AEROSPACE SECTOR ROADMAP FOR THE REGION OF NUEVO LEÓN
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1. INTRODUCTION

The accelerated growth of the Mexican aerospace sector has been the result of various industry, academia, and government initiatives. Since its launch, the National Flight Plan (NFP) has been a major strategy to boost the development of the industry in Mexico and played a key role in the creation of complementary programs which added to the sector’s progress. To continue this trend and stay on the leading edge as a reliable and competitive destination, we must continue to trigger centres of competitiveness in advanced manufacturing, engineering, and design that will position us as one of the top industry leaders worldwide.

The national strategy focuses on turning Mexico into a destination capable of handling the full cycle of an aircraft, while regional strategies are aligned with the national strategy according to the generation of vocations of the main clusters. The current national strategy, along with the regional strategies, involves the creation of centres of competitiveness in which comprehensive ecosystems are developed that allow high-level industry growth and the integrated growth of talent, promoting quality of life, access to services, and appropriate conditions for social and family life.

In order to further the development and implementation of the regional strategies, a roadmap of the region was developed, which embodies the efforts of the working group using an approach facilitated by ProMéxico. The state is one of five aerospace clusters in the country with very high potential, however, to capitalize on that potential a strategy must be formulated from which different initiatives will emerge, resulting in clear business opportunities as the working group develops action plans for each project. The roadmap aims to guide the direction of the region’s aerospace industry in the medium and long term, detect new niches of opportunity, and identify the emerging factors that may have an effect on the local aerospace sector.

Given the progressive nature of the economic and technology environment, the roadmap must be continually updated. Actions taken must be seen to be clearly aligned with the strategy and new actions should be included which respond to the dynamic conditions of the sector. The ongoing participation of all the actors involved in its implementation is, therefore, of critical importance.
2. DEVELOPMENT OF THE AEROSPACE INDUSTRY IN MEXICO

Mexico has become firmly established as a global leader in the aerospace sector. It has recorded annual growth of 17.2% during the last nine years. There are currently 287 companies and support entities, the majority with certification from the National Aerospace and Defence Contractors Accreditation Program (NADCAP) and ISO9001 and AS9100 standards specific to the aerospace industry. They are located mainly in five states and employ more than 32,600 high-level professionals.

Mexico currently ranks fourteenth as global aerospace supplier and is the sixth biggest supplier to the United States. The country has developed a solid industrial platform of aerospace-related companies. According to INEGI, between December 2012 and December 2013 aerospace equipment manufacturing personnel grew by 9.3%, growth for which the development of industry-specialized training centres was a key factor.

Mexico has built its vocation as a manufacturing, engineering, and development centre with high strategic value. The results of this transition were not unexpected, but arose from the sum of several factors, including the development of advanced manufacturing capacities, the degree of technological sophistication of its exports, the country’s engineering talent (Mexico has the highest number of engineering and technology graduates on the continent), and quality labour. The level of competitiveness in Mexico is reflected in sectors like automotive and electronics. These capacities provide a strong labour base that can be integrated into the aerospace sector.

Leading international companies like Bombardier, Safran Group, General Electric, Honeywell, and Eurocopter have found the right conditions in Mexico to develop design and engineering centres, laboratories, and production lines able to mature quickly and handle complex assignments in the race for new generations of engines, components, and fuselages.

Mexican aerospace exports reached 5.463 billion dollars in 2013. Industry estimates focused on ProAéreo report expected exports of 12.260 billion dollars by 2021, with an annual growth rate of 14%. The value of United States aerospace imports from Mexico has grown at an annual compound rate of 24%, and by 2020 Mexico could supply 5% of all aerospace products the United States buys abroad.

1 Estimated data from ProMéxico Business Intelligence Unit (UIN) with information from the Secretariat of Economy (SE)
2 Information obtained in coordination with the presidents of the aerospace clusters, ProMéxico, and the state Ministries of Trade (SEDECOS)
3 Secretariat of Communications and Transportation (SCT)
4 Monterrey Aerocluster, A.C. with data from INEGI, August 2014
5 US Department of Commerce
6 SE, DGIPAT, 2012
Forecasts point towards a 4.7% increase in air traffic and a demand for 29,000 new aircraft in the next twenty years. Given this opportunity, Mexico is seeking to position among the industry’s ten major suppliers and double exports with 50% national content by 2020.

