



Is China A Threat to Rolls Royce and the Commercial Airline Industry?

Managing the Global Enterprise

MB Sarkar

Team 3

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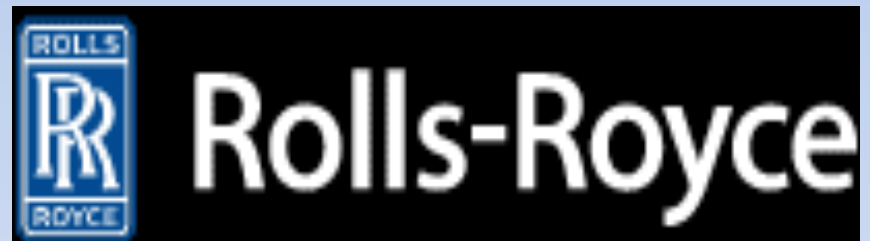
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Executive Summary

- There are 5 major players in the commercial engine industry which have total revenues ranging from 12 Billion to 20 Billion USD
- 50% of described revenues comprises of servicing existing engines in the field
- Of the 5 organizations GE, Pratt & Whitney, and Rolls Royce are true global players in the market with presence in all key markets
- The demand in China is increasing with potential of encompassing 1/3 of the total demand within the next decade
- China is increasing its large passenger aircraft program to form partnerships with GE, Cesna, and Ryanair
- AVIC commercial aircraft engine corporation is also forming partnerships with MTU, Safran, and Hamilton Sundstrand to gain access to minimize technology gaps
- China's State Council is expected to approve a 16 Billion USD investment in Aircraft Engine R&D with more capital to come from China and Hong Kong Financial markets
- There are high ambitions for China to be a major player; we do not believe they can be a viable threat in the wide body plane engine in the short term, however China will emerge as threat within the narrow body engine market in the next decade

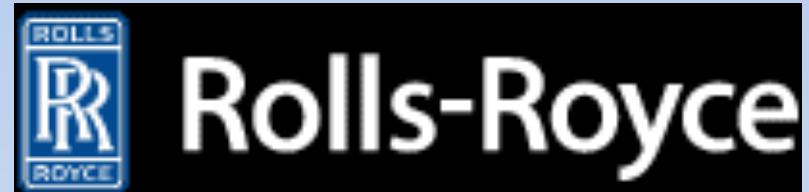
Major Players in Commercial Engine Industry



Major Players in Commercial Engine Industry



- Since 1917
- Revenue \$18.7B
- world's leading producer of large and small jet engines for commercial and military aircraft
- supply aircraft-derived engines for marine applications and provide aviation services



- Since 1906
- Revenue \$19.66B
- powers more than 30 types of commercial aircraft and has 12,500 engines in service

Major Players in Commercial Engine Industry



- Since 1925
- Revenue \$12.94B
- power more than 40 percent of the world's passenger aircraft fleet
- serve more than 800 customers in 160 countries



- Joint venture between **GE Aviation**, a division of General Electric of the US and **SNECMA**, a division of Safran of France
- Formed to build and support the CFM56 series of jet engines
- Provided more than 23,000 engines for more than 500 consumers throughout the world (since 1974)

