This is GE Aviation

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GE Aviation Overview

GE Aviation executive team

John S. Slattery
President & CEO, GE Aviation

David L. Joyce
Vice Chair, GE

Commercial Engines
Bill Fitzgerald
Vice President

Finance
Shane Wright
Senior Vice President, Chief Operating Officer and Chief Financial Officer

Business Development
Dave Farkas
Senior Executive

Commercial Engines Finance
Anne Lynch
Vice President and Chief Financial Officer

Services
Jean Lydon-Rodgers
Vice President

Human Resources & GE Labor Strategy
Athena Kaviris
Vice President

Legal
Eileen Brumback
Vice President and Chief Counsel

Additive Technology
Christine Furstoss
Vice President

Integrated Systems
Brad Mottier
Vice President

Engineering
Gary Mercer
Vice President

Chief Information Officer
David Burns
Vice President

Greater China Region
Weiming Xiang
Vice President

Military Systems
Tony Mathis
Vice President

Sales & Marketing
Jason Tonich
Vice President

Global Government Relations
Peter Prowitt
Senior Executive

Sourcing
Mike Wagner
Senior Executive

Avionics Systems
Alan Caslavka
Vice President

Supply Chain
Tony Aiello
Vice President

Chief Diversity Officer
Joe Allen
Senior Executive

Avio Aero & GE Additive
Riccardo Procacci
Vice President and CEO
Avio Aero and GE Additive

Communications & Infrastructure
Jamie Regg
Senior Executive

Marketing
Kim Schleiff
Senior Executive

’19 GE Aviation **$32.9B Revenue**[-a)]

Commercial Engines & Services **$24.2B**

Military Engines & Services **$4.4B**

BGA & Integrated Systems **$1.9B**

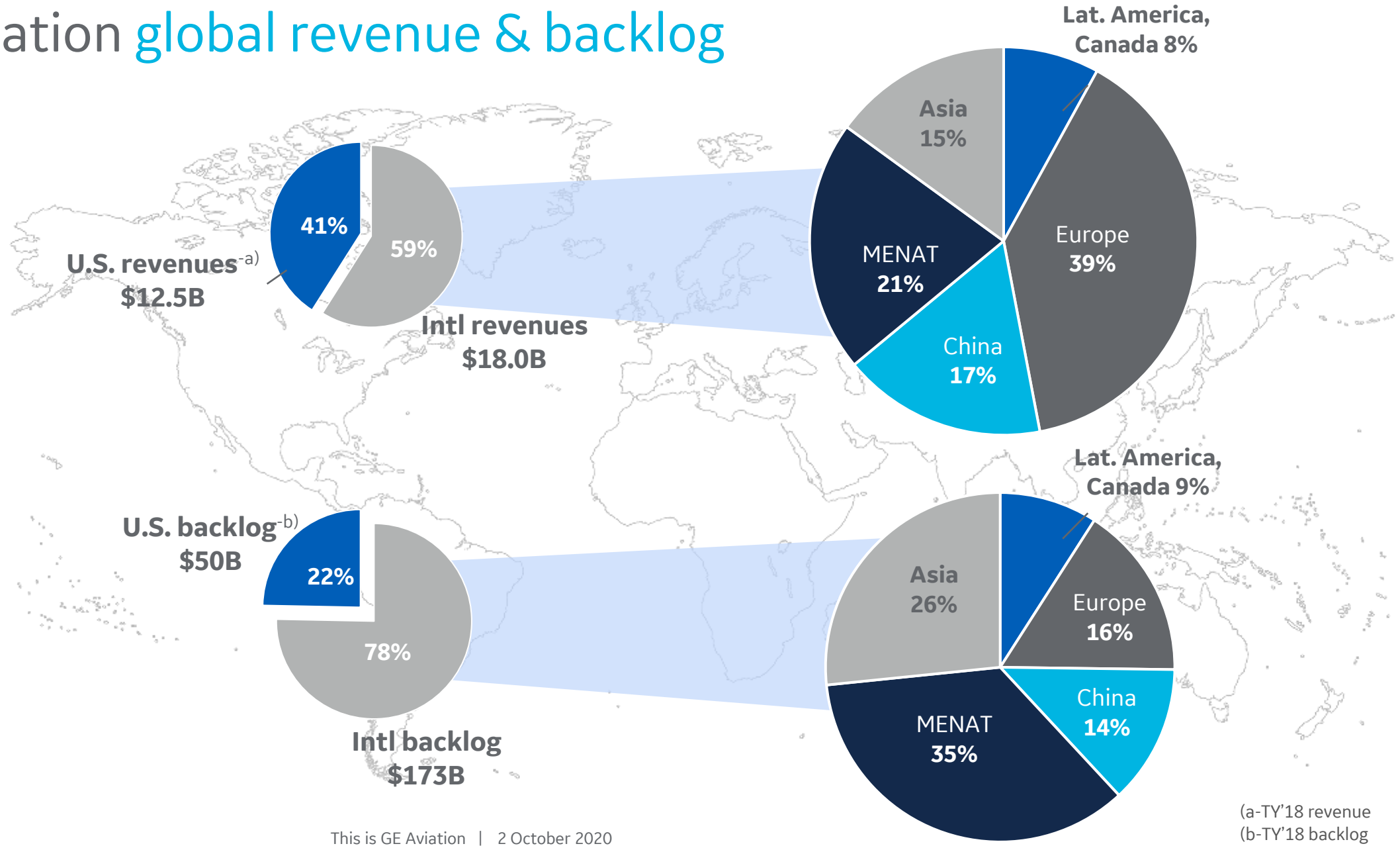
Avio Aero **$1.0B**[-a)]

Avionics & Digital Systems **$0.7B**

Additive & Other **$0.7B**[-b)]

(a-Includes CFM and EA revenue
(b-external only
CFM is a 50/50 Joint Venture between GE and Safran Aircraft Engines
EA is a 50/50 Joint Venture between GE and Pratt & Whitney

Aviation global revenue & backlog



(a-TY'18 revenue
(b-TY'18 backlog

Technical innovation at our core

- U.S. jet engine
- U.S. turboprop engine
- Mach 2 engine
- High bypass engine
- Composite fan blade in airline service
- GE9X … 134,00+ lb. thrust engine
- Commercial engine with Ceramic Matrix Composites
- Additive jet engine parts approved by FAA
- Flight management system-controlled Unmanned Aircraft
- Demonstrated 1 megawatt power generation

1st

Powering the world's **airline** fleets with **36,000** engines

0:02

Every 2 seconds an aircraft with GE engine technology* is taking off somewhere in the world

2,200+

of these aircraft are in-flight, carrying between 50 and 500 passengers

300,000+

people in the air right now depending on our engines

*Includes joint venture engines built by CFM and EA
CFM is a 50/50 Joint Venture between GE and Safran Aircraft Engines
EA is a 50/50 Joint Venture between GE and PW

Powering the world's **military** fleets with **27,000** engines

2/3
fighters in the U.S. fleet are powered by GE Aviation

2/3
helicopters in the US fleet are powered by GE

1/2
of the bombers in the Air Force fleet are powered by GE Aviation

3/4
gas turbine powered combat surface vessels within global Navy fleet

*Includes joint venture engines built by CFM
CFM is a 50/50 Joint Venture between GE and Safran Aircraft Engines

GE Aviation global footprint

Our People
- ~50,000 employees
- 62 supply chain locations
- 7 Engineering Centers
- Double the average of GE years of service
- 46% hourly, 54% salaried

North America

Canada

Mexico

U.S.A.

South America

Brazil

Europe

Czech Republic

France

Hungary

Italy

Poland

Romania

Turkey

United Kingdom

Germany

Asia & Australia

Australia

China

Malaysia

Korea

Singapore

Taiwan

United Arab Emirates

A great GE business

- That invests and delivers
- Unprecedented growth … installed base and services backlog
- A commitment to technology leadership
- Investments in all segments securing product positions
- Digital & Additive … new frontiers for GE's industry leadership
- Built on a simple, competitive cost structure

Commercial Engines

Commercial aircraft segments

	Regional *(CF34 segment)*	Narrowbody *(single aisle, CFM segment)*	Widebody *(twin aisle, CF6, GE90, GEnx segment)*
% Total in service	**15%**	**65%**	**20%**
Aircraft Net Price	**$25-35M**	**$40-55M**	**$90-170M**
Cycles/Day	**6-11**	**4-11**	**2-4**
GE/JV % of total installed fleet[-a)]	**65%**[-b)]	**70%**[-c)]	**66%**[-d)]

(a- Includes CFM and Engine Alliance joint ventures
(b- CF34 sole source (100% of CRJ 200, 700, 900 and Embraer E 170, 175, 190 and 195)
(c- Includes sole source (100% Boeing 737) and dual source (54% Airbus A320 families)
(d- Includes sole source (100% Boeing 777-200LR and -300ER) and multi-source (Boeing 777 classic 77%, 767 75% and 787 63%)

Commercial Engines

GE9X Turbofan

GEnx Turbofan

GE90-115B Turbofan

GE90 Turbofan

CF6 Turbofan

CF34 Turbofan

CFM56 Turbofan

LEAP Turbofan

GP7000 Turbofan

CT7 Turboshaft

777X

787-8/-9

777-200LR

777-200ER

A300-600/-600R/-600F

Bombardier CRJ200/700/900

A318

737 MAX

A380

S-92

747-8

777-300ER

A310-200 ADV/-300

Embraer 170/175

A319

A320NEO

EH101

777F

A300-600ST

Embraer 190/195

A320

C919

AW189

A330

COMAC ARJ21

A321

525 Relentless

767-200ER/-300(ER)(F)/-400ER

A340

214ST

747-200/-300/-400

737-300/-400/-500

SAAB 340

MD-11

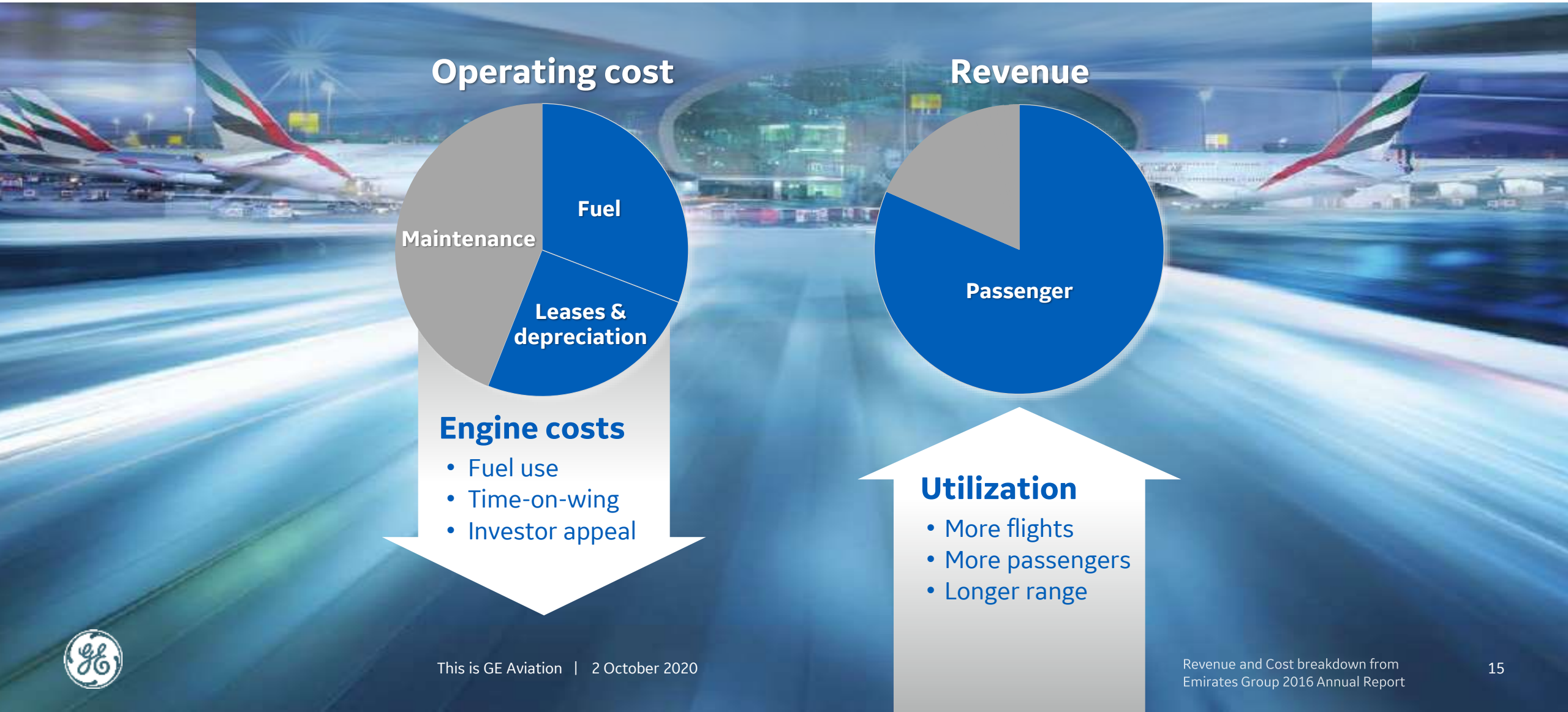
DC-8 Super 70

DC/MD-10

737-600/-700/-800/-900

CFM is a 50/50 Joint Venture between GE and Safran Aircraft Engines
The Engine Alliance is a joint company of Pratt & Whitney and General Electric, U.S.A.