Mexico has the most important specialized talent pool in America with more than one hundred thousand engineering and technology graduates every year, capable of supplying both aerospace and other medium and high technology industries. While the relevance of engineering graduates is not aligned with specific industry needs, their skills are such that they can be quickly trained at more competitive costs than in first-world countries.

Furthermore, Mexico continues to be highly competitive in aerospace manufacturing costs. In the latest KPMG report, Mexico has the lowest labour costs in the sector, compared to Germany, Australia, Canada, the United States, France, Holland, Italy, Japan, and the United Kingdom.

Due to the availability of laboratories and certification units and the presence of Mexican civil aviation authorities, quality infrastructure has also played a dominant role among the industry’s favourable conditions. This led to the signing of the BASA (Bilateral Aviation Safety Agreement) with the United States Federal Aviation Administration or FAA. The agreement implies the acknowledgment by the United States government of aviation certification systems and products made in Mexico, allowing the design and manufacture of components in the country, strengthening domestic supply for the manufacture of parts for the industry. The international community determined that the new Mexican export control system was so efficient and secure that the country was admitted to the Wassenaar Arrangement and the Group of Nuclear Suppliers in 2012, and to the Australia Group in 2013. In other words, Mexico is part of three of the four main export-control regimes in the world, and is in the process of applying the Missile Technology Control Regime. Mexico’s entry to the Wassenaar Arrangement is based on our country’s firm and traditional commitment to disarmament and non-proliferation, as well as the positive outcome of the evaluation of the functioning and effectiveness of the national export control, based on the agreement’s guidelines. Mexico’s access to these regimes represents new opportunities in defence engineering, design, and technology, opening the doors to new future markets and cutting-edge technology, and as a result, enhancing national competitiveness and the attraction of investment in high-technology sectors. In terms of exports, participation in the Wassenaar Arrangement alone has an estimated potential of an additional 11.3 billion dollars.

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8 Airbus Global Market Forecast “Future Journeys 2013-2032”
9 PRO-AEREO 2012-2015. SE and FEMIA. Milestones section
11 Secretariat of Foreign Affairs (SRE). 2013
Mexico’s admission to these regimes confirms the confidence of the international community in the country, establishing it as a reliable destination for the integration of sensitive technologies. It also marks the commitment of remaining a secure destination for the production of goods and services that include restricted or dual-use technologies. In addition, Mexico’s current legal framework effectively protects industrial property and ensures the proper use of goods exported from the country.

To advance the country’s integration into value chains, the Mexican government has rolled out a series of programs to boost international trade activities and thus help the efficient integration of local and global supply chains. These programs include IM-MEX, an instrument which allows the temporary import of goods required for an industrial process or service without paying import taxes, and Drawback, which allows beneficiaries to recover the cost of import taxes paid on goods, raw materials, components, parts, and other materials used in exported products.

The tariff heading 9806.00.06 was created to provide tariff benefits for the import of aviation inputs in Mexico and thus increase the sector’s competitiveness. The heading allows tax-free import for the assembly or manufacture of aircraft pieces, and goods intended for the repair or maintenance of their parts, benefiting MRO activities.

Moreover, Mexico’s strategic geographic location—close to the most important market in the world in aerospace and defence production and consumption, the United States—makes the country a natural magnet for leading companies and high-value projects, enabling entry and consolidation in that market. Mexico has an enviable position in the world; it has signed trade agreements on three continents and is positioned as a gateway to a potential market of more than one billion consumers and 60% of world GDP. In addition, Mexico has a network of free trade agreements that allow it preferential access to 45 countries, thirty agreements on reciprocal promotion and protection of investments and nine limited scope agreements, and is part of the Trans-Pacific Partnership (TPP) and the Pacific Alliance. All of this makes it an attractive destination for other regions such as South America, Asia, and Europe.

The industry’s commitment to implement a national strategy has allowed the main regions where aerospace activity is concentrated to integrate even further, shaping the creation of competitive centres within a certified, world-class ecosystem. Mexico has become a major player in the sector, not only because of its operational efficiency, but also due to its ever-growing scientific, engineering, design, and innovation activities, which have positioned it as a highly attractive destination for investment and development.

The state of Nuevo León is key to Mexico’s growth and development. In the last decade, Nuevo León received the second largest amount of foreign direct investment, with 9.1% of the national total. In addition, the state has managed to place exports equivalent to 8% of the country’s total exports.13 Nuevo León currently contributes 7.2% of domestic GDP14 and produces 11% of goods manufactured in the country.15 making it one of the more important regions in this field. Development in Nuevo León is such that it has reached a per capita GDP of 18,345 dollars per year, when the national average is 10,632 dollars.16 These figures are the result of a developed culture of innovation and a solid urban, technology, and education infrastructure.