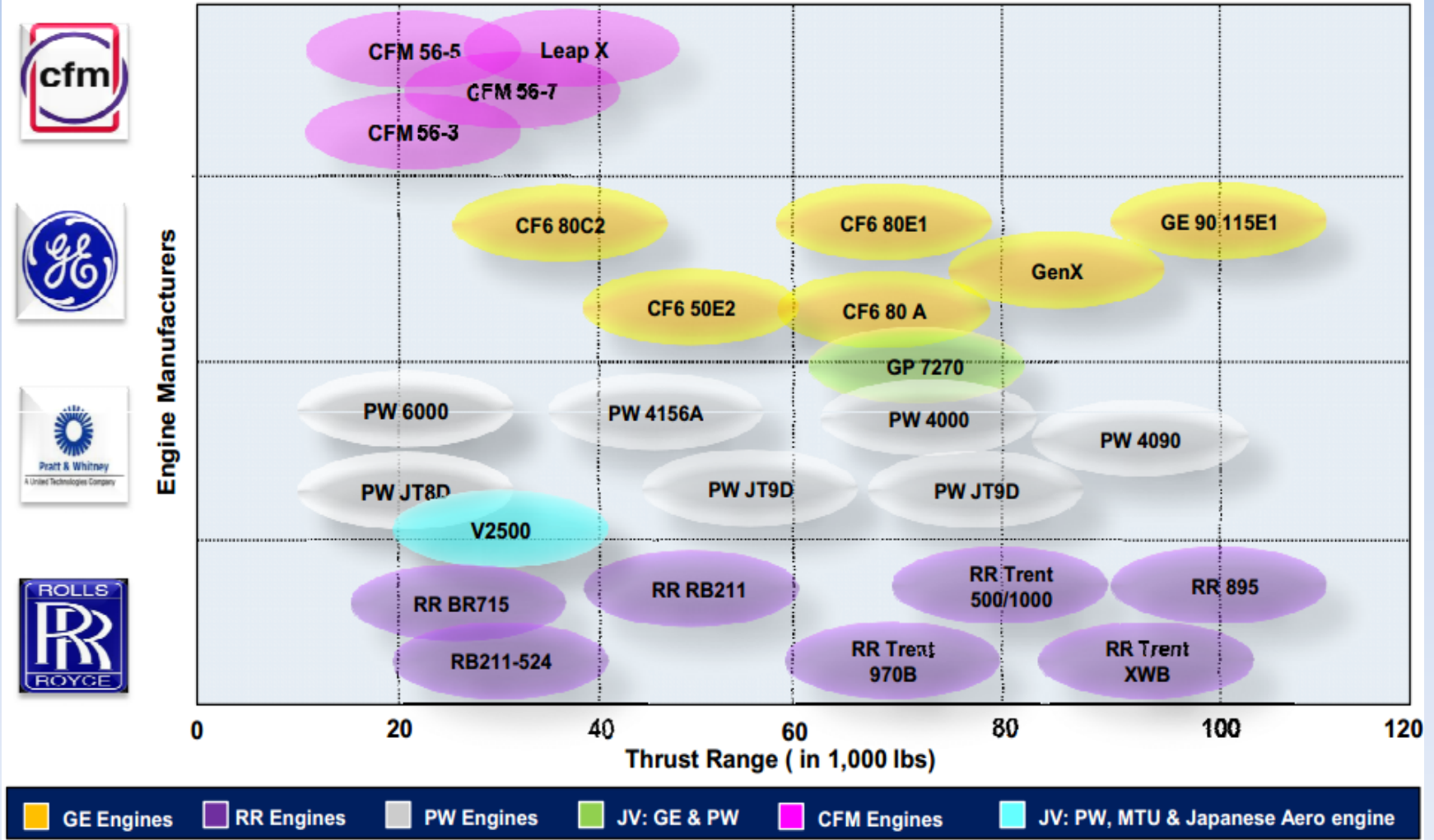
Commercial Turbofan Engines – Wide body Aircraft (Engines with Thrust Range of 60-90K lbs.)

Aircraft	Rolls-Royce	Pratt & Whitney	General Electric	CFM (JV: Snecma & GE)	International Aero Engines (JV: PW, RR, MTU)	Engine Alliance (JV: GE & PW)
A310		●	●			
A330	●	●	●			
A340	●			●		
A350	●					
A380	●					●
B767		●	●			
B777	●	●	●			
B787	●		●			
B747	●	●	●			

Commercial Turbofan Engine – Narrow Body Aircraft (Engines with Thrust Range of 20-40 lbs.)

