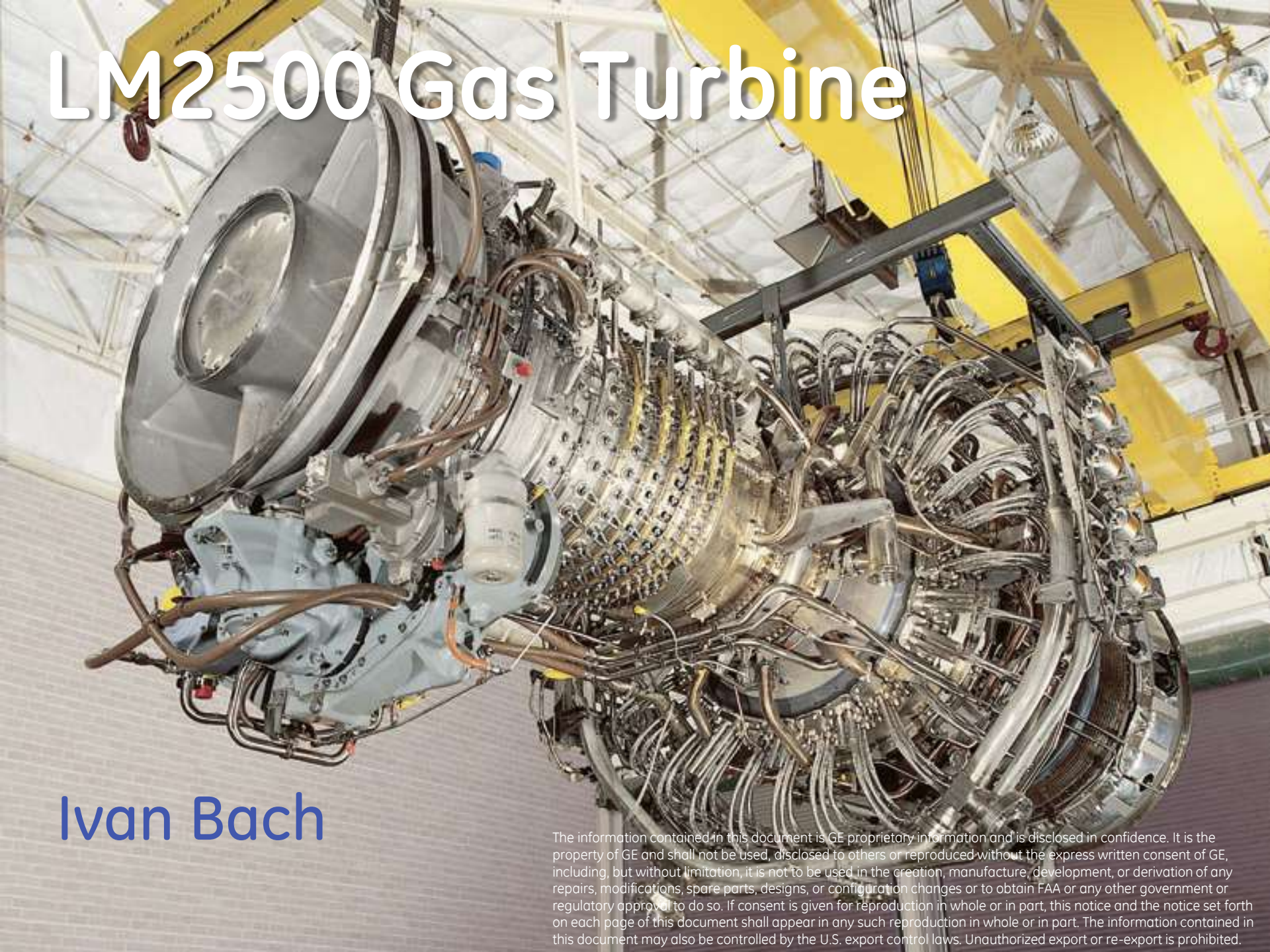
LM2500 Gas Turbine



Ivan Bach

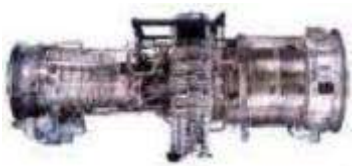
The LM2500 has continuously evolved to provide greater customer value

Estimated 367+ Million Hours, & Over 6100 engines

CF6 Fleet

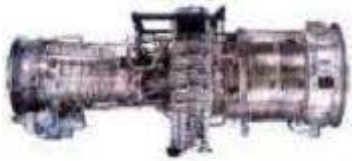
LM2500 Fleet*
77+ Million Hours, Over 2700 engines

