

Testimony of Dr. David Pritchard, Research Associate, University at Buffalo-State University of New York-Canada United States Trade Center before the U.S.-China Economic & Security Review Commission.

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Commissioners, my name is Dr. David Pritchard; I am a Research Associate at the University at Buffalo-State University of New York-Canada United States Trade Center. I have conducted research for over 15 years specializing in the area of "Globalization of Commercial Aircraft Manufacturing". My aerospace industry experience spans over two decades that include six aircraft launches, which has allowed me the opportunity to visit many major aircraft manufacturing plants around the world. I am a graduate of the University at Buffalo-State University of New York with my Ph.D. dissertation titled "Global Decentralization of Commercial Aircraft Production: Implications to the U.S. Based Manufacturing Activity". I very much appreciate the opportunity to present my views this morning on the Chinese Commercial Aircraft Industry and its implications for the Western commercial aircraft industrial base.

The commercial aircraft industry has long been a powerful symbol of Western technological leadership in product-markets requiring high levels of design and engineering innovation. This industry has been an important North American and European export sector for more than 50 years, and many of the advanced manufacturing techniques developed by this sector have been successfully transferred to other industries (e.g. auto-production, machinery, metal fabricating). From now on, however, Western manufacturers of commercial aircraft (e.g. Boeing, Airbus, and Bombardier) will likely embrace a systems integration mode of development and production. Under this system, key components and sub-assemblies will be designed and manufactured by external suppliers. While this represents a sensible strategy from a financial perspective, a potential downside is that foreign risk-sharing partners must receive infusions of tacit scientific and technical knowledge from Western manufacturers. Without these transfers, the systems integration strategy would not be effective because risk-sharing agreements usually entail much more than build-to-print relationships. This raises an important question that ought to be of interest to Western trade policy analysts. Specifically, how can technology transfer to the Chinese have a positive long-term business impact on the Western commercial aircraft industry?

The system integration business model delivers short-term financial benefits at the cost of losing the knowledge-based value of the company over the long-term. The high-technology commercial aircraft industry is an example of trading away intellectual property to risk-sharing partners – intellectual property that took decades to mature with internal corporate investment and public support from government-funded research laboratories. Private capital markets have never been willing to finance the development of large civil aircraft, pushing most aircraft manufacturers toward global sourcing under

risk-sharing partnerships and/or complex subsidy configurations involving both domestic and foreign public agencies. By transforming themselves from manufacturers to systems integrators, will Boeing, Airbus, and Bombardier be promoting innovation by transferring key technologies and core competencies to first-tier risk-sharing partners? Or, will it mean an end as we know them as “commercial aircraft manufacturers” as they transition toward institutions that market and sell aircraft?

Boeing has already opted for a systems integration mode of production for its new 787 model, whereby manufacturing and design processes are distributed across an international network of risk-sharing partners. Airbus and Bombardier plan to use this business model for launching their latest aircraft programs (A350XWB and C-Series), if only because this approach has clear financial advantages for the systems integrator. This approach allows aircraft companies to invest less capital into new launch programs, as compared to the self-funded launch initiatives that have traditionally characterized this industry. Today’s commercial aircraft industry is far different from the early days of jet production, when each aircraft company invented on its own. In the future, system integrators will lose ownership of intellectual property to an industry that is moving toward open architecture. Specifically, the knowledge from research will be made “public” by the first and second-tier suppliers. Since the risk-sharing partners will not be allowed to pass along their non-recurring development costs, they will recoup their investment by amortizing the cost of product development across several manufacturers’ aircraft programs.

