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Risks Associated with Foreign Repair Stations

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1. EXECUTIVE SUMMARY

From our review of publicly available related material and information, U.S. standards associated with domestic oversight and repair, including the capabilities of personnel involved in both tasks, are superior to those overseas. The disparity between the venues are primarily due to multiple legal, regulatory and cultural differences. This includes limitation on access controls and the thoroughness of background checks on personnel. Both conditions increase risks related to situations that could be more easily exploited by terrorists or individuals with harmful intent.

The quality, frequency and thoroughness of inspections are under much closer scrutiny in the United States than elsewhere. Given the absence of direct FAA oversight coupled with the differences more fully described in the following report, we concluded that the safety and security concerns of commercial aviation are better addressed when the repair and maintenance is done in the United States.

There are obvious disparities between domestic and foreign oversight and repair of commercial airline repair stations in foreign venues. Legal, regulatory and cultural differences clearly affect the quality, frequency and thoroughness of inspections. Given the absence of direct oversight by the FAA and the differences described in the report that follows, the qualifications of those responsible for oversight and those maintaining and repairing the aircraft in foreign countries cannot be viewed as meeting the rigorous standards of inspection and repair as required in the U.S.

The Transportation Workers Union of America contracted with Ridge Global, LLC. To examine and assess safety and security risks associated with foreign based repair and overhaul facilities involving the maintenance and repair of commercial airliners. It is estimated that nearly 50% by dollar volume of maintenance work done by operators of U.S. registered aircraft is done in one or more of the nearly 900 FAA certified repair facilities located outside the U.S. The examination relied on publicly available research data and sources and the experience of the authors. All U.S. registered airline aircraft are required by the FAA to be maintained to FAA standards regardless of where the work is performed. Such an examination invited comparison to the standards and protocols required of repair and maintenance facilities operating domestically. Our examination revealed differences in the regulatory environments, levels of oversight, cultural views of safety and security, staffing practices and issuance and possession of FAA certifications for mechanics and technicians between domestic and offshore facilities."

Repair stations, particularly large ones, are complex operations. Risks can be encountered in many ways. It should be noted that the Department of Transportation can address risks through its regulatory authority over domestic facilities. It cannot impose U.S. security regulations on facilities outside the country. This responsibility is vested in the airlines and the FAA.

Foreign repair stations present risks that domestic ones do not. The primary and critical source of these risks is due, in part, to the variance in how regulations and laws are applied. This

situation is exacerbated because of FAA's internal systemic and budgetary challenges that relate to foreign stations. These challenges within the FAA have impacted the number of inspectors available for foreign oversight and their inspections. Logistical and cultural challenges complicate foreign oversight as well. There are procedural differences in how the foreign oversight authorities audit repair stations for FAA compliance. Risk based assessment methodology varies and there are regulatory disparities. One of the most significant challenges deals with drug and alcohol testing requirements. Testing is mandated in the U.S. Employment and privacy laws in many foreign countries prevent such testing. Another contrast involves the inspection process itself. FAA Domestic inspections can be random, i.e. without notice. That approach is prohibited in foreign countries.

The U.S., along with many other nations with well-developed aviation safety and security processes, have embraced a cultural change to what are generically called non-punitive voluntary reporting systems that allow mechanics and other front-line employees to identify deficiencies in processes or even in their own work, without fear of retribution in order to ensure these deficiencies are fully addressed. Many developing nations, however, face significant societal or even legal barriers to developing these systems. An obvious issue that can lead to increased safety and security risk is language differences. Although English is the universal language of aviation, there are potential gaps in ensuring the accuracy of translations to and from English to the native languages of technicians.

The labor pool of highly skilled technicians needed for the ever-increasing technology in modern airline aircraft may differ significantly offshore, particularly in developing market, leading to risks associated with understaffing and inadequate training. The process by which technicians receive certifications to be FAA technicians includes and allowance for non-U.S. citizens to be certified. This potential risk factor and the disparities of certified to non-certified mechanics and technicians were notable and in some cases the ratio of certified to non-certified mechanics was as high as 31 to 1. The comparable U. S. ratio is closer to 2-to-1.

2. INTRODUCTION AND BACKGROUND

Key points:

- Operators of U.S.-registered aircraft contract out, or outsource, about 50% of their maintenance work by dollar volume.
- This work is done by over 800 FAA-certificated repair stations located around the world.
- Airlines contract out maintenance so they can focus on their core competencies, e.g., moving passengers and cargo. They select their maintenance providers based in part on costs, and many MRO shops are set up in low labor-cost countries for this reason.

A. SCOPE

This report is prepared as part of a statement of work and services conducted for the Transport Workers Union of America to assess security and safety risks associated with foreign based maintenance repair and overhaul facilities (MRO). The information herein is a review and update of a variety of general areas that can introduce risks (irrespective of severity) to the safety and security of commercial airline aircraft while those aircraft or their component parts are undergoing maintenance at a facility outside the United States. The review is based on the authors' professional experience with the issues as well as on data and anecdotal evidence in multiple source documents in the public domain. It should be noted that any identified risk can theoretically be mitigated. The safety and security of commercial airline operations is not predicated on an absence of risk, but rather on effectively mitigating those risks to some low level deemed acceptable. Thus, the presence of a given risk does not in itself represent a detriment to the safe operation of aircraft as long as effective mitigations are in place. In this report, we have not attempted to identify mitigations to specific risks, but rather to identify areas where risks are or might be present that would need to be mitigated if an acceptable level of safety and security is to be maintained.

Further, we have not generally made an attempt to explicitly differentiate repair stations performing major airplane-level repair functions from those performing component repairs. While the risk to the overall safe operation of an aircraft may be relatively small for a single part repair improperly accomplished, large scale heavy maintenance checks and similar major repairs are still accomplished as a series of individual component operations. For example, there is a risk to the operation of the aircraft if a fuel line repair is improperly accomplished (or, in a security sense, if damage to that fuel line is intentionally done). It does not matter if the fuel line is the sole reason for a maintenance visit or if that fuel line repair is part of a complete removal and replacement of an engine. While the latter is clearly a more complex task and overall has many more areas of risk, the risk posed by the one component to the safe operation of an aircraft is the same. However, if the scope of the repair station's work is germane to a particular area of risk, we have attempted to so indicate.

B. LIMITATIONS OF THE RESEARCH

The information used as source material for this report, other than the authors' personal experiences, is publicly available. No airline or manufacturer proprietary, government classified or Security Sensitive Information (SSI) sources were used. Apart from the impact that some SSI assessments may have on identifying security risks, it is unlikely that any of the above mentioned non-public material would significantly impact the identified risks enumerated in this report. In addition, the report identifies risks on at a programmatic level, meaning they are generally independent of a specific operator, repair facility or State. More detailed information, such as the specific discrepancies at a given repair facility found by a regulator or airline, would be illustrative of the degree to which a particular risk may be present or be poorly mitigated, but those data are not generally made available by the FAA or the airlines.

C. HISTORICAL PERSPECTIVE: MOVEMENT TOWARD OFFSHORE MRO

International Civil Aviation Organization (ICAO) standards established in the 1944 Chicago Convention—which has been ratified by 192 countries, including the U.S., signifying they will abide by ICAO's guidelines—call for aircraft maintenance to be performed according the regulations from the aircraft's state of registry. This means that all work on U.S.-registered aircraft must be accomplished by an FAA-certified maintenance provider.

In the airline industry, aircraft and engine maintenance used to be part of each operator's capabilities. Airlines staffed teams of technicians to maintain the equipment they flew, and carried mechanics onboard, especially for long-duration trips.

Today, U.S. carriers contract out close to 50% of their maintenance by dollar volume—up from 20% in 1990. Providers range from equipment manufacturers (engine manufacturers such as General Electric and Pratt & Whitney are major providers of maintenances for their customers) to independent repair stations. About 700 of these FAA-approved facilities are located outside of the U.S.

Two major developments led to this shift and gave rise to overseas contract maintenance providers. The first was the dawn of the jet age and, soon after, the advent of aircraft that could fly regular long-range routes with no stops. As intercontinental airlines grew their route networks, they soon developed the need for regular maintenance at their out-stations. The FAA regulations were adapted to approve maintenance facilities in foreign countries.

The second major change that drove a rise in contract maintenance for U.S. airlines was deregulation. Legacy carriers soon lost their guaranteed routes and fixed prices as they competed with each other and, eventually, a wave of new start-ups. This change created cost pressures, which led airlines to seek new ways to perform their core services—moving passengers and goods from place to place by air—while shedding some non-core functions, including airline maintenance.

As airlines sought more cost-effective maintenance options, the ability to establish FAA-approved facilities in foreign countries was leveraged to service an emerging market. Low labor costs in places like China gave rise to major aviation maintenance facilities that provided operators from around the world additional options for outsourcing work.

D. NATURE OF THE MRO MARKET

Consultancy Oliver Wyman places the global commercial airline MRO market at about $78 billion in 2018. North America is expected to generate $20 billion, or 25% of this demand—most of it coming from U.S. airlines. Note that U.S-registered (or "N-registered")

aircraft are not limited to U.S. fleets. Many lessor aircraft carry U.S. registrations, which then requires them to be maintained to U.S. FAA standards, and serviced by FAA-certified repair stations.

Despite the fact that North America will generate the largest share of MRO demand of any global region, much of its work will be handled by repair stations located outside of the U.S. An early trend in using foreign repair stations saw the most labor-intensive work—heavy airframe maintenance visits on widebody aircraft—sent to facilities established in in low labor-cost countries with emerging economies, such as China. As these economies mature, the cost-benefit balance of sending an aircraft far outside of an airline's region is slowly changing. This, combined with increasing demand for aftermarket services from airlines in emerging economies means that some regions—notably Asia-Pacific—will soon face challenges to meet MRO demand.

Meanwhile, engine MRO work, which makes up about 40% of the global aftermarket as measured in sales, is only now beginning to take advantage of labor-cost opportunities. Long seen as requiring a highly skilled (and, in most cases, smaller) workforce than dedicated airframe facilities, engine overhaul providers have been slower to develop shops in lower-cost countries unless the demand there warranted the investment. This is now changing. Examples include GE and Lufthansa Technik selecting Poland for a new overhaul joint venture, and MTU Aero Engines identifying its Zhuhai, China, facility for a major expansion in the coming decade. In each case, the shops will service engines from around the world, not simply within their regions.

3. TERMS DEFINED

Key points:

- This report focuses on systemic, qualitative risks of foreign repair stations, not location-specific, task-specific, quantitative risk.
- Both safety and security risks are considered.

A. HAZARDS, RISKS AND MITIGATIONS

In the context of this report, "risk" is used in a general sense to mean those things that can degrade the safety or security of the MRO operation and/or the aircraft or components being serviced. The risks identified are qualitative, meaning no attempt is made to evaluate the probability of that risk affecting the aircraft or component. In other contexts, risk is sometimes expressed the likelihood of a hazard occurring. For example, ice on a walkway is a hazard. The mere presence of ice does not mean a person will fall if they step on it. The risk of falling on that ice can be expressed as a probability of many things all occurring with the end result being a fall, and the probability of falling on the ice can be reduced by mitigating measures, such as posting a warning sign, requiring certain footwear, removing the ice or treating it with sand. In this report, the risks are identified only in that they may

exist in an operation and may have to be addressed (mitigated) if the safety and security of the operation are to be maintained at an acceptable level.

Risk to the safety and security of an MRO's product can be systemic or task-specific. Systemic, in the context of this report, means they exist due to some aspect of the MRO operation itself, independent of any one task performed by the facility. An example of this might be the absence of an effective inspection or quality control system that could affect any task performed by the MRO. Task-specific risks would be those involving an individual task, such as a facility not having access to a tool identified by the manufacturer as necessary to perform some specific operation. Task-specific risks might be present one day and not the next and would generally only be identifiable by an on-site inspection. It is also noteworthy that systemic risks might increase the likelihood of a task-specific risk. Absence of an effective tool control process (a systemic risk) might increase the likelihood of the tool needed for a task not being available. The report is intended primarily to identify systemic risks.

B. SAFETY VS. SECURITY

The report discusses both safety and security risk. To the traveling or shipping public whose interest is in making sure nothing interferes with their airline travel or package shipment, safety and security are frequently thought of as interchangeable. However, if the objective is to identify safety and security risks with the intent of developing mitigations to limit their impact on the operation, it is important to recognize the difference.

Safety risks are, in a general sense, things that can go wrong but that can normally be predicted. Tire wear, for example, is inevitable in operations. It can be measured, predicted and measures developed to keep it from becoming dangerous (e.g. maintenance and inspection protocols, replacement intervals, manufacturing standards). Aircraft and component manufactures expend significant time identifying all the ways that parts can fail or people can commit errors and developing mitigations. Safety risks that occur and degrade the MRO operation are almost always the result of either a required mitigation measure missed or, in rare cases, a failure that was never expected to occur at all. In addition, the effectiveness of mitigation measures can be measured if a program is in place to evaluate them (e.g. tires are reaching their wear limit in less time than anticipated, so a change must be made).

Security risks, conversely, are actions performed with intent to do harm. Because of this, some prediction is possible, but it is not possible to anticipate every action someone might take with intent to do harm. In addition, estimation of the likelihood of a criminal act is more difficult than prediction of a mechanical failure based on extensive testing. Predicting criminal acts relies heavily on subjective measures such as interpretation of intelligence data or analysis of a political climate. Mitigations for security risk, therefore, may take different forms than mitigations for safety risks. It is possible to know or assume that some security threats involve direct access to aircraft without knowing specifically what act an individual

might perform if given access. Thus, ensuring a mechanic has proper training by way of a robust tracking and certification program is a safety mechanism intended to ensure that a person has the requisite skill to perform a specific task. Ensuring a mechanic is, in fact, the individual he or she claims to be, by way of badging, access control, etc. is a security mechanism intended to keep unauthorized individuals from having access to an aircraft, regardless of what their intentions may be.

4. AREAS OF RISK

Key points:

- Repair stations, particularly large ones, are complex operations with many opportunities to incur risk.
- Foreign repair stations present risks that domestic ones do not, primarily through variances in how regulations and laws can be applied.
- FAA faces internal systemic and budgetary challenges in its oversight of foreign repair stations.
- While all FAA repair stations are subject to the same set of FAA and TSA regulations, variances in foreign-country laws may prevent certain policies and procedures from being implemented as they are at U.S.-based repair stations.
- An example of the regulatory disparity is drug and alcohol testing requirements. Despite several efforts and a congressional mandate during the last three decades, FAA has not succeeded in expanding mandatory testing for U.S. mechanics and other supervisory personnel to foreign repair stations. The primary obstacle: the inability to tailor a rule that complies with myriad existing privacy and employment laws in foreign countries.
- The inability of FAA and TSA to impose its rules completely at foreign repair stations does not, in and of itself, increase risk. All FAA-certified foreign repair stations follow at least one other set of civil aviation regulations, as well as local security and related regulations, that may be equivalent to, and in some cases more stringent than, comparable U.S. regulations.
- Treaties in place with foreign CAAs are meant to help share resources by, for example, sharing audit duties. But in some cases, a lack of clearly defined procedures on how a foreign authority should audit repair stations for U.S. FAA compliance is creating risk.
- MRO's growth is putting pressure on workforce development, particularly in developing markets. This, combined with a shift to newer-technology aircraft and engines, is threatening to create technician shortages, which could increase risk if organizations are tempted to deviate from well-established hiring or training principles
- The aviation industry's global nature has helped spread MRO work around the world. For instance, EASA has 1,500 approved repair stations in the U.S. alone; nearly twice what FAA has around globe. This helps create a mutual reliance on implementing robust systems for oversight, and provides insulation against potential politically motivated economic actions.

- Shortcomings with FAA's Safety Assurance System oversight and surveillance tool requires re-certification of some foreign repair stations to follow an alternative process than the one SAS established.

A. INTERNAL

Risks to the MRO operation need not be from forces outside of the organization. Operation of a repair station, particularly a large one, can be quite complex, regardless of the complexity of the aircraft it services or even the complexity of the tasks it performs. Deficiencies in the physical facilities, training, staffing, supply availability, scheduling and a host of other processes can represent a risk to the safe and efficient conduct of the MRO's work. Foreign repair stations are not inherently more prone to these internal risks solely by virtue of being located outside the United States. However, some jurisdictions may have limited access to utilities or construction, may have a limited labor pool, may have limited internet or other communications access, or other local limitations that can adversely impact the operation. Perhaps most importantly, the physical remoteness of some sites limits the ability of the FAA or local CAA to verify that the operation is safe and secure thorough inspections. FAA has guidance for inspectors[1] covering all these areas, and ICAO, through its Cooperative Development of Operational Safety and Continuing Airworthiness Program (COSCAP), encourages sharing of such information between CAAs as well[2], so any repair station, foreign or domestic, would know the areas that would be expected to be scrutinized by a local CAA inspector, an air carrier or an FAA inspector. However, standards for many of these required aspects, often of necessity, tend to be subjective (e.g. "adequate" hangar space to perform a task, or "sufficient" numbers of manuals on hand). It then falls on the judgment of an individual inspector to determine if a risk to successful accomplishment of tasks is present. Adequacy and sufficiency may well be a function of what is locally achievable and that can be much different. A significant issue highlighted in a 2013 DOT/IG audit of FAA oversight of repair stations is that FAA protocols for inspection using a risk-based assessment methodology (i.e. focus on areas most likely to need scrutiny) are different for foreign repair stations than for domestic. As of that audit (2013), FAA was not using a risk-based approach at foreign locations but rather was in effect taking an annual "snapshot" of conditions and assuming those conditions were valid for the rest of the period.[3]. Similarly, without the routine, more frequent contact that FAA could have with a domestic facility (but admittedly does not always occur), an annual review of conditions might not fully consider how a facility tracks its own self-evaluation of quality issues.