Max Power Output MW/SHP
Thermal Efficiency



LM2500+ G4

33.9/45,400
39.6%



LM2500+

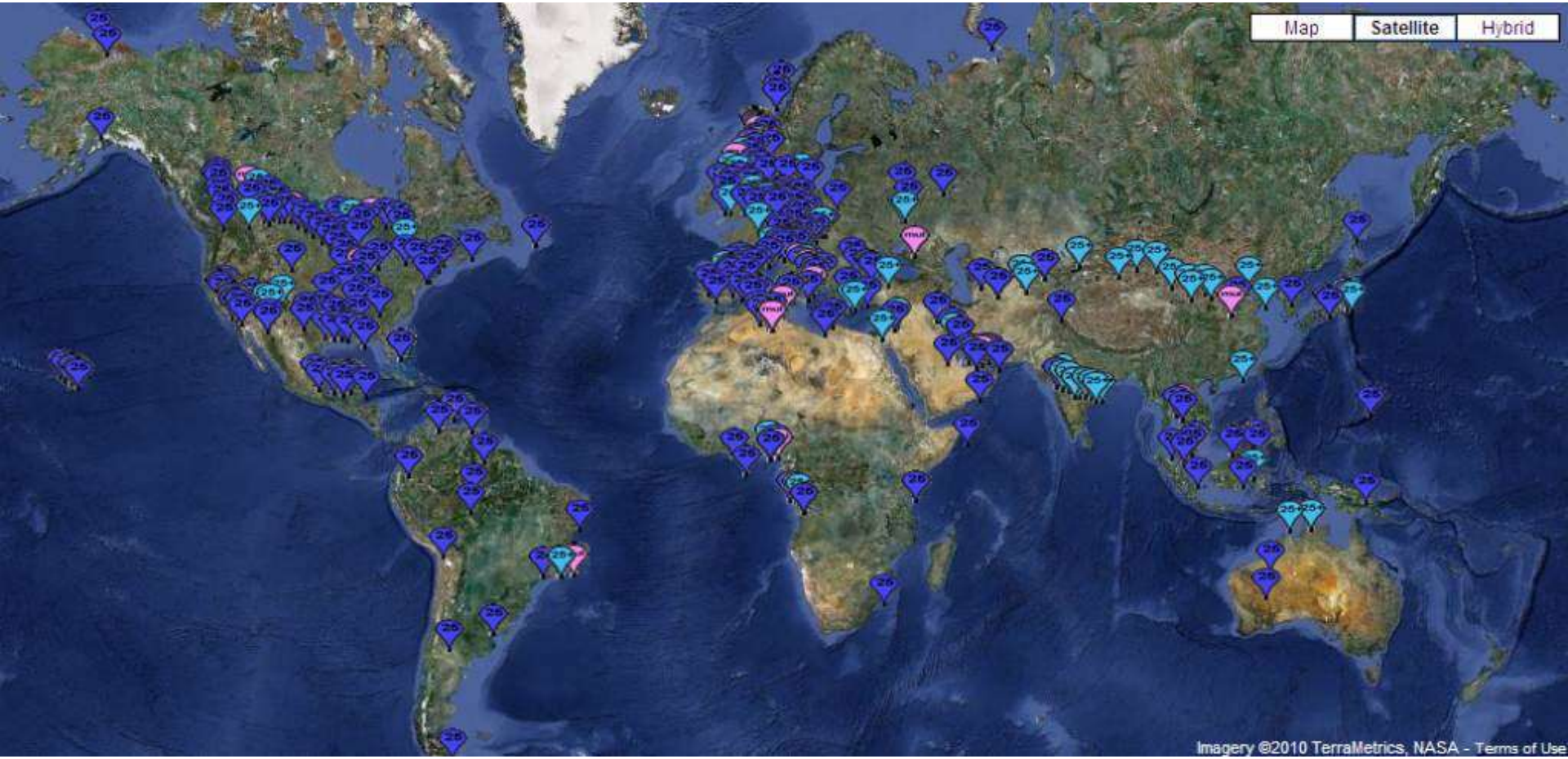
31.3/42,000
39.5%

LM2500

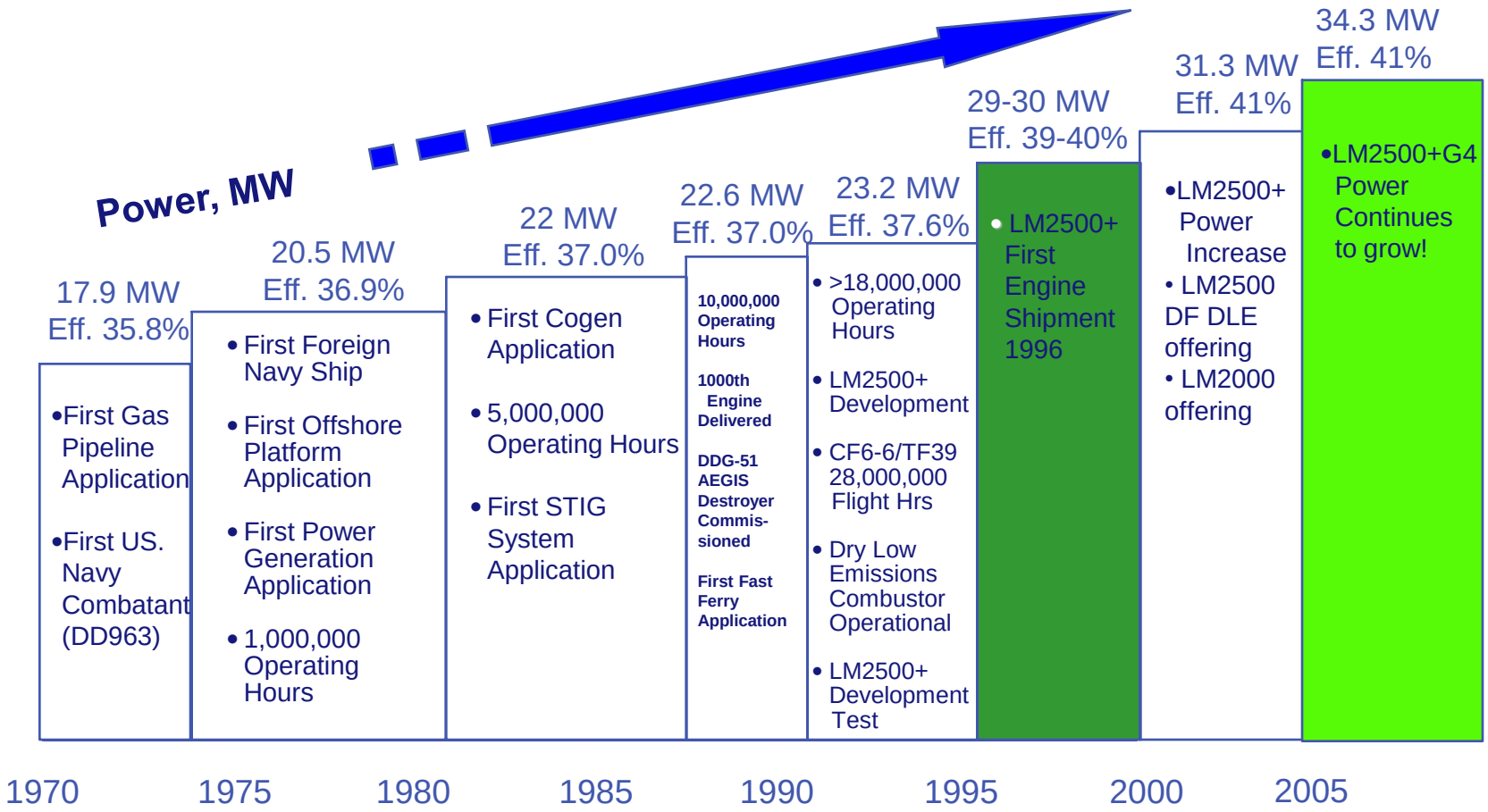
23.9/32,000
37.5%

*Estimated Marine & Industrial fleet

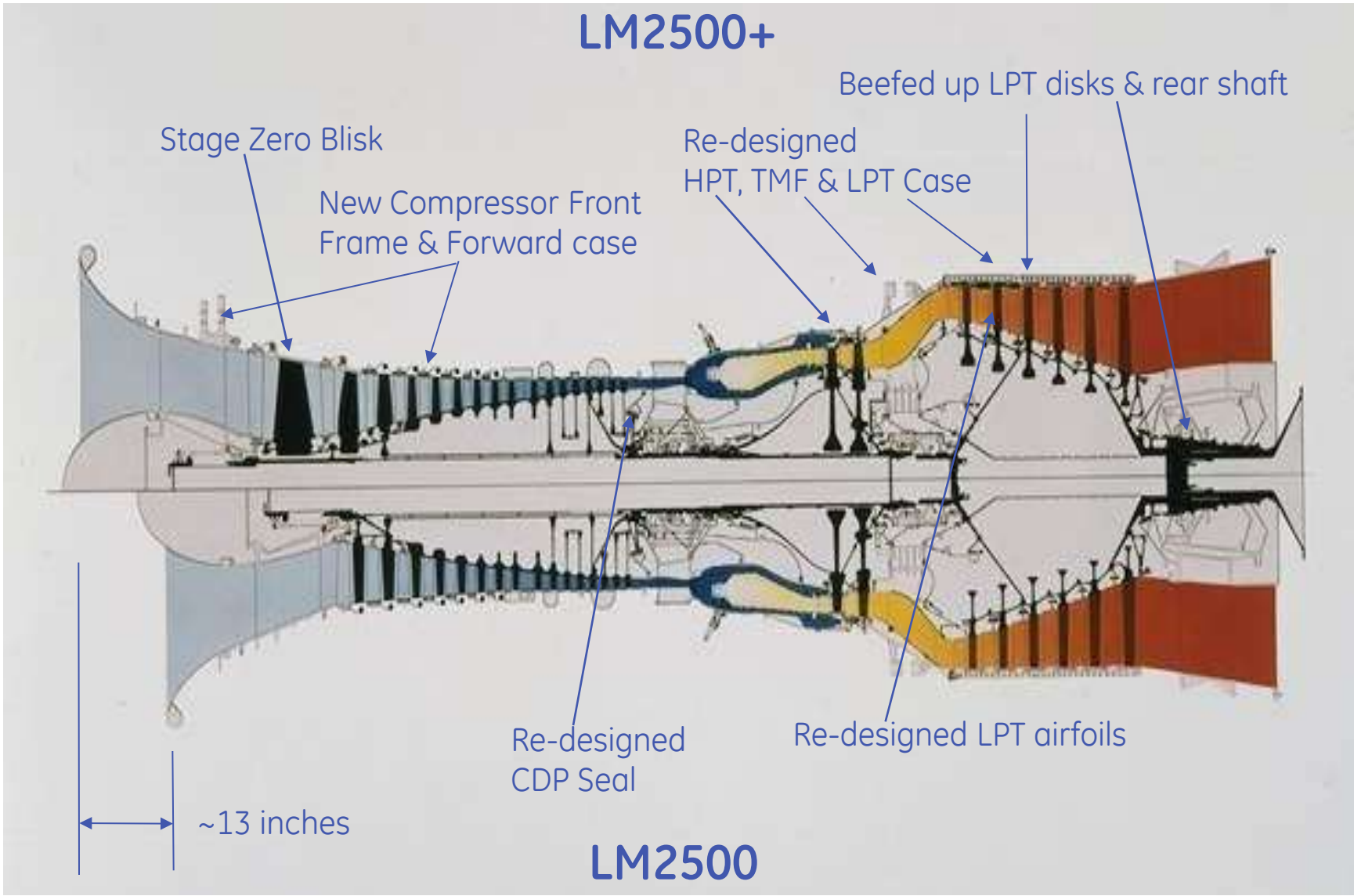
LM2500 Industrial fleet …
… more than 1,500 units installed



LM2500 product line growth



LM2500 vs. LM2500+ GT Centerlines



HP compressor stages 0 and 1 for the LM2500+

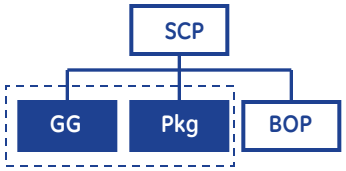
Stage 0 blisk (blades and disk) is electrochemically machined out of a single forging

Stage 1 blades have a wider chord, are more robust and do not have a mid-span damper

Operational Experience

LM2500 Availability and Reliability

Consistent World-Class Results



***2012 data through March**

Source: ORAP®; All rights to Underlying Data Reserved: SPS®

- Aircraft engine & LM family experience
- Extensive development testing
- Every engine is factory full-load tested
- Lease engine and rotable component availability
- Aircraft engine maintenance philosophy

Gas Turbine Package/Generator Set
50th percentile unit (median)

