Summary of the U.S. Civilian MRO Market

Deregulation in the airline industry spurred the outsourcing of the maintenance repair and overhaul market. Prior to deregulation, the majority of air carries conducted their maintenance in-house. Due to the competitive pressure and cost cutting, outsourcing maintenance for U.S and foreign airlines has become an international practice.

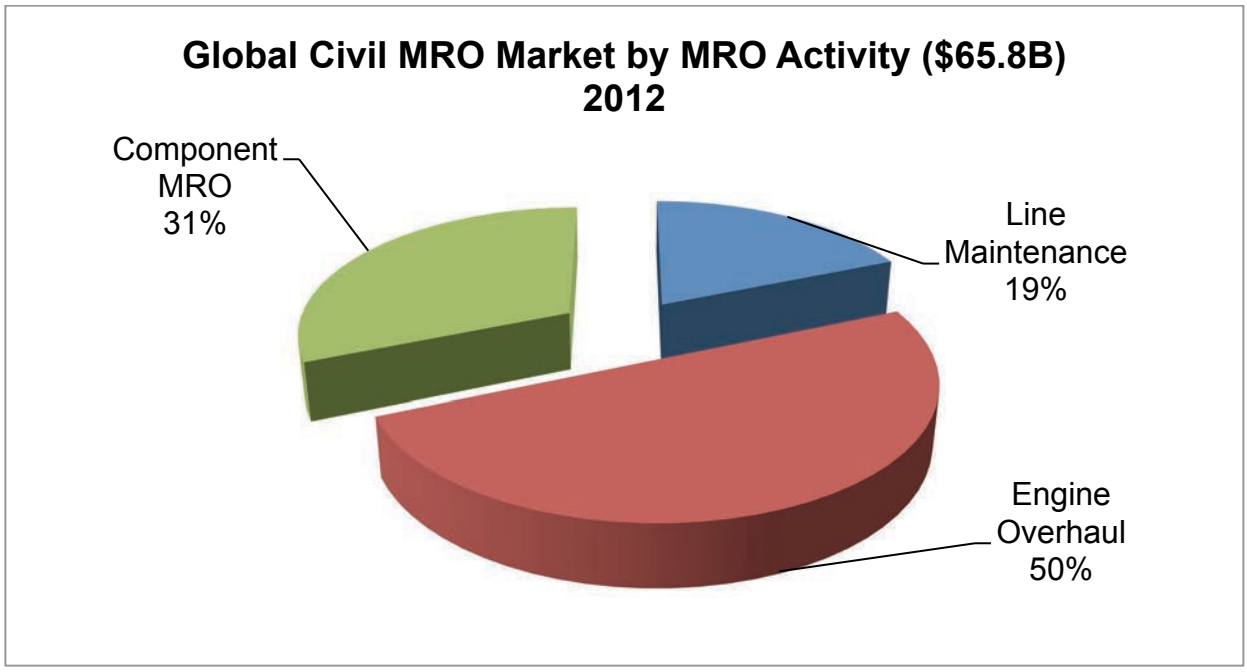
There is an on-going concern of US airlines outsourcing all of their maintenance, repair and overhaul (MRO) to foreign repair stations in countries such as China and El Salvador. The Federal Aviation Administration has stated their concerns in particular determining how much and where outsourced maintenance is performed and oversight.[1]

It is believed that all air carriers outsource some element of their maintenance requirement. The degree and type of outsourcing may vary.