Aircraft	Rolls-Royce	Pratt & Whitney	General Electric	CFM (JV: Snecma & GE)	International Aero Engines (JV: PW, RR, MTU)	Engine Alliance (JV: GE & PW)
A318		●		●		
A319/320/321				●	●	
A 320 Neo				●		
B737				●		
B757	●	●				
B737 Neo				●		
Comac C919				●		

Portfolio of Commercial Turbofan Engines for Wide & Narrow Body Aircraft



RR – 2011 Sales vs. Services

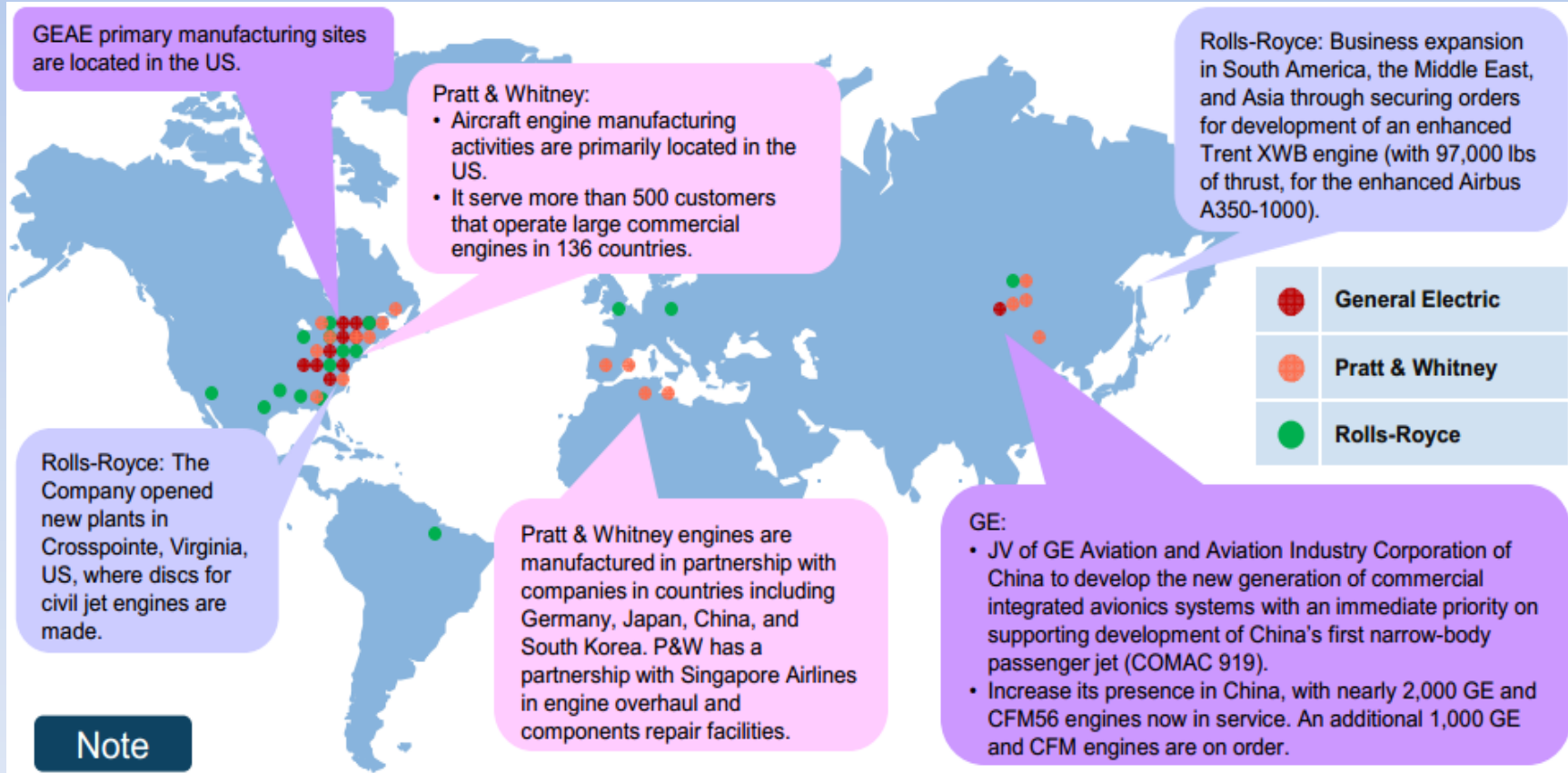
Highlights:

- RR Trent 1000 enters service on Boeing 787
- Trent XWB exclusive contract on longer ranger Airbus A350 XWB
- 1,000th Trent 700 delivered for Airbus A330
- New joint venture announced to address engines for future mid-size aircraft
- BR725 certification program for the Gulfstream G650 on course

Key Financial Data:

	2007	2008	2009	2010	2011
Order book (£B)	35.9 (+80%)	43.5 (+21%)	47.0 (+8%)	48.5 (+3%)	51.9 (+7%)
Engine deliveries	851	987	844	846	962
Underlying revenue (£M)	4,038 (+3%)	4,502 (+11%)	4,481 (0%)	4,919 (+10%)	5,572 (+13%)
Underlying OE revenue (£M)	1,484	1,776	1,855	1,892	2,232
Underlying service revenue (£M)	2,554	2,726	2,626	3,027	3,340
Underlying profit before financing (£M)	564 (+9%)	566 (0%)	493 (-13%)	392 (-20%)	499 (+27%)

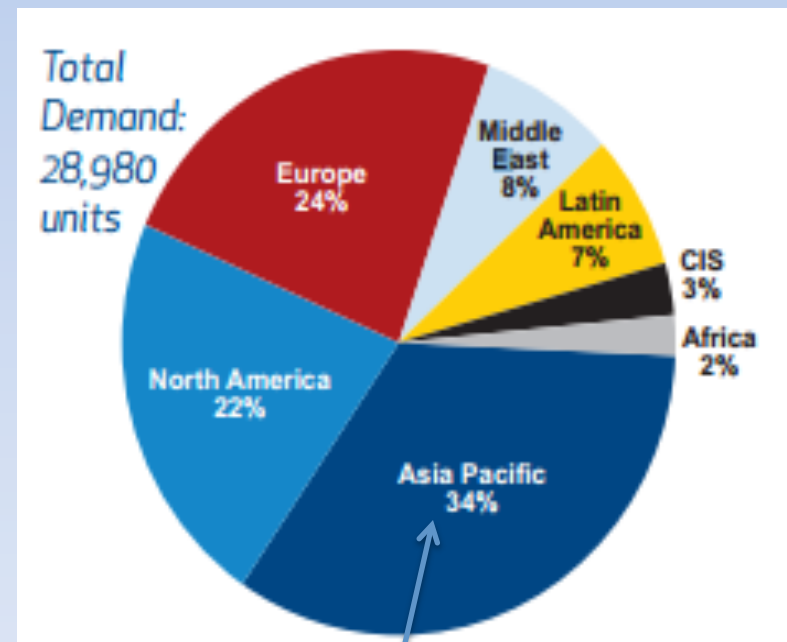
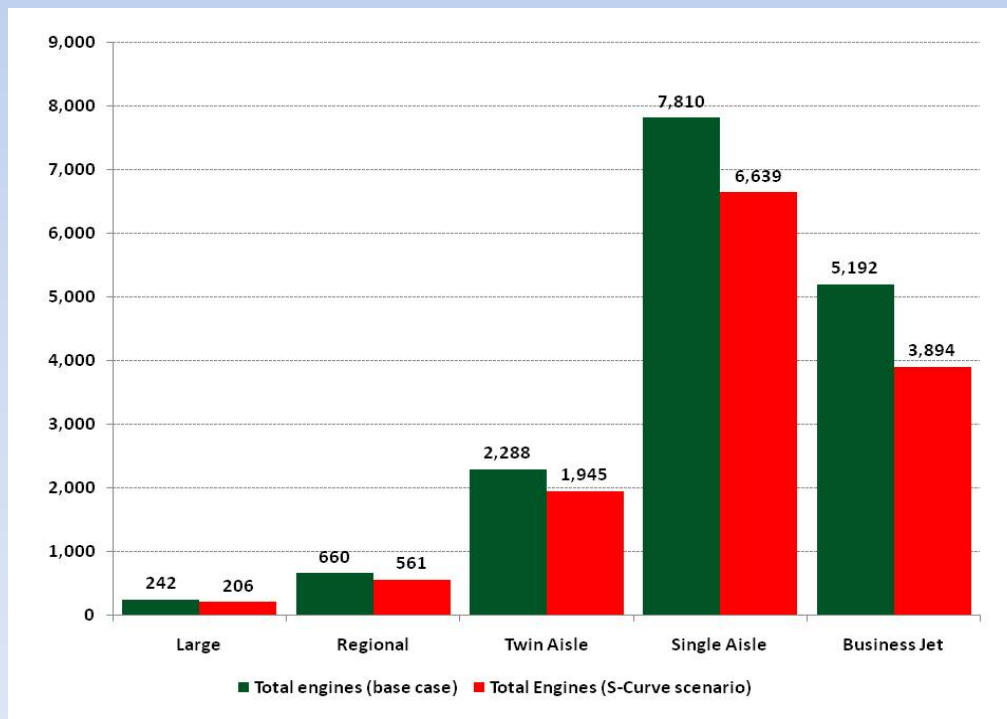
Geographical Footprint – Commercial Turbofan Engine Manufacturers