The reluctance of companies to invest in their own aircraft programs is symptomatic of this sector’s growing reliance on risk-sharing contracts with external suppliers. The widespread acceptance of the system integrator approach, which relies heavily on outsourcing design and sub-assembly production, seems to be taking hold with all three major commercial aircraft manufacturers. The Western aircraft supplier base is a niche group of companies that vie for long-term fixed-price contracts or participate in risk-sharing programs. Today, demands on the technical and financial resources of these suppliers are being strained to the point where many of these companies will not be able to meet production requirements (cash flow). Some of these companies might actually elect not to bid on programs. The system integrator approach for Airbus and Boeing will have them totally committing their launch process to high levels of design and production outsourcing, seeking long-term contracts in dollars, and sourcing to low-cost regions (e.g. China, Russia, and India). This is all bad news for the traditional North American and European supplier. The new “government supported” risk-sharing partners in the “East” will require Western suppliers to participate by various means in host-country production through outsourcing or offshoring, in-country design offices to service the first-tier risk-sharing partners (tribal knowledge transfer and technology leakage will occur), and possibly the licensing of production. Airbus has informed its first-tier suppliers that outsourcing to Asia is a requirement, and that failure to comply will entail significant penalties. These requirements will no doubt be down-flowed to second and third-suppliers, which will enable the first-tier group to meet its requirements. How can the traditional North American and European suppliers compete with foreign government

financed aerospace industries in the “East” unless they make outsourcing an integral part of their production strategies?

China is committed to developing a family of aircraft that meet Western certification standards to support its domestic airlines. Decades of industrial cooperation with the main global airframers has helped China acquire basic production competence in several key areas (see Table 1). Currently, China is working with Boeing on 737 and 787 programs that have an estimated contract value of \$600 million. Airbus has a Memorandum of Understanding signed with China for a 5% risk-sharing partnership on the newly launched A350XWB. The Chinese government has a policy not to have competing production lines for the same single-aisle “Western technology” aircraft. For example, China has the Embraer ERJ 145 co-production for the 45-55 seat aircraft, its own ARJ-21 for the 60-105 seat range, and has recently broke ground on a new final assembly line for the Airbus A320 with 130-160 seats that will be identical to the Airbus plant in Hamburg, Germany. The expected technology transfer from the Airbus joint-venture will assist China in its plans to develop its own commercial aircraft with at least 150 seats, which is part of China’s 11<sup>th</sup> Five Year Plan (2006-10). Preliminary discussions are underway between China and Russia to produce a wide-body aircraft that would compete with Boeing’s 787 and Airbus’s A350XWB.

The Western aircraft suppliers will have to foster a strategy to have close proximity to the Airbus factory in Tianjin (China), and take advantage of investment incentives ranging from tax holidays to capital grants that will significantly lower the cost of their new manufacturing facility. Transferring low-end engineering work packages will lower development costs and avoid the 23% import duty on their products to support the Airbus joint-venture. There is no doubt that suppliers are expected to transfer technology to their Chinese outsourcing partners or offshore facilities that will be utilized for China’s mission to develop its own large commercial aircraft.

It is often argued in the business press that China is decades away from developing large commercial aircraft, and that China lacks the technological capability to enter this market in the near future. I opt to challenge this perspective in light of the sheer volume of investment capital that the Chinese government can throw at its infant aircraft industry. At present, for example, China’s official reserves stand at over \$900 billion, and China has a recent GDP growth rate of close to 10% per annum. China is already producing advanced fighter aircraft under license agreements with Russia, and Chinese design bureaus are equipped with Western Catia V engineering software platforms that are needed to design commercial aircraft. More important, perhaps, is the fact that China has openly declared its intention to develop an indigenous commercial aircraft sector as part of a strategic economic plan to curb imports. This intention should be treated seriously by trade policy analysts, if only because the Chinese have already entered markets that were once viewed as exclusively Western (e.g. automobiles) or exclusively ‘superpower’ (e.g. space vehicles). In short, it would be unwise to dismiss China as a potential player in the Large Commercial Aircraft (over 100 seats) or Regional Jet markets simply because it took other players a long time to establish a credible foothold in this industry.