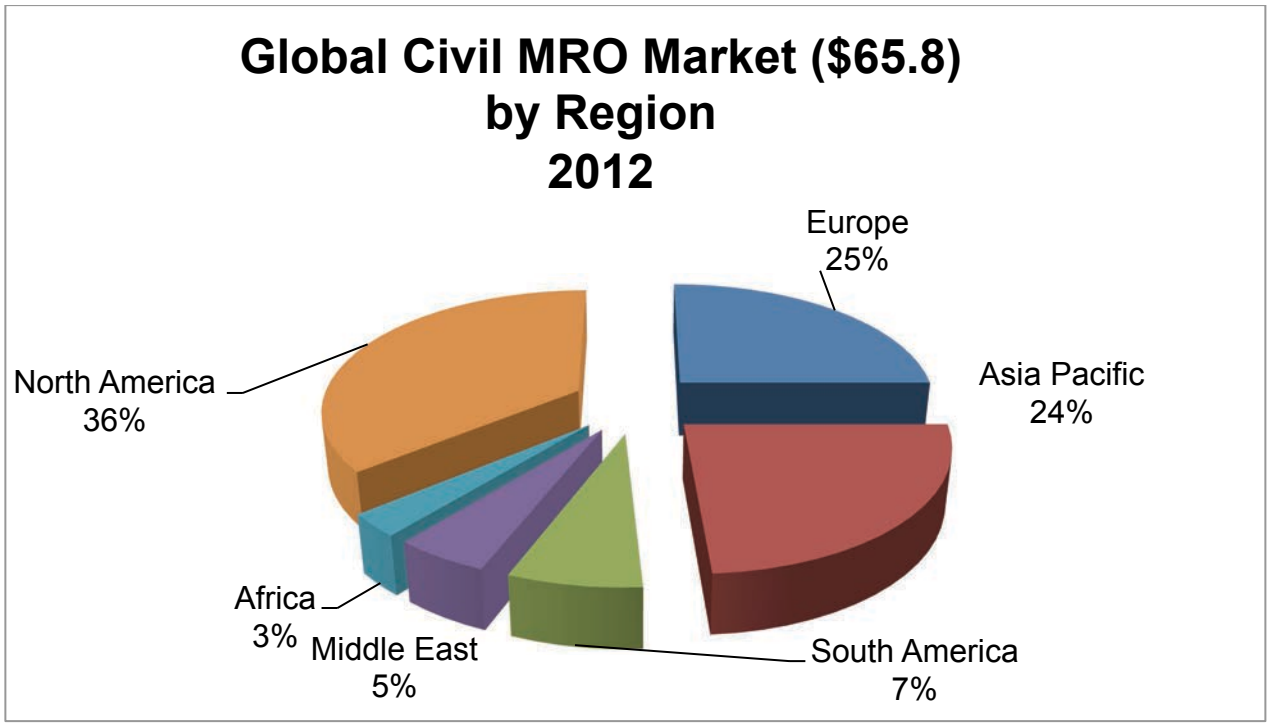
> Typically, heavy maintenance, which is labor intensive and requires extraordinary outlay for facilities and equipment, is outsourced. For carriers in the US, 71% of heavy maintenance is outsourced, with engine maintenance one of the fastest growing segments of the maintenance, repair, and overhaul (MRO) market. On the other end of the maintenance spectrum, ground handling, servicing, and organizational level maintenance is most frequently not outsourced (McFadden and Worrels, 2012:64).[2]

The MRO market contains four distinct segments: heavy airframe, engine, component and line maintenance. The 2012 civil market is estimated at over $65 billion engine overhaul is the largest segment at $26.1 billion followed by component at $16.8 billion. North American-based fleet accounts for $23.5 billion.

[1] FAA Air Carriers' Outsource of Aircraft Maintenance, Report Number:AV-2008-090 September 30, 2008
[2] Journal of Aviation Technology and Engineering 1:2 (2012) 63–73 DOI: 10.5703/1288284314659