Note

- CFM International is a joint venture between GE Aviation, a division of US-based General Electric and Snecma, a division of Safran of France, with manufacturing of engines in their respective facilities.
- IAE International Aero Engines AG is a joint venture between Pratt & Whitney of the United States and MTU Aero Engines of Germany, with manufacturing of engines in their respective facilities.
- Engine Alliance, a 50/50 joint venture between General Electric and Pratt & Whitney, with manufacturing facilities mentioned above.

Potential Chinese Demand for Large Jet Engines for airliners and business jets



1/3 of the overall Demand



- COMAC (Commercial Aircraft Corporation of China) - State owned consortium governing large passenger aircraft programs.
- Adopts an “air-framer-suppliers” model, focusing on design, final assembly and manufacturing, marketing , CS and certification.
- Adheres to the principle of “Development with Chinese Characteristics”, liaising mainly with Chinese suppliers.

Suppliers



中航工业洪都



中航工业沈阳飞机工业（集团）有限公司
AVIC SHENYANG AIRCRAFT CORPORATION



中航工业哈尔滨飞机工业集团有限责任公司
AVIC HARBIN AIRCRAFT INDUSTRY GROUP CO.,LTD.



中航工业西安飞机工业（集团）有限责任公司
AVIC XI'AN AIRCRAFT INDUSTRY (GROUP) COMPANY LTD.

COMAC Foreign partnerships



Ryan Air

Europe's leading low cost airline,
with >300 737's

Signed an aircraft design agreement
with COMAC



GE Avionics

Signed a joint venture with AVIC to
supply avionics to the C-919. This is a
reciprocal agreement to the use of
CFM engines on the C-919



Cessna

AVIC signed an agreement with
Cessna for final assembly of in China
of the Cessna Caravan.



COMAC ARJ-21 700/900

- 90 seat regional aircraft with “high resemblance” of the MD-80
- Development started in 2002 with target launch in 2008. After numerous technical and certification delays current launch is targeted within 2013
- Orders: 309, all Chinese airlines
- Engines:
 - General Electric CF34-10A
 - 17000 lbf thrust



COMAC C-919



- Program began 2009, with scheduled test flight in 2014 and deliveries to begin in 2016.
- Mid range, 170-190 seats, will compete with a320 and 737.
- Orders: 380, all Chinese airlines, with foreign company interest
- Engines:
 - 2* CFM LEAP X, to be replaced with **CJ-1000A**
 - 25000-30000 lbf thrust



中航商用航空发动机有限责任公司
AVIC COMMERCIAL AIRCRAFT ENGINE CO., LTD.