Where engines affect profitability



Revenue and Cost breakdown from Emirates Group 2016 Annual Report

Revenue the most powerful driver of airline profitability

... utilization replaces fuel burn as **#1 engine value**

1% **revenue increase**

Higher Utilization
... More flights
... More passengers

=

5% LOWER fuel cost

or

10% LOWER aircraft price

or

25% LOWER maint. cost

Securing the next generation

Widebody

777X

GE9X

747-8

787

GEnx

A380

GP7000[-d)]

Narrowbody and regional

A320neo

737MAX

C919

ARJ21

LEAP[-c)]

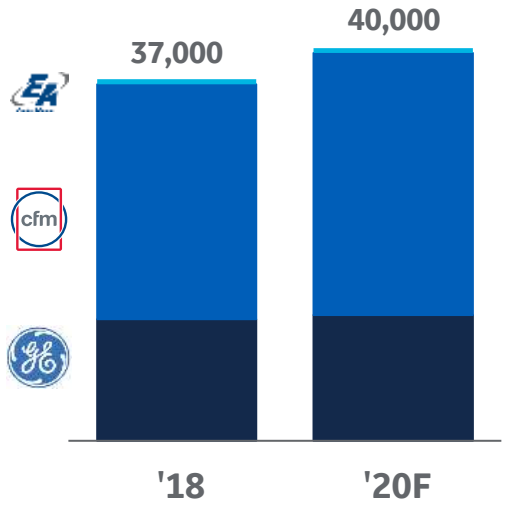
CF34-10

(a- GE comm'l installed base 12,121; JV comm'l installed base 22,898
(b- GE comm'l installed base 11,749; JV comm'l installed base 27,394
(c- CFM is a 50/50 Joint Venture between GE and Safran Aircraft Engines
(d- EA is a 50/50 JV between GE and Pratt & Whitney

Industry leading product portfolio … today and tomorrow

Engine lifecycle revenue

Engines installed base[-b)]

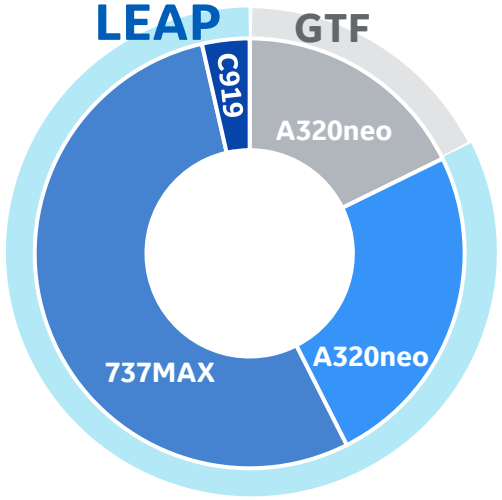


(a- CFM is a 50/50 Joint Venture between GE and Safran Aircraft Engines; EA is a 50-50 JV between GE and Pratt & Whitney
(b- 2018 GE comm'l installed base 12,459; JV comm'l 24,529; 2021F GE comm'l 13,011; JV comm'l 28,782; 2025F GE comm'l 13,220; JV comm'l 34,532

LEAP … fulfilling our commitment to customers and investors

Successfully secured our next great franchise

17,000+ orders and commitments[-a)]



1,600 engines in service

4.6M flight hours

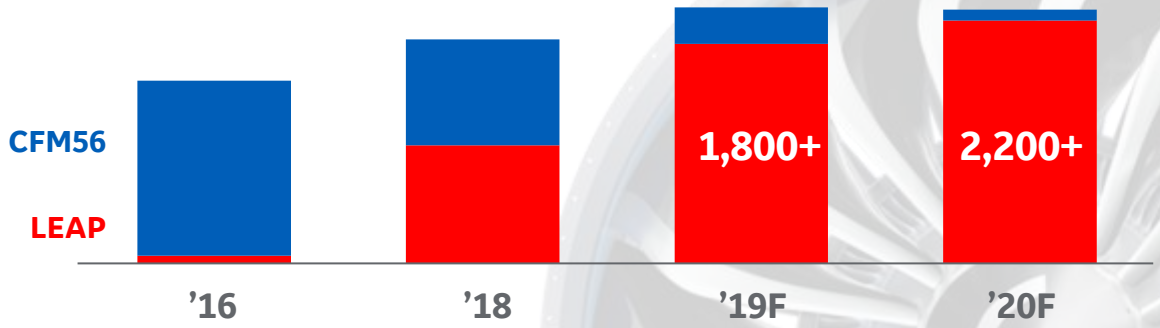
15% better fuel efficiency vs. CFM

6% higher utilization[-b)] vs. GTF

Ranked #1 by investors [-c)] … **$1.4M** residual value advantage[-d)]

Production transition in full swing

production units



- On PO at Boeing and Airbus
- LEAP-1B aligned with MAX plans … working with customers on smooth reentry into service
- Allocated existing supply chain capacity across GE Aviation demand

CFM is a 50/50 Joint Venture between GE and Safran Aircraft Engines; LEAP is a trademark of CFM International
(a-Number includes orders, spares and commitments
(b-LEAP-powered a/c compared to PW1100-powered neos (6 month rolling avg per UBS as of mid-April '19)
(c-Airfinance Journal as of April '19
(d-Ascend

CFM56 … enduring value for customers and investors

Essential to commercial aviation

7M passengers fly every day on an airplane powered by CFM

~23K engines in service

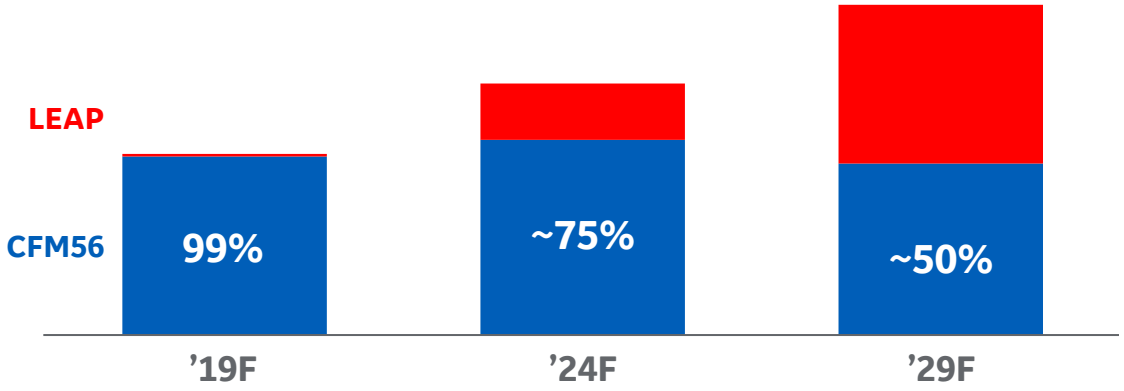
30+ years in service

99.97% departure reliability

1+ billion flight hours of experience

Underpinning strong services growth

worldwide shop visits



- **57%** of fleet[-a)] has not seen its first shop visit …
  21% has only had one shop visit[-a)]
- Focused on supply chain capacity and developing new sources

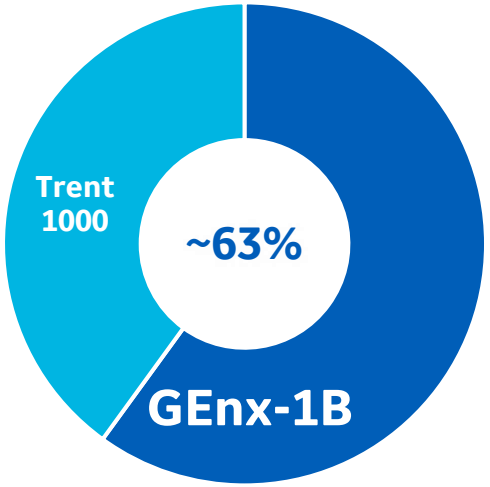
CFM is a 50/50 Joint Venture between GE and Safran Aircraft Engines

(a-CFM-5 & CFM-7 only

GEnx … industry leader on the 787

Performing in the market

787 win rate
Total program



2,500+ engines ordered[-a)]

60+ customers

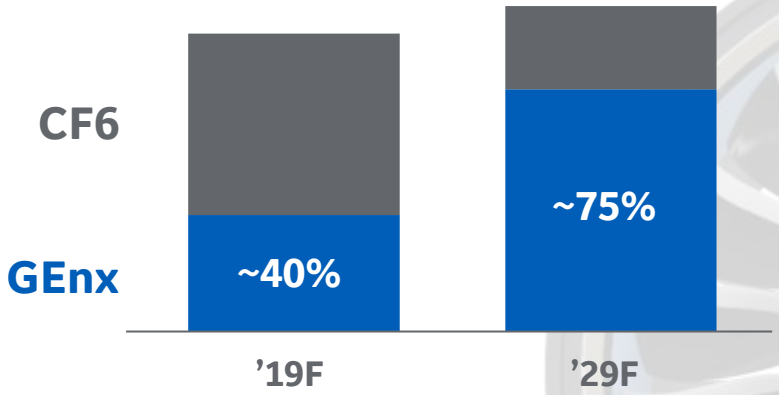
1,500+ engines in service

#1 in investor appeal and remarketing potential[-b)]

$1.6M residual value advantage[-c)]

Admired by investors and customers

worldwide shop visits



- **24M** flight hours … **99.93%+** dispatch reliability
- **5X** fewer engine removals[-d)]
- **13%** better utilization[-e)] … **$10M** revenue per aircraft per year

(a-Life of program
(b-Airfinance Journal as of April '19
(c-Ascend
(d-vs. Trent 1000 per Airframer Reliability Report as of 4Q'18
(e- 6 month rolling avg per UBS as of mid-April '19

GE9X … the world's next great engine

Preparing for entry into service

Sole source on 777X

700 engines on order

5% better fuel efficiency vs. any engine in class

Certification in **2019**

Entry into service in **2020**

Replacing an iconic airplane and engine

GE90 by the numbers

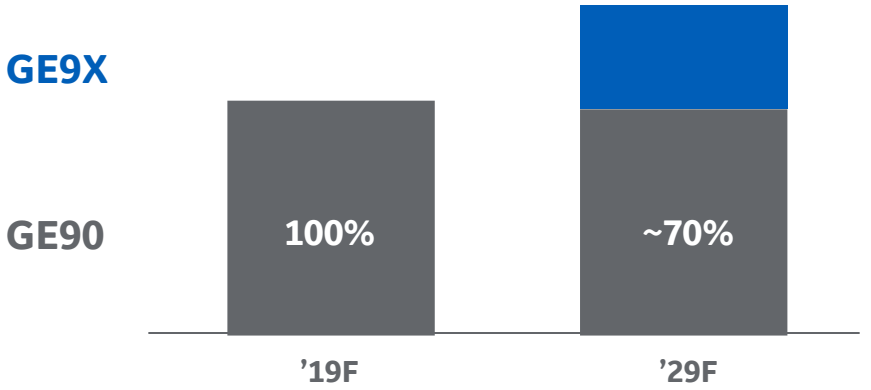
89M flight hours

2,200+ engines in service

75+ customers

~300 deliveries through 2024

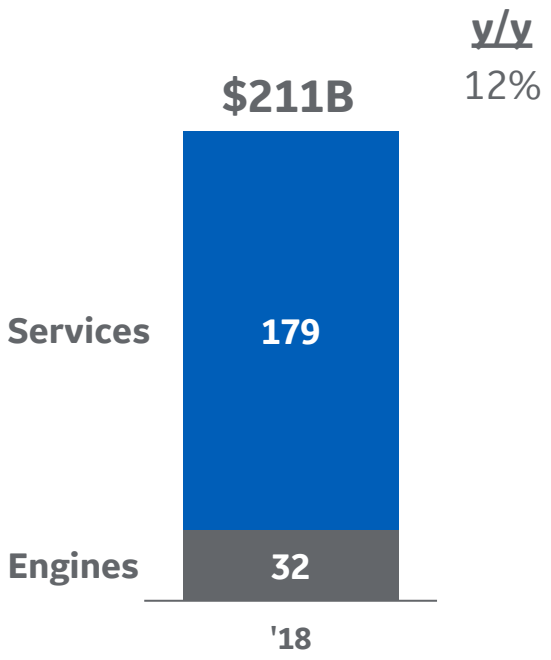
Future growth in aftermarket
worldwide shop visits



