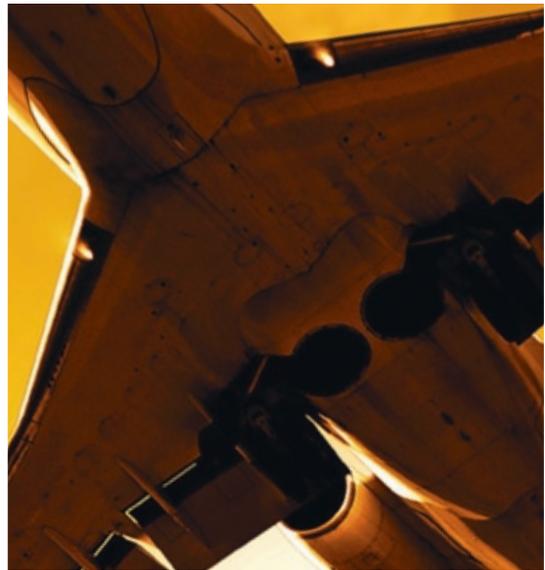


Mexico Takes Flight

A booming aerospace sector south of the border offers tremendous opportunities for U.S. and Canadian manufacturers.



Aerospace manufacturing in Mexico has taken off in recent years with a jet-style roar.

Mexico exported \$1.3 billion worth of aviation products in 2007; in 2009, that figure was expected to top \$4 billion, according to Carlos Bello, general director of the Mexican Aerospace Industry Federation (FEMIA). As of early 2009, approximately 200 aerospace companies were operating in the country, employing nearly 27,000 workers. Aerospace exports from Mexico to the United States totaled more than \$683 million in 2008.

The number of aerospace firms in Mexico could reach 1,000 by 2015, said Jean-Claude Bouche, a senior aerospace consultant at Mexico's Monterrey Institute of Technology, quoted in AINOnline. By then, the industry could employ as many as 40,000 workers, and aerospace could account for \$12 billion worth of exports to the United States.

In 2009, Mexico's Secretary of the Economy reported that 79 percent of the aerospace companies in Mexico were engaged in manufacturing and assembly. Ten percent primarily offered engineering services, and 11 percent performed maintenance, repair and overhaul (MRO).

Major aerospace firms from

abroad, as well as their suppliers, have established a significant presence in Mexico. In 2008, for example, Montreal-based Bombardier Aerospace opened a manufacturing plant at the Querétaro Aerospace Park in

Central Mexico. Designed to build wiring harnesses, fuselages, and flight controls, the facility was slated to employ 1,200 full-time workers by the end of that year.

While Bombardier ramped up production in that factory, Cessna Aircraft and Hawker Beechcraft already were building subassemblies for their business jets in the city of Chihuahua, having moved the work there from Wichita, Kansas, in 2006. Aernnova, a supplier to Boeing, Airbus, Embraer, and other aerospace firms, was constructing an \$84-million plant in Querétaro. Goodrich was building a plant in Mexicali that would make engine cowlings for Boeing.

Early in 2010, Safran SA, a French manufacturer of engines and parts whose customers include Boeing and Airbus, opened two new plants in Querétaro. At the time, the company already employed 3,000 workers in Mexico. And Triumph

Aerospace Manufacturing in Mexico

Value of aviation products exported from Mexico

2007: \$1.3 billion

2009: \$4 billion+

Value of aerospace exports from Mexico to the U.S.

2008: \$683 million

2015: \$12 billion*

Number of aerospace firms in Mexico

2009: 200

2015: 1,000*

Number of aerospace employees in Mexico

2010: 27,000

2015: 40,000*

*projected



Group, a manufacturer of aircraft components and accessories, announced that it would invest up to \$20 million in a new manufacturing site in Zacatecas.

LOW COSTS, STRONG INCENTIVES

Among the many attractions that draw aerospace companies to Mexico, the cost of labor is a major factor. Highly skilled workers in Mexico's aerospace industry earn from \$5.80 to \$7.80 an hour. Mexico is the lowest-cost choice for U.S. companies that outsource manufacturing abroad, surpassing India, China, and Vietnam, according to a report released this year by AlixPartners.

Companies can easily ship products and components to Mexico from their plants in the United States or Canada for final assembly, or ship finished products to customers throughout North America.