A specific security risk likely exists at foreign repair stations. In its 2003 audit of repair stations), the DOTIG highlighted a problem with security awareness more prevalent in foreign locations.[4] The areas they called out would, if left unaddressed, lead to a greater

[1] FSIMS, 8900.1
[2] ICAO Global Aviation Safety Plan, 2017-2019, Doc 10004, sec 2.5.1
[3] DOT/IG Audit Report: FAA Continues to Face Challenges in Implementing a Risk-based Approach for Repair Station Oversight, May 1, 2013
[4] DOT/IG TSA Report AV-2003-027, Security at Aircraft Repair Stations, February 28, 2003

likelihood of problems with physical access by unauthorized personnel to repair station facilities outside the United States than exists domestically. Given the age of the report, we reviewed current FAA inspection guidance and see no explicit requirement to evaluate security, although evaluation of the adequacy of physical facilities might incorporate some security considerations. The DOT report points out that the US government cannot impose U.S. security regulations on facilities outside the country, so it falls on the airlines and the FAA to develop effective security strategies.

B. CYBER

It is difficult to determine the nature of any specific cyber-risks to repair stations, either foreign or domestic using public information. However, a current survey of the industry by Oliver Wyman[5] suggests not only that the threat is real but that the industry may not be fully prepared to counter it. Large organizations such as airlines and manufacturers likely have at least some protection in place and a means to review it effectiveness. This may not be true for every level of the global supply chain, and smaller repair shops both foreign and domestic may not be well protected and represent a potential threat vector for bad actors to gain access to computer systems handling safety-critical documentation for repair and overhaul. Review of inspection protocols suggest no explicit cyber issues are evaluated when FAA inspects certificated foreign repair stations. The areas where cyber-threats might exist can be broadly characterized as falling into one of two groups: vulnerability of the components themselves while under repair and vulnerability of processes, records, etc. used in repair processes. The software used so extensively in modern airline aircraft has been widely and intensively studied to develop processes to ensure integrity of computer code when it is used to perform critical safety functions on aircraft. There is no FAA regulation requiring software to be tamper-proof per se. There are extensive procedures used by airlines and flight crews that would effectively identify malfunctioning software, whether that malfunction was due to some inadvertent interference or a deliberate attempt to corrupt the code. However, the security risk of an individual gaining access to the software and introducing a deliberate error into the software without directly affecting its function could be difficult to detect and counter. Thus, any cyber vulnerability of a component in a repair station is likely a subset of the vulnerability of the repair facility to compromise by unauthorized personnel and the systems in place in a facility to minimize the likelihood of persons with criminal/terrorist connections having access to critical systems.

Cyber risk to a repair station's internal processes may be a more pertinent concern. Electronic record keeping, transmittal of reports and documents, personnel records, etc. all represent areas that, if not accurate and reliable, could adversely impact the safe, secure and effective operation of a repair station, as well as the ability of a regulator to monitor progress in addressing identified deficiencies. If the station does not take steps to secure its computer resources, inspection records, personnel qualification documentation, then the accuracy of those records is in question. Since the records may be the primary means of FAA determining compliance over time, that determination may be compromised.

[5] Oliver Wyman: MRO Survey 2018: Tackling Industry Disruption

C. ENVIRONMENTAL

Risks posed by environmental conditions are unlikely to be significant inasmuch as most repair work can be expected to be conducted inside a facility which has been determined to be "adequate" by the FAA. Review of the list of foreign repair facilities (Appendix IV) however, shows several locations with notably harsh climates such as tropical storms or desert heat. While it would be expected that any facility determined by FAA and airline customers to be sufficient would have effective means of facility climate control in place.

D. REGULATORY/LEGISLATIVE

i. State and local regulations

All FAA-approved repair stations follow a single set of rules: FAR Part 145. However, there are variances within the rules that create regulatory differences between repair stations on U.S. soil and foreign facilities. In some cases, the rules for non- U.S. facilities are more stringent. In others, U.S. shops have a higher regulatory burden. Among the notable differences:

- Aviation maintenance technicians perform what FAA considers "safety-sensitive functions," and therefore are required to be part of employer-sponsored drug and alcohol testing programs. There is no FAA-mandated drug and alcohol testing for employees in non-U.S. shops. (See Sec 3 (d) (iv) for a more in-depth discussion of this issue.)
- Non-U.S. facilities must renew their certificates every two years. Certificates for U.S.-based facilities do not expire; compliance is determined solely through routine surveillance and regular audits.
- U.S.-based repair stations must use an FAA-certified mechanic for certain supervisory roles as well as to approve an aircraft's return to service. Personnel in foreign repair stations do not have FAA-mandated certification requirements, but the shops must have an FAA-approved training program.

It is important to note that the absence of an FAA mandate does not necessarily equate to a lower standard. Every FAA foreign repair station complies with at least two sets of civil aviation regulations: FAA's Part 145 and those of its home country. As an example, a 2013 Congressional Research Service (CRS) report found that the ratio of FAA-certificated to non-certificated mechanics in U.S.-based repair stations was much higher than in foreign repair stations[6]. One Chinese repair station had 31 non-certificated FAA-certificated mechanics for every certificated one while the ratio for a large facility in El Salvador was eight to one. Comparable U.S. ratios were closer to 2-to-1 and in the case of a major independent shop, 1-

[6] Tang, R. "Offshoring of Airline Maintenance: Implications for Domestic Jobs and Aviation Safety, "Congressional Research Service, 2012

to-1. But CRS noted that FAA's personnel records for foreign repair stations do not track non-FAA certifications.

Another substantial variation between U.S. and foreign repair stations are related regulatory systems that each must follow. For instance, in the U.S., aviation security is provided by the Department of Homeland Security's Transportation Security Administration (TSA). While not part of the same agency as FAA, TSA's initiatives incorporate FAA and other stakeholder agencies to ensure that outcomes—such as requiring a certain level of background check for an employee working in a specific area of a U.S. airport—are feasible. Enacting similar requirements on foreign repair stations can be a challenge because of a lack of inter-governmental coordination between states. An example is TSA's 10-year effort to enact repair station security rules, which was finalized in 2014. TSA's draft rule envisioned several security measures, such as mandatory access control systems, facility security programs, and employee background checks, that industry argued were not feasible for all 4,700 repair stations.

The final rule dropped these requirements except for what TSA terms "higher risk" repair stations—those located on or adjacent to an airport. (A repair station is "adjacent to" an airport if there is an accessible path big enough to move a large aircraft--defined as having a maximum certificated takeoff weight (MTOW) of more than 12,500 lbs.--between the facility and the airport.)

TSA was likely confident in setting these parameters because it also sets the security standards for U.S. airports, which are required to badge employees that require access to secure areas—which includes any area near aircraft, such as on the airfield or near hangars. But it has no control over what airports in foreign countries are required to do. TSA's solution was to require repair stations located outside the U.S. to complete a short questionnaire that the agency would use to determine the facility's risk level.

Similarly, variations between U.S. and foreign-state laws mean TSA must have two different sets of repair station inspection protocols. While inspections of U.S.-based shops are unannounced, visits to foreign repair stations must be coordinated with the host government. Inspections are limited to "higher risk" shops; TSA does not inspect off-airport repair stations except for in extreme circumstances.

Finally, the regulation applies only to FAA Part 145-certificated repair stations. Among facilities not affected by the rule are repair stations in Canada, which--per the U.S.-Canada aviation safety bilateral--don't get FAA Part 145 certificates, but rather comply with FAA Part 43 when performing work on U.S.-registered aircraft.

The variations in domestic and foreign repair stations presents potential risks in certain areas—notably the absence of a single set of security standards that extend beyond the repair station to the surrounding infrastructure (e.g., the airport). Attempts to impose greater scrutiny have triggered backlash from several sources. A 2009 effort by U.S. lawmakers to mandate twice-yearly inspections for foreign repair stations by FAA personnel was rejected.

Among the concerns: Europe would retaliate with added inspections for the 1,400 U.S.-based repair stations that also have EASA approval. Among the burdens this would impose upon the repair stations: lost productivity from having to accommodate additional audits (repair stations are audited by customers, partners, and other regulators in addition to FAA/EASA) and added costs that EASA would require offsetting its expenses.

In 2011, the U.S and the European Union agreed to transition all direct oversight of FAA-certificated repair stations to the EU—part of a broader agreement entitled "The Agreement between the United States of America and the European Community on Cooperation in the Regulation of Civil Aviation Safety." As the U.S. Dept. of Transportation's Office of Inspector General (DOT/IG) explained in a 2015 report:

"Prior to implementing the agreement, FAA inspectors assigned to two field offices in London and Frankfurt were responsible for conducting inspections of all FAA-certificated repair stations in Europe (except those covered by separate bilateral agreements in France, Germany, and Ireland). Under this new agreement, foreign authority inspectors in 18 countries are responsible for inspecting 407 FAA-certificated repair stations. FAA closed its London office in 2011 and recently announced it will close the Frankfurt office [in 2015] and reassign its inspectors to stateside inspection offices.[7]"

With the change, FAA's Europe-based inspection staff declined from 23 in 2005 to zero by 2016. While the change in and of itself does not indicate an increase in risk, GAO in a 2015 report found that FAA did not properly prepare its European counterparts for the transition.
"FAA transferred direct oversight of EU repair stations to foreign authorities within timeframes specified in the agreement,[8]" GAO said. "However, FAA's initial assessment of foreign authorities' capabilities was incomplete. FAA also did not receive assurance that foreign authorities completed inspector training that should have been accomplished prior to transferring inspection authority." Among GAO's findings: EASA inspectors were not adequately trained on how to ensure repair stations were complying with FAA regulations, leading to approvals of repair station manuals that did not meet U.S. requirements.

"FAA's inability to fully evaluate foreign authorities' capabilities, coupled with inspector training weaknesses, process differences, and data limitations, hinders FAA's assurance that repair stations in the European Union receive quality oversight and maintain aviation safety," GAO found. It made a series of recommendations to FAA. The agency concurred with them, but did not provide a detailed plan of how they would be addressed.

Variances in local regulations also impede FAA personnel inspecting foreign repair stations by restricting what can be brought into a foreign repair station. In some instances, electronic devices—such as laptops—are not permitted, for various reasons (e.g. espionage concerns, cyber-security policies, etc.) The lack of access to current guidance or data-

[7] DOT/IG, "FAA Has Not Effectively Implemented Repair Station Oversight in the European Union," Report No. AV-2015-066, July 16, 2015
[8] DOT/IG, 2015

collection tools can create difficulties for on-site inspections that inspectors in U.S. facilities don't encounter.

ii. Treaties and agreements

FAA's 2011 agreement with the EU covers all 28 EU countries. The agency has agreements, or bilaterals, that cover 48 countries and vary in terms of complexity. In the most advanced agreements, such as the EU bilateral, the two sides recognize each other's aviation regulations in lieu of applying their own in circumstances—such as opening a repair station that will work on aircraft from multiple countries—where both sets of rules must be followed. In these agreements, differences in the signatories' regulations are listed as "special conditions" that applicants seeking dual certifications must meet. For example, the U.S.-EU bilateral contains 12 special conditions that European-based repair stations must meet that do not correlate to EASA regulations as part of demonstrating compliance with FAA regulations.

Civil aviation authorities use bilateral agreements to reduce oversight burdens. Such agreements do no relieve agencies of their requirements to ensure compliance with their regulations, but rather provide another means to make findings by using systems of their bilateral partners to the maximum possible extent, in an agreed-upon manner. They are based on the concept of reciprocal acceptance, not mutual recognition, and rely on regulatory systems that may use different processes or procedures to generate equivalent results.

FAA and other civil aviation authorities that use bilaterals agree that they are beneficial for both regulators and industry. They provide streamlined systems of demonstrating compliance with applicable regulations without compromising safety. But as the 2015 GAO report demonstrates, bilateral agreements can present added risk if procedures for providing adequate ongoing oversight are not in place.

iii. Thoroughness of accident/incident investigations

In ensuring that foreign repair stations maintain the required standards, FAA relies to varying degrees on the air carriers who contract with the facility and the State in which the facility is located to monitor, identify and address risks as a supplement to FAA's own inspections. The ability of a given State to effectively identify risk is largely dependent upon the ability to thoroughly and completely investigate accidents and incidents. The frequency of major accidents is currently so low that the bulk of information that comes from investigations comes from incident investigation and an in-depth analysis of the findings of those investigations. In the U.S., the FAA and industry have developed an extremely robust series of protocols to share information gleaned from detailed investigations. The information is generally shared without fear of its being used by the regulator to pursue enforcement actions, so the quality of the information tends to be extremely high, and risks are identified with a high level of specificity. In addition, initiatives such as the Commercial Aviation Safety Team (CAST) have, in recent years, begun efforts to take the results of this

detailed risk identification and use it to develop mitigation strategies, many of which are implemented voluntarily by airlines and manufacturers. EASA and Canada are both participants in CAST and have implemented similar efforts in their jurisdictions. Many of the States outside the U.S., Canada and Europe that have one or more FAA-certificated repair stations do not have the advantage of such a well-developed system to self-identify areas of risk. Repair stations in such areas would still, of course, receive updates, through the FAA or airlines, on information pertinent to operational risks in the repair process, but would not necessarily have access to the more detailed and timely information generated by a "continuous improvement" series of processes.

iv. Drug/alcohol testing requirements

The issue that perhaps best illustrates the challenges in implementing a single set of regulations that govern repair stations in multiple countries is FAA's effort to expand drug and alcohol (D&A) testing standards in foreign repair stations. FAA, via 14 CFR § 120, has required testing of employees performing "safety-sensitive functions" for air carriers and certain other operators since 1991. In 2006, FAA expanded the requirement to include subcontractors "at any tier," which extended the requirements beyond a third-party repair stations to their service providers. But FAA § 120 does not apply to facilities "outside the territory of the United States."

Efforts to change this have stalled because FAA has not been able to create a rule that accomplishes its goal—a mandatory testing program—and meets the myriad laws in the countries that have FAA-certificated repair stations. In 2014, FAA—acting under a Congressional mandate included in the FAA Modernization and Reform Act of 2012—issued a call to industry to solicit feedback on how to create a workable rule. The feedback underscored the difficulty in creating a rule that would apply to U.S.-approved entities on foreign soil. Among the various viewpoints:

The European Union (EU) argued that the D&A issue should be taken up under the US-EU Bilateral Aviation Safety Agreement (BASA) ""Consultations and Settlements of Disputes" clause (Article 17), rather than imposed through a unilateral rulemaking. The EU also recommended that FAA work through the International Civil Aviation Organization (ICAO) to help reach an international consensus. [9]

Japan's JAL Engineering Company (JALEC) said that there are no regulations for drug and alcohol testing for employees that conduct aircraft maintenance in Japan. "However, the managers in our company hold a starting assembly at the starting of every shift and check the health condition of the staff by hearing and face-to-face meeting. Such meetings contribute to prevent the troubles regarding with drug and alcohol." JALEC added that Japanese culture

[9] European Union in comments to FAA re. "Drug and Alcohol Testing of Certain Maintenance Provider Employees Located Outside of the United States," Advanced Notice of Proposed Rulemaking, Docket No. FAA-2012-1058

does not promote drinking at lunch or at mealtime before work, so in its view, alcohol testing is "not required."[10]

Engine manufacturer and MRO provider Pratt & Whitney said that compliance with a single set of standards would be challenging because of the various international laws in place. "Some . . . such as Germany require pre-employment testing but do not allow random testing," Pratt said. "Other countries, such as Singapore, do not allow either pre-employment testing or random testing." [11]

Transport Canada (TC) wrote that, "Matters of testing for alcohol or drug dependencies are dealt with by the Canadian Human Rights Commission, which currently prohibits discrimination on the basis of disability or perceived disability, including a previous or existing dependence on alcohol or a drug. As such, requiring an employee or applicant for employment to undergo testing for dependency on alcohol or drugs as a condition of employment may be considered a discriminatory practice on the ground of disability or perceived disability.[12]"

Another challenge FAA faces in broadening its drug and alcohol testing is establishing a safety case. In the 2014 feedback solicitation, done as an advanced notice of proposed rulemaking, FAA explained the issue:

"The FAA indicated in the 2005 Regulatory Evaluation"—produced for a 2006 amendment to the agency's existing rules—"that it believed it was possible that illegal drug use or alcohol misuse by members of the aviation community may have contributed to additional accidents or incidents."