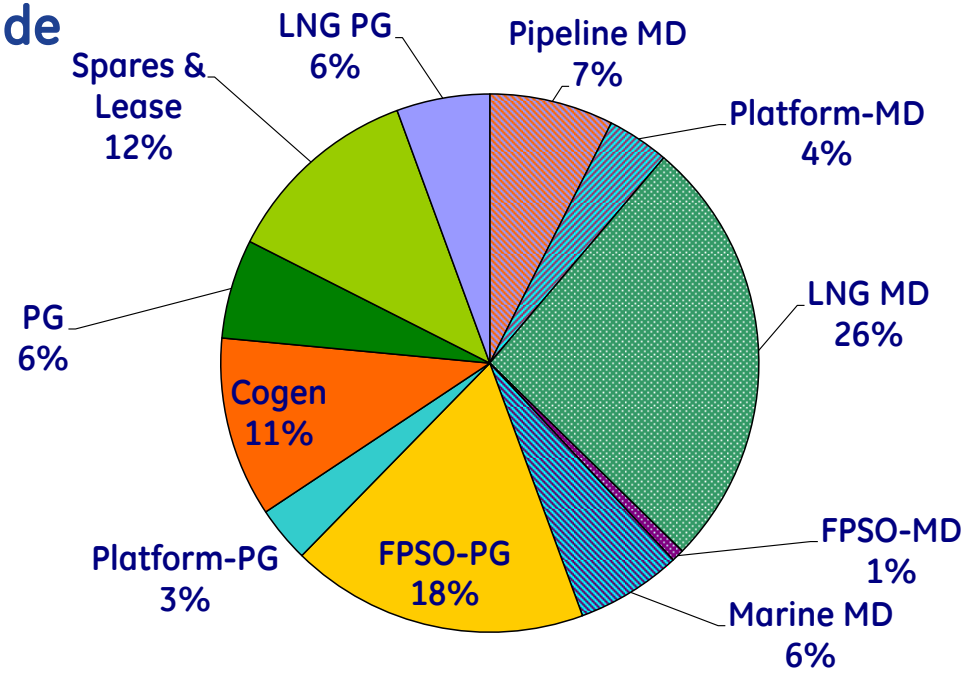
All data represents 12 month period

imagination at work

Total LM2500+G4 estimated fleet stats*

Great industry acceptance in less than 7 years

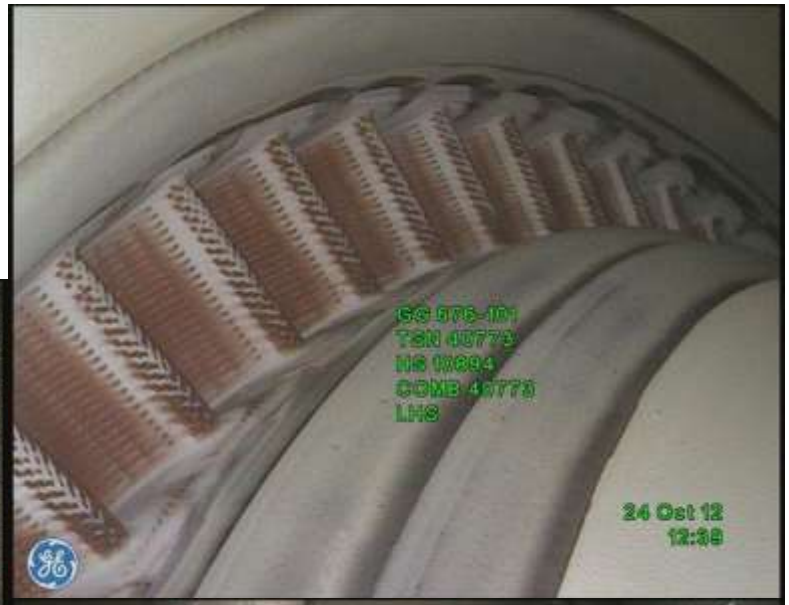
- Total orders received 268 units
- Applied to 74 projects worldwide
- Total service hrs > 640,000
- High time engine > 43,000 hrs
- Production units tested and shipped > 156
- Units in service > 70



*Estimated Marine & Industrial as of Jan 2013

Excellent results - +G4 Fleet Leader BSI at 40,773 hrs.

Currently original combustor in service at >43,000 hrs.*



*As of Oct 2012

Maintenance Philosophy

"On-Condition"

Inspect and Repair as Necessary to Restore to Desired Operational Condition

Modular Design

- –Major Component Exchanges
- –Easier to Handle & Transport

Split Case Design

- –Ease of Component Replacement
- –Blade Replacement & Repair
- –Compressor Cases

Fast Engine Exchanges

- –Minimized Downtime
- –2 day outage with spare or lease engines

LM2500 Gas Turbine

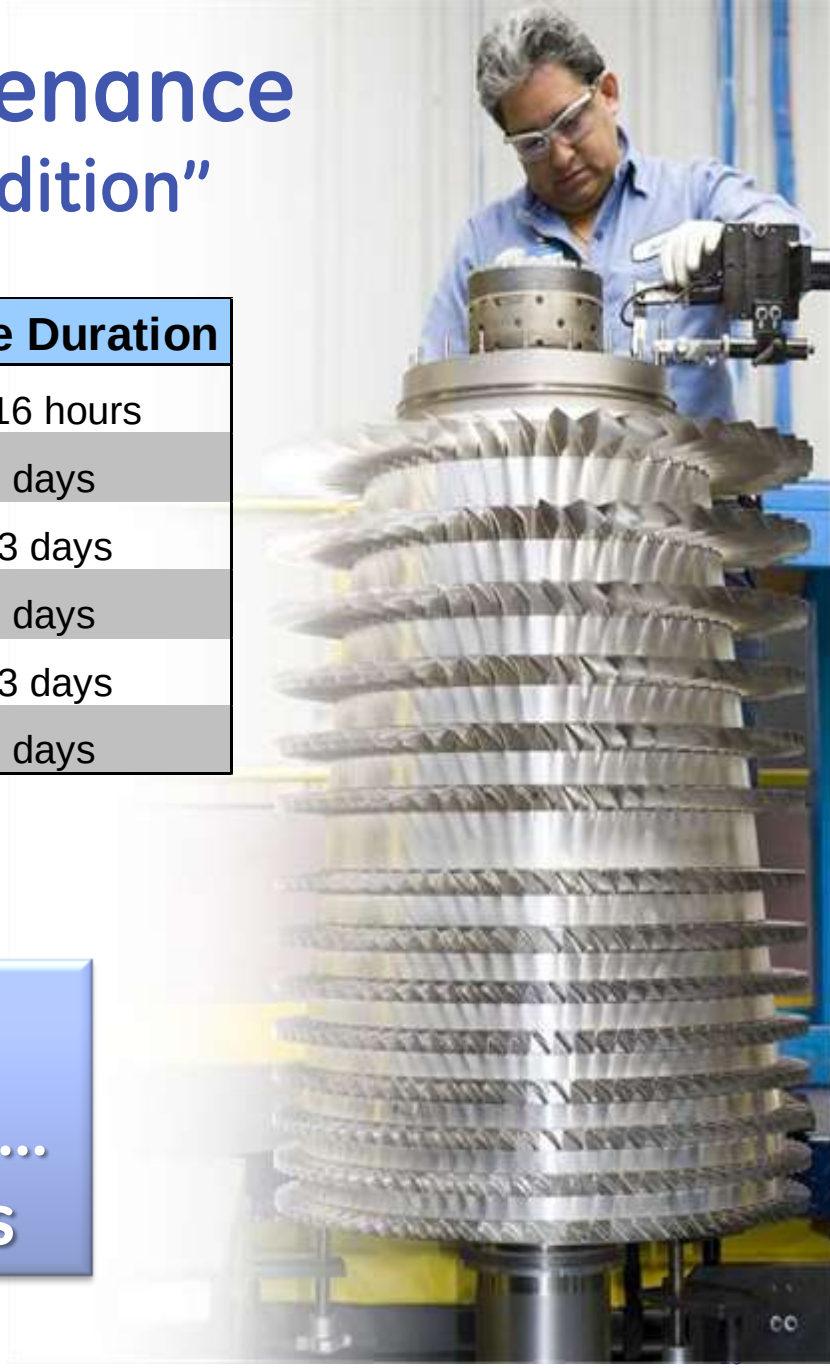
Typical scheduled maintenance
Actual maintenance is "On-Condition"