"You're talking hours and days, rather than weeks, for transit to the United States," says Jim Moore, vice president of sales for the aerospace, automotive and industrials vertical at Ryder Supply Chain Solutions. "You can ship on Thursday morning by truck and deliver on Monday."

Having targeted aerospace as a strategic growth industry, the Mexican government is doing its best to make the country an attractive environment for this sector. One of the most important incentives is the maquila system, which has prompted many North American manufacturers, in a variety of industries, to "nearshore" their production in Mexico.

Maquilas are factories that operate in free trade zones. Companies import materials and equipment to those locations without paying taxes or duties, then re-export the finished products. Often, the manufactured goods are components that are shipped to factories outside Mexico for final assembly in products such as aircraft, automobiles, and computers.

But even outside the maquila zones, parts and materials for use in aerospace manufacturing enjoy special tariff treatment, entering the country duty-free, says Ricardo Alvarez, director of business development for the aerospace, automotive and industrials vertical at Ryder Supply Chain Solutions. "Also, the value-added tax (VAT) is refundable after five days of the import process," he notes.

Mexico's federal and state governments have established a variety of other tax incentives for the aerospace industry. In fact, from 2006 to 2008—a time when

Mexico had eliminated incentives for many manufacturing sectors—it retained its incentives for aerospace. These included capital equipment grants, help with infrastructure, real estate grants, and the establishment of an Aerospace Training Center in Querétaro.

FEMIA, an association of 48 aerospace manufacturers operating in Mexico, works with the federal and state governments to promote the interests of the industry. One of FEMIA's goals is to develop a National Strategic Aerospace Plan.

WORKFORCE DEVELOPMENT

Beyond the financial incentives, aerospace manufacturers discover several other compelling reasons to locate facilities in Mexico. One is the labor pool. The country has invested considerable resources in developing a skilled workforce—including engineers and technicians—for the industry.

In 2006, the state of Querétaro established an aerospace program at the Querétaro University of Technology (UTEQ). University officials worked with the government of Quebec and the Montreal Aerospace Trade School (EMAM) to develop a curriculum to train technicians for Bombardier's facility in the state. Aernnova Mexico also has used UTEQ to train employees.

A second institution focused on the industry, the National Aeronautic University of Querétaro, opened in 2009. "Querétaro is the first university in Latin America focused on aerospace," says Alvarez. It provides technical degrees in areas such as maintenance and electrical work, as well as degrees in aerospace engineering.

The Monterrey Institute of Technology also has developed a prominent aviation program. This includes four regional research centers that work with aerospace companies on workforce training. The Institute's Aerospace Industry Development Center (CEDIA) assembles experts to conduct research in areas such as lean supply chain, lean manufacturing, and supplier development. Under another program, engineering students serve as interns with aerospace manufacturers, often going on to take jobs with those companies.

In 2007, 14 academic institutions formed the Mexican Council of Aerospace Education (COMEA). This body established standards for educating technicians and aeronautical, electrical, mechanical, software, and electronic engineers to work in the industry.



Mexico's skilled labor force is a major draw for manufacturers locating facilities in the country.

STREAMLINED SAFETY CERTIFICATION

Another factor that has helped to stimulate the aerospace industry in Mexico is the Bilateral Aviation Safety Agreement (BASA). This 2007 agreement with the United States provides a way for aerospace companies manufacturing in Mexico to certify that their designs and components comply with U.S. standards and Federal Aviation Administration (FAA) regulations.

"With BASA in place, Mexico's aeronautical authority certifies parts, components, aeronautical systems, and even complete aircraft manufactured and assembled in Mexico, designed for the United States and other markets," says Venkat Ramasubramanian, senior consultant, supply chain engineering at Ryder. "BASA implies significant cost reduction, especially for companies importing parts and components to be converted

into systems or aircraft sections."

A final draw for aerospace companies in Mexico is the development of facilities tailored for the industry's needs.

In Querétaro, for example, Bombardier is the anchor tenant in the Querétaro Aerospace Park, a joint project of Mexican developer Vesta, GE Real Estate, and GE Capital Aviation Services (GECAS). Slated to eventually encompass two million square feet of manufacturing space, the park now also counts Safran, General Electric, Snecma, and Meggitt Aircraft Braking Systems as tenants. The property is adjacent to Querétaro International Airport, which contains the Aerospace Training Center. A second Aerospace Park is located in Zacatecas, with Triumph Group as its anchor tenant.