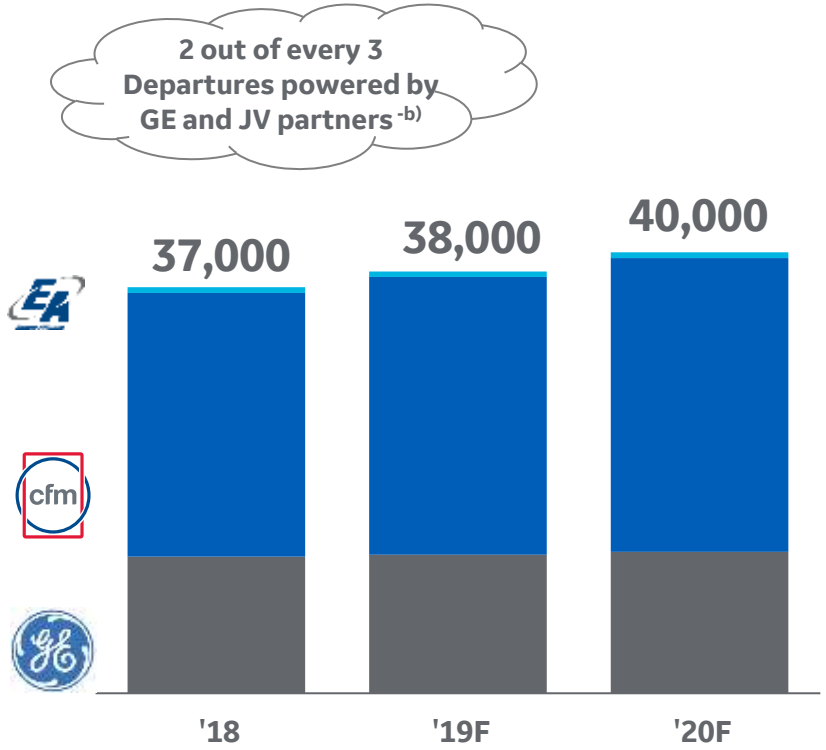
Commercial Services

Sustainable leadership in Commercial portfolio

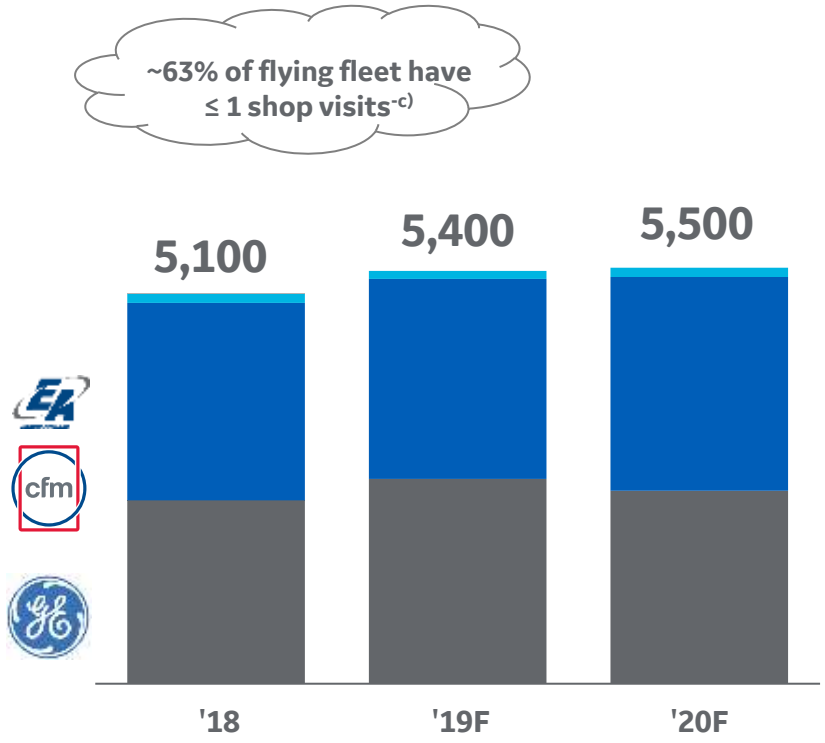
Commercial backlog



Engines installed base[-a)]



Worldwide shop visits



Record backlog

Growing fleet

Continued growth

(a- 2018 GE comm'l installed base 12,459; JV comm'l 24,529; 2021F GE comm'l 13,011; JV comm'l 28,782; 2025F GE comm'l 13,220; JV comm'l 34,532
(b- Includes GE and JV engines
(c – As of 2018
GE and JV engines; CFM is a 50/50 JV between GE and Safran Aircraft Engines; EA is a 50/50 JV between GE and Pratt & Whitney

Services for every stage of your engine's lifecycle

TrueChoice™ Services

- Breadth of service options and material offerings
- Crafted to meet evolving needs of airlines, lessors and MROs
- Enabled by digital insights, analytics and physics

TrueChoice **Flight Hour**

TrueChoice **Overhaul**

TrueChoice **Material**

TrueChoice **Transitions**

Our Services portfolio

Services offerings

Product	Structure	% of Shop Visits[-a)]
Flight hour	Long-term risk-transfer, Contractual Services Agreement (CSA)	32%
Overhaul	Time and Materials, pay by event	11%
Materials	Parts: new, used, repaired	52%
Transitions	Asset exchanges, short-life builds	5%

TrueChoice™

(a- Based on 2019 Op Plan
(b- CFM is a 50/50 Joint Venture between GE and Safran Aircraft Engines
(c- GE90 only
(d- GP7000 is a product of EA, a 50-50 JV between GE and Pratt & Whitney

$178B Services backlog (4Q'18)

	Backlog
CFM/LEAP[-b)]	$81B
GE90/GE9X	$48
GEnx	$26
CF6	$9
CF34	$8
GP7000[-d)]	$6

Military

Military engines

F101 Turbofan

B-1B

F110 Turbofan

F-16C/D

F-16E/F

F-15

F-2

F118 Turbofan

B-2

U-2S

F404 Turbofan

F/A-18

T-50

JAS 39 Gripen

Tejas Mk1

T-X

F414 Turbofan

F/A-18E/F

EA-18G

Tejas Mk2

Gripen E/F

KF-X

X-59

J79 Turbojet

F-4

F-5

T-38

T-2

J85 Turbojet

TF34 Turbofan

A-10

Adaptive Cycle Engine

Future fighters

F103/CF6-50 Turbofan

E-4B

KC-10

CF6-80 Turbofan

VC-25A

C-5M

KC-767 Tanker

E-767 AWACS

A330 MRTT

C-2

F108/CFM56-2 Turbofan

KC-135R

RC-135

E-6B

E-3 AWACS

KE-3

CFM56-7 Turbofan

P-8

737 AEW&C

C-40

T700/CT7 Turboshaft & Turboprop

T901 for US Army Apache and Black Hawk

UH-60

MH-60T

SH-60/MH-60

HH-60G

VH-60N

S-70 Firehawk

AH-1W

AH-1Z

UH-1Y

NH90

SH-2G

AH-64

AW101

AW149

CN235

VH-92A

KUH-1

T58 Turboshaft

CH-46

S-61

VH-3D

T64 Turboshaft & Turboprop

US-1A

C-27A/G.222

MH-53E

CH-53E

CH-53D

T408

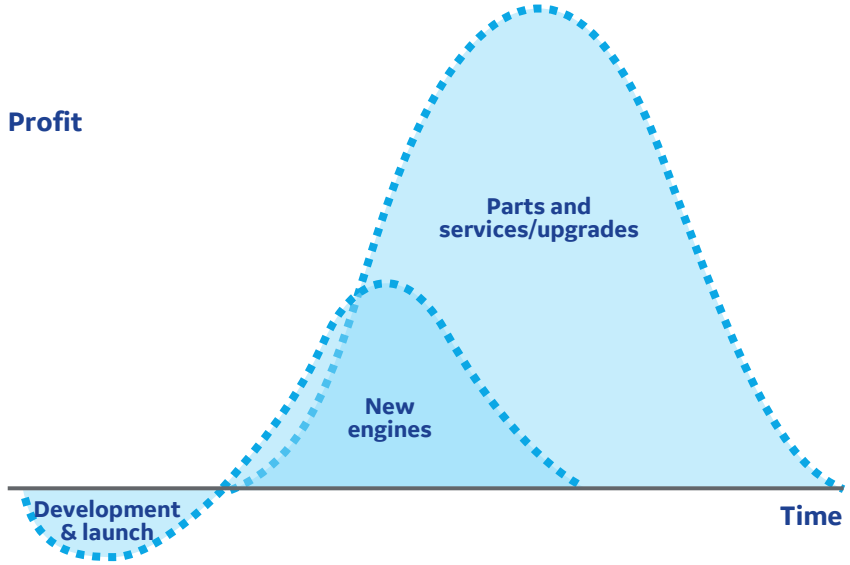
CH-53K

CFM is a 50/50 Joint Venture between GE and Safran Aircraft Engines

The aviation business models

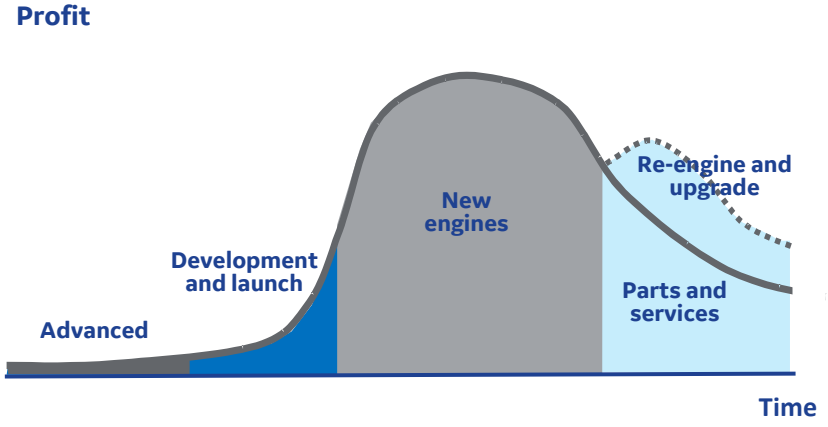
Commercial programs

- Upfront cash assistance to air-framers
- Skinny margins on install engines
- Attractive profits on parts and services
- Broad customer base



Traditional military programs

- Government funded development
- Positive margin at launch
- Regulated margins
- Narrow customer base



Genesis of our commercial business

C-5
1968

TF39 turbofan leads to CF6

1970: DC-10

747
767
A300
MD-11

Present: A330

Over 7,800 delivered

... best selling widebody engine in history

B-1
1974

F101 turbofan leads to CFM56

737 family

A340-200/300
DC-8-70

A320 family

Over 30,000 delivered

... best selling narrowbody engine in history

S-3
1972

TF34 turbofan leads to CF34

CRJ family

E-Jet family

Over 7,400 delivered

... best selling regional engine in history

Commercial investments in military

CF6-80

- C-5M re-engine

- A330 MRTT/Military 767

- C-2 indigenous transport

CFM56-7B

- F110 life extension

- CFM56-2 performance upgrade

- F101/F118 performance upgrade

- P-8 Poseidon

CF34

- TF34 improvements

- B-52 re-engine oppt'y

CFM is a 50/50 JV between GE and Safran Engines

Military Systems Operation … 75+ year legacy

26,000+ engines with 300 customers globally … $4B sales

Our segments …

Combat

F101 F414
F110 J85
F118 J79
F404 TF34
XA100

Rotorcraft

T700 T58
CT7 T64
T408 T901

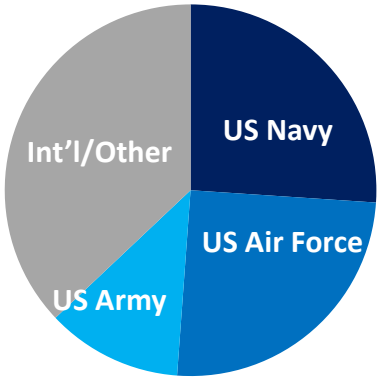
Tanker/Transports

F103 (CF6-50)
F108 (CFM56)
F138 (CF6-80)