The state’s innovative training is reflected in the ranking of the National Innovation Index Venture Institute, an entity created with support from CONACYT.19 Nuevo León appears second place as a state and its capital, Monterrey in third place as a city. Monterrey is one of the Latin American Cities of the Future according to the Financial Times ID.20 The urban infrastructure of the state of Nuevo León shows a high degree of development. Its transport capacities, through the state’s road and railroad networks, give it access to the major ports and cities of Mexico and North America. The state is connected to the United States, for example, by the Kansas City Southern KCS railroad and to the interior by networks given in concession to KCS and Ferromex. The central-east trade corridor, which passes through Nuevo León, is the main artery that links Canada, the United States, and Mexico. The state is connected by major roads with the United States border (highways to Nuevo Laredo and Reynosa), with the Gulf of Mexico (Pan-American Highway), and with the rest of the country (Matehuala-San Luis Potosí-Mexico City trunk road). Nuevo León has two fully functional airports: the International Airport of Monterrey, the fourth largest in the country for the number of operations and passengers handled;21 and the International Airport of the North for general aviation.

The state government is working on two projects to further develop infrastructure, the first is Nuevo León, Knowledge Economy and Society, which includes actions to link academia with technology companies through new knowledge parks, integrating roads and transport services with digital and fibre optic networks; the second is Interpuerto Monterrey, which seeks to position Nuevo León as a logistics platform among the world’s trade networks through a multimodal logistics park that will become a full-service dry port (with offices, trade, and hotel infrastructure to accommodate the needs of its clients, and a logistics research centre—in partnership with the Autonomous University of Nuevo León—to benefit the companies installed in the park and the region’s inhabitants).22

In terms of the state’s technology and R&D capacity, Nuevo León has 98 research centres and four high-tech parks—the Monterrey Institute of Technology and Higher Education (Instituto Tecnológico y de Estudios Superiores de Monterrey, ITESM) and the Autonomous University of Nuevo León (UANL)—rank among the top five universities in the country.23 Thus, the state has a solid infrastructure and the necessary resources to serve a highly productive, innovation- and knowledge-based sector such as aerospace. Nuevo León’s qualified and highly competitive workforce is renowned around the country and abroad due to its more than one hundred years of experience in highly productive sectors like metalworking and electrical-electronics. The state has also begun to excel in high-value sectors such as high-precision machining and advanced manufacturing.

All these capacities have allowed the state’s aerospace industry to develop in a favourable environment. In addition, the efforts of the triple helix working towards a common goal led to the founding, in 2009, of the Monterrey Aerocluster, a non-profit organization whose mission is to develop and promote the aerospace industry in the region and which has played a major role in its growth ever since. For its efforts in striving towards excellence, in 2014 the Monterrey Aerocluster was awarded the Bronze Label for Cluster Management Excellence by the European Secretariat for Cluster Analysis.24

del, which maintains that the potential for innovation and economic development in a knowledge society lies in the conjunction of elements from academia, industry, and government to generate new formats for knowledge production, transfer, and application.25 As a perfect complement to the innovation, urban capacities, and technology provisioning mentioned above, the education and human capital infrastructure in the state are among the most advanced in the country. There are 93 universities (campus) and educational institutions that offer 213 technical degree courses and graduate over five thousand engineers every year.26 Two of the universities—the Monterrey Institute of Technology and Higher Education (Instituto Tecnológico y de Estudios Superiores de Monterrey, ITESM) and the Autonomous University of Nuevo León (UANL)—rank among the top five universities in the country.27 Thus, the state has a solid infrastructure and the necessary resources to serve a highly productive, innovation- and knowledge-based sector such as aerospace. Nuevo León’s qualified and highly competitive workforce is renowned around the country and abroad due to its more than one hundred years of experience in highly productive sectors like metalworking and electrical-electronics. The state has also begun to excel in high-value sectors such as high-precision machining and advanced manufacturing.