POTENTIAL ROADBLOCKS

Clearly, there are many compelling reasons for an aerospace firm to locate a manufacturing plant in Mexico. To make the venture successful, though, a company needs to proceed with great care. Just as it offers many advantages, production in Mexico also poses some serious challenges.

■ **Criminal activity.** Stories about theft, smuggling, and violence in Mexico are all too familiar these days. An average of 1,500 freight hijackings are recorded in Mexico each year, according to supply chain security firm FreightWatch International. Corrupt corporate employees and police officials who cooperate with criminal gangs make this kind of activity especially hard to control.

Beyond watching out for their own freight, companies that ship goods out of Mexico need to take care about anything extra that might hitch a ride with the official load. Drugs and other contraband, including illegal immigrants, sometimes find their way onto trucks that are headed for the border.

If authorities find that a load has been compromised, that discovery could delay the truck for as long as 30 hours while inspectors conduct a complete search. The violation also could jeopardize the shipper's clean record, subjecting future loads to long searches as well.

■ **Proper documentation.** Smuggling isn't the only hazard that might delay a load at the border. If a company's logistics partner doesn't handle all the details of its paperwork and electronic filings correctly, that could stall a shipment as well. Problems with trucks themselves—such as lights that don't work or seals that show signs of tampering—also cause delays.

“Crossing the border to Mexico can involve a delay of 30 to 48, or even 72 hours if you don't have your act together,” says Moore. “And it's getting worse.”

■ **Lean manufacturing.** Uncertainties about border crossings are of special concern to aerospace manufacturers, many of which have implemented lean manufacturing programs.

In lean manufacturing, each component used to build a complete aircraft is assigned a specific role. A 737 jet, for example, might have 350,000 parts, each with a unique, detailed plan for delivering it to the production line just-in-time and presenting it ergonomically to the worker who will attach it. “A tremendous amount of engineering, data management, and synchrony goes into this for 350,000 parts,” Moore says.

Orchestrating the arrival of thousands of parts is a complex art. The manufacturer must be able to track the progress of every component. Delays can wreak havoc, so there's no room for uncertainty about the movement of any shipment.

STARTUP CHALLENGES

While labor rates and government incentives make Mexico an economical choice for aerospace manufacturing, it's often hard for a company establishing an operation to control startup costs. If not handled properly, those costs could cancel out the benefits of the location.

For example, a new manufacturing facility might not receive enough inbound materials and complete enough finished product to build full truckload shipments. The alternative—less-than-truckload (LTL) transportation—is more expensive. “If they don't go to a third-party logistics service provider (3PL) and take advantage of the volumes that a 3PL handles, the startup costs for logistics will be too high,” says Alvarez.

A startup also requires flexibility. Not every 3PL is prepared to handle the smaller-scale operations that a company conducts in the beginning, and then ramp up gradually to manage greater volumes as the facility reaches full production.

Nor can every 3PL offer service in every region of Mexico. No single service provider covers the entire country on its own. The supply chain might require partnerships with reliable local companies to fill in the gaps—for instance, providing air freight or ferry services to and from the tip of Baja California. “The selection, contracting, and continual evaluation of your partner is





Ryder Mexico manages more than 80 carriers and 3,000 border crossings every week.

critical," Moore says.

According to William McNeill, research analyst, AMR Research, "Security, liability, compliance, and costs need to be managed very closely. Collaborating with trading partners, increasing investments in IT for better visibility across the supply chain, and using models and simulation can help mitigate the risks inherent with global trade."*

For an aerospace firm operating in Mexico, the key to a successful operation is to choose the right logistics partner. A service provider with deep roots in Mexico, a strong network of facilities and carrier relationships, sophisticated technology, and unmatched expertise clearly makes an excellent choice. If a company also can show years of experience serving the needs of aerospace companies in North America, the choice is even more clear.

Manufacturers have been turning to Ryder as a trusted partner in Mexico since 1994. Ryder has extensive operations throughout Mexico, especially in the "Golden Triangle" bounded by Monterrey, Guadalajara, and Mexico City, and in Juarez and Baja—areas that encompass a major portion of the country's commercial activities.

With more than 600 trucks under management, Ryder accommodates a vast variety of cross-border transportation needs, including crossdocking and consolidation

services designed to control costs for its customers. "We cross the Mexican border almost 3,000 times per week," Moore says.