Hours	Scheduled Maintenance Action	Outage Duration
4,000	Inspection (Every 4,000 hours)	12-16 hours
25,000	On-Site Hot Section Replacement	3 days
50,000	Depot Refurbishment*	2-3 days
75,000	On-Site Hot Section Replacement	3 days
100,000	Depot Refurbishment*	2-3 days
125,000	On-Site Hot Section Replacement	3 days

* Spare or lease engine installed during refurbishment.
Maintenance intervals above are based on gas fuel operation

** STG & OTSG maintenance intervals can be aligned with GTG outages

12 days of outage in 50k hours of operation … vs 67 days for typical GTs



Light Weight, Small Footprint Solution
6 pack

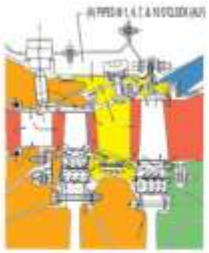
Quick Engine Exchange!

Gas Generator:	2000 Kg
Gas Turbine:	3600 Kg
Package Footprint:	~110 m^2

Thank You

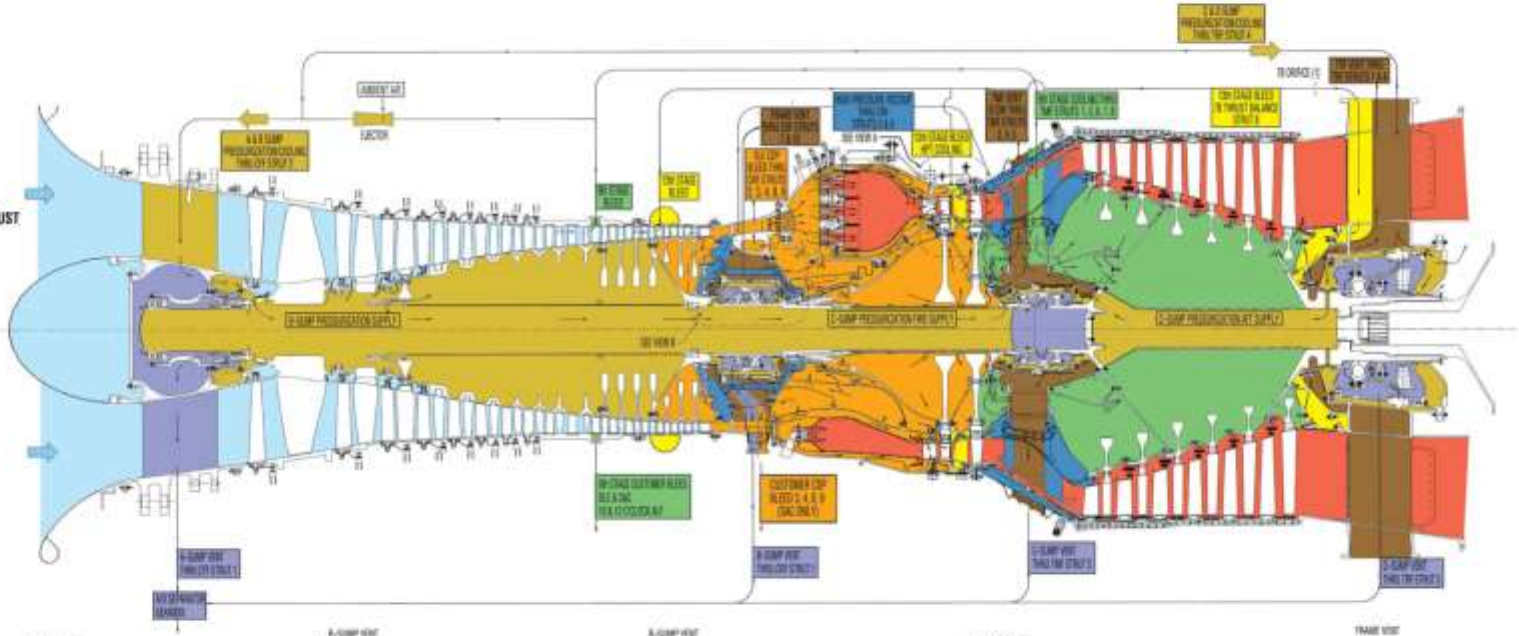
Combustion Systems

LM2500+G4
Gas Turbine Airflow
6-Stage Power Turbine

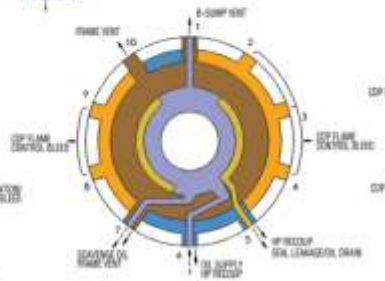

VIEW A

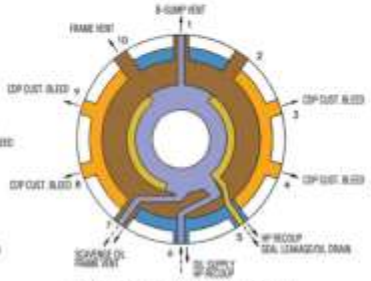

VIEW B

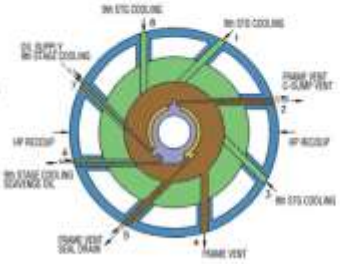
- SUMP PRESSURIZATION
- SUMP VENT
- COMBUSTION/TURBINE EXHAUST
- CDP AIR
- COMPRESSOR INLET
- 9th STG BLEED/COOLING
- 13th STG BLEED/COOLING
- FRAME VENT
- HIGH PRESSURE RECOUP