In feedback on the 2014 solicitation, commenters underscored the lack of a clear safety case linked to any in-service incidents.

"If the FAA cannot demonstrate a quantifiable increase in the level of safety today as compared to…when the FAA last made efforts to institute drug and alcohol testing outside of the United States, then this effort may be an exercise in futility," Pratt and Whitney said. "It will be extremely difficult, if not impossible, to convince a foreign country to change its laws when the FAA concurs that there has never been any aviation accident directly attributed to a maintenance worker misusing or abusing drugs or alcohol."[13]

v. FAA budget, staffing, and resources adequacy

FAA's most recent budget request reflects an effort to do more with less. FAA's Fiscal Year 2019 budget—which would fund the agency from Oct. 1, 2018-Sept. 30, 2019—is 1.8%

[10] JALEC, ibid
[11] Pratt & Whitney, ibid
[12] Transport Canada, ibid
[13] Pratt & Whitney, ibid.

below its most-recently Congressionally-approved budget, which covered FY2017. (As this report was being prepared, Congress was working on an FY18 budget for the Department of Transportation. In lieu of a new budget, Congress was approving "continuing resolutions," which in most cases authorize budgets at the previously approved levels. Hence, FAA's FY18 budget is, with a few minor exceptions, identical to its FY17 budget.

FAA's Aviation Safety Organization (AVS) would face a similar reduction as the overall budget. "The $1.276 billion AVS budget request calls for 7,187 direct full-time equivalents (FTEs), compared to 7,266 in fiscal 2017.[14] Requested AVS funding is 1.7% below the fiscal 2017 enacted figure.

FAA in its budget-justification documents said it does not expect an increase in oversight and certification work for traditional areas, but it does project a surge in demand for work related to unmanned aircraft systems (UAS).

"The number of UAS aviation products requiring certification and approvals services is anticipated to expand within the system and products as well as operational complexity is anticipated to increase as new technologies are introduced," FAA said[15]. "These factors are driving the need in the short-term to reprioritize some of AVS existing resources for certification services and UAS integration." [16]

FAA's staffing plan calls for adding AVS personnel "in the future," but the strategy of reprioritizing existing resources produces a risk that traditional certification and oversight work could suffer, especially if the agency has underestimated the amount of UAS work that industry will demand in the near term.

The agency's push to keep costs in line while meeting industry's demand comes as AVS struggles to maintain its current workload. A 2016 GAO report pointed to "budget and logistics" as primary challenges facing the agency's foreign repair station oversight efforts.

"FAA inspectors told us that recent budgetary challenges have made it more difficult to travel to foreign repair stations to conduct oversight and that inspectors conduct oversight of foreign repair stations less frequently than for domestic repair stations," GAO reported[17] . "For example, inspectors for three of the four CMOs told us that constraints on FAA approval for foreign travel has led to cancellation of some scheduled oversight of foreign repair stations."

[14] FAA, "Budget Estimates, Fiscal Year 2019," February 2018.
[15] ibid
[16] ibid
[17] GAO, "FAA's Risk-Based Oversight for Repair Stations Could Benefit from Additional Airline Data and Performance Metrics," Report No. GAO-16-679, July 2016.

The issues are evident in FAA's international field offices (IFOs) as well. "The inspectors told us that foreign trips to conduct oversight are more scrutinized than domestic trips, scrutiny that can make it more difficult to oversee foreign repair stations," GAO said.[18]

Inspections of foreign repair stations face another challenge: various requirements that make unannounced visits that require sending inspectors across international borders either difficult or, in some cases, impossible.

"Some travel by FAA inspectors involves obtaining: (1) official country-entry approvals from the foreign government, (2) facility access approvals from the repair station, and (3) sometimes from the foreign CAA. Inspectors told us that obtaining access can be challenging in certain countries, such as those in areas of Africa and Central America. Travel restrictions, either imposed by the country or the U.S. Department of State, and others can require invitations from the foreign repair station," GAO found.[19]

The GAO report interviewed FAA personnel from 11 offices, including three IFOs. Personnel from six offices said unannounced inspections are both possible and valuable. Personnel from three offices said the value of unannounced visits vs. planned audits is negligible. "These inspectors told us that if there were regulatory noncompliance problems at a repair station's operations, they would likely be able to find it whether or not the inspection was announced." GAO said. They explained that the processes and procedures for performing maintenance are too complex to be changed even with advanced knowledge of a FAA visit."[20]
Like all FAA inspectors, IFO personnel are considered "non-essential" in the event of a government shutdown. While such shutdowns have been rare and usually of short duration (several days), they can disrupt IFO inspection schedules, which must be set weeks in advance due to the need to arrange access to foreign countries and their facilities. Domestic inspectors, by contrast, usually established their schedule at the last minute—as they conduct true "surprise" inspections—and are therefore less disrupted by Congressionally-mandated, budget-related shutdowns.

One of FAA's responses to its staffing issues is a shift to a risk-based oversight system. Simply put, FAA's vision is to adopt a philosophy that emphasizes systems safety based on collecting and analyzing data to look for trends, as opposed to ensuring specific tasks—such as a repair—are accomplished according to the agency's rules. This philosophy of identifying trends that point to possible areas of risk, as opposed to focusing on detecting issues after they come to light, aligns with international best practices recommended by ICAO and adopted by many civil aviation authorities.

Part of the shift to risk-based oversight includes developing new tools. The primary surveillance tool used by inspectors to oversee repair stations, airlines, and other certificate holders is the Safety Assurance System (SAS). Starting in 2015, airlines and repair stations

[18] ibid
[19] ibid
[20] ibid

were tracked using SAS. Inspectors (and in some cases certificate holders themselves) fill out data collection tools (DCTs) with standardized queries. The information helps paint a picture of each certificate holder's operation, and helps FAA prioritize its oversight resources to focus on the operators that pose the highest risks.

FAA has experienced difficulties implementing SAS—primarily related to the software. The 2016 GAO report said that SAS's design did not meet the data-collection targets the agency established.[21] Continuous problems with the SAS software has required emergency patches, and the DCT used for repair stations in Europe and Singapore—all of which are under special intra-governmental "maintenance annex guidance" agreements, was not functioning as of March 2018. This requires FAA IFO personnel to use an older system for data-collection as part of mandatory, semi-annual certificate renewals for more than 470 foreign repair stations. Using the alternative system eliminates one of SAS's key benefits—standardizing data from all certificate holders and using it to determine risk in a consistent manner.

E. ECONOMIC

i. Strength and stability of local and State economy

Aviation is a global business. While a local or regional economy's health will influence passenger and cargo demand in that region, the strength of mature markets, such as North America and Europe, and the growing importance of emerging markets, such as East Asia and South America, suggests that—absent so-called Black Swan events that would have global implications—airline demand is growing immune to regional disruption. Evidence of this can be found in the International Air Transport Association's annual traffic figures. The last 10 years have seen average annual growth, as measured in revenue ton kilometers, of 5.5%. This despite pronounced economic slumps in several major markets, including Brazil, the Middle East, and Russia.

From an MRO standpoint, arguably the largest economic risk that foreign repair stations present is on the trade front. Large-scale political trade disagreements could trickle down to the aviation industry, through tariffs on products or restrictions on services. However, the U.S. is home to more "foreign" repair stations—facilities approved by foreign civil aviation authorities to perform work on non-U.S. aircraft and engines—than any other country. As of March 2018, EASA listed 1,493 approved repair stations in the U.S.[22] The importance of maintaining a balance between having work sent abroad and importing work from foreign entities should help mitigate the risk of politically motivated economic sanctions.

ii. Labor pool and workforce

[21] ibid
[22] EASA, "Foreign EASA Part-145 Valid Approvals For Organizations Located In The United States," March 16, 2018.

North American operators are the largest users of MRO services from outside their home region. In Oliver Wyman parlance, North American airlines "import" about $430 million in MRO services annually[23]. Most of this—about $310 million—is airframe maintenance service performed in Asia[24].

Meanwhile, Asia-Pacific is the fastest-growing global airline region. “Over the next two decades, fast growth in China’s domestic market will make it the largest domestic market in the world, and traffic within Asia is set to become the largest travel market,” Boeing’s 2017 Current Market Outlook said. By 2036, Asia-Asia-Pacific’s fleet is growing to support this demand: in 2016, the region’s 6,830 commercial transport-category aircraft represented 29% of the global fleet. By 2036, the region is projected to have 17,520 aircraft, or 37% of the global fleet, Boeing said[25].

These changes will put strain on Asia’s maintenance providers to attract sufficient numbers of technicians. Boeing’s 2017 Technician Outlook, which forecasts demand for new airline mechanics globally, projects a need for 648,000 new technicians in the next 20 years. Nearly 40% of these, or 256,000, will be needed in Asia-Pacific.[26]

Adding to the workforce-development challenge is the rapid transition to newer-technology aircraft, many of which incorporate higher percentages of advanced materials, such as composites, in their designs compared to current-generation aircraft. For example, Boeing reports that 50% of the 787’s material, as measured by weight, is composite, while 20% is aluminum. By comparison, 70% of the 777-300ER’s primary structure is aluminum[27]
.

Figures calculated by Oliver Wyman illustrate the trend. “By 2028, jets built in the 1990s will drop from comprising 66% of the global fleet to 41%. By that year, aircraft built in 2010 or later will make up more than 36% of the fleet,” the consultancy said.[28]

This, noted Boeing, will further strain maintenance providers beyond the issue of attracting enough technicians. “As airlines continue to take delivery of new airplanes, advances in airplane technology will drive an increased need for technicians skilled in avionics, composites, and digital troubleshooting,” Boeing said.[29]

The issues facing the future maintenance workforce are not limited to Asia-Pacific. But the region’s projected growth combined with its current role as a key MRO provider for U.S. airlines mean that the risk of foreign repair station workforce issues that could affect U.S. operators is most acute in this region.

[23] Oliver Wyman, “Global Fleet and MRO Forecast Commentary, 2017-2027,” January 2017
[24] Oliver Wyman, “Global Fleet and MRO Forecast Commentary, 2018-2028,” January 2018
[25] Boeing,” Current Market Outlook, 2017-2036, June 2017
[26] Boeing, “Pilot and Technician Outlook, 2017-2036,” July 2017
[27] Smith, B. “The Boeing 777,” Advanced Materials & Processes, September 2003
[28] Oliver Wyman, “Global Fleet and MRO Forecast Commentary, 2018-2028,” January 2018
[29] Boeing, “Pilot and Technician Outlook, 2017-2036,” July 2017

iii. Prevalence of unapproved/counterfeit parts

Ensuring that only airworthy parts are installed on aircraft and available in the supply chain is one of FAA's many roles. A 2017 DOT Office of Inspector General (OIG) report found several shortcomings in FAA's efforts to identify suspected unapproved parts (SUPs) and remove them from the supply chain.

The primary areas of concern: "weaknesses in recordkeeping and management controls to capture and accurately report the number of SUPs cases," the OIG explained. Specifically, nearly half of 265 active SUPs entries in FAA's database were either incomplete, invalid, or duplicative. "As a result, the quality of data available to FAA to analyze trends is compromised, and FAA does not have a full picture of the problems and risks involving unapproved parts within the aviation industry," OIG concluded.[30]

The need to raise visibility for SUPs led EASA to begin publishing its SUPs and related notifications on a public website in 2017. Among the records available as of March 2018 are nearly 30 reports of stolen parts for commercial aircraft, such as the Airbus A320, and engines, including the CFM56. One possible motivation for parts theft is rising demand for used parts, which are cheaper than new parts. Consultancy ICF International projects the used parts, or used serviceable material (USM) market growing at an average annual rate of 5.2% through 2026, a faster rate than MRO as a whole. In dollar terms, USM will generate $7.7 billion in 2026 sales, up from $4.5 billion in 2016, ICF calculates.

FAA and other civil aviation agencies have processes and procedures in place to ensure used parts are properly documented to ensure they are eligible for re-installation, and unapproved parts are removed from the system. But the financial motivation that the USM market presents combined with shortcomings identified in FAA's SUPs efforts suggests that unapproved parts are an area of at least negligible risk throughout the aviation maintenance ecosystem, regardless of geographic location.

F. SOCIETAL/CULTURAL/POLITICAL

i. Investigative climate

In the US, two broad aspects of aviation lend themselves to an extremely robust and effective set of processes to identify risks. One is the statutory separation of the government accident investigation body (National Transportation Safety Board, NTSB) from the aviation regulator, the FAA, coupled with the fact that accidents and incidents are investigated with the sole aim of preventing recurrence as opposed to apportioning blame. The other is the development of and regulatory support for voluntary, non-punitive reporting programs such as the Aviation Safety Action Program (ASAP) and Voluntary Disclosure Reporting Program (VDRP). Having NTSB as a stand-alone organization without ties to the FAA allows

[30] DOT/IG, "Enhancements Are Needed to FAA's Oversight of the Suspected Unapproved Parts Program," Report no. AV2017049, May 30, 2017

thorough investigation of accidents and incidents and more pertinent to the discussion of repair stations, allows individuals to discuss issues with the NTSB without jeopardizing their FAA certification. The use of ASAP and VDRP has a similar effect and in fact encourages front line employees and airlines to self-identify failures and bring them to the attention of the FAA without jeopardizing their certification so that systemic safety problems can be more easily identified and corrective action can be developed. It is stated, published FAA policy that "open sharing of apparent violations or other safety concerns and observations, as well as a cooperative approach to solving problems, will enhance and promote aviation safety…"[31] Thus, repair station personnel in the US can have the ability to work in an environment that encourages self-identification of risks to the operation. This has been likened to having thousands of inspectors working continuously to ensure a safe operation. The US is not the only State with such an investigative climate, but there are still a large number of States whose laws and procedures lead to criminal prosecution of employees who may commit errors leading to safety problems. ICAO accident investigation guidance for States includes provisions that information developed in an investigation must not be used in judicial proceedings[32] but under the ICAO treaty agreements, States are not obligated to fully comply. States whose laws are based on the Napoleonic Code, which include most of Europe and Latin America, frequently have criminal investigations that run parallel with a safety investigation, and sometimes in fact take priority over the safety investigation. The net result of all these provisions, in the context of a repair station operation, is that a mechanic in the US can identify a problem, or even identify an error he or she commits, bring it to the attention of supervisors and the FAA so problems can be fixed, without concern that his/her FAA license is in jeopardy or that any legal action might be taken as a result of the error. A mechanic in a foreign repair facility, conversely, may have strong motivation to ignore or suppress information about risks in the operation. Errors may go undetected and risks may go unreported. This would leave 100% of the responsibility for identifying those problems to the FAA during their inspections. As noted elsewhere in this report, the FAA has very limited opportunity to detect specific, individual errors in their oversight role, so if the individual mechanic or front-line supervisor has, in effect, a disincentive to reporting based on the local laws, such errors are unlikely to be identified.

ii. Government stability and political climate

The list of foreign repair facilities includes many that are in countries listed by the US Department of State as "Reconsider Travel" due to a variety of issues, including violent crime rates, drug activity and terrorism. Many more are in the category of "Exercise increased caution" for similar, if not as chronic, issues. Unstable or dangerous conditions potentially have an adverse impact on the State CAA's ability to provide thorough oversight and likely even more of an impact on FAA's ability to validate the repair station's certification. If the repair station's work force lives or works in dangerous areas, the quality of the work itself can suffer.

[31] FAA N 8900.450, 2/16/18
[32] ICAO Annex 13, paragraph 5.12

Similarly, if government corruption or even local business practices lead to a higher incidence of bribery or similar unscrupulous behavior, the likelihood of falsified records, poorly documented employees or even use of unapproved parts could be adversely impacted. The FAA does not publish an explicit requirement for either its inspectors or FAA senior managers to coordinate with the State Department to identify such areas and include that information in their evaluation of facilities.

iii. Language issues

English is accepted as the "language of aviation" and many aspects of certifying an individual to perform a task address the ability to communicate in English. ICAO Annex 1 has extensive descriptions of a multi-tiered system to evaluate the ability to communicate in English *in an operational context* (emphasis added). The FAA requirements to become a certificated mechanic specify an individual must be able to "read, write, speak and understand" English. However, there is no requirement that compares this ability to a measurable standard, such as the ICAO language proficiency rating scale. In addition, FAA regulations explicitly allow individuals who cannot meet the language requirement to become FAA-certified mechanics provided they are employed outside the United States by a U.S. air carrier.

FAA regulations require repair station supervisors working outside the US to "understand, read and write English." Recognizing that an FAA-certified repair station can employ both certificated and non-certificated mechanics (who therefore have no FAA-mandated language proficiency requirement), the potential for communications difficulties is increased. FAA and manufacturers' manuals and guidance are in English. FAA guidance to its inspectors regarding foreign repair stations directs them to ensure English language documents are available and FAA requirements allow for "national language" versions provided the documents are in both English and the "national language." However, no requirement exists to validate the accuracy and completeness of a document translated to or from English and another language. Again, the possibility of communications difficulties leading to incomplete or incorrect repairs must be considered.