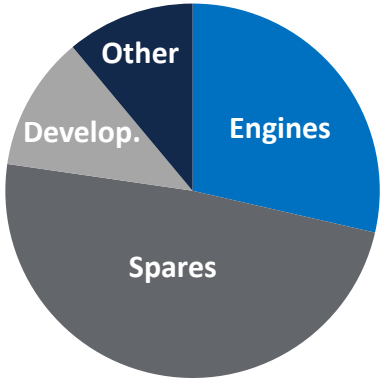
Marine

LM6000
LM2500+
LM2500+G4
LM1600
LM500

Our customers …



Our offerings …



CFM is a 50/50 JV between GE and Safran Engines

Our contribution to US national security today …

Over 16,500 GE and CFM engines in service

Source: Flight Global

(a- Includes CFM, 50/50 Joint Venture between GE and Safran Aircraft Engines

Our contribution to International security today …

Over 10,100 GE and CFM engines in service

Combat
4,500

Transports
1,300

Helicopters
4,300

Marine
1,200

Installed engines [a)]

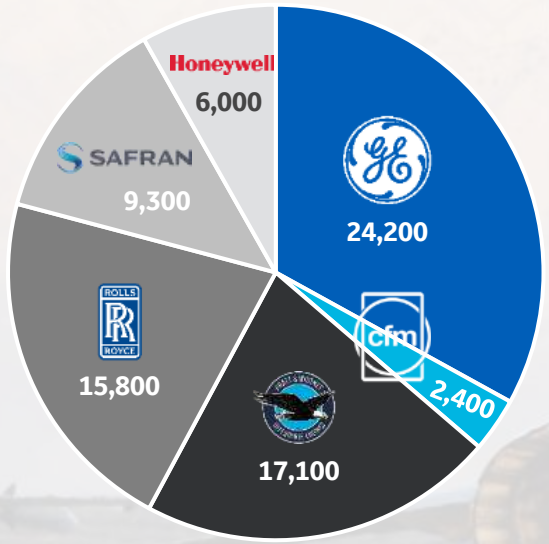
Source: Flight Global

(a- Includes CFM, 50/50 Joint Venture between GE and Safran Aircraft Engines

Military … strong portfolio with growth

($ in billions)

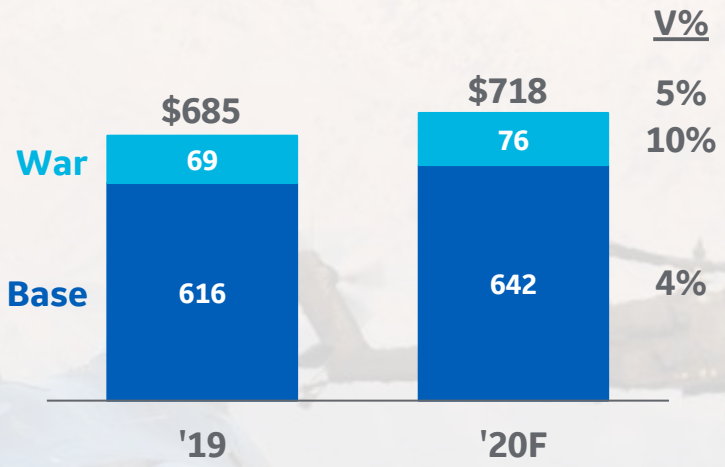
Global installed fleet[-a)]



GE and CFM power:

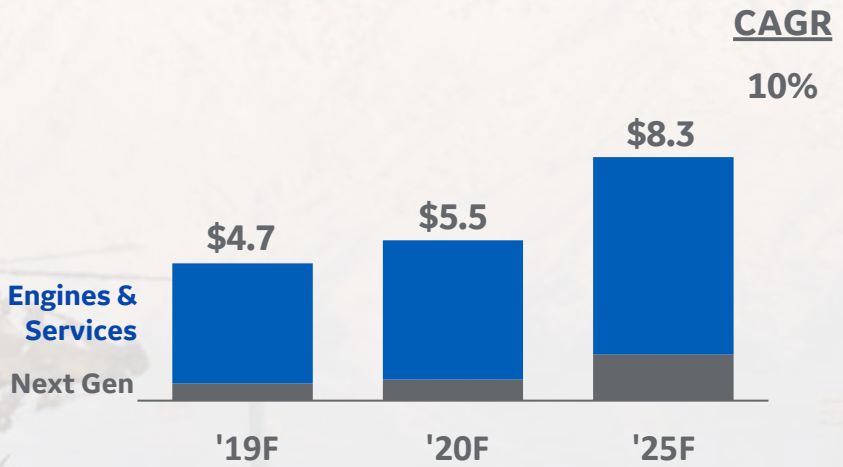
- **56%** DoD fleets
- **2/3+** DoD helos and fighters
- **18** international indigenous platforms

US DoD budget[-b)]



- 9% growth in research and technology (RDT&E)
- 5% growth in operations and maintenance
- International defense budgets also increasing ~3%[-c)]

GE revenue growth

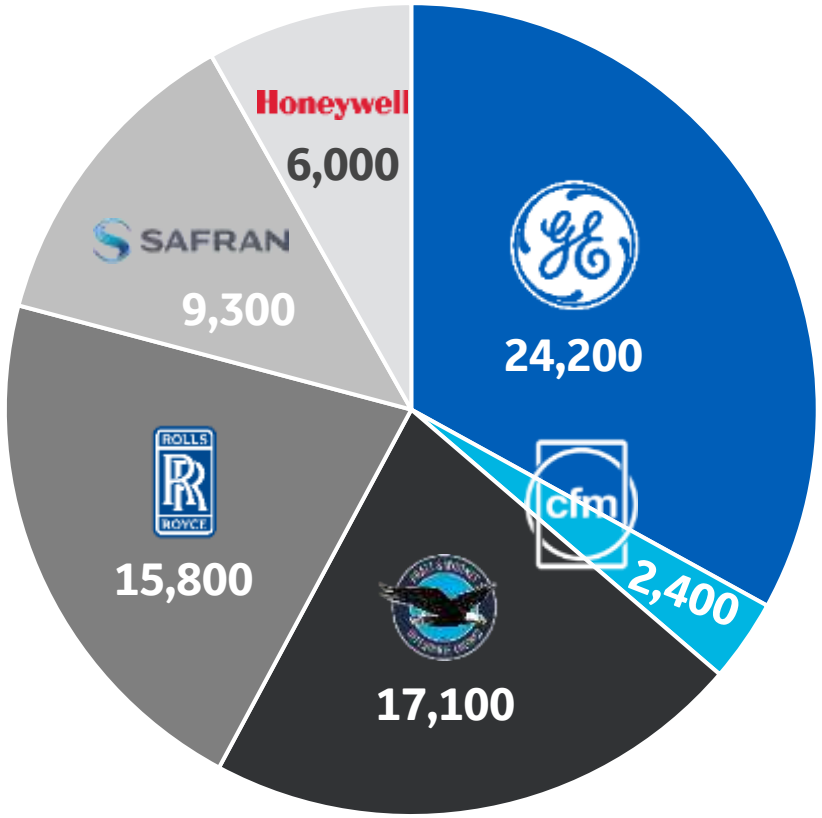


- 9% CAGR in Engines & Services
- 18% CAGR in next gen programs
- Transitioning 1,000 engineers from Commercial to Military

CFM is a 50/50 Joint Venture between GE and Safran Aircraft Engines
(a-Includes only primary Western aircraft engine manufacturers of fleets >5,000; Excludes marine gas turbines and commercial helicopter engines; **56%** DoD fleets (52% GE, 4% CFM)
(b- DoD Comptroller, FY20 budget request
(c-Forecast International

Our global military position

Global installed fleet



Power for U.S. DoD

Total platforms

Rotorcraft

66% 6,346

Combat [-a)]

65% 4,432

Large transports

Turbofan powered

48% 1,333

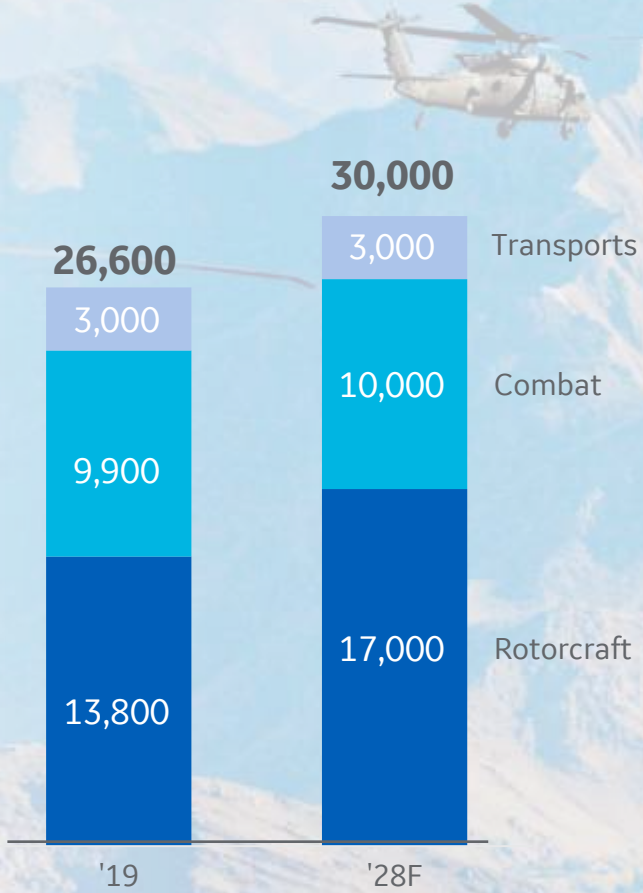
Marine

Gas-turbine powered surface combatants

94% 95

(a- includes combat trainers and bombers

10 year installed base growth



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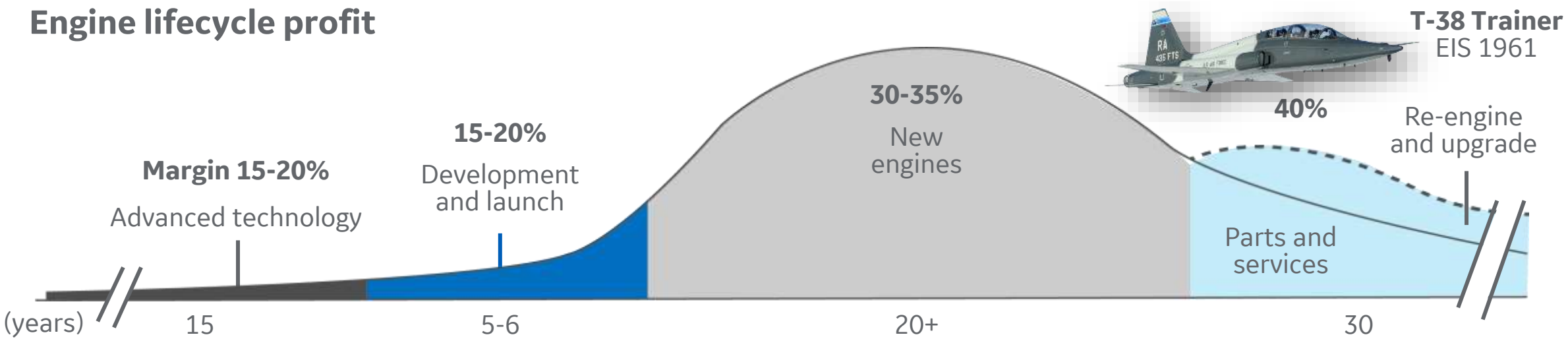
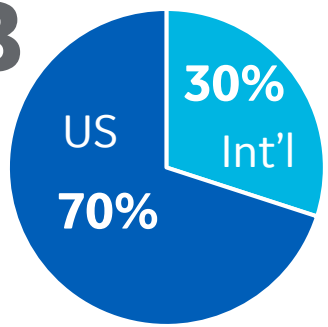
Our military business … longest cycle segment in portfolio

Engine lifecycle profit



GE global defense revenue[-a)]