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3. THE AEROSPACE INDUSTRY IN THE REGION

The state of Nuevo León is key to Mexico’s growth and development. In the last decade, Nuevo León received the second largest amount of foreign direct investment, with 9.1% of the national total. In addition, the state has managed to place exports equivalent to 8% of the country’s total exports.13 Nuevo León currently contributes 7.2% of domestic GDP14 and produces 11% of goods manufactured in the country.15 making it one of the more important regions in this field. Development in Nuevo León is such that it has reached a per capita GDP of 18,345 dollars per year, when the national average is 10,632 dollars.16 These figures are the result of a developed culture of innovation and a solid urban, technology, and education infrastructure.

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14 ENSEÑANZA/Tecnológico/Conaco/2016-06-PoliticaComercial.pdf
15 Regional Indicators of Economic Activity, Banamex-Citi, 2014. http://www.banamex-
16 Group of Economic Activity, Banamex-Citi, 2014. http://www.banamex-
26 Cluster Management Excellence by the European Secretariat for Cluster Analysis.26

The state currently has 32 aerospace-related companies which generate more than three thousand direct jobs and export 800 million dollars a year. With twenty-two DGAC certified Maintenance, Repair and Overhaul (MRO) workshops serving 12% of the Mexican fleet, Nuevo León is the third biggest investor in aerospace R&D in the country.

Top-ranking educational institutions have also been an important support tool for growing the aerospace industry in the state. The ITESM has developed AS9100 certification programs and has a master’s degree program with a double major in aerospace engineering and lightweight technologies with the Steinbeis University in Berlin (Steinbeis-Hochschule Berlin). The UANL also has bachelor, master, and doctoral degree courses in aeronautical engineering. The Centre for Research and Innovation in Aeronautical Engineering (Centro de Investigación e Innovación en Ingeniería Aeronáutica, CIIIA) contributes to the regional and national development of the sector. And Álvaro Obregón and CONALEP schools offer a technical degree in engine and glider maintenance.

As a result of the above, Nuevo León has the capacity to train the region’s human capital for rapid insertion into the industry, meeting the rigorous quality controls demanded by the sector. Thus, it has become specialized in the machining of pieces and thermal treatment of metals, safety systems, connectors, and harnesses. Some companies in the state have also specialized in the manufacture of electrical conductors. The region’s industry has developed complete fuselages with pieces imported from the United States and others manufactured in Mexico. According to data from MD Helicopters México, 24 fuselages for a Boeing military-use aircraft will be manufactured in the coming months, 90% of the fuselage being manufactured with domestic labour.

Thus, the state has created the bases for the evolution of the aerospace industry. Its capacities in other industries might also trigger the emergence of a much more complex degree of specialization within the sector. Nuevo León already has the foundations, infrastructure, and capacities to firmly establish itself as an aerospace-oriented region, joining the national development strategy of the sector.

### Centers maintenance and repair (MRO)

- **Aero Alterno, S.A. de C.V.**
- **Aero Corporación Azor, S.A. de C.V.**
- **Aerovitro S.A. de C.V.**
- **Ankura Desarrollos Aeronáuticos, S.A. de C.V.**
- **Hawker Beechcraft Services de México, S. de R.L. de C.V.**

### Manufacturing and supplying major aerospace companies in Nuevo León

- **OEM**
  - MD Monterrey

- **Tier 1**
  - FRISA
  - Viokon
  - Jaiter
  - CIMSAMEX
  - Ez1 Metales
  - Tecmaq
  - MIMSA

- **Tier 2**
  - HEMAQ
  - AEISA
  - Metalinspec
  - EXOVA
  - PIAGA

- **Support**
  - HEMAQ
  - AEISA
  - Metalinspec
  - EXOVA
  - PIAGA

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27 Monterrey Aerocluster, A.C. 2014
28 DGIPAT. 2014
29 Monterrey Aerocluster, A.C. 2014
30 DIGIPAT. SE. 2012
31 MD Helicopters. 2014
4. SWOT, CAUSAL MAP, AND TRENDS

SWOT

The analysis of the current situation of the sector shows Nuevo León as a state with high potential for the development of human capital and a solid advanced manufacturing base. It is important to continue working on these aspects and on the development of supply chains to boost growth in the sector and in readiness for future challenges. The sector’s main opportunities lie in the creation of synergies between aerospace companies from Nuevo León and other industries, states, and clusters, and the existence of local companies from other industries willing and able to lean towards the aerospace industry.