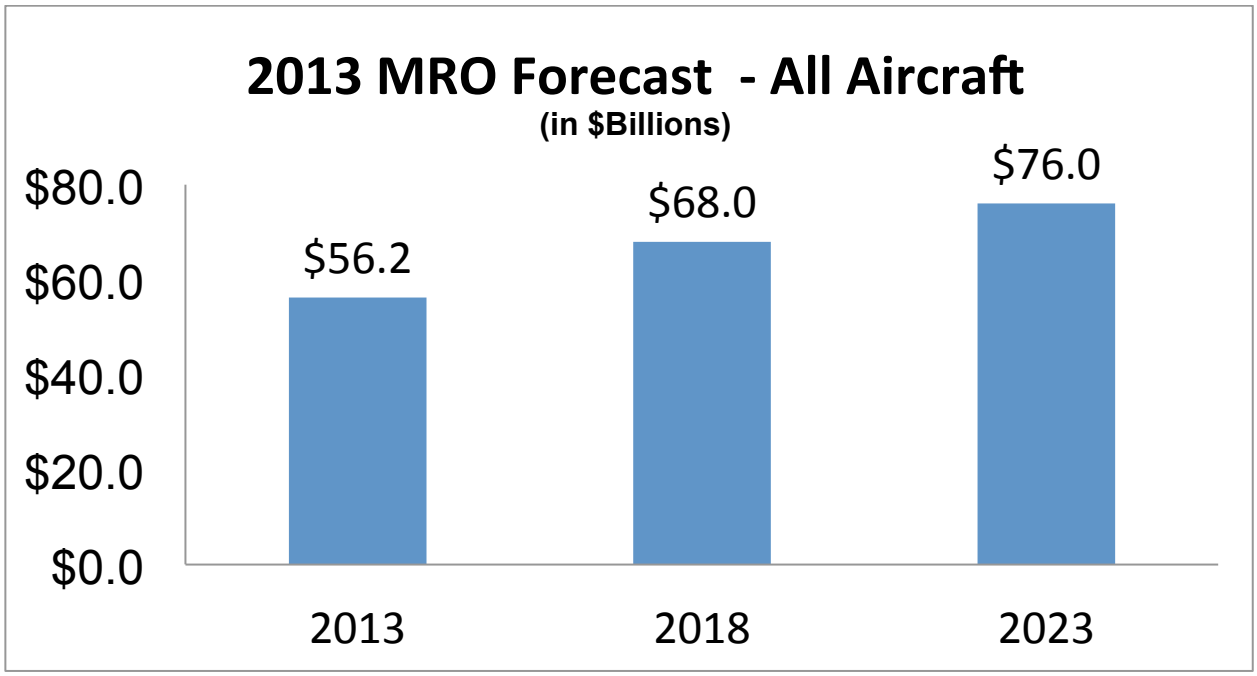


The North American MRO market is the largest geographic market – estimated to be $23.5 billion. Europe and Asia Pacific are the next largest markets at $16.3 billion and $15.5 billion, respectively



Long Term Outlook

TeamSAI, a consulting firm, predicts a healthy long-term outlook for the MRO market. According to TeamSAI growth is expected to be 3.1% through 2023. Engine segment and component MRO segment are expected to slow in the second portion of the forecast period.



It is predicted that Asia will be the driving force of the global MRO market in the next 10 years. Asia's market share is forecasted to increase to $24.3 billion by 2023, an increase from $13.9 billion in 2013 (or 57%). Total MRO in North America is predicted to decline by 5%, from $17.3 billion in 2013 to $16.4 billion in 2023. Combined, Asian Pacific ($5.1 billion), China ($4.2 billion), and Middle East ($2.8 billion) countries will comprise more than 60% of the ten year increase in the global MRO market.

Outsourcing

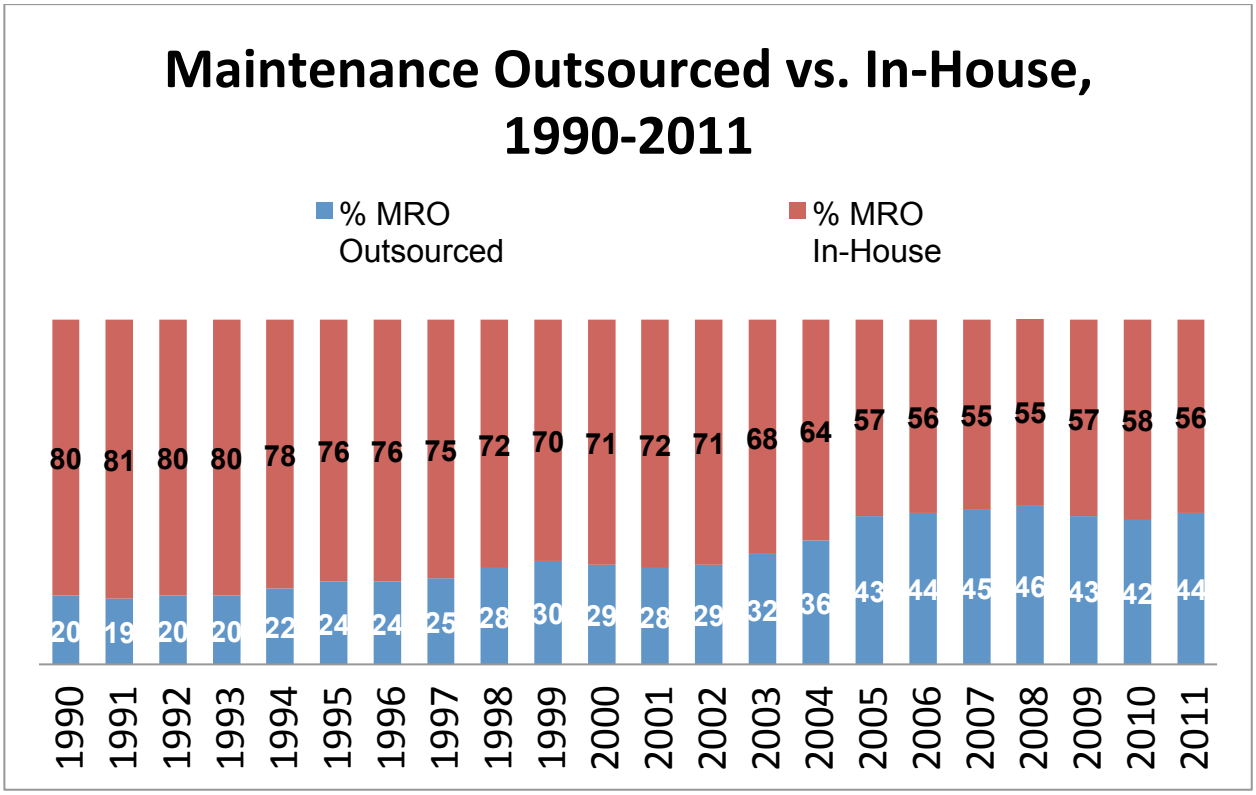
Tang and Elias (2012) state that airlines tend to outsource maintenance to countries such as El Salvador to achieve cost savings through lower wages and benefits. In other cases, state sponsored investment, for example in China has "spurred rapid expansion of the foreign repair facilities considerably over the past decade[3].