Another difficulty inspectors face: there is no standardized method of documenting language shortcomings observed during their visits. Absent an agreed-upon test or other method to objectively and consistently assess a person's proficiency in speaking, reading, writing, or understanding English, documenting deficiencies in a measurable way is a challenge.

iv. Citizenship issues

FAA does not require US citizenship as a precondition for a mechanic to become FAA-certified. Therefore, non-U.S. citizens living outside the U.S. may still become FAA-certified mechanics, but there are specific requirements that must be met in addition to those

applicable to a US citizen applying to be a mechanic in the US. Applicants must provide a demonstration of need, specifically a need to work on U.S.-registered aircraft. In addition, applicants must provide proof of experience from an employer (outside the US) and from the regulator of the country in which experience was obtained (or ICAO equivalent). No specific requirement exists for FAA to independently verify the accuracy of documents provided by foreign employers or regulators.

v. Tolerance of substance abuse issues

FAA requirements for certification of mechanics include provisions for the certificate to be suspended or revoked for violations of certain US Federal or state drug laws. Foreign repair stations employees would fall under the laws of the State in which they operate. Clearly, the legal tolerance for substance use or abuse varies widely around the world, and in fact some States (e.g. Singapore) have such harsh drug laws that the risk of a drug-related risk to safety or security is effectively zero. However, tolerance for drug and alcohol use in other areas of the world is evolving, sometimes rapidly as State governments try to balance emerging research, social norms and public safety considerations. FAA, in inspecting a foreign repair station, would be able to know the local and State laws regarding substance abuse, and would know what, if any, additional requirements might be levied by an air carrier contracting with the repair station. What would be unknown, and therefore an area of potentially increased risk, is the degree to which violations of laws or policies might be tolerated based on local culture.

5. ABILITY TO CONTROL RISK

Key points:

- Risk mitigation at repair stations requires both effective oversight and a productive, location-specific risk mitigation program that integrates elements of safety/security management systems, quality control, and other measures.
- While regulatory oversight is important, ultimately it is the facility's ability to identify and manage risk—and customers' ability and willingness to verify, via audits and other measures, that such systems are effective—that determines a specific repair station's risk level.

An evaluation of risks that may be present in foreign repair stations needs to include a discussion of the likelihood of those risks actually being present in a particular place at a particular time. This is at least partly a function of the ability to identify those risks so they may be controlled or eliminated. This is essentially quality control – if a part or a process is never inspected or evaluated there is no way to tell if it meets the appropriate standard. In the case of foreign repair stations, evaluation of the safety, security and efficiency of the operations takes many forms. Among those is FAA's certification of the operation and their

continuing ability to evaluate it to ensure the appropriate standards are being met. As noted earlier, FAA's ability to inspect foreign repair stations can be impacted by multiple factors. Inspectors' ability to physically travel to a location to conduct an inspection is dependent on personnel availability, travel budget sufficiency and ready access to locations that can sometimes be quite distant or remote. Inspectors' ability to effectively communicate with local personnel and the station's ability to demonstrate compliance are also factors. In some instances, FAA has developed agreements with State authorities effectively delegating the responsibility for oversight of the facility to the State in which the facility is located. In those cases, FAA then evaluates another authority's ability to provide oversight. This can certainly be done effectively but nevertheless introduces complexity to the oversight process that must then be managed. In addition to national authorities providing oversight, FAA relies on the air carriers who are the repair station's customers to provide more direct, continuing evaluation of the facility than is possible by either the FAA or other authority.

Implementation of a Safety Management System (SMS) and a Security Management System (SeMS) as risk reduction tools is gaining increasing support throughout the aviation community. Although SMS is well-established (even if not widely in use), SeMS has come on the scene more recently. Both have robust international support through organizations like IATA and ICAO. FAA and EASA have varying levels of regulatory and advisory guidance on implementing SMS. The initial focus, primarily in SMS, has been on front-line operations at airlines, but information for other aviation industry sectors, including MRO, is being developed. A properly structured and implemented SMS would be expected to identify many of the risks that could impact safe and secure operation of a repair station. However, a common misunderstanding of SMS is that it is a process unto itself, rather than a system of processes that include operational issues, personnel changes and an overall cultural change that must take place before SMS or SeMS is truly functional. This can impact the risks in foreign repair stations in two general ways. First, an SMS may be implemented structurally but not yet mature, leading to incomplete risk analysis. If "traditional" means of identifying risk such as inspection and testing are not present, risks can be missed. Second, as noted earlier, the assurance that a repair station meets standards can be the result of multiple layers of oversight – FAA, NAA, air carrier, and the MRO's own internal quality control process. In that scenario, only the MRO and possibly the air carrier is actually inspecting work being done. The other levels of oversight are on the ability of another organization to perform *its* oversight. If every level of that oversight is using an SMS, effective oversight is definitely possible, but a level of subjectivity is introduced as each organization's SMS is used to evaluate another SMS.

6. APPENDIX I: TYPICAL INSPECTION/OVERSIGHT METHODOLOGY

"No aircraft is so tolerant of neglect that it is safe in the absence of an effective inspection and maintenance program. The processes that affect an aircraft are Deterioration [sic] with age (e.g. fatigue, wear and corrosion) as well as chance failures (e.g. tire burst, excess structural loads)."[33]

In the most general sense, "inspection" is simply the process of looking at a part or process and seeing if it meets a predetermined set of specifications; that is, is it the shape and size it's supposed to be, does it accomplish what it's intended to accomplish, and so forth. "Oversight," in the context of this document, is the act, typically by a regulator or other external organization, of ensuring not only that the subject organization's products are satisfactory and meet some standard, but that the processes by which that organization ensures their own compliance are sound. As a practical matter, it would be impossible for the FAA to actually inspect every aspect of every repair station's activity. Thus, FAA, and sometimes an airline customer, provides oversight to ensure that a repair station is correctly accomplishing the tasks for which it is certified. How both the repair station functions and the oversight of those functions are effectively accomplished is an extremely complex process.

To start with, what the reader should understand is that an air carrier aircraft manufacturer or an engine manufacturer, though its own testing and development processes, develops an Aircraft Maintenance Manual (AMM). This is a formal document that specifies in great detail not only what must be done to the various parts of an aircraft to keep it in safe, serviceable condition but also how often various tasks must be performed. This can vary from daily servicing of things like tires and engine oil up to and including what are known as "heavy maintenance" checks where the aircraft is partially disassembled and the thousands of component parts are replaced (because the manufacture has determined that some parts are "life limited" and need to be replaced at certain intervals regardless of their condition) or are inspected and replaced, repaired or refurbished, again based on the manufacturers guidance.
The most basic tasks are typically performed as "line maintenance" meaning they may well be done while an aircraft is at the gate between flights or perhaps at an overnight stop. For more complex tasks, aircraft (or perhaps major components removed from an aircraft, such as landing gear or engines) are taken to a specific location to an MRO certified to perform the task. Essentially, all of the processes that must be accomplished to perform all of the maintenance at any level are written down in great detail. These detailed task descriptions are typically broken down into smaller actions that are intended to be accomplished by an individual mechanic and are known as "work cards." Work cards are step-by-step instructions detailing exactly how a task is intended to be performed. Breaking down even

[33] Cranfield University via Skybrary

the largest, most complex maintenance operation ultimately into step-by-step instructions not only allows a mechanic to have a detailed set of instructions from which to work, but also allows an inspector to either watch a mechanic perform the task and ensure it is being done correctly, or in some cases look at the finished task and see that it was done according to the instructions.

An additional level of quality control, and therefore safety, is afforded for most tasks by *requiring* that work be inspected by a designated supervisory mechanic each time it is performed and certified as correctly completed. The ability to safely and effectively inspect others' work is a separate, additional certification a mechanic must earn in addition to his or her mechanic's certification. The inspector's "sign off" is documented and kept as part of the record of maintenance performed. If a component being worked on is part of a larger assembly, the same concept applies – the work necessary to break down or build up an assembly is defined by the manufacture, separated into smaller parts and ultimately into a step-by-step process completed by a mechanic and supervised and/or inspected as appropriate. In general, all maintenance performed follows this same schema regardless of the size or complexity of the operation being performed. Each level of work, from the most basic "nuts and bolts" operation to the process of assembling multiple complex components is performed using this methodology. This methodology provides multiple opportunities for the work to be inspected and those inspections documented. The use of a standard set of processes defined by the manufacturer means that the work done on a component should be done the same way to the same standard regardless of where the work is performed. Ensuring that uniformity of compliance is achieved is the responsibility of the regulator performing its oversight role, or in some instances the airline itself overseeing the work, but using an oversight process that is in turn approved by the regulator.

With minor variations, this process of maintenance, inspection and oversight is in use worldwide. Aircraft maintenance, and the documentation thereof, is part of the broader process of "continuing airworthiness" that is described in the ICAO Airworthiness Manual as *"All of the processes ensuring that, at any time in its life, an airplane complies with the technical conditions fixed to the issue of the Certificate of Airworthiness and is in a condition for safe operation"* - source: ICAO Airworthiness Manual [ICAO, 2014] (Note: The Certificate of Airworthiness (C of A) or Airworthiness Certificate is the formal document issued by the National Aviation Authority (NAA) to certify that an aircraft is airworthy.)

As noted above, it is impractical, if not impossible, for the FAA or any NAA to provide direct oversight of every maintenance task at all the MRO it has certified. FAA fulfills its oversight role primarily by ensuring the adequacy of processes, facilities and equipment at the MRO, recognizing that in the course of making that determination, an FAA Inspector is likely to be able to see actual work in progress. In fact, FAA normally coordinates inspection dates in advance with an MRO to ensure that work will be in progress[34].

[34] Testimony of Ms. Margaret Gilligan, FAA Associate Administrator for Aviation Safety, before the Senate Committee on Commerce, Science and Transportation, June 20, 2007, pg. 59

The positions for personnel charged with performing FAA's maintenance oversight role are specifically designated for that purpose. FAA job postings for these positions emphasize requirements for significant expertise in the same types of repair and maintenance operations that a prospective Aviation Safety Inspector (ASI) will be evaluating. Because the inspection of a facility has many subjective components, effective accomplishment of the task requires an ASI to have considerable breadth and depth of experience. The position description also specifies the ASI must have expertise tailored to evaluating both the programmatic aspects (e.g. documentation and record keeping) and the specific task accomplishment.[35] Once hired, an air carrier maintenance ASI undergoes academic and practical training specific to the position. FAA has developed extensive guidance for its inspectors, including procedures to use when evaluating and MRO, a Repair Station Assessment Tool (RSAT) that enumerates specific areas that must be evaluated in every inspection of a repair facility and codes of ethics and conduct. FAA also specifies that MRO are inspected once annually (or more frequently if deficiencies are found that warrant closer scrutiny).

[35] FAA ASI job vacancy posting FAA-AHF-17-ACM-53520, amended 2/2018

7. APPENDIX II: LIST OF ACRONYMS

AMM	Aircraft Maintenance Manual
ASAP	Aviation Safety Action Program
ASI	(FAA) Aviation Safety Inspector
AVS	FAA Associate Administrator for Aviation Safety
BASA	Bilateral Aviation Safety Agreement
CAA	Civil Aviation Authority
CAST	Commercial Aviation Safety Team
COSCAP	(ICAO) Cooperative Development of Operational Safety and Continuing Airworthiness Program
CRS	Congressional Research Service
D&A	Drug and alcohol
DCT	Data Collection Tools
DOT/IG	(US) Department of Transportation Inspector General
EU	European Union
FAA	(US) Federal Aviation Administration
FSIMS	(FAA) Flight Standards Information Management System
GAO	(US) Government Accountability Office
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
IFO	(FAA) International Field Office
JALEC	JAL (Japan Airlines) Engineering Company
MAG	Maintenance Annex Guidance
MIP	Maintenance Implementation Procedures
MRO	Maintenance Repair Organization
MTOW	Maximum certificated Takeoff Weight
NAA	National Aviation Authority
NTSB	(US) National Transportation Safety Board
OIG	Office of the Inspector General
RSAT	(FAA) Repair Station Assessment Tool
SAS	(FAA) Safety Assurance System
SeMs	Security Management System
SMS	Safety Management System
SSI	Sensitive Security Information
SUP	Suspected Unapproved Parts
TC	Transport Canada
TSA	Transportation Security Administration
UAS	Unmanned Aircraft System
USM	Used Serviceable Material
VDRP	Voluntary Disclosure Reporting Program

8. APPENDIX III: LIST OF FOREIGN MRO

The following listing is taken from FAA published information, current as of February 2018. **Information is provided for reference only. Country names may not conform to U.S. policy**.

Country	Facility Name	City
Argentina	AEROLINEAS ARGENTINAS	BUENOS AIRES
Argentina	AUSTRAL LINEAS AEREAS S A	BUENOS AIRES
Argentina	AMS SERVICIOS AERONAUTICOS	BUENOS AIRES
Argentina	AGRO CROM SRL	BUENOS AIRES
Argentina	AERO BAIRES S A C I	SAN FERNANDO, B.A.
Australia	TAE AVIATION PTY LTD	ADELAIDE, SA
Australia	EAST COAST PROPELLERS PTY LTD	BANKSTOWN, NSW
Australia	MCDERMOTT AVIATION PTY LTD	COODORY, QLD 4563
Australia	EXECUJET MAINTENANCE AUSTRALIA PTY, LTD	MASCOT, NSW
Australia	BOEING AUSTRALIA COMPONENT REPAIRS PTY LTD	MELBOURNE, VIC
Australia	SIKORSKY AIRCRAFT AUSTRALIA LIMITED	PINKENBA, QLD
Australia	QANTAS AIRWAYS LTD	PINKENBA, Queensland
Australia	VECTOR AEROSPACE AUSTRALIA PTY LTD	QUEENSLAND
Australia	THOMAS ELECTRONICS OF AUSTRALIA PTY LTD	REGENTS PARK
Australia	HAWKER PACIFIC PTY LIMITED	REGENTS PARK, NSW
Australia	AIRLINE SERVICES LIMITED	SHARSTON
Austria	HANCOCK AVIATION GMBH	DORNBACH
Austria	JET AVIATION VIENNA GMBH	VIENNA
Austria	AUSTRIAN AIRLINES	VIENNA
Azerbaijan	SW TECHNICS BRANCH OF SILK WAY WEST AIRLINES LLC	BAKU, AZERBAIJAN
Belgium	BRIDGESTONE AIRCRAFT TIRE EUROPE S A	FRAMERIES
Belgium	EUROPEAN SUPPORT CENTER BVBA	GENK
Belgium	ASP AVIONICS NV-SA	GENK
Belgium	SONACA SA	GOSSELIES
Belgium	AGUSTA AEROSPACE SERVICES S A	GRACE-HOLLOGNE
Belgium	ESTERLINE BELGIUM	KORTRIJK
Belgium	SAFRAN AERO BOOSTERS S.A.	MILMORT (HERSTAL)
Belgium	LAMBERT AIRCRAFT ENGINEERING BVBA	WEVELGEM
Belgium	SAFRAN AIRCRAFT ENGINE SERVICES BRUSSELS	ZAVENTEM
Belgium	SABENA AEROSPACE ENGINEERING	ZAVENTEM
Brazil	TAM AVIACAO EXECUTIVA E TAXI AEREO S.	ARACATI-CE CEP

	A.	
Brazil	LIDER TAXI AEREO S/A-AIR BRASIL	BELO HORIZONTE
Brazil	EMBRAER S.A.	GAVIAO PEIXOTO
Brazil	TAM AVIACAO EXECUTIVA E TAXI AERO S A	JUNDIAI, SAO PAULO
Brazil	LIDER TAXI AEREO	MACAE, RIO JANEIRO
Brazil	GOL LINHAS AEREAS S/A	MINAS GERAIS
Brazil	GE-CELMA	PETROPOLIS
Brazil	TAP MANUTENCAO E ENGENHARIA BRASIL S A	PORTO ALEGRE, RS
Brazil	SAFRAN HELICOPTER ENGINES INDUSTRIA E COMERCIO DO	RIO DE JANEIRO
Brazil	TAP MANUTENCAO E ENGENHARIA BRASIL S A	RIO DE JANEIRO
Brazil	TAM-LINHAS AEREAS S A	SAO CARLOS
Brazil	DIGEX AIRCRAFT MAINTENANCE LTDA	SAO JOSE DOS CAMPOS
Brazil	ROCKWELL COLLINS DO BRASIL LTDA	SAO JOSE DOS CAMPOS
Brazil	ELEB EQUIPAMENTOS LTDA	SAO JOSE DOS CAMPOS
Brazil	HONEYWELL DO BRASIL LTDA	SAO JOSE DOS CAMPOS
Brazil	C AND D BRASIL LTDA	SAO PAULO
Brazil	LIDER TAXI AEREO S/A-AIR BRASIL	SAO PAULO
Brazil	GULFSTREAM DO BRASIL SERVICOS DE SUPORTE E MANTENI	SOROCABA
Brazil	PRATT AND WHITNEY CANADA DO BRASIL LTDA	SOROCABA
Brazil	DASSAULT FALCON JET DO BRASIL LTDA	SOROCABA - SP
Brazil	EMBRAER S/A	SOROCABA (SP)
Chile	UNILODE AVIATION SOLUTIONS CHILE SPA	PUDHAUEL
Chile	MANTENIMIENTO Y SERVICIOS SCL LTDA	SANTIAGO
Chile	DESARROLLO DE TECNOLOGIA	SANTIAGO
Chile	LAN AIRLINES S A	SANTIAGO
Chile	AEROSERVICIO S A	SANTIAGO
Chile	AEROCARDAL LTDA	SANTIAGO
China	BEIJING ANDAWELL SCIENCE & TECHNOLOGY CO LTD	BEIJING
China	GULFSTREAM HNA BEIJING TECHNICAL SERVICES CO	BEIJING
China	DEER JET (BEJING) CO LTD	BEIJING
China	NANSHAN JET CO LTD	BEIJING
China	STAECO (BEIJING) BUSINESS JET MAINTENANCE CO., LTD	BEIJING
China	DAS NORDISK PHOENIX AVIATION EQUIPMENT LTD	BEIJING
China	BEIJING OU TUO TECHNOLOGY COMPANY LIMITED	BEIJING