Strengths

• Capacity to provide high-level technical talent
• Solid industrial base in high-technology sectors
• High-level academic institutions integrated to the sector
• Advanced urban, technological, and educational infrastructure
• Outstanding capacity for research, development, and innovation
• Entrepreneurial vision, values, and work culture focused on high quality
• Availability of public and private financing resources

Weaknesses

• Insufficient industry-government coordination
• Little promotion of the state as an investment alternative for the sector
• Lack of initiatives to strengthen the supply chain
• Few large aerospace companies in the region
• Lack of technical knowledge of the aerospace sector

Opportunities

• Synergies with other industries, states, and clusters
• Willingness of companies from other sectors to explore the aerospace sector
• The sector’s projected growth
• Foreign investment seeking new destinations
• Supplier development

Threats

• High degree of international competition in the sector
• Other attractive national and international destinations seeking local talent
• Growth of more attractive industries for the investor
• Perceived level of security in the country

CAUSAL MAP

Based on the results of the SWOT analysis and the current situation of the aerospace industry in the region, the following variables were selected for their importance to the development of the sector:

- Urban and technological infrastructure (roads, fibre optics, ports, airports, and research centres)
- Number of sector-related educational programs
- Number of graduates per year from sector-related degree courses
- Number of companies whose main line of business is aerospace
- Number of companies that can be reoriented
- Demand for technicians and engineers

Relationship between the variables:

- Number of aviation companies
- Number of companies that can be reoriented
- Demand for technicians and engineers
- Number of graduates per year from A+D programs
- Urban and technological infrastructure

Based on the analysis, the following relationships were identified:

1. Urban and technological infrastructure influences the number of aviation companies.
2. The number of aviation companies affects the demand for technicians and engineers.
3. The demand for technicians and engineers is influenced by the number of graduates per year from A+D programs.
4. Urban and technological infrastructure also impacts the number of sector-related educational programs.
5. The number of companies that can be reoriented is influenced by the number of graduates per year from sector-related degree courses.
The above map shows the direct and indirect relationships between the different players in the region. It shows the natural relationships between variables and highlights the region’s commitment to attack the substantive issues related to the sector. The strong commercial activity in different sectors has allowed Nuevo León to develop an urban and technological infrastructure base with attractive robust and agile capacities which cater to aerospace companies.

**TRENDS**

The trends analysis covers the social, technological, economic, environmental, and political-legal perspectives. Its importance lies in its capacity to obtain strategic information that allows the identification of the most important market niches and the evaluation of scenarios where the country or region might obtain better opportunities.

The main input on technological trends was obtained from the analysis conducted by the International Air Transport Association (IATA). The most important trends for the state are presented in this document, and so it will be important for local organizations to understand them and find specific opportunities in each one.12

Annual production in commercial aviation is expected to rise by 25% by around 2023. The increased demand has drawn more new global competitors to the market dominated by Boeing and Airbus, and so new options are being analysed to diversify and develop supply chains.13

Small companies have now formed clusters in order to gain access to scale economies. Being cost competitive and having high quality standards will be a trend to be reckoned with in the next few years. Nuevo León is fully aware of this and has designed support programs for aerospace industry suppliers, such as the Aerospace SMB Development Program—started in 2010—whose aim is to support the growth of small and medium-sized companies, increasing their capacities and improving their processes.14

In the defence sector, budgets are forecast to remain low, mainly due to the interruption of armed conflicts in Iraq and Afghanistan. Despite these adjustments to defence spending, the United States has remained the most lucrative country.

The defence industry represents 70% of the total value of the A+D market, while the civil segment barely contributed the remaining 30%. Aerospace and defence companies are facing new challenges related to cost cuts in their programs and contracts. In addition, there is continuous pressure to build ever more efficient and lighter aircraft. Given this situation, Mexico has the opportunity to become a strategic partner in the manufacture of dual-use goods. Since its entry into the leading export regimes, the country has received increasingly more profitable and strategic projects. Some of the projects that fit this profile are combat aircraft and drones.15

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12 The IATA Technology Roadmap Report, 3rd edition
13 Global Aerospace & Industry Outlook—December 2014
# 5. Roadmap of the Aerospace Sector of Nuevo León

## Strategic Milestones

1. Be the top R&D centre in the country for advanced manufacturing and aerospace design.

## Strategic Projects

1. Build a virtual laboratory with a mapping of all the scientific infrastructure at NL research centres and institutions
2. Increase complementary installed capacities in research centres
3. Strengthen collaborative work between companies and academic institutions through joint participation in R&D projects

2. Nuevo León as the most important HUB in Latin America for civil aviation MRO.

- Parts and components logistics hub
- Create a centre specialized in modifications and design
- Proposal for an avionic and certification lab for different aircraft types
- Promote the establishment of local suppliers
- Guidance on promoting NL as an MRO hub

3. Become the biggest generator of human capital for the aviation sector in Mexico, specialized in high-precision manufacturing, materials, mechanical design, and maintenance for aviation.