The percent of maintenance expenses outsourced increased from 22.7% in 1995 to 45.3% in 2012, an increase of 22.6 percentage points

Line maintenance remains the lowest of the MRO segments in terms of outsource at 36%, but it continues to rise, up 1% from 2012. The outsourcing trend in this segment is expected to continue. Engine MRO is primarily outsourced. Overall, engine work is outsourced as much as 33%. Component MRO is estimated be outsourced by 85%.

[3] Tang, Rachel and Bart Eliam (2012)Offshoring of Airline Maintenance: Implications for Domestic Jobs and Aviation Safety CRS 7-5700

Total Outsourced Flight Equipment Maintenance Expense totaled $4.8 billion in 2011 and $5.1 billion in 2012.



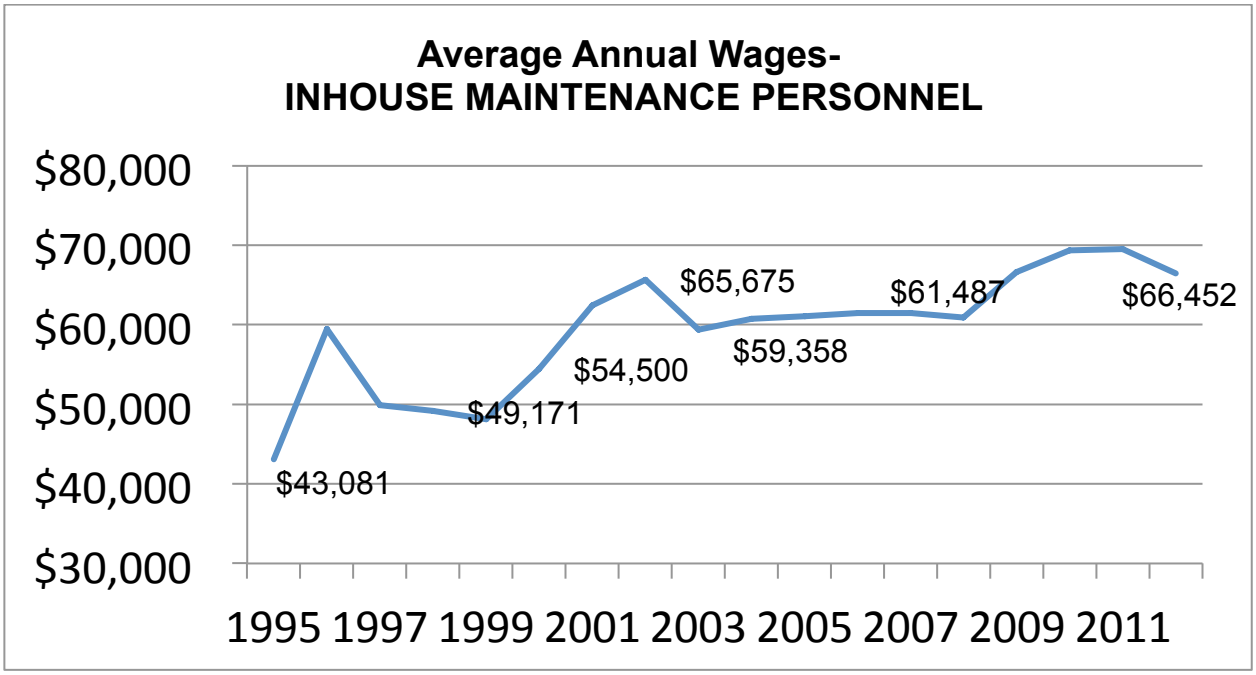
Employment, Labor Cost and Economic Activity