China's efforts to develop a world-class aircraft design and manufacturing industry needs to be taken seriously by the West. The Boeing 20-year market forecast for China has projected a need for 2,880 aircraft valued at over \$280 billion. In the past, Western aircraft industry analysts predicted that the market would be split 50/50 between Boeing and Airbus. No real consideration was ever given to the Chinese for developing their own commercial aircraft industry that would avoid outwardly investing in Western aircraft. The Chinese have experienced a 20-year technology transfer program, and have gained technical and tribal aircraft knowledge from all western aircraft manufacturers. Today, the Chinese are currently in the final assembly stage for their new ARJ 21 regional jet that features US engines and avionics. Surprisingly, the FAA has just opened a new office in China to support the FAA certification of the ARJ 21 even though no US airline has purchased the aircraft. Only a few years ago the FAA stated they did not have the resources or desire to assist the Chinese in the FAA aircraft certification process. So it's not only the commercial aircraft manufacturers diffusing knowledge to the Chinese but government agencies like the FAA of the US and JAA of Europe.

If anyone had any doubts about the Chinese being a player in the commercial aircraft industry, the agreement between the Tianjin Zhongtian Aviation Industry Investment Company and Airbus to open a joint venture A320 final assembly facility in Tianjin should put to rest any dissension on this matter. This joint venture will have a facility identical to Airbus's Hamburg plant and will give the Chinese aircraft industry the "golden keys" to complete their quest to be a global player in the building commercial aircraft to Western standards. Recently, Boeing Chairman and Chief Executive said "There is not doubt that (China) will be someday in the commercial airline business".

The long term strategy for Airbus and Boeing could be to cede the China single-aisle aircraft market to Chinese State-Owned Enterprise (SOE) aircraft, and then battle for market share on the wide-body aircraft requirements. In doing so, past industrial cooperation, current ventures and future risk sharing partners will give the Chinese SOE aircraft enterprises the knowledge and capability to design and build Western standard commercial aircraft. China's aviation ambitions will require huge sums of capital investment into the Chinese SOE's. Recent estimates have this launch investment pegged between \$6.5 to \$7.7 billion for the new China large aircraft program which could have the prototype built by 2010. The Chinese government will be subsidizing billions of dollars to their SOE aircraft industry so the question needs to be raised why is this not in violation of the WTO agreements? Will the USA file a WTO case against China as the new large aircraft program will infringe on Boeing's market?

My point, quite simply, is that the major Western airframers have opted for a short-term global sourcing tactic that maximizes shareholder value at the expense of longer-term strategic interests. Today's market for large passenger jets is a duopoly. Within 10 years, the market may start to look like a triopoly with a strong Chinese presence. This presence has been fostered by decades of technology transfer from Western manufacturers, which has given China a broad array of technical and production competencies in the commercial aircraft sector.

**Table 1  
China Aircraft Offset Programs**

<b>Assembly/Part</b>	<b>Program</b>	<b>Source/Offset</b>
<b>Vertical Fin &amp; Tail</b>	<b>Boeing 737</b>	<b>Boeing USA</b>
<b>Empennage</b>	<b>Boeing 757</b>	<b>Vought USA</b>
<b>Final Assembly</b>	<b>MD-82</b>	<b>McDonnell USA</b>
<b>Nose &amp; Wing</b>	<b>A320</b>	<b>Airbus Europe</b>
<b>Final Assembly</b>	<b>A320</b>	<b>Airbus Europe</b>

Other sources of information:

Boeing in China: <http://www.boeing.com/companyoffices/aboutus/boechina.html>

Airbus in China: [http://www.airbus.com/en/worldwide/airbus\\_in\\_china.html](http://www.airbus.com/en/worldwide/airbus_in_china.html)

AVIC1 Commercial Aircraft Co. Ltd- ARJ 21 Regional Jet Program:  
[http://www.acac.com.cn/site\\_en/about.asp](http://www.acac.com.cn/site_en/about.asp)