- Develop a mapping of human capital needs, and tailored programs on training, specialization, and technical assistance across all levels
- Development of promotion programs for academic institutions which offer aerospace education

4. Nuevo León with a developed and skilled supply chain integrated into the aerospace value chain.

- Raising of local supply chain capacities and manufacturers’ needs analysis
- Link companies in the Monterey Aerocluster to the Business Liaison Centre of the Secretariat of Economic Development of Nuevo León
- Aerospace Industry Assistance and Support Centre (Centro de Asistencia y Soporte para la industria Aeroespacial, CASIA) of Nuevo León
6. MILESTONES AND STRATEGIC PROJECTS

MILESTONE 1

Be the top R&D centre in the country for advanced manufacturing and aerospace design.

Estimated implementation: 2020

Being the top R&D centre in advanced manufacturing and design in the aerospace sector means that the state has sufficient facilities, capacities, personnel, and resources to accommodate the most advanced R&D activities. A knowledge and technology-based economy leads to multiple benefits across different sectors. In addition to generating higher returns for the aerospace sector, investment in R&D will create a virtuous circle of socioeconomic growth and development for the state. R&D activities enable the furthering and diffusion of scientific knowledge, the creation of new specialties, and the acquisition of tacit knowledge. The application of such knowledge leads to the development of new technologies that can become process, product, or service innovations. While R&D projects are underway, new capacities are established through the instruction and training of professionals, the acquisition of infrastructure and the development of services, which, later on, will be available to other sectors. Although the results are not immediate, the positive effects in the medium term are considerable, reaching not only the economic, but also the social sphere.

Monterrey Aerocluster supports innovation initiatives developed by the industry, higher-educational institutions and research centres, which trigger technology development in the sector. Nuevo León has high-level research centres, such as the UANL research centre, the technological branch of the aerospace industries in the north of Mexico, through the promotion of high-value projects in the production chain and the development of new technologies, products, materials, and processes, it has become unique in Mexico, with fifteen laboratories equipped with third-generation technology, a hangar, and a wind tunnel. The coordinated work of the different players in implementing the strategic projects will be fundamental to achieve the milestone.

Strategic Project 1

- Build a virtual laboratory with a mapping of all scientific infrastructure at NL research centres and institutions.
- Responsibility of: Monterrey Aerocluster A. C. - R&D Committee
- Estimated implementation: 2016

This project consists of the development of a virtual space, a platform which documents all the capacities, projects, services and infrastructure at the service of the aerospace industry. The virtual laboratory will be a technology platform that serves the industry and where those interested in an activity or service can enter, search, and contact the institution or research centre that meets their need.

The advantage of this project is knowing the scientific capabilities of the state in the research centres and institutions, and enhancing them to trigger the development of the industry. By building the virtual laboratory, access to the state’s scientific and technological capabilities and skills will be available first hand, enabling institutions or companies that require them to access them easily, quickly and efficiently, reducing response times and achieving a more efficient flow of information. The map will lay the groundwork to support strategies with local industry to meet its goals.
Action Plan

1. The Monterrey Aerocluster will appoint an R&D committee and give it the power to manage, implement, and make decisions on issues related to the R&D activities of the state’s aerospace industry.

2. The Monterrey Aerocluster R&D committee will develop a mapping of the scientific and technological capacities in the various public and private research centres and educational institutions.

3. The committee will have a supplier selection process to develop the networking platform. It will also handle the management, development, and approval of the technology platform. The developer will be responsible for training the committee members and manager on the operation and management of the platform.

4. The committee will appoint the person responsible for finding the manager of the platform. The manager will be responsible for the operation and management of the platform.

5. Bi-monthly working groups will be held where each institution presents its capacities and the shortages in the state are identified.

Strategic Project II

- Increase complementary installed capacities in research centres.
- Responsibility of: Monterrey Aerocluster A. C. - R&D Committee
- Estimated implementation: 2020

With particular emphasis on the non-duplication of capacities in research centres, this initiative consists of an analysis of the existing attributes in these state centres to identify the need for investment in infrastructure, and draw up a development plan. The aim is to have a comprehensive supply and the capacity to serve the aerospace sector in all the necessary areas. The initiative is a result of the previous strategic project.