Total labor cost, in particular wages and pension benefits, appear to be increasing for airline maintenance personnel. Overall, wages and salaries for “In house” maintenance personnel rose from $43,081 in 1995 to $66,452 in 2012 while total labor expenses (not exclusively maintenance) increased from $24.30 billion to $34.22 billion during the same period. Hirsch (2006) states there is a union wage premium in the airline industry including mechanics.

During this continued era of deregulation and consolidation in the airline industry, airline companies have used the wage premium argument to outsource portions of scheduled maintenance and other work to specialized companies.

Hirsch recognizes an airline’s mechanics union to bargain to limit such substitution, however, “the possibility of substitution should constrain the magnitude of union premiums among mechanics.”[4]

Hirsch, Barry. "Wage determination in the US airline industry: union power under product market constraints." (2006).



Compared to foreign based companies, wage disparity exists amongst skilled airline mechanics in the United States compared to similar jobs at foreign repair stations. This wage gap can vary significantly based on the country. For instance, in Central America an experienced mechanic annual salary can range between $15,000 and $74,880. Further, in Singapore, the 2010 median annual wage for aircraft engine mechanics was $31,600. In comparison, data provided by the Massachusetts Institute of Technology (MIT) Airline Data Project, in 2012 shows the average annual wages for in house maintenance personnel is $66,452

However, this wage disparity does not tell the complete story and can be "misleading without additional consideration.

> In 2010, per capita gross domestic product in El Salvador, adjusted for purchasing power parity (PPP), was around $7,500, compared to $47,800 in the United States…PPP adjusted per capita GDP in Singapore was $57,900, considerable higher than United States (Tang and Ellias 2012:19).

In ideal situations, TeamSAI state that in the long term labor rates will move towards "equilibrium". The consulting firm state that as developing regions mature, China as an example, the low labor costs advantage will eventually erode. In the long term, as labor rates begin to equalize, labor arbitrage opportunities may adjust whereby…

> Lower margin airframe work may stay closer to home in the coming years as it becomes more expensive to send aircraft abroad (e.g. Asia) for certain maintenance. On the other hand, higher margin work (e.g. engines and components) may continue to drive OEMs and large independent MROs to expand service center in areas they see the most demand (TeamSAI 2013:14).[5]

Tang and Elias also acknowledge the potential shift in outsourcing capabilities. They believe in the short term, the United States may be at an advantage in engine maintenance because it requires advanced technical and engineering skills. However, in the long term, the advantage of skilled

[5] TeamSAI (2013) World Fleet and MRO Forecast Commentary

workers could erode “if offshore maintenance centers in Asia and Central America begin to invest more heavily in advanced technical training”(Tang and Elias 2012:20).

However, experience tend to show that even though some companies advocate bringing some portions back to the United States it is often at the expense of labor’s wages and benefits. Thus, given the quest to control labor cost to maintain or increase its profit margins, the push to outsource will more than likely remain.

Heavy Airframe Maintenance

Independent and airline-owned heavy airframe maintenance facilities employ 369,000 employees within 2,788 companies. In the US, there are 137,124 employees in the heavy airframe maintenance supply chain within 2,406 companies; nearly 85% of the providers in the US are SMEs – employing nearly 24,000 people.

According to the FAA, there are 217,971 technicians engaged in heavy airframe maintenance, with nearly 30% being FAA certificated individuals. In the US, there are 102,857 technicians – approximately 57% or 58,561 are FAA certificated.

Labor represents approximately 70% of the typical cost with material and other services account for 30%.