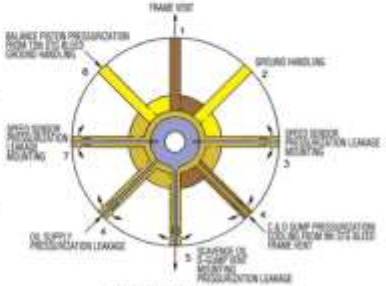



COMPRESSOR FRONT FRAME
STRUT USAGE
AFT LOOKING FORWARD


COMPRESSOR REAR FRAME (DLE ONLY)
STRUT USAGE
AFT LOOKING FORWARD

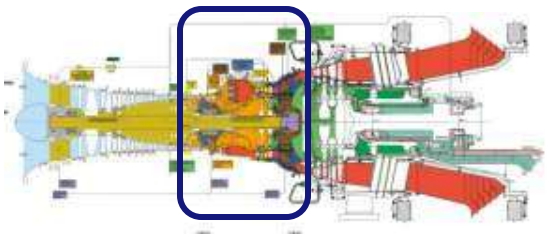

COMPRESSOR REAR FRAME (SAC ONLY)
STRUT USAGE
AFT LOOKING FORWARD


TURBINE MID FRAME
STRUT USAGE
AFT LOOKING FORWARD


TURBINE REAR FRAME
STRUT USAGE
AFT LOOKING FORWARD

DLE vs.. Standard Combustor

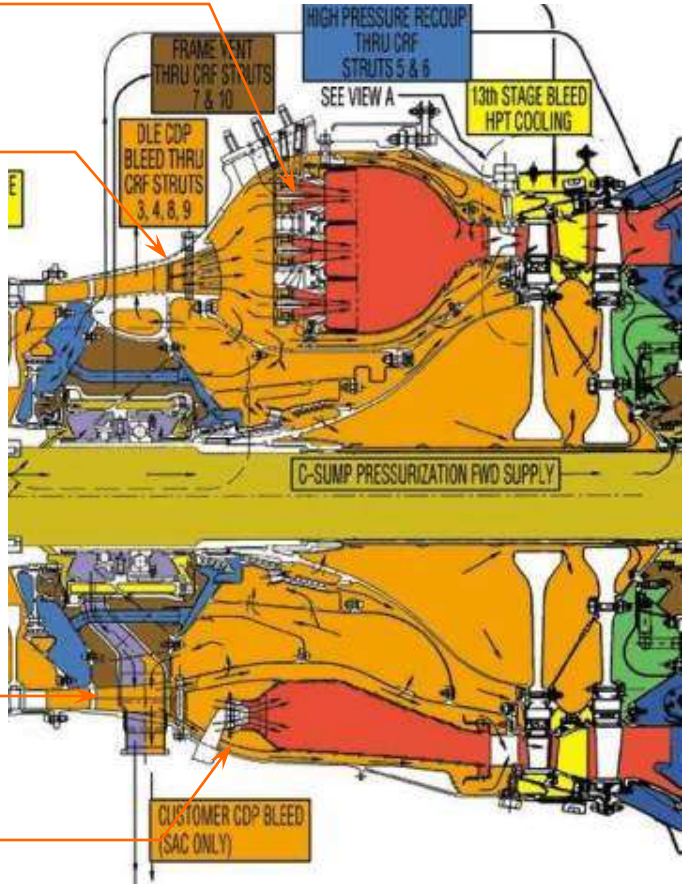
LM2500+/+G4



With dry low emissions combustor

30 PREMIXERS COMPRISING 75 STAGED INJECTORS

4 PASSAGE COMPRESSOR DIFFUSER



SINGLE COMPRESSOR DIFFUSER PASSAGE

SINGLE ROW OF 30 FUEL NOZZLES

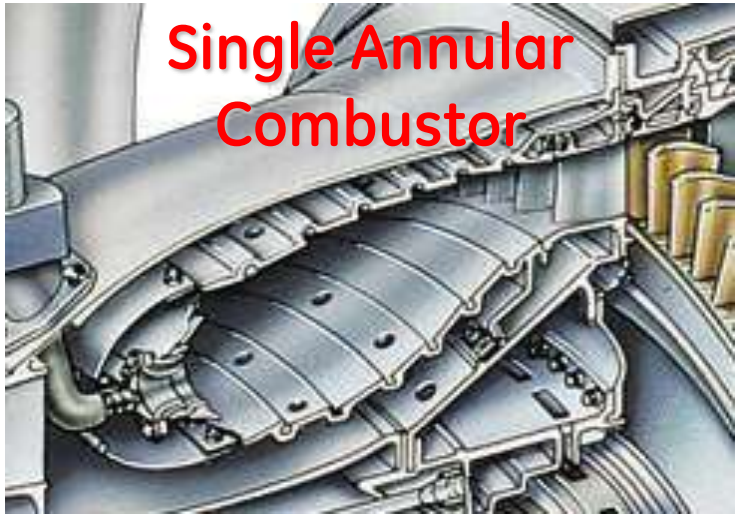
SYSTEM OF CHOICE FOR SITES WHERE EMISSIONS ARE REGULATED AND WATER USE IS RESTRICTED

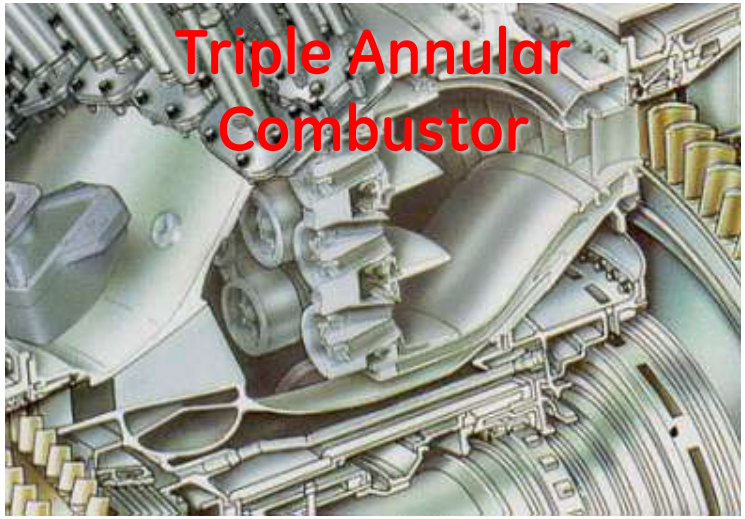
SYSTEM OF CHOICE FOR SITES WHERE EMISSIONS ARE **NOT** REGULATED OR WATER IS AVAILABLE