One of the main benefits of the project will be to determine the kind of investment required in research centres and institutions, and create value in an organized manner through a network of scientific collaboration in aeronautics. Projects will be developed collaboratively using each entity’s capacity in pursuit of the original goal (not to duplicate capacities), by common agreement with the participants. In addition, the collaboration network will have the power to manage funds and resources before the appropriate authorities, in a more efficient way than if each institution did so separately.

Action Plan

1. The committee appointed by Monterrey Aerocluster will conduct an analysis of the required capacities.

2. An analysis will be performed of national and international best practices to determine which apply to the domestic market.

3. Monterrey Aerocluster will form the network of scientific collaboration in aeronautics, in which all research centres and institutions will be represented.

4. The collaboration network will appoint the individual or party responsible for gathering the documentation and presenting the results of the capacity analysis.

5. The committee will create an office for the management of funds, select the missing capacities, and define the institution where the investment will be made.

Strategic Project III

- Strengthen collaborative work between companies and academic institutions through joint participation in R&D projects.
- Responsibility of: Monterrey Aerocluster A. C. - R&D Committee
- Estimated implementation: 2017

This project consists of developing and strengthening the link between companies and institutions in R&D projects, adding the capacities of the different participants through the scientific collaboration network in aeronautics. The benefit of this program is the collaborative development, through the network, of high value added projects.

In parallel, the project will also support talent training initiatives. Informing companies of the scope of the institutions in the scientific collaboration network will enable the joint implementation of aerospace development projects. It will also seek the support of chambers such as CAINTRA, which give support and access to updated databases of suitable candidates for development in the aerospace industry.

Action Plan

1. Monterrey Aerocluster R&D Committee will liaise between the industry and academia so that each party knows the capacities and needs of the other.

2. The committee will be responsible for determining which institutions will participate and the scope of the project. The R&D Committee will develop a strategic plan that will be presented to the board.

3. The human resources required for the initiative will be defined and talent development programmes will be created based on specific needs.

4. The initiative presented by the R&D Committee, endorsed by Monterrey Aerocluster, will be the spearhead for the achievement of excellence in education plans, geared towards the needs of the industry, bearing in mind that the said plans are evolutionary and adaptable to market needs.

5. A plan will be made to identify projects suitable for collaborative work.

6. Operational and management needs will be defined to ensure the relationship is appropriate.

7. A procedure will be designed to verify that the project meets the requirements for development under a collaboration scheme.

8. A scheme will be defined to measure the progress and number of projects, and a program designed to control the scope of the projects.
Nuevo León as the most important HUB in Latin America for civil aviation MRO

Estimated implementation: 2020

Nuevo León has enormous potential for becoming an outstanding centre for integrated MRO services. The proposal for the hub covers all the capacities and maintenance levels of engines and components for the different brands and models of civil aircraft, the modification and dismantling of end-of-life aircraft, and quality laboratory testing and approval by certification units so that the workshops can jointly offer a full service for users (operators and owners).

According to data from TeamSAI, the global market value of MRO is 57.7 billion dollars and is expected to reach 86.8 billion dollars by 2024. Furthermore, the market value in Latin America is expected to double, going from 2.6 billion to 5.5 billion dollars in the same period.36

Growth expectations indicate that within the next twenty years the global market for executive jets will also grow significantly. Forecasts mention the delivery of twenty thousand new aircraft valued at 617 billion dollars, North America receiving the bulk of them, with an estimated 4,885 units.37

Mexico is the second biggest market for executive jets in Latin America and has the fourth biggest fleet in the world, behind Brazil, Canada, and the United States.38 Until 2013, there were some 6,427 private aircraft registered in the country (including airplanes and helicopters).40

In the domestic market, the northern region has a third of the country’s fleet of executive jets; Nuevo León represents 13.2% of the national total, the second largest fleet in the country. In addition, the New Mexico and Texas markets have around 2,100 aircraft of this type.41

The conditions developed in the Mexican aerospace sector will be leveraged to consolidate the aeronautics integrated services hub in the region: the solid national strategy of the sector—which focuses on the generation of advanced manufacturing capacities and R&D engineering and development,— the sustained growth of the Mexican aerospace sector, availability of talent and proven experience in the education of maintenance-specialized professionals, and the reliability of the Mexican aerospace system in terms of safety and quality.