- Founded in 2009 to develop China's high bypass jet engines through R&D and international cooperation. Major subsidiaries:
 - Shenyang Liming Aircraft Corporation
 - Avic Xi'an Aeroengine
- Mission: *“Strengthening the **nation** with aviation; Promoting the **national** aviation engine industry and supplying sustainable power for the global development”*

为世界提供

持久绿色动力





中航商用航空发动机有限责任公司

AVIC COMMERCIAL AIRCRAFT ENGINE CO., LTD.



CJ-1000A
Launch 2016
0.53 kgf thrust



CJ-1000AX
Launch – 2022
0.53 kgf thrust



CJ-1000ER
Launch – 2026
0.52 kgf thrust

- Operate in 5 year plans
- First engine, CJ-1000A is targeted at the COMAC C-919
- Bypass ration >9
- HPC Pressure Ratio = 20

AVIC Engine Foreign partnerships



MTU Aero Engines
Germany's leading engine
manufacturer

Specializes in high tech
manufacturing techniques like
lasercarving for which it has patents
Provides engine maintenance



Safran SA

French developer of aerospace
propulsion and aircraft equipment,
Cooperation with (AVIC) to develop
new-generation turbo shaft engines
for heavy helicopters intended for
both the Chinese market and
international markets.



Hamilton Sundstrand Corporation, a
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reached an agreement to form a
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a new auxiliary power unit (APU) for
the commercial aircraft segment.





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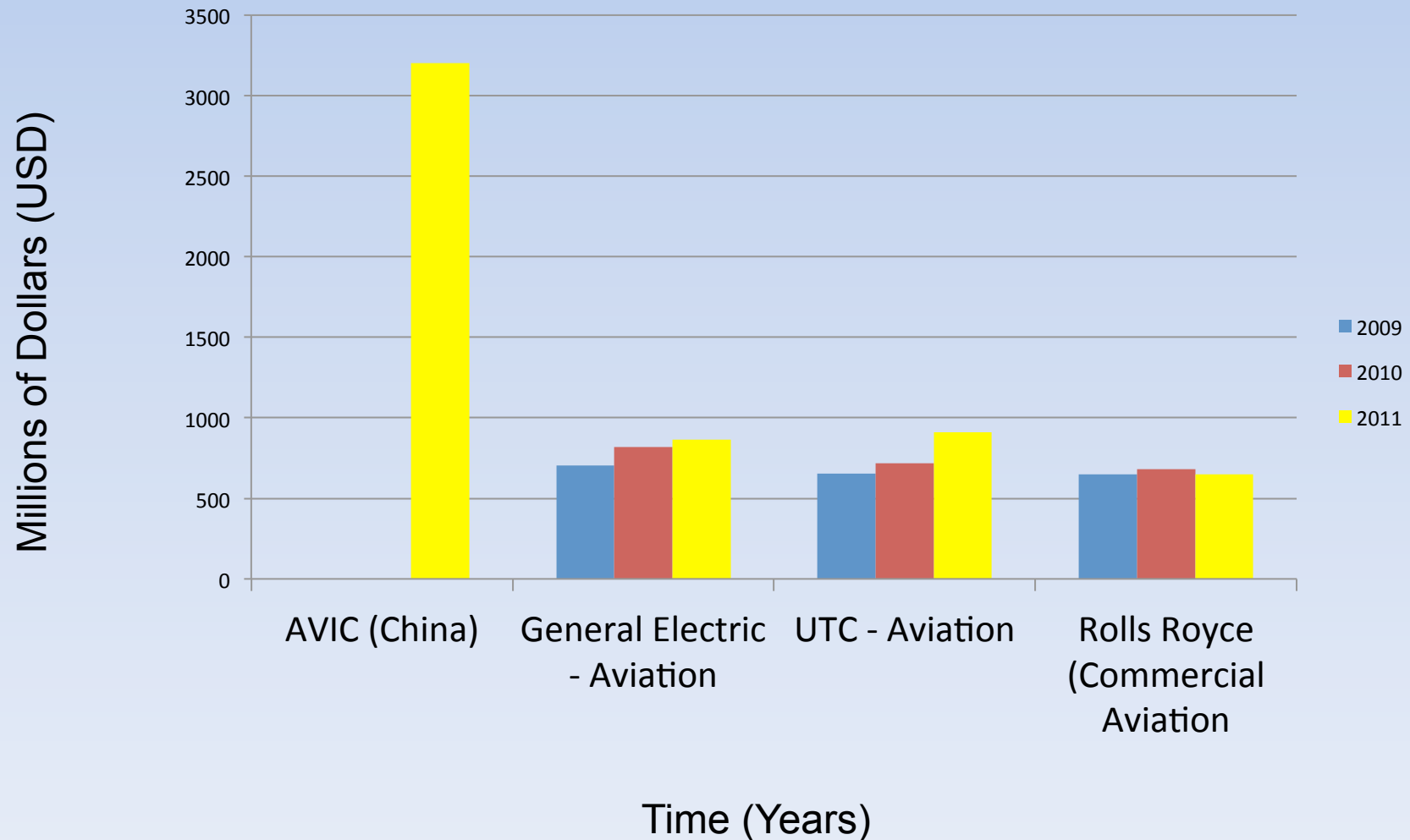