With standard combustor

Flexible emissions reduction …

LM2500	LM2500+	LM2500+G4	LM6000	LMS100	Control technology
			Water injection		
✓	✓	✓	✓	✓	25ppm NOx (gas fuel)
✓	✓	✓	✓	✓	42ppm NOx (liquid fuel)
			Steam Injection		
✓	✓	✓	✓		25ppm NOx (gas fuel)
✓					+15ppm NOx (gas fuel)
			Dry Low Emissions		
✓	✓		✓		**15ppm NOx (gas fuel)**
✓	✓	✓	✓	✓	25ppm NOx (gas fuel)
			✓		65ppm NOx (liquid fuel)
✓	✓	✓			100ppm NOx (liquid fuel)
✓	✓	✓	✓		**Dual Fuel DLE**



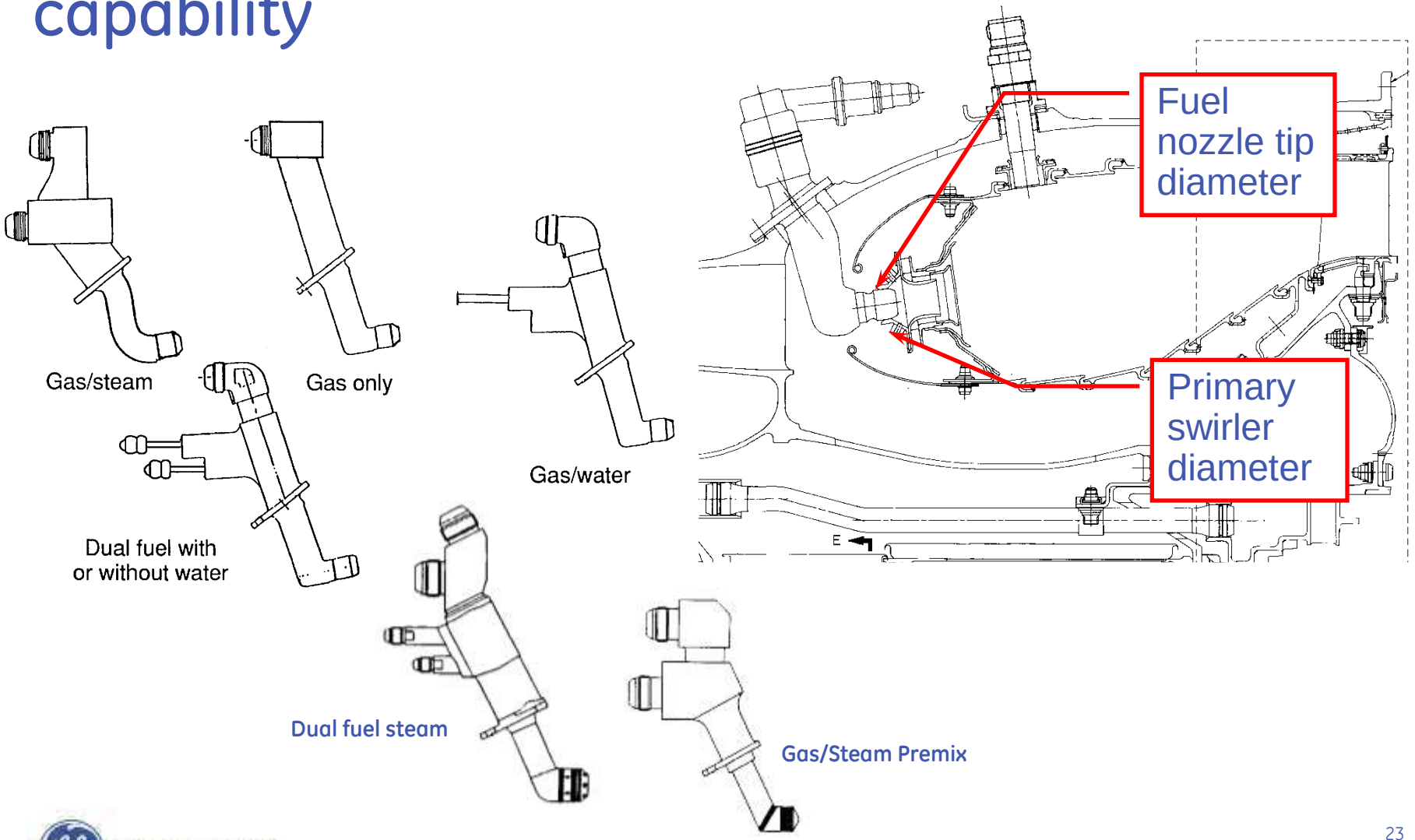


✓ **Under Development**

GT offerings as of 1Q2013

Single Annular Combustion (SAC)

Fuel nozzle to SAC Combustor interface must be considered to evaluate capability



LM2500 product line has 2 swirler diameters, therefore another degree of flexibility

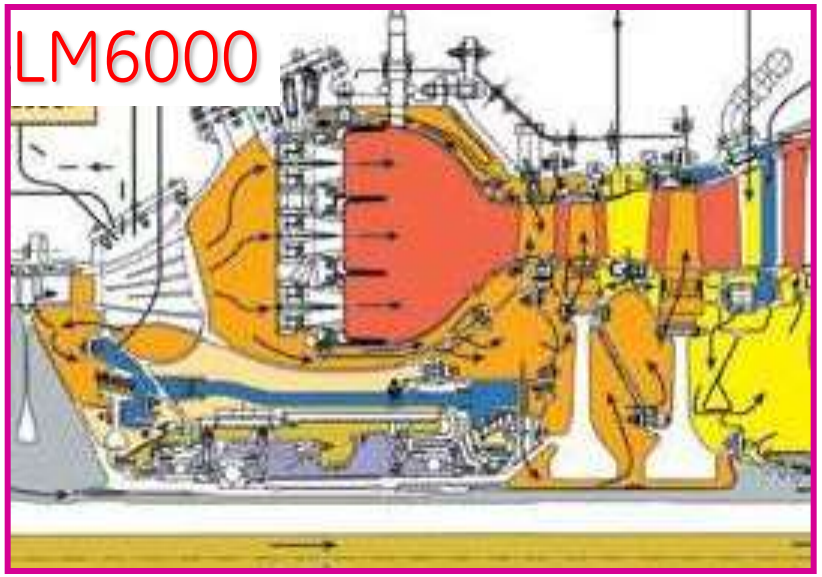
Original LM2500 **New larger tip LM2500** **LM6000**