AEROSPACE EXPERTS

Ryder also has more than a decade of experience serving the aerospace industry. The company provides a suite of logistics planning, procurement, and execution services tailored to the needs of customers such as Boeing, Northrop Grumman, and General Electric Aviation. Each year, Ryder manages nearly \$700 million worth of transportation expenses for aerospace firms and nearly six million shipments.

Some of the aerospace industry's logistics needs are highly particular. "It requires a very unusual assembly of shapes and sizes, speeds and unique equipment to do some of this work," Moore observes. Ryder has managed shipments involving everything from the suits worn by space shuttle astronauts to entire aircraft fuselages.

While some of the requirements of aerospace logistics are distinctive, other aspects find parallels in the automotive industry, a sector where Ryder's experience runs especially deep. "We were the chosen partner for Toyota to launch their North American manufacturing back in 1986," Moore points out.

Ryder's expertise in lean manufacturing, developed in the automotive industry, translates well in the demanding worlds of aerospace and defense. "We take exactly the same principles and apply them to the manufacture

* AMR Research (recently acquired by Gartner, Inc.), AMR Research and American Shipper Investigate Mitigating Risk Through Global Trade Management, William McNeill, Greg Aimi, Bob Kraus, February 10, 2010

Government Incentives Available to Aerospace Manufacturers in Mexico

- Duty-free imports for manufacturing parts and maintenance, repair and overhaul (MRO) components
- Income tax credits for projects involving research and development, process design, and product design
- Science and Technology Fund for R&D, technology development or technology transfer
- Support Program for the Development of New Enterprises
- Ministry of Economy grants for strategic projects
- Immediate capital investment deduction
- Reduced income tax and trade facilitation programs for export-oriented companies
- Labor training support programs
- State incentives: infrastructure, land reserves, credits on property and payroll taxes

of missiles, tanks, armored vehicles, satellites, ships and, of course, aircraft,” Moore says.

The logistics infrastructure and technology that Ryder first developed to serve automotive OEMs and Tier One suppliers bring major advantages to its aerospace customers as well.

“Our technology handles enormous volumes. We range upwards of one billion parts delivered per week, with precise arrival times for every part at lineside,” Moore says. “We’ve taken all of that—the processes, the knowledge capital—and over the past 10 years we’ve adapted it nicely to the demands of the aerospace business.”

Ryder’s infrastructure on both sides of the U.S.-Mexico border, and its unparalleled skill in managing cross-border shipments, promise a smooth ride for aerospace firms that ship freight in and out of Mexico. “Anyone who deals with us in Mexico gets world-class technology and supply chain practice combined with Mexican domain expertise,” Moore says.

KEEPING LOADS SECURE

“Security is probably the biggest concern shippers have at the moment about operating in Mexico, and many of them look to their 3PL partners to provide it. How do you minimize your risk? Make sure your 3PL has a proven history of operating in Mexico and has made, and continues to make, the necessary investments in security-related technologies, experts, and procedures,” says Adrian Gonzalez, director of logistics viewpoints for ARC Advisory Group.

The advantages of working with Ryder in Mexico start with the security and integrity of customers’ loads. “We have control-and-release yards on both sides of the border that have security inspections,” says Moore. “We also have canine inspections on both sides. And we maintain very close relationships with all the government agencies involved in monitoring and regulating Mexico-U.S. traffic.”

Once a load leaves the yard, Ryder uses global positioning system (GPS) technology and satellite communications to track its progress and respond quickly if anything appears to go awry. When necessary, Ryder assigns security escorts to trucks to make sure valuable loads reach their destinations without trouble.

The company also employs geofencing, a technology that draws a virtual barrier around a vehicle’s route. “If the GPS indicates that the vehicle has strayed outside its correct route, the system sends an alarm to warn that a theft may have occurred,” says Bill Anderson, group director, global security for Ryder System, Inc. Ryder develops a security plan for each load and takes full responsibility for executing it correctly. The security rules it has developed for its own equipment and drivers apply equally to Ryder’s partner carriers in Mexico, and Ryder regularly audits facilities to make sure employees are following the rules correctly.

“A well-planned and implemented security program ensures that you’re screening and hiring qualified



Choosing a 3PL that employs the proper security equipment helps minimize risk when shipping in Mexico.

people,” Moore says. “It keeps employees, property, and operations safe, and it reduces the costs associated with lost product.”