China	AIRCRAFT MAINTENANCE AND ENGINEERING CORP	BEIJING
China	BEIJING FENG RONG AVIATION SCIENCE & TECHNOLOGY CO	BEIJING
China	REGENT AERO SPACE CORPORATION-BEIJING	BEIJING
China	BEIJING CRONDA NEW TECHNOLOGY CO LTD	BEIJING
China	TIMKEN (CHENGDU) AEROSPACE AND PRECISION PRODUCTS	CHENGDU
China	SICHUAN AIRCRAFT MAINTENANCE ENGINEERING CO., LTD.	CHENGDU
China	AIRCRAFT MAINTENANCE & ENGINEERING CORPORATION BEI	CHENGDU
China	CHENGDU FALCON AIRCRAFT ENGINEERING SERVICES CO LT	CHENGDU
China	CHENGDU HUATAI AVIATION TECHNOLOGY COMPANY LIMITED	CHENGDU
China	SICHUAN SERVICES AERO ENGINE MAINTENANCE CO LTD	CHENGDU
China	SICHUAN AOTE ACCESSORIES REPAIR CO LTD	CHENGDU
China	SICHUAN HAITE HIGH TECH COMPANY LTD	CHENGDU
China	GUANGZHOU HANGXIN AVIONICS COMPANY LTD	GUANGDONG
China	ST AEROSPACE GUNAGZHOU AVIATION SERVICES CO LTD	GUANGHZOU
China	GUANGZHOU AIRCRAFT MAINTENANCE ENGINEERING CO LTD	GUANGZHOU
China	JR-TECH (GUANGZHOU) CO., LTD	GUANGZHOU
China	GRAND CHINA AVIATION MAINTENANCE COMPANY LIMITED	HAIKOU HAINAN
China	HUTCHINSON INDUSTRIAL RUBBER PRODUCTS (SUZHOU) CO.	JIANGSU
China	SHANDONG XIANGYU AVIATION TECHNOLOGY SERVICE CO.,	JINAN
China	TAIKOO SHANDONG AIRCRAFT ENGINEERING COMPANY LTD	JINAN, SHANDONG
China	DUNLOP TAIKOO (JINJIANG) AIRCRAFT TYRES CO., LTD.	JINJIANG, FUJIAN
China	TAIKOO SPIRIT AEROSYSTEMS JINJIANG COMPOSITE CO LT	JINJIANG, FUJIAN
China	NANJING WANGHANG AIRCRAFT COMPONENT MAINTENANCE EN	NANJING, JIANGSU
China	SHANGHAI DONGSHI AERO EQUIP AND ENGINEERING CO LTD	PUDONG, SHANGHAI
China	BRIDGESTONE AIRCRAFT TIRE COMPANY (CHINA) LIMITED	QINGDAO

China	SHANGHAI TAIKOO AIRCRAFT ENGINEERING SERVICES CO	SHANGHAI
China	B/E AEROSPACE SHANGHAI CO., LTD.	SHANGHAI
China	BOEING SHANGHAI AVIATION SERVICES COMPANY LIMITED	SHANGHAI
China	EASTERN AIRLINES TECHNIC CO LTD	SHANGHAI
China	SHANGHAI HAWKER PACIFIC BUSINESS AVIATION SVC CNTR	SHANGHAI
China	AIR FRANCE KLM COMPONENT SERVICES SHANGHAI CO LTD	SHANGHAI
China	SHANGHAI PRATT AND WHITNEY AC ENGINE MTC CO LTD	SHANGHAI
China	SHANGHAI EASTERN AIRCRAFT MAINTENANCE LIMITED	SHANGHAI
China	SHANGHAI HANGXIN AERO-MECHANICS COMPANY LIMITED	SHANGHAI
China	LIEBHERR MACHINERY SERVICE (SHANGHAI) CO., LTD.	SHANGHAI
China	CEA HONEYWELL AIRCRAFT WHEELS AND BRAKES REPAIR AN	SHANGHAI
China	SHANGHAI TECHNOLOGIES AEROSPACE COMPANY LIMITED	SHANGHAI
China	COLLINS AVIATION MAINTENANCE SERVICES SHANGHAI LTD	SHANGHAI
China	SHANGHAI HUTE AVIATION TECHNOLOGY COMPANY LTD	SHANGHAI
China	GE ON WING SUPPORT SHANGHAI COMPANY LTD	SHANGHAI
China	HONEYWELL AVIONICS SHANGHAI COMPANY LIMITED	SHANGHAI
China	TOPCAST AVIATION SERVICES LIMITED	SHATIN
China	SHENYANG NORTHERN AIRCRAFT MAINTENANCE AND ENGINEE	SHENYANG
China	GREAT EAGLE SHENZHEN AVIATION ENGINEERING CO LTD	SHENZHEN
China	LUFTHANSA TECHNIK SHENZHEN COMPANY LIMITED	SHENZHEN
China	THALES AEROSPACE BEIJING COMPANY LIMITED	SHUNYI, BEIJING
China	PPG AEROSPACE MATERIALS SUZHOU CO LTD	SUZHOU
China	AIR ASIA CO LTD	TAINAN
China	ASIAN COMPRESSOR TECHNOLOGY SERVICES COMPANY LTD	TAOYUAN
China	HWA-HSIA COMPANY LIMITED	TAOYUAN
China	EVERGREEN AVIATION TECHNOLOGIES CORPORATION	TAOYUAN CITY

China	CHINA AIRLINES LTD	TAOYUAN, R.O.C.
China	GOODRICH AEROSTRUCTURES SERVICE CHINA CO LTD	TIANJIN
China	SR JET CO., LTD.	TIANJIN
China	EXECUJET HAITE AVIATION SERVICES CHINA CO. LTD.	TIANJIN
China	HONG KONG AERO ENGINE SERVICES LIMITED	TSEUNG KWAN O
China	WUHAN HANGDA AERO SCIENCE AND TECHNOLOGY DEVELOPME	WUHAN
China	HAECO COMPONENT OVERHAUL (XIAMEN) LIMITED	XIAMEN
China	FLIGHTPARTS XIAMEN COMPONENT SERVICES LTD	XIAMEN, FUJIAN
China	GOODRICH TAECO AERONAUTICAL SYSTEMS XIAMEN CO LTD	XIAMEN, FUJIAN
China	TAIKOO XIAMEN AIRCRAFT ENGINEERING COMPANY LTD	XIAMEN, FUJIAN
China	HONEYWELL TAECO AEROSPACE XIAMEN COMPANY LTD	XIAMEN, FUJIAN
China	TAIKOO XIAMEN LANDING GEAR SERVICES COMPANY LTD	XIAMEN, FUJIAN
China	AVIC QINLING AEROSPACE XIAMEN LTD	XIAMEN, FUJIAN
China	ST AEROSPACE TECHNOLOGIES XIAMEN COMPANY LIMITED	XIAMEN, FUJIAN
China	TAIKOO ENGINE SERVICES XIAMEN COMPANY LIMITED	XIAMEN, FUJIAN
China	KRAUSS CHINA AVIATION TECHNOLOGIES COMPANY LTD	XI'AN
China	GREAT EAGLE XIAN AVIATION ENGINEERING CO LTD	XI'AN
China	XIAN AVIATION TECHNIC CO LTD	XIAN CITY
China	EASTERN AIRLINES TECHNIC CO LTD NORTHWEST BRANCH	XIAN, SHAANXI
China	PARKER FACRI ACTUATION SYSTEMS (XI'AN) CO. LTD	XIAN, SHAANXI PROV
China	XI AN HSH AERO-TECHNOLOGY CO LTD	XI'AN,SHAANXI PROV
China	HUBEI CHAOZHUO AVIATION TECHNOLOGY CO LTD	XIANGANGCITY
China	MTU MAINTENANCE ZHUHAI COMPANY LTD	ZHUHAI
Columbia	AEROVIAS DEL CONTINENTE AMERICANO SA	ANTIOQUIA
Columbia	AEROESTRUCTURA DE COLOMBIA	BOGOTA
Columbia	AEROVIAS DEL CONTINENTE AMERICANO S A	BOGOTA
Columbia	CORPORACION DE LA INDUSTRIA	BOGOTA
Columbia	AEROVIAS DE INTEGRACION REGIONAL AIRES S A	BOGOTA

Columbia	CENTRAL CHARTER DE COLOMBIA S.A.S.	COLOMBIA
Columbia	HELICENTRO SAS	CUNDINAMARCA
Columbia	INDUSTRIAL AERONAUTICA SA - INDAER	MEDELLIN
Columbia	TAMPA CARGO S A	RIO NEGRO
Costa Rica	COOPERATIVA AUTOGESTIONARIA DE SERVICIOS AEROINDUS	ALAJUELA
Costa Rica	LINEAS AEREAS COSTARRICENSES S A	ALAJUELA
Costa Rica	HELICORP S A	SAN JOSE
Czech Republic	HONEYWELL AEROSPACE OLOMOUC S R O	MARIANSKE-UDOLI
Czech Republic	JOB AIR TECHNIC A. S.	MOSNOV
Czech Republic	CZECH AIRLINES TECHNICS J S C	PRAGUE 6
Czech Republic	JIHOSTROJ A S	VELESIN
Denmark	GENERAL ENTERPRISES B V	9761 TK EELDE
Denmark	NORDIC AVIATION CAPITAL A/S	BILLUND
Denmark	SUN-AIR OF SCANDINAVIA A/S	BILLUND
Denmark	SCANDINAVIAN AVIONICS A S	BILLUND
Denmark	UNILODE AVIATION SOLUTIONS DENMARK APS	DRAGOR
Denmark	ST AEROSPACE SOLUTIONS EUROPE A-S	KASTRUP
Denmark	SKYWAYS TECHNICS A/S	SONDERBORG
Ecuador	CENTRO DE MANTENIMIENTO AERONAUTICO	LATACUNGA
Egypt	ALKAN AIR	CAIRO
Egypt	ARAB ORGANIZATION FOR INDUSTRIALIZATION ENGINE FAC	CAIRO
Egypt	EGYPTAIR MAINTENENACE AND ENGINEERING	CAIRO GOVERNORATE
El Salvador	AEROMAN	SAN SALVADOR
El Salvador	AVIOTECHNOLOGY S A DE C V	SAN SALVADOR
England	CFS MAINTENANCE LIMITED	BEDFORDSHIRE
England	BRINKLEY PROPELLER SERVICES LIMITED	BEDFORDSHIRE
England	GKN AEROSPACE SERVICES LIMITED	BEDFORDSHIRE
England	MONARCH AIRCRAFT ENGINEERING LTD	BEDFORDSHIRE
England	THOMSON AIRWAYS LIMITED	BEDFORDSHIRE
England	IAE LIMITED	BEDFORDSHIRE
England	GULFSTREAM AEROSPACE LIMITED	BEDFORDSHIRE
England	PRATT AND WHITNEY CANADA UK LTD	BEDFORDSHIRE
England	HARRODS AVIATION LIMITED	BEDS
England	MODULUS UK LIMITED	BERKS
England	AVIA TECHNIQUE LIMITED	BERKSHIRE
England	DUNLOP AIRCRAFT TYRES LTD	BIRMINGHAM

England	GOODRICH CONTROL SYSTEMS	BIRMINGHAM
England	GKN AEROSPACE SERVICES LIMITED	BIRMINGHAM
England	MEGGITT AEROSPACE LIMITED	BIRMINGHAM
England	PANDECT INSTRUMENT LABORATORIES LIMITED	BUCKINGHAMSHIRE
England	SAFRAN ELECTRICAL & POWER UK LIMITED	BUCKS
England	AIM COMPOSITES LIMITED	CAMBRIDGE
England	MARSHALL OF CAMBRIDGE AEROSPACE LIMITED	CAMBRIDGE
England	NORVIC AERO ENGINES LTD	CAMBRIDGESHIRE
England	TURBINE MOTOR WORKS LIMITED	CAMBRIDGESHIRE
England	AIR NEW ZEALAND LIMITED	CANTERBURY
England	RGV AVIATION LIMITED	CHELTENHAM
England	DELAVAN LIMITED	CHESHIRE
England	THE SKYWHEELS GROUP LIMITED	CHESHIRE
England	AD AEROSPACE LIMITED	CHESHIRE
England	APPLE AVIATION LTD.	CORNWALL
England	MEGGITT AEROSPACE LIMITED	COVENTRY
England	MEGGITT AEROSPACE LIMITED	COVENTRY
England	THALES AVIONICS LIMITED	CRAWLEY
England	AIR ATLANTA AVIASERVICES LIMITED	CRAWLEY, WEST SUSSEX
England	RDDS AVIONICS LIMITED	CT9 4ED UNITED KINGDOM
England	ROLLS ROYCE PLC	DERBY
England	NDT SERVICES LIMITED	DERBY
England	MORGAN WARD NDT LIMITED	DERBYSHIRE
England	TRT LIMITED	DERBYSHIRE
England	JETWORKS LIMITED	DORSET
England	AMSAFE BRIDPORT LIMITED	DORSET
England	MCA AVIATION LIMITED	DORSET
England	AEROTEK AVIATION ENGINEERING LTD	DORSET
England	HONEYWELL UK LIMITED	DORSET
England	CSE BOURNEMOUTH LIMITED	DORSET
England	PENNY AND GILES AEROSPACE LIMITED	DORSET
England	AEROSPACE TOOLING LIMITED	DUNDEE
England	EXECUTIVE AND BUSINESS AVIATION SUPPORT LIMITED	ESSEX
England	ACS AVIATION INDUSTRIES LIMITED	ESSEX
England	CSR TECHNICS LIMITED	ESSEX
England	HANLEY SMITH LIMITED	ESSEX
England	AICRAFT COMPONENT SERVICES LIMITED	ESSEX
England	INFLITE ENGINEERING SERVICES LTD	ESSEX

England	IPECO HOLDINGS LIMITED	ESSEX
England	KEARSLEY AIRWAYS LTD	ESSEX
England	OAKENHURST AIRCRAFT SERVICES LTD	ESSEX
England	SKYSMART MRO LIMITED	ESSEX
England	ROTABLE REPAIRS LIMITED	ESSEX
England	STORM AVIATION LIMITED	ESSEX
England	GARDNER AEROSPACE - BASILDON LIMITED	ESSEX
England	SMITHS AEROSPACE LIMITED	ESSEX
England	ZODIAC AEROSPACE SERVICES UK LIMITED	ESSEX
England	FLYBE AVIATION SERVICES LIMITED	EXETER
England	GE AVIATION SYSTEMS LIMITED	GLOUCESTERSHIRE
England	GE AVIATION SYSTEMS LIMITED	GLOUCESTER
England	SAFRAN LANDING SYSTEMS SERVICES UK LIMITED	GLOUCESTER
England	ONTIC ENGINEERING AND MAINTENANCE UK LTD.	GLOUCESTERSHIRE
England	TRIUMPH AEROSPACE OPERATIONS UK, LTD	GLOUCESTERSHIRE
England	MOOG CONTROLS LIMITED	GLOUCESTERSHIRE
England	APMS AVIATION LIMITED	GLOUCESTERSHIRE
England	SKF UK LIMITED	GLOUCESTERSHIRE
England	ULTRA ELECTRONICS LIMITED	GREENFORD
England	BARNBROOK SYSTEMS LIMITED	HAMPSHIRE
England	KAL AVIATION LIMITED	HAMPSHIRE
England	SAFRAN HELICOPTER ENGINES UK LIMITED	HAMPSHIRE
England	MEGGIT UK LIMITED	HAMPSHIRE
England	COMPOSITE TECHNOLOGY LIMITED	HAMPSHIRE
England	PROPTECH AERO LIMITED	HAMPSHIRE
England	VECTOR AEROSPACE INTERNATIONAL LIMITED	HAMPSHIRE
England	TAG FARNBOROUGH ENGINEERING LIMITED	HAMPSHIRE
England	EATON LIMITED	HAMPSHIRE
England	2EXCEL ENGINEERING LIMITED	HAMPSHIRE
England	GAMA AVIATION (ENGINEERING) LIMITED	HAMPSHIRE
England	GARMIN EUROPE LIMITED	HAMPSHIRE
England	H AND S AVIATION LTD	HAMPSHIRE
England	MEGGITT UK LIMITED	HAMPSHIRE
England	EATON LIMITED	HAMPSHIRE
England	HONEYWELL UK LIMITED	HAMPSHIRE
England	REHEAT INTERNATIONAL LIMITED	HAMPSHIRE
England	BOS AEROSPACE LTD	HANDFORTH
England	LINDEN BECKETT HOLDINGS	HANTS
England	GOODRICH AEROSPACE UK LIMITED	HATFIELD, HERTS.