$4.1B

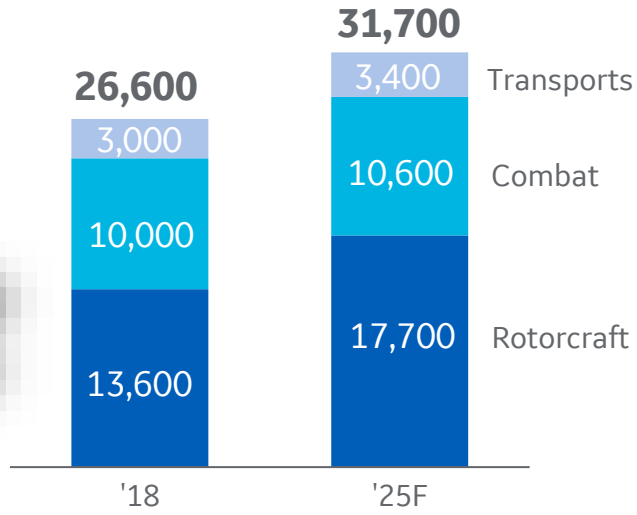


(a- 2019 revenue

Revenue sources

- Engines
- Services
- Development programs
- Spare parts

GE 10 year installed base growth



Expanding the core … 9% CAGR in engines and services

US DoD

F404 … T-X

F110 … F-15EX

T700 … CSAR

CF34/Passport … B-52

CFM56 … P-8A

F414 … F/A-18

LM2500 … DDG51

T64 ERIP … CH-53E

US equipment with allies

F110 … F-16 and F-15s … active campaigns in 16 countries

F414 … F/A-18 and Growlers … active campaigns in 8 countries

T700/CT7 … Apache/Black Hawks … active campaigns in 31 countries

Indigenous growth platforms

F404 … T-50

F414 … KF-X

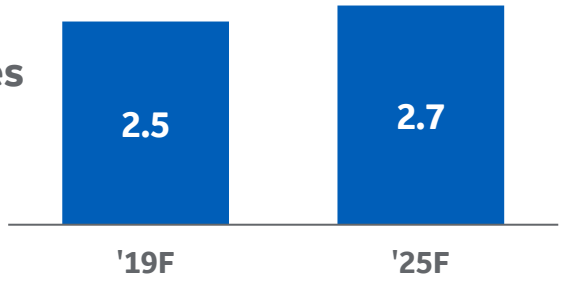
F414 … Gripen

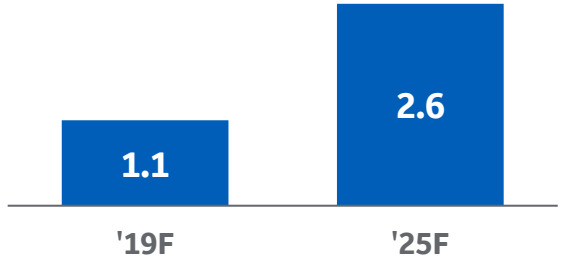
F404 … Tejas

LM2500 … multiple ships

F110 … TF-X

Revenues
($ in billions)





CFM is a 50/50 Joint Venture between GE and Safran Aircraft Engines

Next gen development programs … ~$2B in 2025[-a)]

Advanced Combat Engines

F-35 Lightning II

XA100

5th gen baseline: Fuel burn 25% ↓; Thrust 10% ↑

Adaptive cycle … a disruptive engineering technology for the future

Rotorcraft

Black Hawk/Apache/
Future Vertical Lift

T901

T700 baseline: Fuel burn 25% ↓; Power 50% ↑

Ensures the continuity of the T700 helicopter franchise

Heavy Lift

King Stallion

T408

T64 baseline: Fuel burn 18% ↓; Power 57% ↑

Defining the next generation of heavy lift propulsion

(a-Includes Advanced Technology programs

Readiness is the metric that matters

We know what it takes to fly hot and high because we've powered 100% of US Black Hawk and Apache missions since 1979. Experience has inspired our future. We are ready.

TOUCH HERE TO LEARN MORE

Army objectives (T700 baseline)

POWER	**50% MORE**
FUEL EFFICIENCY	**25% BETTER**
ENGINE LIFE	**20% LONGER**

GE T901 for ITEP

GET901.COM

GE Aviation Global Supply Chain

GE Aviation Supply Chain Plants - 2019

North America

Canada
Bromont, Quebec

Mexico
Saltillo

U.S.A.
Asheville, NC
Auburn, AL
Baltimore, MD
- Middle River Aircraft Systems

Batesville, MS
Cincinnati, OH (Lean Labs)
- Composites - Evendale
- Structures & Rotating Parts – Evendale
- NDE & Metrology – QTC
- Turbine Airfoils – ACSC
- Additive – Springdale

Clearwater, FL
Dayton, OH – Unison
Dayton, OH – TDI
Dayton, OH - Elano
Durham, NC
Ellisville, MS
Hebron, KY (OWS)
Evendale, OH
- Manufacturing Operations
- Development Assembly
- Assembly

Grand Prairie, TX (OWS)
Grand Rapids, MI
Greenville, SC
Hooksett, NH
Huntsville, AL
Jacksonville, FL
Lafayette, IN
Long Island, NY
Lynn, MA
- Assembly & Test
- Plant Services
- Component Manufacturing

Madisonville, KY
McAllen, TX
Muskegon, MI
Newark, DE (CCP)
Norwich, NY (Unison)
Peebles, OH
Rockford, IL
Rutland, VT
Sterling, VA
Strother, KS
Terre Haute, IN
West Jefferson, NC
Wilmington, NC
Vandalia, OH

Europe

Hungary
Veresegyhaz

Italy
Avio
- Rivalta
- Pomigliano Naples
- Brindisi
- Geti in /Cameri

Poland
Bielsko Bialo – Avio
Dzierzoniow

Romania
Bucharest

Czech Republic
Prague (GE Czech)

United Kingdom
Cardiff, Wales
Cheltenham (Avionics & UKLG)
Gloucester (Dowty)
Hamble
London (LHR OWS)
Newmarket
Prestwick, Scotland Caledonian

South America

Brazil
Petropolis (Celma)
Rio de Janeiro (OWS)

Asia

Australia
Brisbane

China
Shanghai (OWS)
Suzhou

Malaysia
Kuala Lumpur (GEESM)

Korea
Seoul (ICN OWS))

Singapore
GEASO
ATI Systems

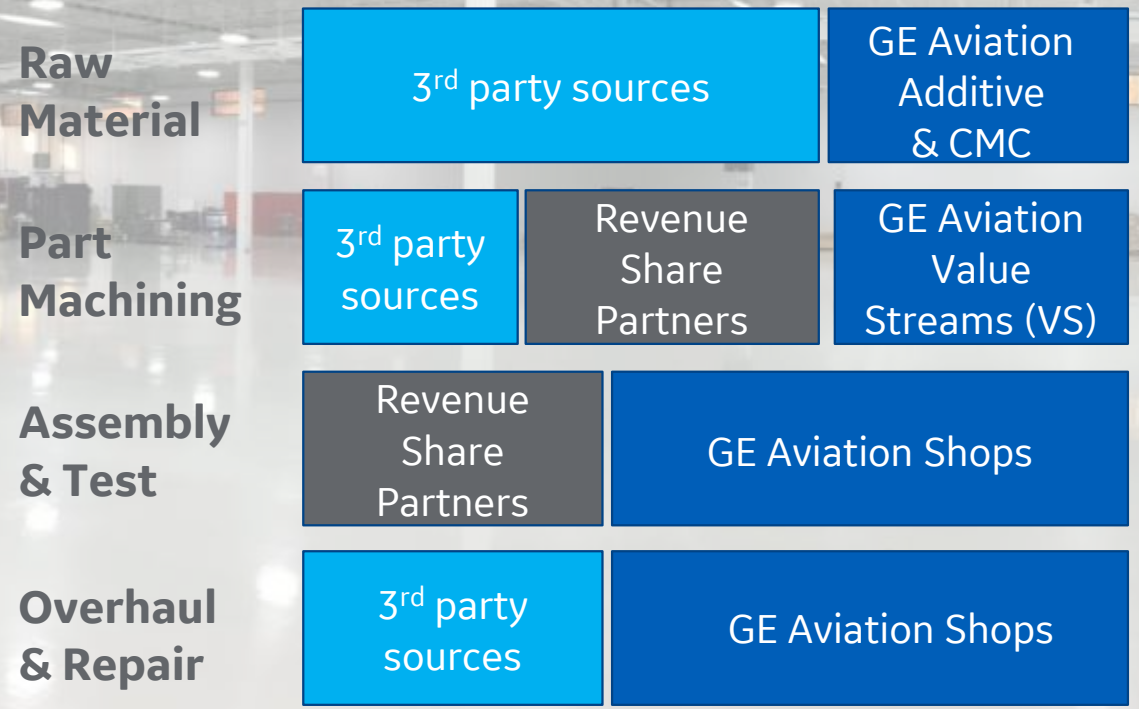
United Arab Emirates
Dubai (OWS)

Qatar
Doha(OWS)

JV's
Butte, MT
Charleston, SC (Venture Aero)
Clyde, NY
Miramar, FL (PTI)
San Marcos, TX (CFAN)
Środa Śląska , Poland (XEOS)
France (FAMAT)
Taiwan (EGAT)
Turkey (TEI)

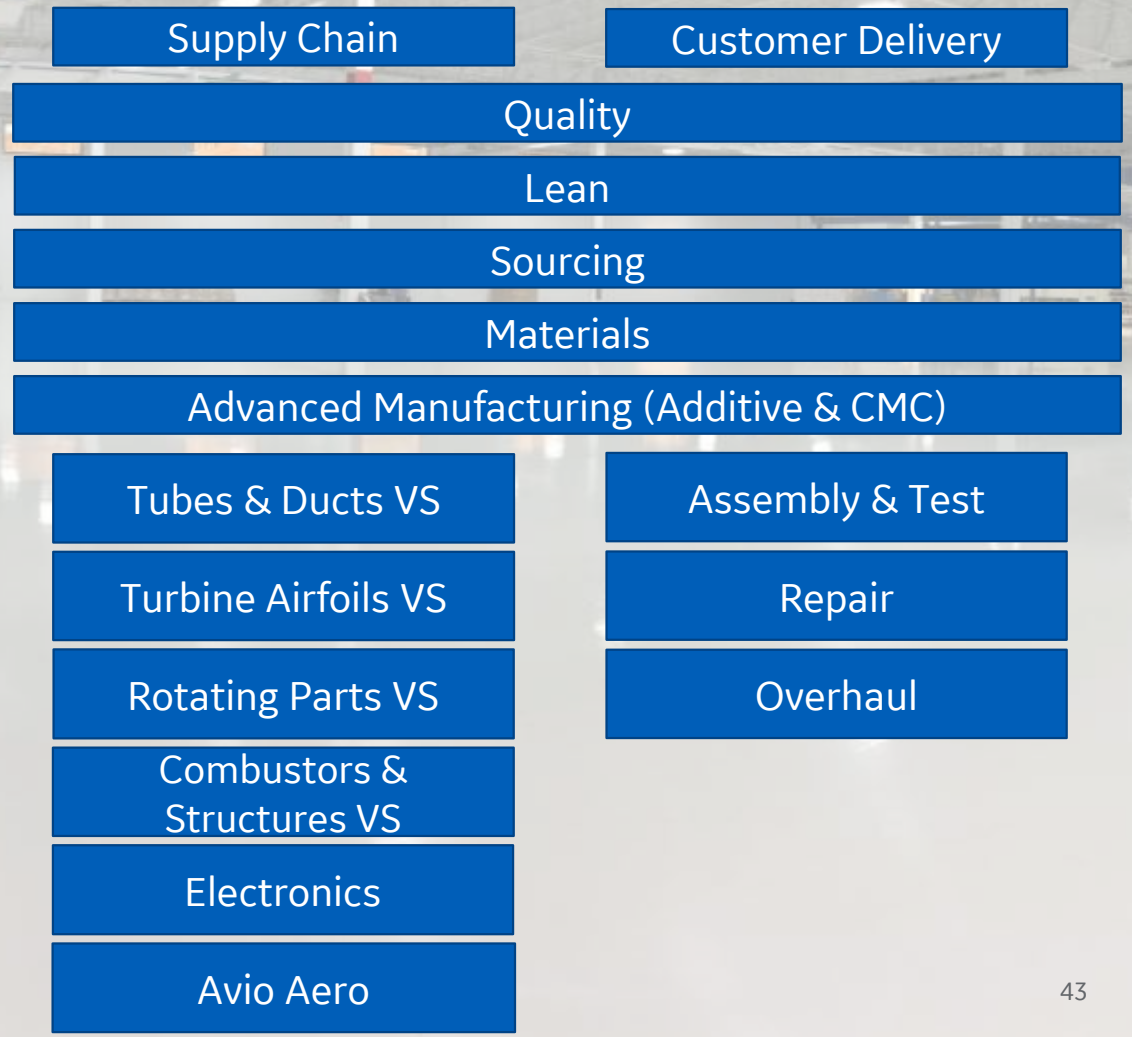
How GE Aviation's Supply Chain works

Make/buy landscape[-a)]