SPEED ACROSS THE BORDER

Ryder’s reputation as a security-conscious manager of contraband-free loads is one of several factors that help to ensure smooth border crossings for its customers. Others include Ryder’s ability to transmit electronic pre-notifications to Customs officials as loads head toward the border, and its participation in certification programs such as C-TPAT (Customs-Trade Partnership Against Terrorism) and Customs BASC (Business Alliance for Secure Commerce).

“We have developed processes, technologies, and security procedures to a high state of the art, such that our border crossing time is about one hour,” Moore says.

Not only can Ryder’s customers expect short transit times in and out of Mexico, but they also can expect to know exactly where their goods are every step of the way. “It doesn’t matter if it’s one pallet, one box, or a full truckload. The customer gets visibility at the part number level for every movement and is informed of every exception,” Alvarez says.

That level of visibility comes from Ryder’s Control Tower capabilities. A Control Tower is a centralized operation that monitors and coordinates every shipment from start to finish. “We have a 24 x 7 center in Nuevo Laredo that watches over every movement in Mexico and across the border,” Moore says. “That’s backed up by another large 24 x 7 facility in Dallas, one in Novi, Mich., and another in Shanghai, China.”

Ryder’s operations in Mexico translate into abundant opportunities for its customers to reduce supply chain costs. Even if a customer needs to move only one pallet, it can take advantage of Ryder’s volumes to realize economies of scale.

Mexico-bound freight is consolidated into full truckloads at numerous points in the United

States and Canada. “We move those trailers to the border in Laredo or El Paso,” Alvarez says. “We control all the security there. We also handle the linehaul from the border to Querétaro, Nuevo Leon, Chihuahua or wherever it needs to go. Then we deconsolidate and run the short distance to the customer’s location.” For freight moving north from Mexico, the reverse process is similar.

The breadth and depth of Ryder’s operations in Mexico also spell good news for aerospace companies that are establishing operations in the country. “We have grown to have a large enough network in Mexico that we can be flexible throughout the startup phase of an operation, all the way up to full run rate,” Moore says.

One of Ryder’s aerospace customers, for example, recently started production at a new facility in Mexico not far from the border. “They’re looking to us to help them with staffing and, eventually, with shipments into and out of that facility,” Moore says. “For us, that can range from one person to several hundred.”

There’s no minimum number of employees, amount of warehouse space, or number of trucks that Ryder will assign to a customer, and no lower limit to the freight volumes it will manage. “We can be a flexible, easy partner to work with,” he says.

Ryder’s Presence in Mexico

OPERATIONS IN MEXICO SINCE: 1994

CUSTOMER ACCOUNTS: 86

HEADQUARTERS IN MEXICO: Mexico City

REGIONAL OFFICES: Guadalajara, Monterrey, Saltillo

LOCATIONS: 32

DC SPACE MANAGED: 2.2 million square feet

CARRIERS UNDER CONTRACT: 80+

RYDER DEDICATED VEHICLES: 643

BORDER CROSSINGS MANAGED PER YEAR: Approximately 130,000

CERTIFICATIONS, STANDARDS AND PROCESSES: C-TPAT (Customs-Trade Partnership Against Terrorism) operations, Customs BASC (Business Alliance for Secure Commerce) certified, FAST (Free and Secure Trade)-certified dedicated Mexican carriers

SMOOTH SOARING

As Mexico’s aerospace industry continues to grow, more OEMs and suppliers will land there, drawn by the country’s skilled labor pool, low manufacturing costs, and government programs designed to help them succeed. Manufacturing in Mexico poses some serious challenges, of course. Companies that launch such an enterprise poorly equipped may experience a turbulent flight.

But with the right logistics partner—one that understands the industry and knows how to move freight across the border efficiently, securely and economically—an aerospace firm that embraces new opportunities in Mexico can expect to cruise in safety and comfort.

YOU NAME IT



We'll Customize A Supply Chain Solution For It

Whatever you manufacture or wherever you store and distribute your products, Ryder's end-to-end supply chain solutions are designed to fit perfectly with your company's unique needs. Unmatched experience, flexibility and innovative thinking. This is what we offer to hundreds of companies, from electronics and car makers to consumer product and aircraft manufacturers. We can do the same for you. Call **1-888-88-RYDER** or visit www.ryderscs.com.



SUPPLY CHAIN, WAREHOUSING & TRANSPORTATION SOLUTIONS