Engine Overhaul

The global engine overhaul supply chain employs 355,648 employees within 1,970 companies; approximately 70% are SMEs, employing nearly 19,738 people worldwide. In the US, there are 127,298 employees in the engine overhaul supply chain within 1,656 entities; nearly 80% are SMEs – employing nearly 18,000 people.

Globally, there are 208,966 technicians in the engine overhaul supply chain, around 30% of whom are FAA certificated. In the US there are 95,701 technicians – approximately 57% or 54,600 are FAA certificated.

Material accounts for 58% of the typical cost with labor representing 22% and parts repair coming in at 10%.

Component Maintenance

The global component maintenance supply chain employs 407,524 employees within 3,405 companies; approximately 75% are SMEs, employing nearly 33,342 people worldwide. In the US, there are 156,971 employees in the component maintenance supply chain within 2,829 entities; about 80% are SMEs – employing 28,119 people.

Globally, there are 236,171 technicians in the component maintenance supply chain; around 30% are FAA certificated. In the US there are 113,635 technicians – approximately 51% or 58,137 are FAA certificated.

Typical cost structures vary as well, with some types having a significant material investment.

Line Maintenance

Labor, which is internal to the line maintenance facility, accounts for approximately 116,500 employees; an additional 12,700 employees support work in other parts of the line maintenance supply chain. In the US, it is estimated that approximately 41,000 employees are in line maintenance supply chain.

Almost 90% of the segment is performed by the operators, with labor accounting for over 85% of the cost structure.

State Level

At the state level, ICF SH&E estimates that California, Texas, Georgia, and Florida combined represent more than a third of the total US civil aviation maintenance employment with an estimated 111,000 employees. Ten states represent nearly two-thirds of the total employment in the United States.

California and Texas also generate the most economic activity followed by Arizona, Washington, Georgia and Connecticut; together, these six states generate almost half of the total economic activity.

Aviation Maintenance Industry Employment		
Maintenance, Repair and Overhaul (MRO)		
State	FAA-Certificated Repair Station Employees	Total Employment- MRO plus Parts Manuf/Distribution
California	28,408	36,497
Florida	16,488	18,873
Georgia	16,001	20,683
Texas	25,090	34,873
All States Total	196,130	306,585

California and Texas also generate the most economic activity followed by Arizona, Washington, Georgia and Connecticut; together, these six states generate almost half of the total economic activity.

Aviation Maintenance Industry Economic Activity (in $millions)		
State	MRO	Total Economic Activity- MRO plus Parts Manuf/Distribution
Arizona	$784	$4,122.5
California	$3,115.2	$5,074.5
Connecticut	$1.8	$1.8
Georgia	$1.1	$1.1
Texas	$3,106.9	$4,556.7
Washington	$179.3	$209.5
All States Total	$24,094	$46,975

Selected MRO Companies and Locations by U.S. Carrier

Carrier	Company	Location
JetBlue	Aviation Technical Services	Moses Lake, WA
	Aeroman	El Salvador
	Pemco	Tampa, FL
Southwest Airlines	Aeroman	El Salvador
	Pemco	Dothan, AL
Alaska Airlines	Empire Aerospace	Hayden, ID
	AAR Corp	Wood Dale, IL
	Delta TechOps/Chromalloy Gas Turbine Corporation	Atlanta, GA
United Airlines	Ameco Beijing	Beijing, China
	Haeco	Hong Kong, China
Delta Airlines	Aeromexico/Delta Joint Venture	Queretaro, Mexico
American Airlines	Haeco	Hong Kong, China
	Heico Corp	Hollywood, FL
	Timco	Greensboro, NC
U.S. Airways	AAR Corp	Miami, FL
	Mobile Aersopcae	Mobile, AL
	Dean Baldwin (A/C painting)	US
PSA	AAR Corp	Hot Springs, AR
Air Wisconsin	AAR Corp	Hot Springs, AR