England	H.R. SMITH TECHNICAL DEVELOPMENTS LIMITED	HEREFORD
England	CABINAIR SERVICES LIMITED	HERTFORDSHIRE
England	GOODRICH CONTROL SYSTEMS	HERTFORDSHIRE
England	GKN AEROSPACE SERVICES LIMITED	ISLE OF WIGHT
England	BAE SYSTEMS OPERATIONS LIMITED	KENT
England	SUMMIT AVIATION ENGINE OVERHAUL LIMITED	KENT
England	JETS BIGGIN HILL LIMITED	KENT
England	AVOTEC LIMITED	LANARKSHIRE
England	EURAVIA ENGINEERING AND SUPPLY CO LIMITED	LANCASHIRE
England	PARADIGM PRECISION BURNLEY LIMITED	LANCASHIRE
England	AEROLUX LIMITED	LANCASHIRE
England	PANASONIC AVIONICS CORPORATION	LANGLEY SLOUGH
England	MEGGITT ADVANCED COMPOSITES LIMITED	LEICESTERSHIRE
England	B/E AEROSPACE (UK) LIMITED	LEIGHTON BUZZARD
England	PRAXAIR SURFACE TECHNOLOGIES LIMITED	LINCOLN, LINCOLNSHIRE
England	AMETEK AIRTECHNOLOGY GROUP LIMITED	LONDON
England	AEM LIMITED	LUTON, BEDFORDSHIRE
England	MEGGITT UK LIMITED	MAIDENHEAD, BERKSHIRE
England	THOMAS COOK AIRCRAFT ENGINEERING LIMITED	MANCHESTER
England	UNILODE AVIATION SOLUTIONS UK LTD	MANCHESTER
England	CHEVRON TECHNICAL SERVICES LIMITED	MANCHESTER
England	AEROCO GROUP INTERNATIONAL LIMITED	MANCHESTER
England	GE AIRCRAFT ENGINE SERVICES	MIDDLESEX
England	MUIRHEAD AEROSPACE LIMITED	MIDDLESEX
England	HONEYWELL UK LIMITED	MIDDLESEX
England	BRITISH AIRWAYS PLC	MIDDLESEX
England	AVIALL UK INC	MIDDLESEX
England	SATAIR UK LIMITED	MIDDLESEX
England	EARTH POLE LIMITED	MIDDLESEX
England	ATC HOLDINGS LIMITED T/A AERO ENGINE CENTRE	MIDDX
England	KLM UK ENGINEERING LTD	NORWICH, NORFOLK
England	CHROMALLOY UNITED KINGDOM LTD	NOTTINGHAM
England	FERRANTI TECHNOLOGIES LIMITED	OLDHAM
England	GENERAL AERO SERVICES COMPONENTS LTD	ORSETT,GRAYS,ESSEX
England	AIRBUS HELICOPTER UK LIMITED	OXFORD
England	ATLANTIC INERTIAL SYSTEMS LTD	PLYMOUTH DEVON

England	APPH LIMITED	RUNCORN
England	STANSTED AEROSPACE LIMITED	SAFFRON WALDEN
England	IMT AVIATION LIMITED	SAFFRON WALDEN ESSEX
England	DONCASTERS AEROSPACE LIMITED	SHROPSHIRE
England	DONCASTER CITATION SERVICE CENTRE LIMITED	SOUTH YORKSHIRE
England	AEROSPACE NDT LIMITED	SOUTH YORKSHIRE
England	WAS COMPONENTS LTD	SOUTHEND-ON-SEA
England	AEM LTD	STANSTED
England	GT ENGINE SERVICES LIMITED	STANSTED, ESSEX
England	MEL AVIATION LTD	SUFFOLK
England	APPLUS AEROSPACE UK LIMITED	SURREY
England	AS-AEROSPACE LIMITED	UXBRIDGE, MIDDLESEX
England	AEROCARE INTERNATIONAL LIMITED	WARRINGTON
England	BRITISH AIRWAYS	WEST DRAYTON
England	CFS AEROPRODUCTS LIMITED	WEST MINDLANDS
England	25 REPAIR CENTRE LIMITED	WEST SUSSEX
England	WORLD AERO LTD	WEST SUSSEX
England	REMOTE VISUAL INSPECTIONS LIMITED	WEST SUSSEX
England	AIRBASE INTERIORS LIMITED	WEST SUSSEX
England	COMPONENT PROCESS AND REPAIR LIMITED	WEST SUSSEX
England	MULTIFLIGHT LTD	WEST YORKSHIRE
England	PRAXAIR SURFACE TECHNOLOGIES LIMITED	WILTSHIRE
England	GRIFFITHS AERO LIMITED	WIMBORNE
England	AOG INSPECTION LIMITED	WITNEY
England	MOOG WOLVERHAMPTON LIMITED	WOLVERHAMPTON
England	HS MARSTON AEROSPACE LIMITED	WOLVERHAMPTON
England	GOODRICH ACTUATION SYSTEMS LIMITED	WOLVERHAMPTON
England	LEONARDO MW LIMITED	YEOVIL
Estonia	MAGNETIC MRO AS	TALLINN
Ethiopia	ETHIOPIAN MRO	ADDIS ABABA
Finland	GA TELESIS ENGINE SERVICES	VANTAA
France	SAFRAN ELECTRICAL & POWER	03110 CHARMEILI
France	ACTIA AUTOMOTIVE	31772 COLOMIERS CEDEX
France	REVIMA APU	76490 RIVES En SEINE
France	SAS POTEZ AERONAUTIQUE	AIRE SUR L'ADOUR
France	SERVICE ELECTRONIQUE AVIATION MARINE (S.E.A.M.)	Aix-En-Provence
France	METAL IMPROVEMENT COMPANY	AMILLY
France	NTN-SNR ROULEMENTS	ANNECY

France	L'HOTELLIER	ANTONY CEDEX
France	ZODIAC AEROSPACE SERVICES EUROPE	ARS
France	ZODIAC ACTUATION SYSTEMS	AUXERRE
France	TARMAC AEROSAVE S. A. S.	AZEREIX
France	AIRBUS S A S	BLAGNAC
France	BARRY CONTROLS AEROSPACE	BLAGNAC
France	SAFRAN VENTILATION SYSTEMS	BLAGNAC
France	ROCKWELL COLLINS FRANCE	BLAGNAC
France	COMPOSITE INDUSTRIE S A	BONDOUFLE CEDEX
France	EMBRAER AVIATION INTERNATIONAL	BONNEUIL-EN-FRANCE
France	SAFRAN ELECTRONICS & DEFENSE	BOULOGNE-BILLANCOURT
France	AUXITROL S A	BOURGES CEDEX
France	VISION SYSTEMS AERONAUTICS	BRIGNAIS
France	THALES COMMUNICATIONS AND SECURITY S. A. S.	BRIVE CEDEX
France	ANTAVIA	CAMPSAS
France	REVIMA	CAUDEBEC-EN-CAUX
France	SOCIETE AIR FRANCE	CEDEX
France	STELIA AEROSPACE	CEDEX
France	GOODRICH ACTUATION SYSTEMS SAS-DIV HOIST AND WINCH	CERGY PONTOISE CEDEX
France	BOREA	CHADELEUF
France	ZODIAC HYDRAULICS	CHATEAUDUN
France	THALES AVIONICS SAS	CHATELLERAUX CEDEX
France	ZODIAC AERO ELECTRIC	CHAURAY
France	EATON AEROSPACE FLUID CONVEYANCE	COIGNIERES CEDEX
France	SAFRAN TRANSMISSION SYSTEMS	COLOMBES
France	FALGAYRAS SAS	COLOMIERS
France	SERMA INGENIERIE	CORNEBARRIEU
France	AERONET	DAMMARTIN
France	SIBA MAINTENANCE SERVICES	DINAN
France	SABENA TECHNICS DNR	DINARD CEDEX
France	CRMA	ELANCOURT
France	ATELIERS BIGATA	EYSINES, GIRONDE
France	RATIER-FIGEAC	FIGEAC CEDEX
France	MEGGITT FRANCE	FLEAC
France	JPC AVIATION	FRANCE, 21121
France	SOCIETE D'ETUDES ET DE CONSTRUCTIONS AERO	GENNEVILLERS
France	SOGAFREM	GONESSE
France	VECTOR AEROSPACE FRANCE	GONESSE CEDEX

France	EXTINGUISHER MAINTENANCE STATION	GOUSSAINVILLE
France	OROLIA SAS	GUIDEL
France	ZODIAC SEATS FRANCE	ISSOUDUN
France	TROYES AVIATION	LA CHAPELLE ST LUC
France	CAVOK SARL	LAPALISSE
France	LOUIS GENTILIN S. A.	LAUNAGUET
France	DASSAULT FALCON SERVICE	LE BOURGET CEDEX
France	CESSNA CITATION EUROPEAN SERVICE CENTER	LE BOURGET CEDEX
France	SATORI	LE BOURGET CEDEX
France	GOODRICH AEROSPACE SERVICES	LE MESNIL AMELOT
France	INDRAERO SIREN	LE PECHEREAU
France	AIR PRECISION S A S	LE PLESSIS ROBINSON
France	CIRCOR INDUSTRIA	LE PLESSIS TREVISE
France	PRONAL SA	LEERS
France	EA SERVICES	L'ISLE JOURDAIN
France	HS AEROSPACE DIJON	LONGVIC
France	SOCATA	LOUEY
France	TECHNIC AVIATION	MANOSQUE
France	CEMG AEROSAUVETAGE	MAREUIL LES MEAUX
France	AEROMECANIC	MARIGNANE
France	AIRBUS HELICOPTERS	MARIGNANE
France	A&T AEROSPACE	MARTIGNAS-SUR-JALLE
France	SAFRAN AIRCRAFT ENGINES	MELUN CEDEX
France	OTONOMY AVIATION	MERIGNAC
France	SABENA TECHNICS BOD	MERIGNAC
France	THALES AVIONICS ELECTRICAL SYSTEMS	MERU
France	SAFRAN LANDING SYSTEMS	MOLSHEIM CEDEX
France	MTA AVIATION	MONTSALEON
France	LEACH INTERNATIONAL EUROPE S A S	NIORT
France	N S E	NIZEROLLES
France	SOCIETE DE MARQUAGE ET DE SIGNALISATION-SMS	PARIS
France	NEW EAS	PERPIGNAN
France	ZODIAC AEROSAFETY SYSTEMS	PLAISIR
France	ZODIAC AEROTECHNICS	PLAISIR
France	TMH-NOVATEC	POITIERS CEDEX 9
France	SAFRAN NACELLES	PONT- AUDEMER
France	NOVAE AEROSPACE INDUSTRY	PRUNAY
France	AIR SUPPORT	PUJAUDRAN
France	SMA	REAU
France	AIRCRAFT INTERIOR PRODUCTS	ROISSY CDG CEDEX

France	DASSAULT AVIATION	SAINT CLOUD
France	MANUFACTURE FRANCAISE DES PNEUMATIQUES MICHELIN	SAINT DOULCHARD_____
France	PRAXAIR SURFACE TECHNOLOGIES	SAINT ETIENNE CEDEX 1
France	F-TECH AEROSTRUCTURES GROUPE	SAINT JEAN DE VEDAS
France	GOODRICH ACTUATION SYSTEMS SAS	SAINT MARCEL
France	CHROMALLOY FRANCE	SAINT OUEN L'AUMONE
France	FLY-BY-WIRE SYSTEMS FRANCE	SAINT VALLIER
France	ELDEC FRANCE	SAINT PRIEST
France	SECA	SAINT-SOUPPLETS
France	BRONZAVIA INDUSTRIE	SARTROUVILLE
France	AQUITAINE ELECTRONIQUE	SERRES-CASTET
France	SEFEE	ST. AFFRIQUE, CEDEX
France	HYDRAULIC REPAIR AND SUPPORT	ST. MALO
France	NOVINTEC	SULLY SUR LOIRE
France	SAINT-GOBAIN SULLY	SULLY SUR LOIRE
France	SAS PAUL LOPEZ	TARNOS
France	SAFRAN HELICOPTER ENGINES	TARNOS
France	AIRBUS CORPORATE JET CENTRE	TOULOUSE
France	ELTA	TOULOUSE
France	LATECOERE	TOULOUSE
France	TESTIA FRANCE	TOULOUSE
France	GOODRICH AEROSPACE EUROPE	TOULOUSE
France	LIEBHERR-AEROSPACE TOULOUSE SAS	TOULOUSE CEDEX 2
France	NEXTER ELECTRONICS	TOULOUSE CEDEX 1
France	HONEYWELL AEROSPACE	TOULOUSE CEDEX 3
France	AIRBUS OPERATIONS	TOULOUSE CEDEX 9,
France	OUEST CABLAGE AERONAUTIQUE ET MARINE	TRELIVAN
France	TEAM	TROYS
France	SKF AEROENGINE FRANCE	VALENCIENNES CEDEX
France	HONEYWELL AEROSPACE VENDROME	VENDOME
Germany	LUFTHANSA TECHNIK INTERCOAT GMBH	24568 KALTENKIRCHEN
Germany	N3 ENGINE OVERHAUL SERVICES GMBH AND COMPANY KG	ARNSTADT
Germany	AVIONIK STRAUBING VERTRIEBS UND SERVICE GMBH	ATTING
Germany	MT-PROPELLER GERD MUHLBAUER GMBH	ATTING
Germany	AUGSBURG AIR SERVICE GMBH	AUGSBURG
Germany	SITEC AEROSPACE GMBH	BAD TOELZ
Germany	ROLLS-ROYCE DEUTSCHLAND LTD AND CO KG	BLANKENFELDEMAHLOW
Germany	VSE AVIATION GMBH	BUDENHEIM

Germany	AIRBUS OPERATIONS GMBH	BUXTEHUDE
Germany	ZF LUFTFAHRTTECHNIK GMBH	CALDEN
Germany	A E S AIRPLANE-EQUIPMENT AND SERVICES GMBH	COLOGNE
Germany	RUAG AEROSPACE SERVICES GMBH	D-82234 WESSLING
Germany	AIRBUS HELICOPTERS DEUTSCHLAND GMBH	DONAUWORTH
Germany	ELBE FLUGZEUGWERKE GMBH	DRESDEN
Germany	CESSNA DUSSELDORF CITATION SERVICES CENTER GMBH	DUESSELDORF
Germany	RODER PRAZISION GMBH	EGELSBACH
Germany	NORD MICRO AG AND CO OHG	FRANKFURT/MAIN
Germany	NORTHROP GRUMMAN LITEF GMBH	FREIBURG
Germany	AIRPLUS MAINTENANCE GMBH	FRIEDRICHSHAFEN
Germany	ATLAS AIR SERVICE AG	GANDERKESEE
Germany	APPARATEBAU GAUTING GMBH	GILCHING
Germany	HAITEC AIRCRAFT MAINTENANCE GMBH	HAHN AIRPORT
Germany	LUFTHANSA TECHNIK AKTIENGESELLSCHAFT LHT	HAMBURG
Germany	BOMBARDIER AEROSPACE AUSTRIA GMBH	HORSCHING
Germany	MTU MAINTENANCE HANNOVER GMBH	LANGENHAGEN
Germany	REINER PIORKOWSKI - ESZ AIRCRAFT ENGINEERING	LAUPHEIM
Germany	DIEHL AIRCABIN GMBH	LAUPHEIM
Germany	LIEBHERR ELEKRONIK GMBH	LINDAU
Germany	LIEBHERR-AEROSPACE LINDENBERG GMBH	LINDENBERG
Germany	GOODRICH LIGHTING SYSTEMS GMBH	LIPPSTADT
Germany	KRAUSS GMBH OBERFLACHENTECHNIK	LUDWIGSFELDE
Germany	MTU MAINTENANCE BERLIN-BRANDENBURG GMBH	LUDWIGSFELDE
Germany	PARKER HANNIFIN MANUFACTURING GERMANY GMBH AND CO	MAINZ KASTEL
Germany	TELAIR INTERNATIONAL GMBH	MIESBACH
Germany	RHEINLAND AIR SERVICE GMBH	MONCHENGLADBACH
Germany	E. I. S. AIRCRAFT GMBH	MUENCHEN
Germany	MTU AERO ENGINES AG	MUNICH
Germany	SAFRON ELECTRONICS & DEFENSE GERMANY	MURR
Germany	SAUTER, BACHMANN AG	NETSTAL
Germany	GOODRICH CONTROL SYSTEMS GMBH	NEUSS
Germany	PORTA AIR SERVICE GMBH & CO KG	NORDHEIN-WESTFALEN
Germany	AERO DIENST GMBH AND CO KG	NURNBERG
Germany	EURO AVIONICS GMBH	PFORZHIM
Germany	TP AEROSPACE TECHNICS GMBH	QUICKBORN