(a- Not to scale

Organization Structure



Anatomy of the Aviation Supply Chain

Demographics[-a)]

- **62** sites
- **19** countries
- **31,000** employees
- **5,000** suppliers
- **$9B** sourced material annually
- **8** risk-sharing partners
- **15** joint ventures

Customer base

Commercial airlines

Commercial airframers

Military

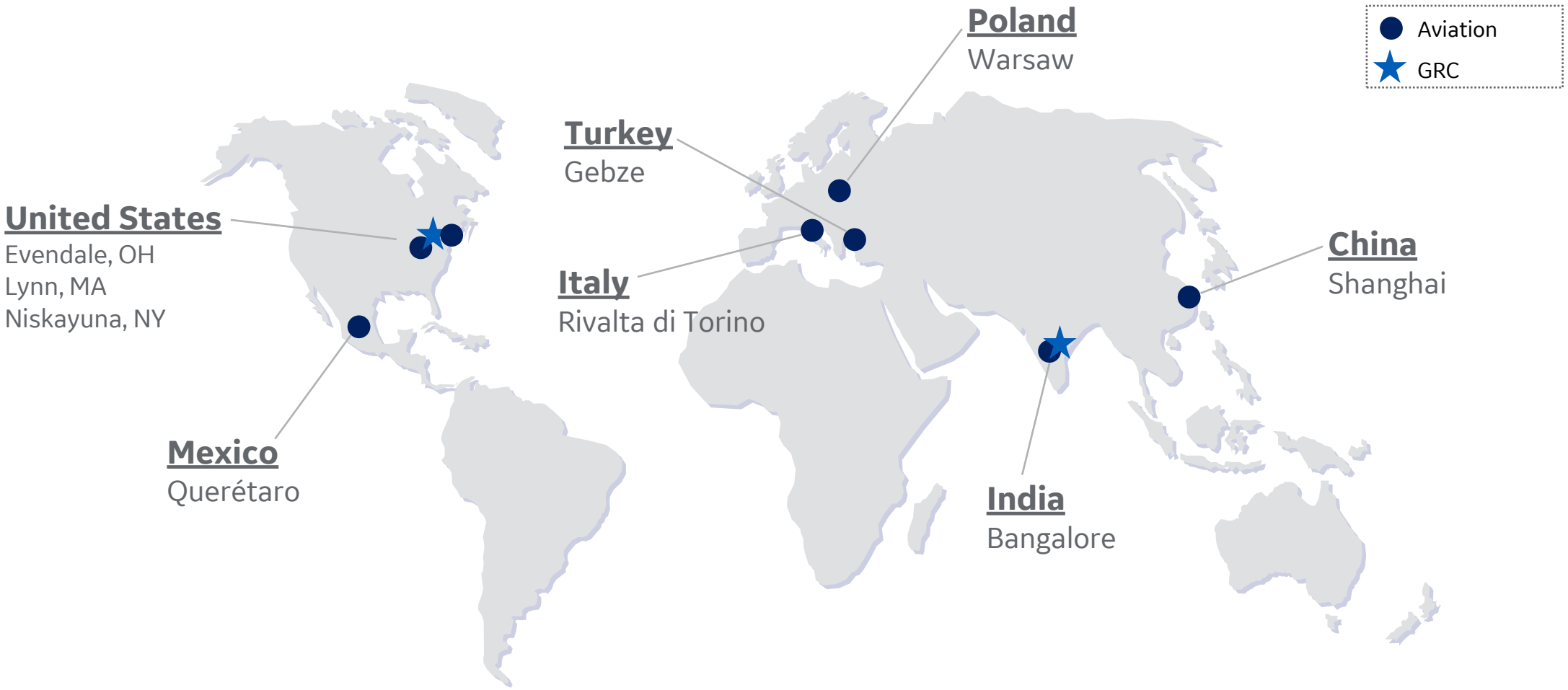
Maintenance providers

Original Equipment Manufacturers (OEM)

(a- as of 2018 YE

Engineering Excellence

Engineering … a global community



Over 9,000 engineers around the globe
+ 1,100 technologists at 2 Global Research Sites

Carbon-fiber composites … only GE

Fan Blades

GE90-94B
777-200ER

Wide chord design
22 blades

GE90-115B
777-200LR, -300ER, 777F

Swept aero
22 blades

GEnx
787, 747-8

Improved efficiency
18 blades

GE9X
Boeing 777X

Improved materials
16 blades

2020 experience 100+ million flight hours

Fan Cases

- Integrated structure
- Saves 700+ lbs per aircraft on 787

Fan Flowpath Spacer

- 1st composite load carrying rotating part
- Saves 40 lbs per aircraft on 777

Fan Outlet Guide Vane

- GE Aviation's 1st composite structural fan OGV

Leveraging advanced composite technology for significant weight savings

Compression technology … only GE

1 technology platform … **4** product applications

GEnx
787, 747-8

2011

23-1

Compressor pressure ratio

LEAP & Passport
737MAX, A320neo Global 7/8000

2015-2016

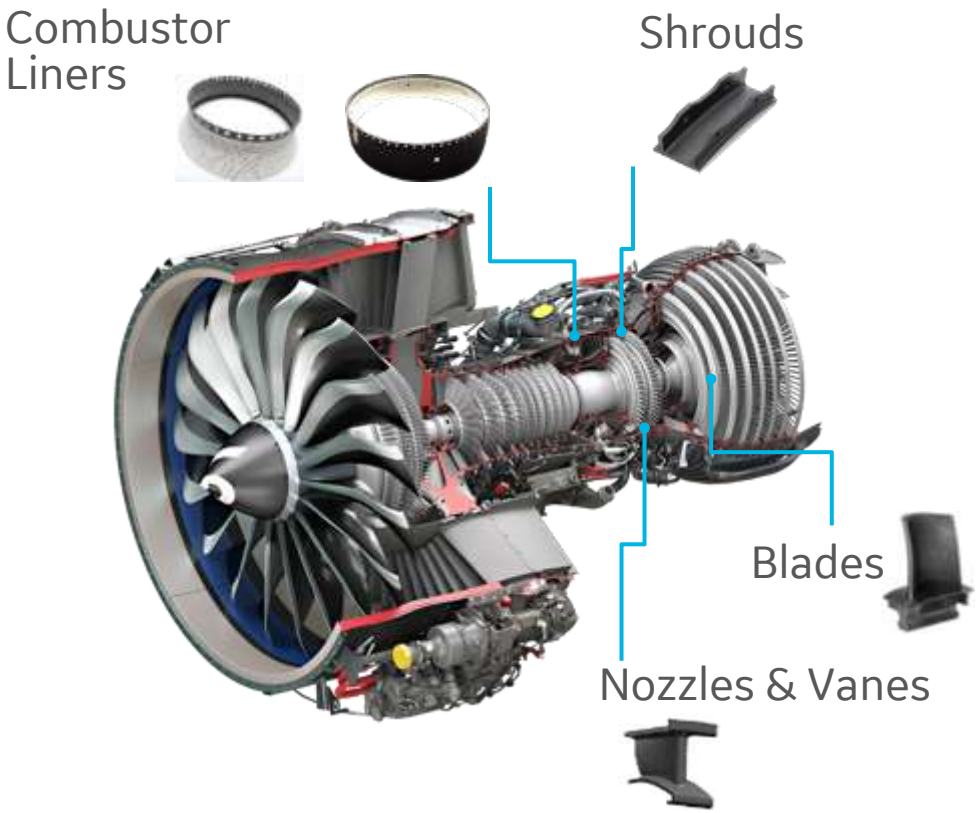
22-1

GE9X
777X

2018 Cert

27-1

Ceramic Matrix Composites … only GE



2,400°F capability

500°F hotter than metal

+

1/3 weight of metal

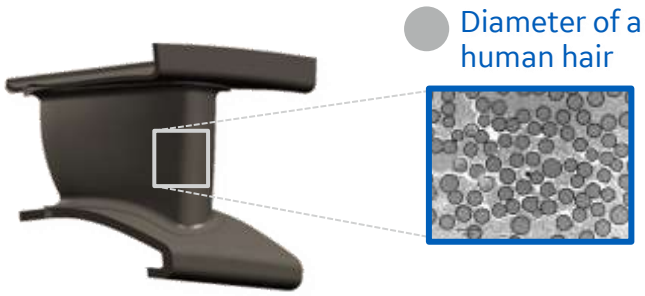
=

Lower fuel burn
Increased range
More thrust
Higher durability

CMCs … GE's breakthrough material

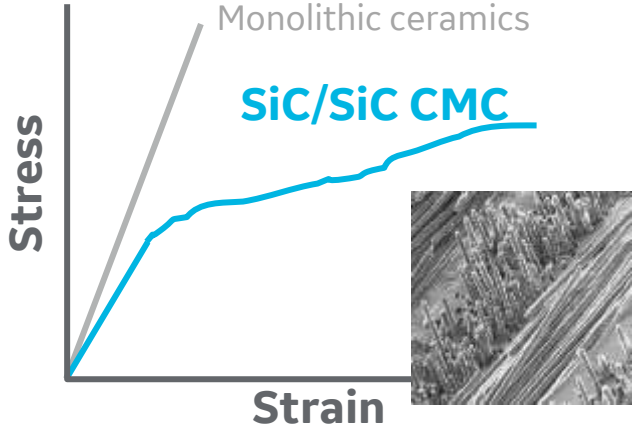
Stronger, lighter, hotter

Silicon carbide fibers in a silicon carbide matrix (SiC/SiC)



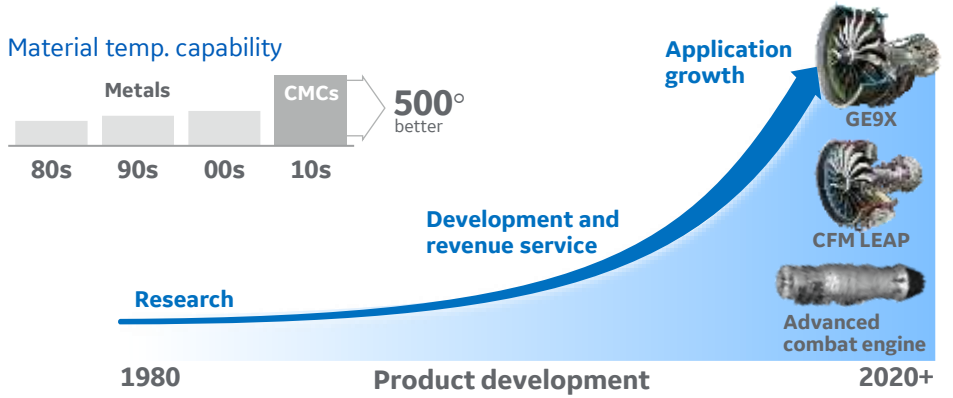
SiC/SiC advantage:

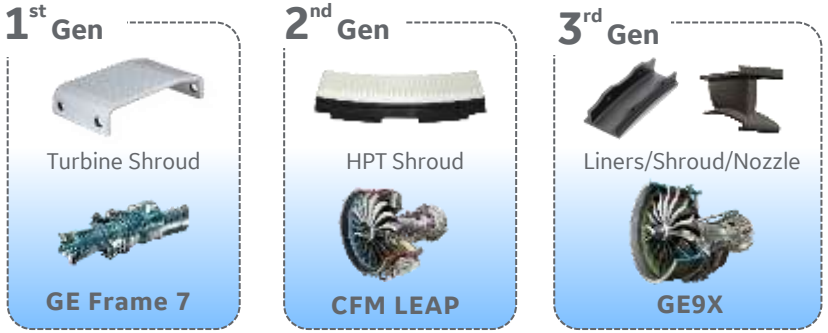
Strength
Damage tolerance
Impact resistance