China spends billions on aerospace - Biz Wire - March 5, 2013 - BONTV China



<http://www.youtube.com/watch?v=dcozX4AVtDc>

Financial Comparisons: Aviation Expenditures



Russia Squeezes China's Engines

- Since 1989, import into China of military aircraft and military engines has been banned by Western countries
- Being solely reliant on Russian aircraft and engines forced China to invest in its own military aircraft and engines
- Though having relative success within aircraft manufacturing, the Chinese military aircraft engine industry suffered numerous setbacks resulting from lack of technology
 - More so manufacturing technology and reliability
- The WS-10A engine which is a Chinese copy of the Russian made AL-31FN has been having reliability issues repeatedly, which has caused the Chinese to go back and order hundreds of Russian made engines to power their J-10 fighter
- Russia fears that the recently purchased engines will be reverse engineered, therefore they have started to put more restrictions on exporting to China thus squeezing China by its recently purchased engines

Government Run Companies vs. Private/Public Companies

- Some of China's technological setbacks in its military programs are attributed to the government run structure of its aircraft and engine industry
- The lack of incentives and entrepreneurship stifling innovation
- Billions of dollars poured over the years were ineffectively used
- The Russian aircraft and engine industry has suffered similar setbacks during its seventy years of communism
- China is moving towards partially privatizing their aircraft and engine programs as can be seen by the fundraising in the private markets

Conclusion

- Chinese State Council is expected to approve a 16 Billion USD investment over the next 5 years in Aircraft Engine R&D with estimated 50 Billion USD for 20 years. More capital is expected to come from China's and Hong Kong's Financial markets
- China is partnering with leading American and European companies in the technology of engine technology and enhanced manufacturing technology
- Pundits and think-tanks alike estimate that China's large investments are driven by nationalistic ambition for technological independence, and fueled even further by crippling military bans from Western Nations
- China is making an effort to partially privatize its engine industry to increase efficiency and technological advancement
- High ambitions for China to be a major player; we do not believe they can be a viable threat in the wide body plane engine in the short term, however China will emerge as a narrow body engine threat within the next decade
- As consultants to Rolls Royce, we agree with the assertions made by the regional director of North East Asia that China would not be a direct threat to Rolls Royce commercial aviation within the next 10 years because their primary revenue is derived from the Wide-Body Engine market sales and services. With that being said, the investment they make in the narrow-body R&D should translate to wide-body technology gap closures.



THANK YOU



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