Germany	HONEYWELL AEROSPACE GMBH	RAUNHEIM
Germany	MOTORFLUG BADEN-BADEN GMBH	RHEINMUNSTER
Germany	FACC OPERATIONS GMBH	RIED IM INNKREIS
Germany	HOFFMANN GMBH AND CO KG	ROSENHEIM
Germany	MSI AIRCRAFT MAINTENANCE SERVICES INTERNATIONAL GM	RUESSELHEIM
Germany	RUDOLF FRITZ GMBH	RUESSELSHEIM
Germany	CARGOLUX AIRLINES INTERNATIONAL S A	SANDWEILLER
Germany	BOMBARDIER SERVICES (UK)LTD	SARRBRUCKEN
Germany	AIRCRAFT MAINTENANCE AND ENGINEERING SERVICE GMBH	SCHKEUDITZ
Germany	LUFTHANSA BOMBARDIER AVIATION SERVICES GMBH BERLIN	SCHOENEFELD
Germany	BEECHCRAFT-BERLIN AVIATION GMBH	SCHONEFELD
Germany	FAG AEROSPACE GMBH AND COMPANY KG	SCHWEINFURT
Germany	TECHNIFY MOTORS GMBH	ST. EGIDIEN
Germany	RTG AERO-HYDRAULIC INC NIEDERLASSUNG DEUTCSHLAND	STUHR
Germany	GROB AIRCRAFT SE	TUSSENHAUSEN
Germany	DIEHL AEROSPACE GMBH	UEBERLINGEN
Germany	METAL IMPROVEMENT COMPANY LLC	UNNA
Greece	1SOURCE AERO SERVICES S A	SCHIMATARI
Guatemala	AVIATECA S A	GUATEMALA CITY
Guatemala	ELECTRONIKS	GUATEMALA CITY
Guatemala	DHL DE GUATEMALA S A	GUATEMALA CITY
Hong Kong	HONGKONG JET ENGINEERING COMPANY LIMITED	HONG KONG
Hong Kong	GOODRICH ASIA-PACIFIC LIMITED	HONG KONG
Hong Kong	GROUND SUPPORT ENGINEERING LIMITED	HONG KONG
Hong Kong	HONG KONG AIRCRAFT ENGINEERING COMPANY LTD	HONG KONG
Hong Kong	BRIDGESTONE AIRCRAFT TIRE CO (ASIA LIMITED)	HONG KONG
Hong Kong	JET AVIATION HONG KONG LIMITED	LANTAU
Hong Kong	DAH CHONG HONG - DRAGONAIR AIRPORT GSE SERVICE LTD	LANTAU
Hong Kong	CHINA AIRCRAFT SERVICES LIMITED	LANTAU
Hong Kong	METROJET LTD	LANTAU, HONG KONG
Hungary	LUFTHANSA TECHNIK BUDAPEST KFT	BUDAPEST
Hungary	AEROPLEX OF CENTRAL EUROPE	BUDAPEST
Hungary	G E AVIATION HUNGARY KORLATOLT FELELOSSEGU TARASAG	VERESEGYHAZ
India	MAX MRO SERVICES PVT LTD	JUHU, MUMBAI
India	KRIS AERO SERVICES PVT LTD	MAHARASHTRA

India	AIR INDIA ENGINEERING SERVICES LIMITED	MUMBAI
India	AIR INDIA ENGINEERING SERVICES LIMITED	NEW DELHI
India	MAGNUM AVIATION PVT LTD	NOIDA, U.P.
Indonesia	P T NUSANTARA TURBIN DAN PROPULSI	BANDUNG
Indonesia	PT. BANTAM TEKNIK	BATAM
Indonesia	PT JAS AERO-ENGINEERING SERVICES	TANGERANG
Indonesia	P T GARUDA MAINTENANCE FACILITY AERO ASIA	TANGERANG
Indonesia	PT MULADATU	TANGERANG BANTEN
Ireland	TURBINE REPAIR SERVICES GLOBAL IRELAND LIMITED	CO. CORK
Ireland	UJET INTERIORS LTD	CO. CLARE
Ireland	AIRCRAFT COMPONENTS AND INTERIORS LTD	CO. MEATH
Ireland	SR TECHNICS AIRFOIL SERVICES LIMITED	CORK
Ireland	ATLANTIC AVIATION GROUP LIMITED	COUNTY CLARE
Ireland	SHANNON AIRCRAFT MOTOR WORKS LTD	COUNTY CLARE
Ireland	TEAM ACCESSORIES LIMITED	COUNTY DUBLIN
Ireland	CAV ICE PROTECTION LIMITED	COUNTY DURHAM
Ireland	DUBLIN AEROSPACE LIMITED	DUBLIN
Ireland	AERO INSPECTION INTERNATIONAL LIMITED	DUBLIN
Ireland	AERO ENGINES IRELAND LIMITED	DUBLIN
Ireland	PARCAVIATION ENGINEERING SERVICES LIMITED	DUBLIN 9
Ireland	THOMPSON AERO SEATING	NORTHERN IRELAND
Ireland	SHORT BROTHERS PLC	NORTHERN IRELAND
Ireland	VORTEX AVIATION IRELAND LIMITED	SHANNON
Ireland	ND TECHNOLOGIES LTD	SHANNON, IRELAND
Israel	T G L AVIATION RUBBER COMPANY LTD	AKKO
Israel	EMCOAIR	ASHDOD
Israel	BET-SHEMESH ENGINES LTD	BET-SHEMESH
Israel	ELBIT SYSTEMS LTD	KARMIEL
Israel	KRATOS GMI EYAL	KIBBUTZ EYAL
Israel	EL AL ISRAEL AIRLINES LTD	LOD
Israel	BUSINESS JETS DIV COMMERCIAL AIRCRAFT GROUP ISRAEL	LOD
Israel	BEDEK AVIATION GROUP	LOD
Israel	ORBIT COMMUNICATION SYSTEMS LTD	NETANYA
Israel	TURBOCHROME LTD.	QIRYAT-GAT
Israel	ELBIT SYSTEMS ELECTRO-OPTICS-ELOP, LTD.	REHOVOT
Israel	ARKIA AIRCRAFT MAINTENANCE	TEL AVIV
Israel	SHL SERVO SYSTEMS IAI LIMITED	TEL AVIV

Italy	SEKUR SERVICE INTERNATIONAL S.R.L.	04011 APRIUA ITALY
Italy	AERO SEKUR S P A	APRILIA
Italy	MECAER AVIATION GROUP S P A	BORGOMANERO (NO)
Italy	LEONARDO S P A - HELICOPTERS	CASCINA COSTA DI SAMAR
Italy	JET AVIONICS	CIAMPINO
Italy	NAYAK AIRCRAFT SERVICES ITALY SRL	FIUMICINO AEROPORTO
Italy	UMBRA CUSCINETTI S P A	FOLIGNO (PG)
Italy	LOGIC S P A	MILANO
Italy	LEONARDO SPA - AIRBORNE & SPACE SYSTEMS	MONTEVARCHI-AREZZO
Italy	ATITECH S P A	NAPLES
Italy	GE AVIO S. R. L.	NAPLES
Italy	LEONARDO S.P.A.-AIRBORNE & SPACE SYSTEMS	NERVIANO (MILANO)
Italy	ABL S.R.L.	POMEZIA
Italy	IAG ENGINE CENTER EUROPE S.R.L	ROME
Italy	COMET ELETTROMECCANICA S.R.L.	ROME
Italy	GELBYSON S.R.L.	ROME
Italy	ALITALIA - SOCIETA AEREA ITALIANA SPA	ROME
Italy	ASE S. P. A.	SAN GIORGIO SU LEGNANO
Italy	FAREM SRL	SESTO SAN GIOVANNI
Italy	SECONDO MONA SPA	SOMMA LOMBARDO, VARESE
Italy	MICROTECNICA S R L	TORINO
Italy	PUBBLI AER FOTO AEROSERVIZI S R L	VARESE
Italy	LEONARDO S.P.A. - DIVISIONE VELIVOLI	VARESE
Italy	FRONTLINE S. R. L.	VERGIATE
Italy	THALES ITALIA S. P. A AVIONICS	VERGIATE
Italy	SKF INDUSTRIE S P A SKF AVIO	VILLAR PEROSA (TO)
Japan	MITSUBISHI HEAVY INDUSTRIES AERO ENGINES, LTD	AICHI-KEN,
Japan	KAWASAKI HEAVY INDUSTRIES LTD	AKASHI, HYOGO
Japan	SUMITOMO PRECISION PRODUCTS CO LTD	AMAGASAKI CITY
Japan	PANASONIC AVIONICS COROPRATION	CHIBA
Japan	NABTESCO CORPORATION	GIFU-KEN
Japan	NARITA FACILITY OF METAL TECHNOLOGY CO LTD	NARITA
Japan	AIRLINE CONTAINER LEASING AIRSHOP	NARITA
Japan	JAL AIRTECH CO LTD	NARITA, CHIBA
Japan	IHI CORPORATION	TOKYO
Japan	JAL ENGINEERING COMPANY LIMITED	TOKYO

Japan	ALL NIPPON AIRWAYS CO LTD	TOKYO
Japan	TAMAGAWA AERO SYSTEMS CO LTD	TOKYO
Jordan	JORDAN AIRMOTIVE LIMITED COMPANY	AMMAN
Jordan	JORDAN AERONAUTICAL SYSTEMS COMPANY	AMMAN
Jordan	JORDAN AIRCRAFT MAINTENANCE LIMITED	AMMAN
Kenya	AFRICAN INLAND MISSION INTERNATIONAL INC	NAIROBI
Malaysia	C AND A AVIATION SDN BHD	JOHOR BAHRU
Malaysia	CELESTICA MALAYSIA SDN.BHD.	KULIM, KEDAH, MALAYSIA
Malaysia	CTRM AVIATION SDN BDH	MELAKA
Malaysia	HRD AERO SYSTEMS SDN BHD	NILAI, NEGERI SEMBILAN
Malaysia	HONEYWELL AEROSPACE AVIONICS MALAYSIA S B	PERAI, PULAU PINANG
Malaysia	AIRFOIL SERVICES SDN BHD	PETALING JAYA SELANGOR
Malaysia	AAR LANDING GEAR SERVICES SDN BHD	SELANGOR
Malaysia	INTERIORS AEROSERVICES M SDN BHD	SELANGOR DARUL EHSAN
Malaysia	HAMILTON SUNDSTRAND CUSTOMER SUPPORT CENTRE MALAYS	SELANGOR DARUL EHSAN
Malaysia	SR TECHNICS MALAYSIA SDN BHD	SHAH ALAM
Malaysia	PARKER HANNIFIN MALAYSIA SDN BHD	SHAH ALAM
Malaysia	MAS ENGINEERING AND MAINTENANCE DIVISION	SUBANG
Malaysia	AIRBUS HELICOPTERS MALAYSIA SDN BHD	SUBANG
Malaysia	GE ENGINE SERVICES MALAYSIA SDN BHD	SUBANG SELANGOR D.E.
Malaysia	AIROD AEROSPACE TECHNOLOGY SDN BHD	SUBANG, SELANGOR D.E.
Malta	MCM MAINTENANCE CENTRE MALTA LTD	LUQA
Malta	MEDITERRANEAN AVIATION COMPANY LTD	MALTA
Malta	AEROMARITIME MEDITERRANEAN LTD	MALTA
Malta	TEAM EUROPE LTD	SWATAR
Mexico	AERO SERVICIOS ESPECIALIZADOS DEL NORESTE S.A. DE	APODACA
Mexico	SERVICIOS AERONAUTICOS SAB	APODACA
Mexico	MONTERREY JET CENTER S A DE C V	APODACA, N.L.
Mexico	AEROVITRO S A DE C V	APODECA, N.L. 66600
Mexico	SERVICIO TECNICO AEREO DE MEXICO S A DE C V	C.P. 15620, MEXICO D.F
Mexico	QET TECH AEROSPACE S. A. DE C. V	CD. OBREGON, SONORA
Mexico	HONEYWELL AEROSPACE DE MEXICO S DE R L DE C V	CHIHUAHUA
Mexico	TURBOTEC S A DE C V	COAHUILA C.P.

Mexico	SERVICIOS AEREOS CORPORATIVOS S.A. DE C.V.	JALISCO
Mexico	SIASA AIR INTERIOR SERVICES SA DE CV	LEON, GUANAJUATO
Mexico	CHROMALLOY S A DE C V	MEXICALI, B.C.
Mexico	ENSAMBLADORES ELECTRONICOS DE MEXICO S DE R L DE C	MEXICALI, BC
Mexico	HONEYWELL AEROSPACE DE MEXICO S DE R L DE C V	MEXICALI, BC
Mexico	AEROVIAS DE MEXICO S A DE C V	MEXICO CITY
Mexico	MEXICANA MRO SA DE C V	MEXICO CITY
Mexico	AIRBUS HELICOPTER MEXICO S.A. DE C.V.	MEXICO CITY
Mexico	OXIGENO V C S A DE C V	MEXICO CITY, D.F.
Mexico	AERO ELECTRONICA INTERNACIONAL S A DE C V	MEXICO CITY, D.F.
Mexico	HANHAUSEN-VARCACIA S A DE C V	MEXICO, D.F.
Mexico	LLANTAS Y ARTEFACTOS DE HULE S A	MEXICO, D.F.
Mexico	ALE SERVICE CENTER, S. DE R.L. DE C.V.	MONTERREY
Mexico	NDT EXPERT MEXICO	QUER TARO
Mexico	SAFRAN AIRCRAFT ENGINE SERVICES S.A. DE C.V.	QUERETARO
Mexico	REGENT AEROSPACE CORPORATION	QUERETARO
Mexico	AM DL MRO JV, S.A.P.I. DE C.V.	QUERETARO
Mexico	MC JETS SA DE CV	QUERETARO
Mexico	TURBORREACTORES S A DE C V	QUERETARO
Mexico	SAFRAN LANDING SYSTEMS SERVICES AMERICAS, S.A. DE	QUERETARO
Mexico	AMETEK REYNOSA SERVICE CENTER	REYNOSA
Mexico	SERVICIOS AERONAUTICOS QUINTANA SA SAQ MRO	SALTILLO CO
Mexico	ABC AEROLINEAS S A DE C V	TOLUCA
Mexico	AEROVICS S A DE C V	TOLUCA
Mexico	CIMA AVIACION, S.A. DE C.V.	TOLUCA
Mexico	ALE SERVICE CENTER, S. DE R.L. DE C.V.	TOLUCA
Mexico	CONCESIONARIA VUELA COMPANIA DE AVIACION S A DE C	TOLUCA
Mexico	CENTRO DE SERVICIO AVEMEX S A DE C V	TOLUCA, EDO DE MEXICO
Morocco	SAFRAN AIRCRAFT ENGINE SERVICES MOROCCO	NOUASSER, CASABLANCA
Netherlands	NEDAERO COMPONENTS B V	6902 PA ZEVENAAR
Netherlands	AERONAMIC BV	ALMELO
Netherlands	KLM ROYAL DUTCH AIRLINES	AMSTERDAM
Netherlands	VLIEGWERK HOLLAND	ARNEMUIDEN
Netherlands	SAMCO AIRCRAFT MAINTENANCE	BEEK