Improving engine efficiency

Committed development to deliver a better engine





LEAP is a trademark of CFM International, a 50/50 Joint Venture between GE and Safran Aircraft Engines

CMCs: in commercial service and primed for military applications

Significant commercial investment …

$1.5B

Spent on engineering, tech readiness, lean labs and manufacturing; $100MM annually

$700M

Investment in plant and equipment through 2020 Delaware, Asheville, Huntsville and Cincinnati

4+ million

Revenue hours accumulated on CMC materials

17,000+

LEAP and GE9X engines on order with CMC material technology

LEAP is a trademark of CFM International, a 50/50 Joint Venture between GE and Safran Aircraft Engines

… benefits the military

Successful engine demonstration

- ✓ ADVENT: 130° F beyond target
- ✓ F414 turbine blade 1000 cycle test
- ✓ CT7/T700 shrouds environmental test

Adaptive engine: **world record** combined pressure and turbine temperature

Advancing applications

- T901 & AETP incorporate CMCs
- Active support from AFRL and NAVAIR

Commercial experience accelerating military development

- Durability and life modeling
- Manufacturing and inspection processes
- Industrialization and manufacturing scale-up
- Field/depot inspection capability

Business & General Aviation and Integrated Systems

Business & General Aviation Engines

CF34 Turbofan

CFM56-5B

CFM56-7B

Passport

GE-Honda* HF120

M601, H Series

Catalyst

Affinity

Bombardier Challenger 600 series

Airbus A319-A320-A321

Boeing Business Jet

Bombardier Global 7500

Honda Jet

Aircraft Industries Let L-410

Cessna Denali

Aerion AS2 Supersonic Jet

Embraer Lineage 1000

Bombardier Global 8000

Thrush 510G

Nextant G90XT

Diamond Aircraft DART-550

BGA customer and market profile

BGA is unique in GE Aviation

- ~4,000 customers … 1-2 aircraft per
- Low number of departures per year … few shop visits
- High customer expectations … concierge support
- 600+ Contractual Service Agreements (CSAs) tailored to customer profiles
- Sole-source engine applications

Owner/Operators

Zetta Jet

NETJETS

DELTA PRIVATE JETS

Nationwide

FedEx

LifeFlight

LUKOIL OIL COMPANY

Marriott

SECRETARIA DE MARINA ARMADA DE MEXICO

Perry Air LLC

garth brooks

BGA portfolio

JV – need disclaimer

Turboprops

M601
H Series family
Catalyst

Lowest cost of operation, best performance

Light jets

HF120

GE Honda franchise

M

Integrated power dist system – primary non engine prod. Something for Gulfstream

Everything but engines

Large cabin

CF34
Passport

Flight Efficiency, Services & Power

History of the Catalyst … the first all-new, clean-sheet turboprop engine in more than 30 years

2008
GE Aviation enters the general aviation turboprop market

2009
Modified existing turboprop engine with incrementally better materials and design

2014
Design begins for Catalyst based on foundation of customer insights

2015
Announce Cessna Denali as the first application for the Catalyst engine

2016
Catalyst announced as first turboprop engine with additive parts

2017
First Catalyst engine testing

2018-2019
Completing altitude and other tests … Anticipated first flight in 2019

2020
Anticipate Catalyst's entry to service on Cessna Denali

GE Aviation's fastest program • 100+ patents filed • Proprietary additive manufacturing

A diverse base of customers

Engines

Utility aircraft

Business Jets

Turboprops

Bombardier Global 7500

Embraer Lineage 1000

HondaJet

Boeing Business Jet

Airbus Corporate Jet

Cessna Denali

Aircraft Industries L 410

Diamond Dart

Thrush 510G

Bombardier Challenger 650

Integrated Systems

Power

Mechanical

Unison

F-35

777X

777

Gulfstream 500/600

Bombardier Q400

A350

Airbus A350-1000

Cessna Denali

Competitive landscape

VALUE PROP

Passport™
2018

Thrust
Fuel Burn
Emissions
Noise

HF120
2016

Thrust
Fuel Burn
Emissions
Noise

Catalyst™
2020

Power
Fuel Burn
Integrated FADEC + Prop Control
Cost of ownership

H-Series
2011

Power
Fuel Burn
Electronic Engine and Prop Control
Cost of ownership

COMPETITORS

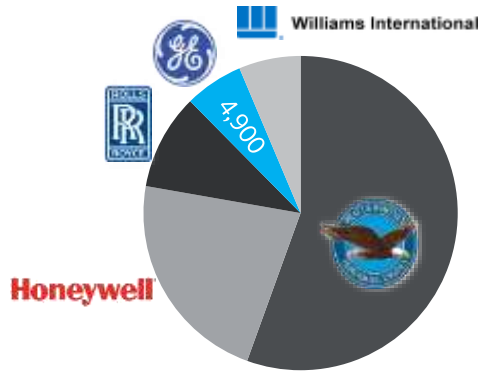
BR725
2009

FJ44-1AP
2005

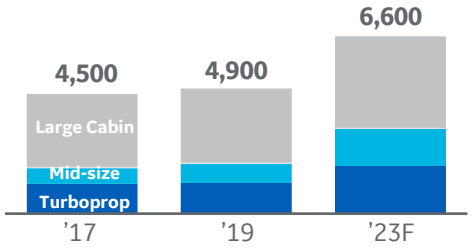
PT6A-67
2007

PT6A-140
2012

Top BGA installed fleets
(# engines as of 6/18)



GE in-service fleet
(# engines)



B&GA market … Technology differentiates GE

GE Technologies

Compressor Technologies

Combustor technologies

Turbine technologies

Data Link

Controls technology

Digital capabilities

Additive manufacturing

Adapting proven technologies to differentiate on **performance, simplicity and service**

1980

CF34

H Series

HF120

Passport™

Catalyst™

2020

- Enhancing the competitiveness of current engines
- Introducing over 100 engine technologies across Turboprop engines
- Achieving balance of technology, capability & economics
- Migrating proven commercial transport technology to BGA

Integrated Systems portfolio

Electric Power

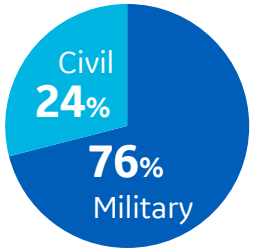
Power generation

Power distribution

Power conversion

Air management

Batteries



Unison

Ignition systems

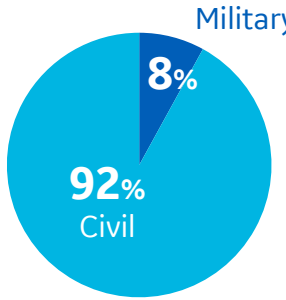
Harnesses

Surface Coolers

Tubes & Ducts

Stators & Rotors

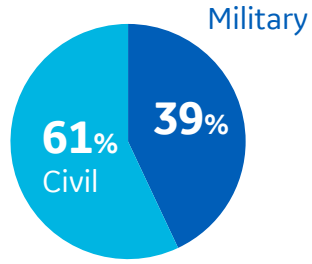
Sensors



Mechanical

Propeller C130J

Wing components A350



Integrated Systems … differentiated products & solutions

Electric Power

- Efficient Power
- Modular … weight / space reduction
- High Temp, High Density
- Tier 1 system integration

Unison

- High quality
- Low total cost of ownership
- Reliable turnaround time
- Advanced technology

Mechanical

- Efficiency
- System simplification
- Structures cost reduction

COMPETITORS

United Technologies, Collins Aerospace, Honeywell, SAFRAN, THALES

5+ major competitors

AEROSPACE, MEGGiTT, AMETEK, EXOTIC METALS, Honeywell

20+ major competitors

United Technologies, GKN AEROSPACE, SPIRIT, AERnnova

20+ major competitors

Integrated Systems … technology-driven growth

GE Technologies

SiC

Solid State

Icephobics

Thermal

Digital capabilities

Additive manufacturing

Ignition system

1990

777 ELMS

Bombardier Q400 Propeller

Gulfstream APMS

Airbus A350-1000 Rad-free Ignition sys

B737 Max Surface HX

LM C130J Propeller

JSF EPMS

A350 Wing TE

Cessna Denali Additive HX

2020

777X ELMS & backup generation

- Enhancing current slate of products
- Leapfrogging with new and game-changing performance
- Achieving balance of technology, capability and economics

Avionics

Systems business overview

Two global businesses

Avionics Systems

Flight Management

Displays

Computing & Networking

Military Systems

Integrated Systems

Electrical power

Mechanical

Unison

Legacy programs

787

737 / A320

A350

G650

Typhoon

F-35

C130

F-18

Growth programs

777X

C919 / 929

G500/600

KC-46

T-X

1,700 customers ... 160+ platforms ...
85+ products ... 33,000+ part numbers

Boundless avionics

Open systems are boundless. Unlike proprietary software, you have the ability to change and upgrade. Achieving greater portability and interoperability means you can do more with fewer restrictions, putting technology on your terms.

The result is a customizable and flexible systems architecture.

Lower cost of change, with full control, throughout the ownership lifecycle.

OPEN

Invest and operate with confidence, maintain change control, reduce cost, enable third-party applications

CONNECTED

Tailored ecosystems designed to best suit your operational needs, cybersecure, and built on IoT platform

TRUSTED

Advice and technology you can count on to solve complex industry challenges such as certification and compliance

Enabling success with open, connected and trusted solutions

OPEN AVIONICS

Making customer choice, customization, architecture flexibility, and low cost of change a reality

- Open computing and networking
- Open Flight Deck
- Open FMS
- TrueCourse™ FMS
- Connected FMS

CONNECTED, HIGH-INTEGRITY INTERFACES

Solving aerospace and industrial connectivity challenges while bringing processing to the edge

- Aerospace and industrial edge computing
- Remote electronics units
- Remote data concentrators
- Remote interface control

TRUSTED AUTONOMY

Bringing intelligent avionics to unmanned and autonomous platforms

- Autonomy and mission applications
- AiRXOS* creating certifiable, UTM-ready avionics
- Next-gen air traffic management

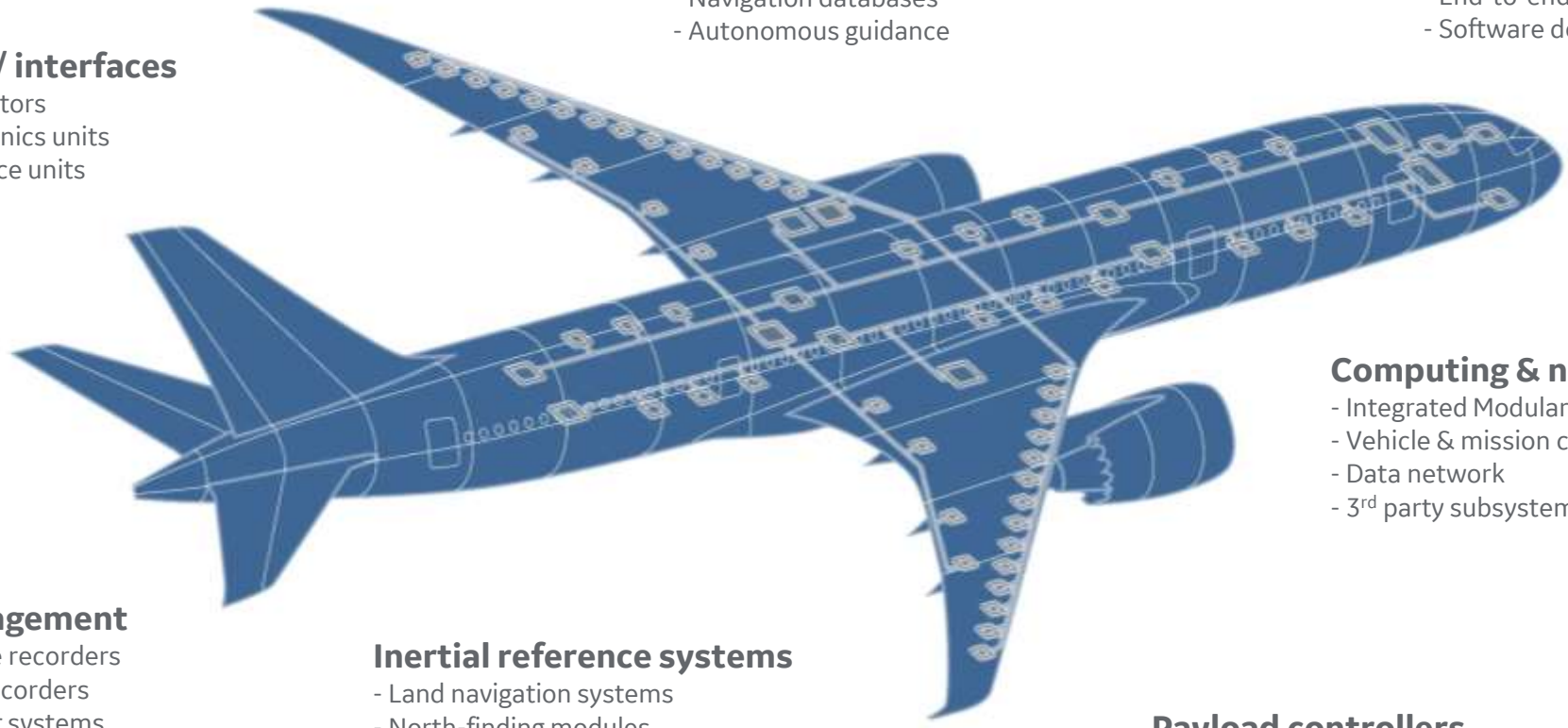
*AiRXOS is a part of GE Aviation

Avionics … open, connected, trusted systems on civil & military air and land vehicles