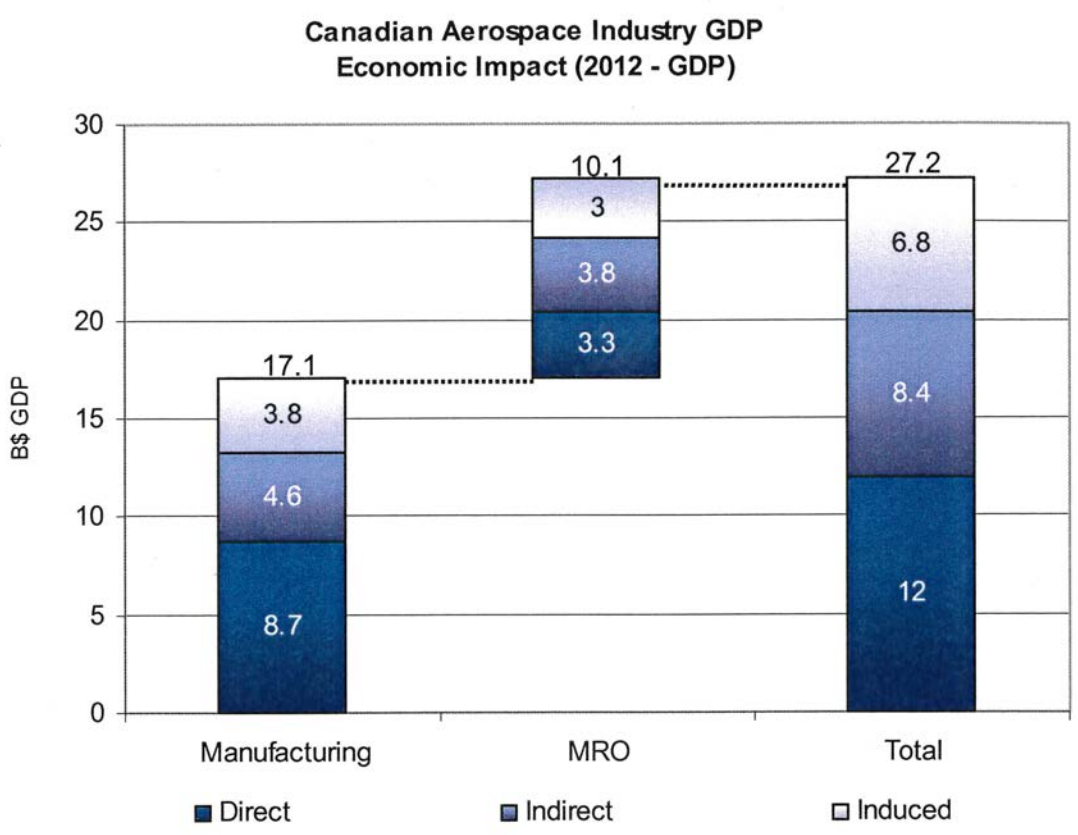
Background of the MRO Industry in Canada

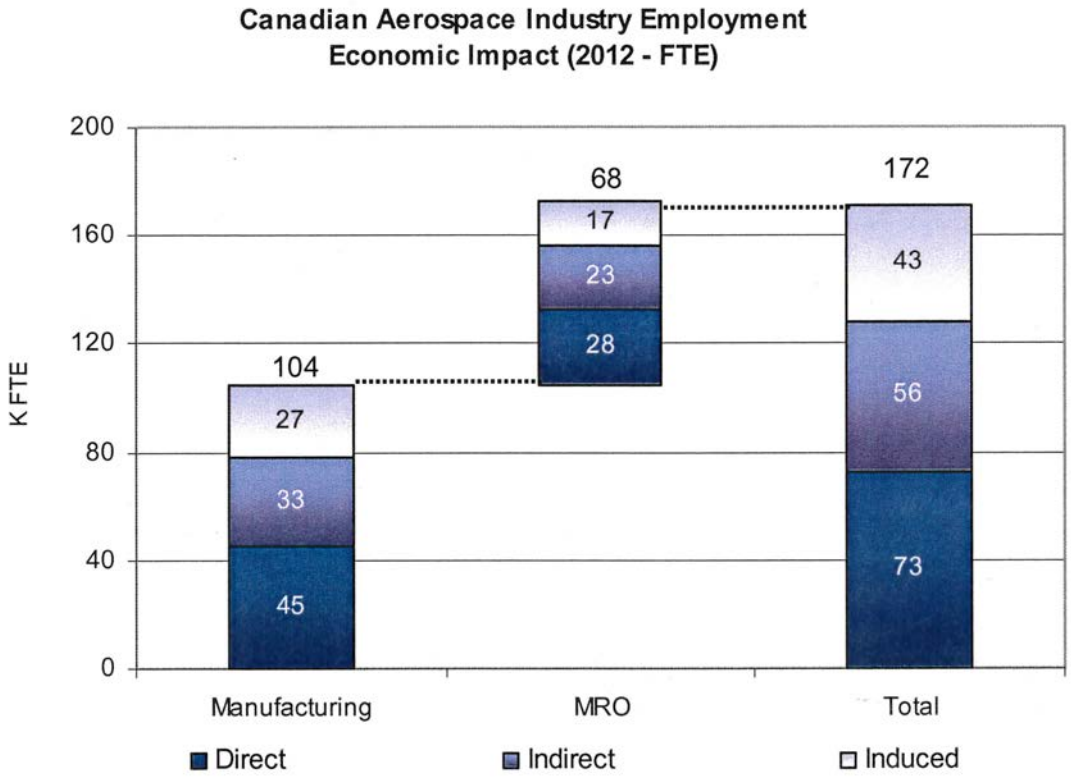
Submitted by Carlos DaCosta, IAMAW Airline Coordinator, Canada – October 2013