Netherlands	DIRECT MAINTENANCE BV	BG Oude Meer
Netherlands	KEMPEN AIRCRAFT MAINTENANCE B.V.	BUDEL
Netherlands	HUGEN AIRCRAFT MAINTENANCE FOR AIRCRAFT B.V.	DUIVEN
Netherlands	AIRCRAFT AND COMPONENT MRO BV	EINDHOVEN
Netherlands	FOKKER LANDING GEAR BV	HELMOND
Netherlands	FOKKER SERVICES B V	HOOFDDORP
Netherlands	AAR AIRCRAFT COMPONENT SERVICES	HOOFDDORP
Netherlands	FOKKER TECHNIEK B.V.	HOOGERHEIDE
Netherlands	AIRBORNE SERVICES BV	HOOGERHEIDE
Netherlands	FOKKER ELMO B V	HOOGERHEIDE
Netherlands	SPECTO AEROSPACE BV	LELYSTAD
Netherlands	HAMILTON SUNDSTRAND CUSTOMER SUPPORT CENTER MAASTR	MAASTRICHT AIRPORT
Netherlands	KONINKLIJKE FABRIEK INVENTUM B.V.	NIEUWEGEIN
Netherlands	JET POWER AIRCRAFT AND TRANSIT COMPANY NV	ORANJESTAD
Netherlands	RIJNMOND AIR SERVICES B V	ROTTERDAM
Netherlands	NAYAK AIRCRAFT SERVICE NETHERLANDS BV	SCHIPHOL-EAST
Netherlands	JETSUPPORT BV	SCHIPHOL-EAST
Netherlands	EUROPEAN PNEUMATIC COMPONENT OVERHAUL AND REPAIR B	SCHIPHOL-RIJK
Netherlands	UNILODE AVIATION SOLUTIONS NETHERLANDS B.V.	THE NETHERLANDS
Netherlands	CHROMALLOY HOLLAND	TILBURG
Netherlands	GOODYEAR NEDERLAND B V	TILBURG
Netherlands	STANDARD AERO B V	TILBURG
Netherlands	AIR REPAIR B V	WEST-KNOLLENDAM
New Zealand	AIRWORK NZ LTD	AUCKLAND
New Zealand	AIR NEW ZEALAND LIMITED	AUCKLAND
New Zealand	PRATT AND WHITNEY AIR NEW ZEALAND	CHRISTCHURCH, CANTERBU
Norway	NORRONAFLY PROPELLER AND PARTS A S	OSLO
Norway	AERO NORWAY AS	SOLA
Norway	HELI-ONE NORWAY AS	STAVANGER AIRPORT
Panama	AM-TECH ENGINEERING INC	PANAMA CITY
Panama	COPA AIRLINES	PANAMA CITY
Peru	LAN PERU S A	CALLAO
Peru	TACA-PERU	CALLAO
Peru	TALMA SERVICIOS	LIMA
Peru	LC BUSRE	LIMA

Peru	SERVICIO DE ELECTRONICA	LIMA
Peru	SEMAN - PERU	LIMA
Philippines	MOOG CONTROLS CORPORATION	BAGUIO CITY BENGUET
Philippines	AIRWORTHY INTERNATIONAL INC	PAMPANGA
Philippines	METROJET ENGINEERING CLARK	PAMPANGA
Philippines	MIASCOR AVIATION PRODUCTS INC	PARANAQUE CITY
Philippines	FIELDTECH ASIA INC	PASAY CITY
Philippines	LUFTHANSA TECHNIK PHILIPPINES	PASAY CITY
Philippines	SIA ENGINEERING PHILIPPINES CORPORATION	PHILIPPINES 2023
Philippines	HONEYWELL CEASA SUBIC BAY COMPANY INC	SUBIC BAY
Philippines	B/E AEROSPACE INC	TANAUAN CITY, BATANGAS
Poland	HELI-ONE (POLAND) SP. Z.O.O.	JASIONKA
Poland	HAMILTON SUNDSTRAND POLAND SP ZO O	RZESZ W
Poland	PRATT & WHITNEY RZESZOW S.A.	RZESZOW
Poland	CENTRAL EUROPEAN ENGINE SERVICES SP Z O O	WARSAW
Poland	JENOPTIK ADVANCED SYSTEMS GMBH	WEDEL
Poland	HS WROCLAW SP. Z.O.O.	WROCLAW
Portugal	OGMA-INDUSTRIA AERONAUTICA DE PORTUGAL S A	ALVERCA
Portugal	TRANSPORTES AEREOS PORTUGUESES S A	LISBON
Qatar	QATAR AERONAUTICAL COLLEGE	DOHA
Qatar	GENERAL ELECTRIC INTERNATIONAL INC., QSTP-B	DOHA
Qatar	GULF HELICOPTERS COMPANY	DOHA
Romania	AEROSTAR SA	BACAU
Romania	ROMAERO S A	BUCHAREST
Romania	S C COMPANIA NATIONALA DE TRANSPORTURI AERIENE ROM	BUCHAREST
Russia	JET AVIATION VNUKO LIMITED	MOSCOW
San Salvador	TACA INTERNATIONAL AIRLINES	SAN SALVADOR
Saudi Arabia	SAUDI ARAMCO AVIONICS	DAMMAM
Saudi Arabia	JET AVIATION SAUDI ARBIA CO LTD	JEDDAH
Saudi Arabia	AIRCRAFT ACCESSORIES AND COMPONENTS COMPANY LTD	JEDDAH
Saudi Arabia	SAUDIA ARABIAN AIRLINES SAUDIA AEROSPACE ENGINEERI	JEDDAH
Saudi Arabia	SAUDI ARAMCO AVIATION REPAIR STATION	RAS TANURA

Saudi Arabia	ALSALAM AEROSPACE INDUSTRIES	RIYADH
Saudi Arabia	SAUDI ARAMCO AVIATION REPAIR STATION	TANAJIB
Scotland	ETHOSENERGY (GBR) LIMITED	ABERDEEN
Scotland	SURVIVAL ONE LTD	ABERDEENSHIRE
Scotland	GAS TURBINE SOLUTIONS LIMITED	AYRSHIRE
Scotland	TURNER AVIATION LTD	GLASGOW
Scotland	GE CALEDONIAN LTD	PRESWICK, SCOTLAND
Scotland	HARRY MENDELSSOHN AVIONICS	SCOTLAND
Scotland	IMT AVIATION SCOTLAND LIMITED	SCOTLAND
Scotland	ROHR AERO SERVICES LTD	SCOTLAND
Scotland	TELEDYNE LIMITED	SCOTLAND
Scotland	WOODWARD INTERNATIONAL INC	SCOTLAND
Scotland	ACLAS TECHNICS LIMITED	WEST LOTHIAN
Serbia	JAT TEHNIKA D O O BELGRADE	BELGRADE
Singapore	DALLAS AIRMOTIVE ASIA-PACIFIC PTE LTD	SELETAR AIRPORT
Singapore	ZODIAC AEROSPACE SERVICES ASIA PTE LTD	SINGAPORE
Singapore	BOMBARDIER AEROSPACE SERVICES-SINGAPORE	SINGAPORE
Singapore	MAG ENGINE SYSTEMS PRIVATE LIMITED	SINGAPORE
Singapore	PRATT AND WHITNEY COMPONENT SOLUTIONS PTE LTD	SINGAPORE
Singapore	LIEBHERR SINGAPORE PTE LTD	SINGAPORE
Singapore	ONTIC ENGINEERING AND MANUFACTURING ASIA	SINGAPORE
Singapore	BELL HELICOPTER ASIA (PTE) LTD.	SINGAPORE
Singapore	VECTOR AEROSPACE ASIA PTE LTD	SINGAPORE
Singapore	MAJ AVIATION PTE LTD	SINGAPORE
Singapore	INTERIORS AEROSPACE PTE. LTD.	SINGAPORE
Singapore	COMPONENT AEROSPACE SINGAPORE PTE LTD	SINGAPORE
Singapore	FOKKER SERVICES ASIA PTE LTD	SINGAPORE
Singapore	EAGLE SERVICES ASIA PTE LTD	SINGAPORE
Singapore	FUEL ACCESSORY SERVICE TECHNOLOGIES PTE LTD	SINGAPORE
Singapore	GE AVIATION, ENGINE SERVICES-SINGAPORE PTE. LTD.	SINGAPORE
Singapore	HONEYWELL AEROSPACE SINGAPORE PTE LIMITED	SINGAPORE
Singapore	SAFRAN LANDING SYSTEMS SERVICES SINGAPORE PTE. LTD	SINGAPORE
Singapore	ST AEROSPACE SYSTEMS PTE LTD	SINGAPORE

Singapore	HAWKER PACIFIC ASIA PTE LTD	SINGAPORE
Singapore	JET AVIATION ASIA PACIFIC PTE LTD	SINGAPORE
Singapore	SAFRAN ELECTRONICS & DEFENSE SERVICES ASIA PTE LTD	SINGAPORE
Singapore	ESTERLINE SENSORS SERVICES ASIA PTE LTD	SINGAPORE
Singapore	SINGAPORE AERO ENGINE SERVICES LIMITED	SINGAPORE
Singapore	AEROSPACE COMPONENT ENGINEERING SERVICES PTE LTD	SINGAPORE
Singapore	TURBINE OVERHAUL SERVICES	SINGAPORE
Singapore	ACP METAL FINISHING PTE LTD	SINGAPORE
Singapore	HONEYWELL AEROSPACE SINGAPORE PTE LTD	SINGAPORE
Singapore	PRATT AND WHITNEY CANADA S E A PTE LTD	SINGAPORE
Singapore	ST AEROSPACE ENGINES PTE LTD	SINGAPORE
Singapore	ASIAN SURFACE TECHNOLOGIES PTE LTD	SINGAPORE
Singapore	AMETEK SINGAPORE PTE LTD	SINGAPORE
Singapore	PANASONIC AVIONICS SERVICES SINGAPORE PTE LTD	SINGAPORE
Singapore	AERO INDUSTRIES (SINGAPORE) PTE LTD	SINGAPORE
Singapore	ST AEROSPACE ENGINEERING PTE LTD	SINGAPORE
Singapore	AVIATION AND ELECTRONICS SUPPORT PTE LTD	SINGAPORE
Singapore	GOODRICH AEROSTRUCTURES SERVICE CENTER-ASIA PTE LT	SINGAPORE
Singapore	ROCKWELL COLLINS SOUTHEAST ASIA PTE LTD	SINGAPORE
Singapore	THALES SOLUTIONS ASIA PTE LTD	SINGAPORE
Singapore	SIA ENGINEERING COMPANY LTD	SINGAPORE
Singapore	SATAIR PRIVATE LIMITED	SINGAPORE
Singapore	TELAIR INTERNATIONAL SERVICES PTE LTD	SINGAPORE
Singapore	GOODRICH AEROSPACE PTE LIMITED	SINGAPORE
Singapore	ST AEROSPACE SERVICES CO PTE LTD	SINGAPORE
Singapore	ABV AVIATION SUPPORT PTE LTD	SINGAPORE
Singapore	MEGGITT AEROSPACE ASIA PACIFIC PTE LTD	SINGAPORE
Singapore	W H BRENNAN AND CO PTE LTD	SINGAPORE
Singapore	JAMCO SINGAPORE PRIVATE LIMITED	SINGAPORE
Singapore	SETSCO SERVICES PTE LTD	SINGAPORE
Singapore	WINDSOR AIRMOTIVE ASIA PTE LTD	SINGAPORE
Singapore	EXCEL AEROSPACE PTE LTD	SINGAPORE
Singapore	STANDARD AERO ASIA PTE LTD	SINGAPORE
Singapore	FAG AEROSPACE (SINGAPORE) PTE LTD	SINGAPORE

South Africa	SAA TECHNICAL SOC LTD	KEMPTON PARK
South Korea	GE ON WING SUPPORT KOREA INC	GYEONGGI-DO
South Korea	SHARP AVIATION K INC	INCHEON
South Korea	ASIANA AIRLINES	INCHEON
South Korea	KING AEROSPACE INC	PYONGTAEK
South Korea	KOREAN AIR LINES	SEOUL
Spain	AEROSPACE ENGINEERING GROUP S L	ABANTO, VIZCAYA
Spain	INDUSTRIA DE TURBO PROPULSORES S A	AJALVIR, MADRID
Spain	AERNNOVA AEROSPACE S A	ALAVA
Spain	COMPANIA ESPANOLA DE SISTEMAS AERONAUTICOS S A CE	MADRID
Spain	AERONAUTICA GESTION S.L.	MADRID
Spain	INDUSTRIAS ZACARIAS MORENO SL	MADRID
Spain	GETSTAIR MAINTENANCE SLU	MADRID
Spain	IBERIA LINEAS AEREAS DE ESPANA S A OPERADORA	MADRID
Spain	CESSNA SPANISH CITATION SERVICE CENTER	VALENCIA
St. Barts	ST BARTH COMMUTER	SAINT BARTHELEMY
Sweden	YTSTRUKTUR ARBOGA AB	ARBOGA
Sweden	SAAB AB AVIONICS SYSTEMS	JONKOPING
Sweden	ADVANTAGE TURBINE SERVICES SWEDEN AB	KNIVSTA
Sweden	SAAB AB-MALMSLATT/ARBOGA	LINKOPING
Sweden	CTT SYSTEMS AB	NYKOPING
Sweden	TABY AIR MAINTENANCE AB	OREBRO
Sweden	ENVIROTAINER ENGINEERING AB	ROSERSBERG
Sweden	SCANDINAVIAN AIRLINE SYSTEM-DENMARK-NORWAY-SWEDEN	STOCKHOLM
Sweden	PATRIA HELICOPTERS AB	STOCKHOLM-ARLANDA
Sweden	GKN AEROSPACE SWEDEN AB	TROLLHATTAN
Sweden	AIRSAFE SWEDEN AB	VASBY
Switzerland	EMTEQ EUROPE GMBH	BACHENBUELACH
Switzerland	AMAC AEROSPACE SWITZERLAND AG	BASEL AIRPORT
Switzerland	AIR SERVICE BASEL GMBH	BASEL AIRPORT
Switzerland	JET AVIATION AG BASEL	BASEL EUROAIRPORT
Switzerland	5 STAR AVIATION CLEMENT	ZURICH AIRPORT
Switzerland	RUAG SWITZERLAND LTD ASN	EMMEN
Switzerland	JET AVIATION AG GENEVA AIRPORT BRANCH	GENEVA

Switzerland	TAG AVIATION SA	GENEVA
Switzerland	CESSNA ZURICH CITATION SERVICE CENTER GMBH	KLOTEN
Switzerland	CERMEC MOTOR SA	PUIDOUX
Switzerland	PILATUS AIRCRAFT LTD	STANS
Switzerland	ALTENRHEIN AVIATION LTD.	SWITZERLAND
Switzerland	MEGGITT S A	VILLARS-SUR-GL NE
Switzerland	HEDINGER AIRCRAFT COMPONENTS AG	WATTWIL SG
Switzerland	SWISSPORT INTERNATIONAL LTD	ZURICH
Switzerland	SR TECHNICS SWITZERLAND	ZURICH - AIRPORT
Thailand	MJETS MAINTENANCE LIMITED	BANGKOK
Thailand	THAI AIRWAYS INTERNATIONAL PUBLIC COMPANY LIMITED	BANGKOK
Thailand	TRIUMPH AVIATION SERVICES ASIA LTD	CHONBURI
Thailand	GOODYEAR THAILAND LTD	PATHUMTHANI
Thailand	CHROMALLOY THAILAND LTD	PATHUMTHANI
Thailand	MICHELIN SIAM COMPANY LIMITED	SARABURI
Trinidad and Tobago	CARIBBEAN AIRLINES LIMITED	PORT OF SPAIN
Turkey	PRATT AND WHITNEY THY TEKNIK UCAK MOTORU BAKIM MER	ISTANBUL
Turkey	MRO TEKNIK SERVIS SAN. TIC. A. S.	ISTANBUL
Turkey	TOTAL AVIATION LIMITED	ISTANBUL
Turkey	TURK HAVA YOLLARI TEKNIK A S	ISTANBUL
Turkey	GOODRICH THY TEKNIK SERVIS MERKEZI LTD STI	PENDIK, ISTANBUL
Turkey	AMAC AEROSPACE TURKEY A. S.	SEFAKOY, ISTANBUL
UAE	ETIHAD AIRWAYS ENGINEERING (EYENG)	ABU DHABI
UAE	AEROSPACE TURBINE SERVICES AND SOLUTIONS LLC	ABU DHABI
UAE	H + S AVIATION MIDDLE EAST LLC	ABU DHABI
UAE	ABU DHABI AVIATION	ABU DHABI
UAE	ZODIAC AEROSPACE SERVICES MIDDLE EAST-DWC LLC	DUBAI
UAE	MSI AIRCRAFT MTC SVCS INTERNATIONAL GMBH AND CO KG	DUBAI
UAE	AEROGULF SERVICES LLC	DUBAI
UAE	EXECUJET MIDDLE EAST	DUBAI
UAE	GOODRICH CUSTOMER SERVICE INC	DUBAI
UAE	AEROSTRUCTURES MIDDLE EAST SERVICES, FZCO	DUBAI
UAE	RBI HAWKER LTD.	DUBAI
UAE	B-E AEROSPACE INC	DUBAI
UAE	JET AVIATION DUBAI LLC	DUBAI

Ukraine	PATON TURBINE TECHNOLOGIES	KIEV
Vietnam	AEROSPACE ENGINEERING SERVICES JOINT STOCK COMPANY	HANOI
Vietnam	VIETNAM AIRLINES ENGINEERING COMPANY LTD	HANOI
Vietnam	VIETNAM AIRLINES ENGINEERING COMPANY LTD	HO CHI MINH CITY
Wales	AERORESPONSE LIMITED	ABERCYNON
Wales	WILLIS ASSET MANAGEMENT LIMITED	BRIDGEND
Wales	NORDAM EUROPE LTD	GWENT
Wales	BRITISH AIRWAYS INTERIORS ENGINEERING	GWENT, WALES
Wales	BRITISH AIRWAYS AVIONIC ENGINEERING LIMITED	SOUTH WALES
Wales	GE AIRCRAFT ENGINE SERVICES LTD	SOUTH WALES