Navigation & guidance
- Flight Management Systems / Connected FMS
- Navigation databases
- Autonomous guidance

Development tools & ecosystem
- End-to-end tool suite
- Software development kit

Controllers / interfaces
- Data concentrators
- Remote electronics units
- Remote interface units



Crew interface systems
- Open Flight Deck
- Displays
- Standby displays

Computing & networking
- Integrated Modular Avionics (IMA)
- Vehicle & mission computing
- Data network
- 3rd party subsystems

Data management
- Cockpit voice recorders
- Flight data recorders
- Data transfer systems

Inertial reference systems
- Land navigation systems
- North-finding modules
- Inertial reference units

Payload controllers
- Station controllers
- Stores management computers

Ancillary mission equipment
- Interference blanking
- Video distribution

Technology foundation … investing in core components and enablers

Avionics enablers

- Next generation **processing & computing** … custom system on a chip (CSoC), miniature avionics computer
- Flexible & scalable **distributed processing with IO**
- Open & configurable **graphics generation**
- Open **video switching** with layering
- ARINC664-conformant **Ethernet switches** with time sensitive networking

1

Safe and secure systems

- **Turn-key development tools** for Integrated Modular Avionics (IMA), and Open Flight Deck
- **Security safeguards** … trusted/ measured boot, cross-domain guards, chain of trust
- Open partitioned operating environment
- **Edge OS**

2

Ecosystem applications

- Next generation **FMS** … TrueCourse,™ Connected FMS, Open FMS
- **Display applications** that work on ARINC 661 servers, crew monitoring, crew interface
- **Utility applications** … secondary power control, landing gear
- **Control applications** … small UAV autopilot, embedded machine learning & artificial intelligence, trusted autonomy

3

Avionics Services … delivering cost-effective lifecycle and performance enhancements

Maintenance, repair, overhaul

Customers have unique services needs … leveraging our global repair and overhaul network, OEM deep expertise, and passion for customer success, GE offers a full suite of MRO and risk-transfer products, tailored to customer needs

Upgrades and retrofits

Our deep understanding of customer operations, pain points, and challenges means we can offer avionics hardware and software upgrades and retrofits that will breathe new life and capabilities into in-service assets

Performance Based Logistics

Leveraging deep avionics domain expertise and a global aerospace supply chain, GE PBL contracts offer customers better outcomes, with reduced financial and operational risks

Customer and product support

Global 24x7 customer and product support operations centers strategically located in the US, Europe, and Asia, mean GE is always available to get customers operating again

Bringing it all together … AVIAGE* has become a tier 1 full-suite avionics provider for commercial platforms

Provider for avionics systems on the COMAC 919

Integrated Display Solutions

Flight Management

Flight Recording Solutions

Onboard Monitoring
Advanced configurable aircraft diagnostics and troubleshooting

Big Data Analytics
Supporting airframe failure prognosis, maintenance and safety

Common Computing Resources
A scalable and configurable open computing platform that translates to reduced operation costs

Avionics Network
ARINC 664 compliant network

3rd Party Subsystems
Tools and support services to manage development and integration of 3rd party hosted functions – relieving integration burden

Data Concentration

Tier-1 System Integration Services
Assisting customers to manage - from specification through design - integration, certification and beyond

*AVIAGE is a joint venture between GE Aviation and AVIC

Avio Aero

Innovation and expertise at the service of the Aviation Industry

Avio Aero is a GE Aviation business which operates in the design, manufacture and maintenance of civil and military aeronautics components and systems. Today, the company offers innovative technological solutions which allow customers to respond faster to the market's on-going changes: additive manufacturing, rapid prototyping as well as technologies dedicated to the design and production of transmissions, turbines and combustors.

Avio Aero
A GE Aviation Business

OUR PEOPLE

4,800 EMPLOYESS

4,200	600	31%	57%	43%
in ITALY	in POLAND	are under 36	operators	salaried

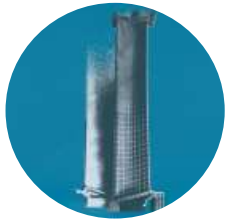
OUR PRODUCTS

ACCESSORY AND POWER TRANSMISSIONS

TURBINES AND COMBUSTORS

PROPULSION SYSTEM DESIGN & INTEGRATION

MRO & CRO SERVICES



ADDITIVE MANUFACTURING

SAND CASTING

KEY CLIENTS

Pratt & Whitney — Dependable Engines

Rolls-Royce

Eurofighter Typhoon

Ministero della Difesa

LEONARDO

AIRBUS HELICOPTERS

SAFRAN — Aerospace · Defence · Security

A global player

Over **80%** of all commercial aircraft fly with Avio Aero components

30,000+
Large transport engines

7,000+
Combat engines

12,000+
Rotorcraft engines

2,000+
Marine engines

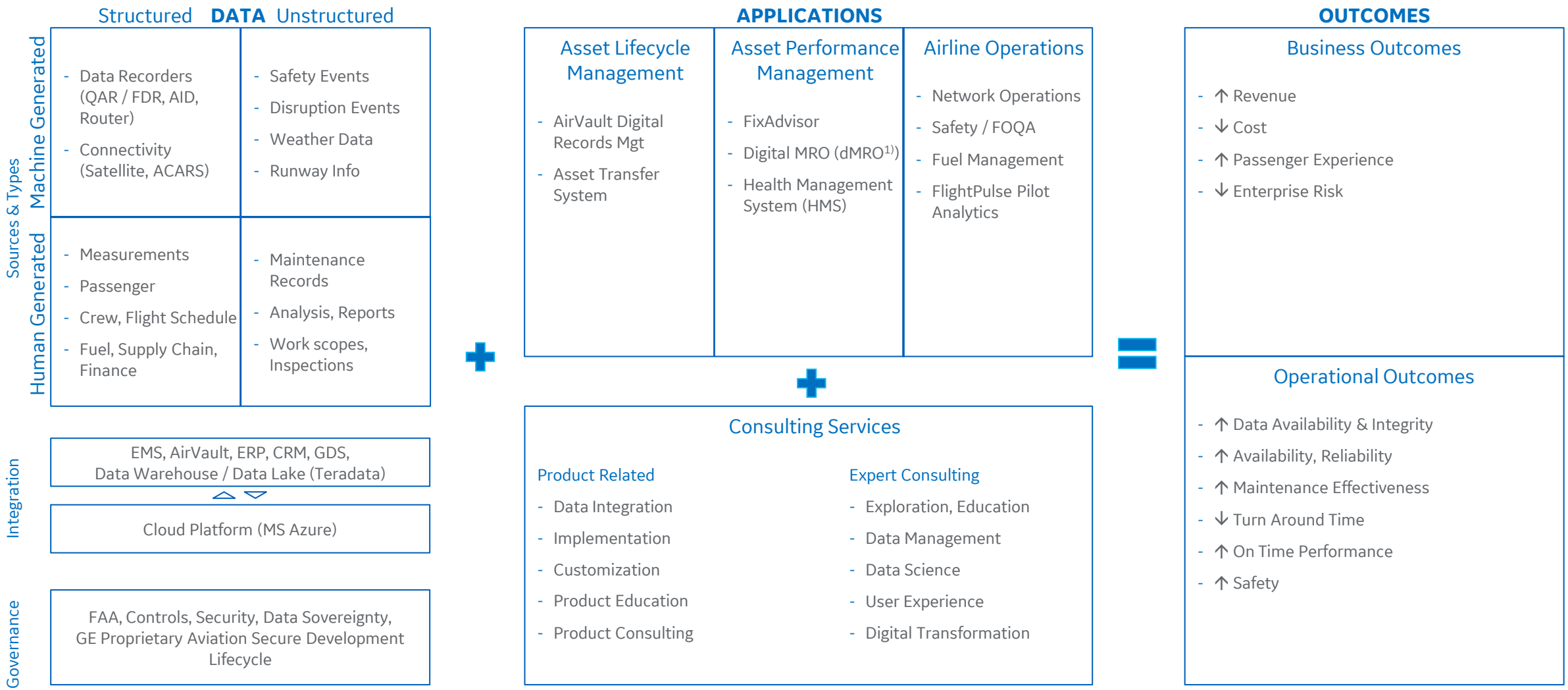
Our R&D network

- Decades of collaboration with European Universities
- Many Industries and SMEs involved in the NTI Network
- 7 Joint Lab in Italy and Poland
- Connection with CRG & other GE European companies

Aviation Digital


Uncovering what’s just beyond the horizon

Trusted data and applications drive meaningful outcomes



1) dMRO offered as a consulting service

We differentiate with data, domain knowledge and dedicated talent

Domain

100+ years of aviation experience, design-engg-material science-supply chain-manufacturing-service-flight-flight operations

People

700+ strong
Aviation Digital Team
committed to your success

Collaboration

consulting services to accelerate your digital transformation, global Accelerator centers (AUS, IAD, CDG, MUC, DXB, PVG)

Data Scientists

1,500 years[1)] of AI + ML + aviation domain experience, aerospace and ML PhDs / Masters, ~100 patents

Data Beliefs

aligned with your data strategy and leveraging your preferred platforms

Applications

purpose-built, GE-developed applications to empower multiple teams - Tech Ops, Flight Ops, Network Ops and IT

Data Custodians

trusted by the industry
to keep data safe and secure

Data Preparation

enabling easy collection-aggregation-storage-preparation-export-application of data

Wingman

true partners in your journey

1) Cumulative experience

Proven capabilities in managing high volume data

8 billion
aircraft maintenance records being maintained on AirVault

8,932
aircraft using Event Monitoring System (EMS) and FOQA[1)]

57,277
airline crew relying on Network Crew Optimization (NCO)

1,651
helicopter assets employing Health and Usage Monitoring System (HUMS)

46,689
years of flight data

170
unique Required Navigation Performance (RNP) procedures designed

175 million
flights analyzed

6,023
pilots optimizing operations with FlightPulse

4,098
aircraft digitizing their maintenance records with AirVault

15,468[1)]
unique aircraft and rotorcraft assets connected to GE solutions

1,766
aircraft using Aviation APM (Asset Performance Management) to help improve availability and reliability

458
airlines, cargo carriers, business jet operators, military forces, OEMs and lessors relying on GE

All data as on April 2019. Source: GE Marketing
1) Includes 2,632 unique tails from Lessors and OEMs for which end asset operator is not known

We use data to improve productivity in GE Aviation

30% ↑
fidelity with engine digital twin

15% ↑
yield at GE's MRO shop with Digital MRO (dMRO) solution

6 Weeks
advance component-level BOM prediction for engine shop visit

14% ↑
accuracy with engine digital twin

25% ↑
detection rate with engine digital twin

Source: GE Marketing

Our solutions drive meaningful results for over 450 customers

2,990 pilots optimizing operations with FlightPulse — Qantas

1% ↓ fuel cost — AirAsia

$ 18 million savings[1] through AirVault — Pioneering American Low Cost Airline

4,013 metric tons of CO_2 saved through efficient navigation procedures — AirAsia

50% productivity gain in first year using AirVault — Leading North American Low Cost Airline

56% ↓ unscheduled engine removals
15% ↓ decrease in overhauls — Emirates

50 analytics projects over 3 years improving asset availability and reliability — China Eastern

1,000 engine events avoided with APM — Delta

Illustrative customers as on April 2019, not comprehensive
Source: Publicly available reports and presentations at GE events
1) Anticipated savings over 5 years