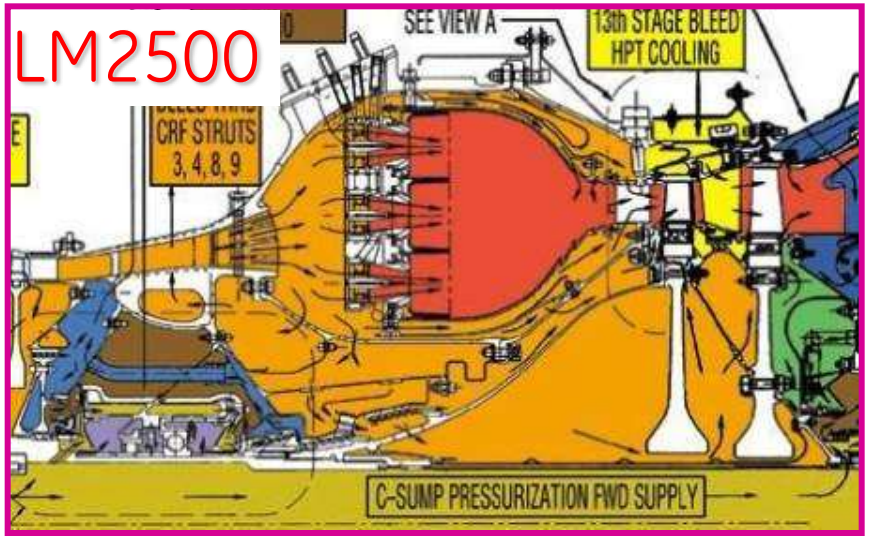
Dry Low Emission

World-leading technology for aeroderivatives

imagination at work

Common Design Approach





- ✓ Common triple-annular architecture
- ✓ Common premixer technology
- ✓ Similar combustor flow splits and emissions characteristics
- ✓ Similar staging and controls
- ✓ Similar acoustic behavior and abatements
- ✓ Same/similar materials for heat shields and liners

Leaders in DLE combustion for aeroderivative gas turbines …

… more than 700 units and 17 million hours!!

LM2500

Gas	**456**	10,354,060
Dual	**15**	**54,598**

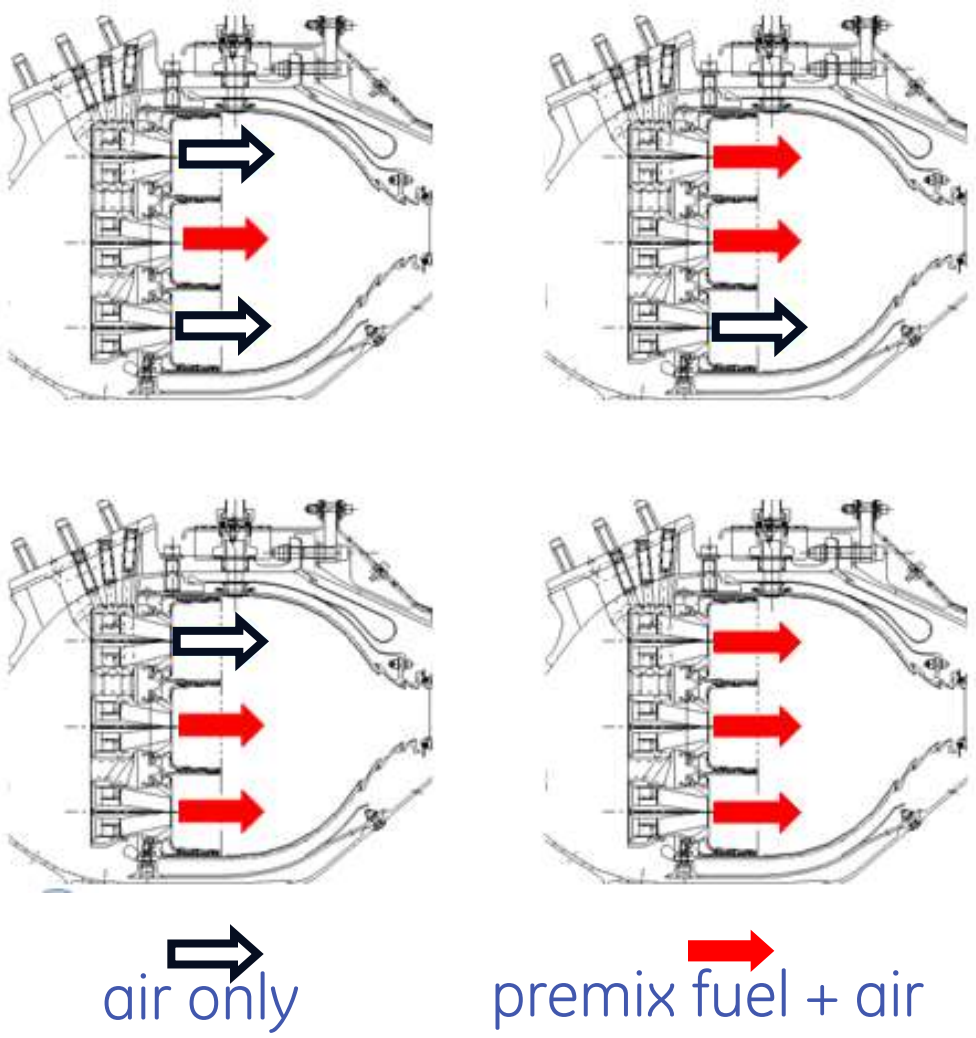
LM6000

Gas -25ppm	228	6,465,578
Gas -15ppm	29	161,579
Dual-25ppm	4	126,313
Dual-15ppm	2	106,045

Data as of July, 2012

DLE1/1.5 Combustor Staging

- ✓ Lean premixed operation throughout operating range
- ✓ Radial staging by fueling banks of premixing cups
- ✓ Some circumferential staging modes to provide extend overlap



DLE Combustor Design Evolution

DLE1

LM2500 Base & +
LM6000PB & PD

30 premixers
75 cups

DLE1.5

LM2500 +G4
LM6000PF

Now also for the
LM2500 at 15ppm!!

DLE2

LM6000PH
LMS100PB

15 premixers
30 cups

Relation of NOx to Firing Temperature