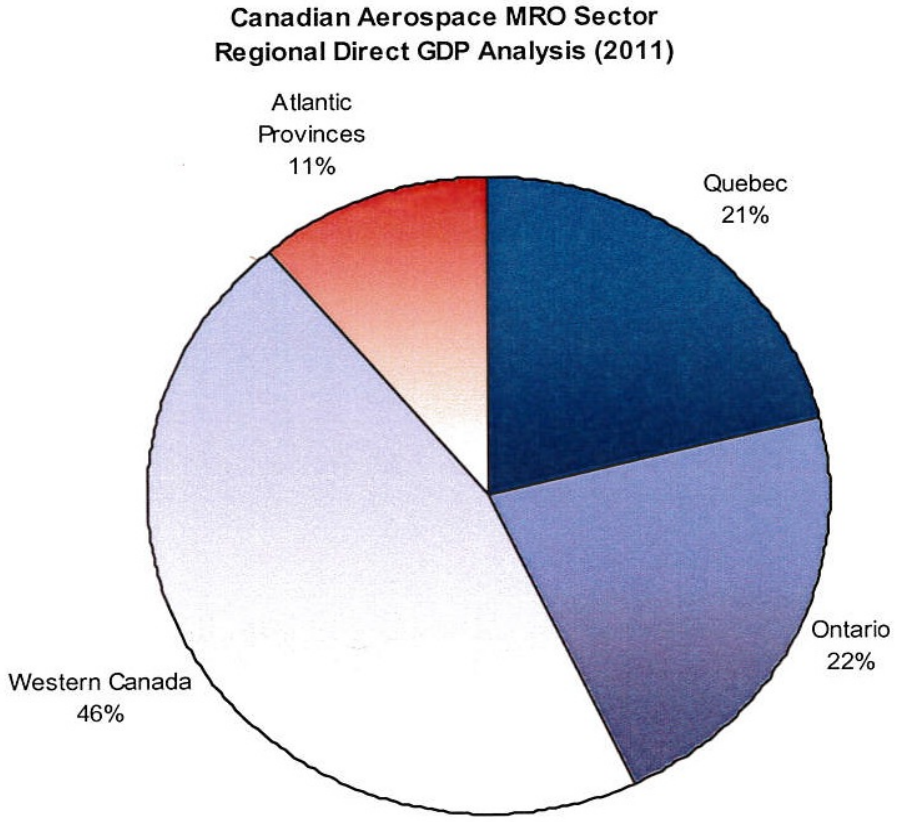
For many years the maintenance, repair and overhaul (MRO) industry in Canada has reacted to the economic atmosphere around the world in the same manner. Slow and steady growth has been the landscape for a few years since the economic meltdown.

However, Canada is unique in that it is physically a very large country but its population numbers are very low, estimated to be at around 35 million today. However, aviation plays a large role due to Canada's large landmass and remote communities.

In Canada, there are more than 1,100 certified Aircraft Maintenance Organizations (AMO), which is the equivalent term to Maintenance, Repair and Overhaul (MRO), with a comprehensive range of capabilities. Collectively these firms generate more than $3 billion in annual revenues and employ about 17,000 highly skilled workers. This represents roughly 30% of Canada's Aerospace industry. Another way to look at this is in terms of the impact on the Canadian economy. The Canadian MRO industry contributed more than $10.1B GDP and 68,000 FTE's to the Canadian economy in 2012. (See below – Data from Industry & Statistics Canada)







With more than 70 years of aircraft maintenance, aircraft repair and aircraft overhaul experience, Canada has a well-deserved reputation for quality. Companies from the United States, Europe,