Achieving the milestone will depend on the implementation of strategic projects that require various actors to coordinate their efforts. If the project is to be successful, the hub must have efficient infrastructure, a flexible regulatory system, maintain a close relationship with educational institutions, and involve the national aerospace manufacturing and R&D industry. The region must capitalize on its competitive advantages, among which are its expertise in high and medium technology, competitive costs, passenger flow representing 7% of the national total,41 and good air connectivity. In addition, the Norte International Airport—the only private airport in Mexico—has twenty-two DGAC-certified workshops of which two are also certified by the Federal Aviation Administration (FAA), making it the second biggest airport in Mexico and Central America for civil aviation operations.42

36 TeamSAI Flight Global. 2014
37 Bombardier Business Aircraft. Market Forecast 2013-2033
38 ProMéxico estimation with data from Aviationweek
40 Information from ProMéxico.
42 Information from Monterrey Aerocluster, A.C. 2014
Strategic projects resulting from the Milestone

Strategic Project I

- Parts and components logistics hub.
- Responsibility of: Monterrey Aerocluster A. C. - MRO Committee
- Estimated implementation: 2017

One of the main pillars of the civil aviation MRO hub will be to have a central warehouse of generic spare parts, i.e., an inventory of certain components with a high degree of reusability, available to all workshops. This will require training programs for maintenance centres on logistics and foreign trade, followed by the Nuevo Esquema de Empresas Certificadas (New scheme of certified companies, NEEC) certification and the relevant authorizations issued by the DGAC.

The centralized inventory—belonging to the different workshops—will raise competitiveness by reducing the waiting time caused by the logistics of parts or spare parts supply, thereby positively impacting the aircraft’s downtime. In this industry, reducing the time the aircraft is grounded for maintenance is vital, so a scheme which guarantees efficient logistics processes and speedy service will have direct impact on airline revenues.

The creation of a parts and components logistics hub is feasible since MRO workshops already have an inventory. They already know the process of managing a generic parts inventory. The next step involves the definition of high-turnover items for handling and distribution through the hub.

Action Plan

1. The Monterrey Aerocluster will appoint an MRO committee with the power to manage, implement, and take decisions on issues related to the MRO activities of the state.
2. Together with the main representatives and experts of sector companies, the Monterrey Aerocluster MRO Committee will design the centralized processes for the use and management of the logistics hub. It will also define a catalogue of generic parts and consumables which the hub will handle.
3. Monterrey Aerocluster MRO Committee will design a marketing and promotion plan to attract participants to the hub.
4. An execution and implementation plan will be designed for the actions agreed on by the Monterrey Aerocluster MRO Committee.

Strategic Project II

- Create a centre specialized in modifications and design.
- Responsibility of: Monterrey Aerocluster A. C. - MRO Committee
- Estimated implementation: 2017

The civil aviation MRO hub will not only provide maintenance, but also comprehensive and customized interior renovation and adaptation services. The centre will have the capacities to provide tailored modification of interiors, upholstery, and entertainment and lighting systems, among others. The plan is to go beyond repairs and offer work that requires design and engineering related to aircraft systems.

The initiative will provide customers with comprehensive and personalized services. A global proposal increases the workshops’ activity and strengthens their relationship with users.

To position the hub as one of the main re-adaptation centres, it will be necessary to define which services are of most value in order to create the appropriate capabilities.
Action Plan

1. Monterey Aerocluster MRO Committee will identify the needs and requirements of the adaptation centre, propose the specific objectives and scope of the project, and define the areas of specialization of the hub.
2. The committee will analyse the companies that already have the capacity to form part of the Centre and define the possible participation of each one.
3. The Monterrey Aerocluster will appoint a team to present the project to potential investors and promote the certification of local companies that can supply the adaptation centre.

Strategic Project III

- Proposal for an avionics and certification laboratory for different aircraft types.
- Responsibility of: Monterrey Aerocluster A. C. - MRO Committee
- Estimated implementation: 2020

This project consists of the development of a specialized laboratory with the necessary equipment to verify, diagnose, and inspect aircraft. The proposal is for the laboratory to focus on the certification and testing of aircraft systems and subsystems.

While the overall benefit of a laboratory of this kind is clear, a particular strategy must be developed in order to define its focus, since the avionics field is so broad. An evaluation of the project by the MRO Committee is needed. The avionics laboratory will allow workshops to access new markets, raise their competitiveness, and offer a high-value service to users.

Action Plan

1. The Monterrey Aerocluster MRO Committee will develop a map of current avionics capacities and define which will need to be developed to compete internationally.
2. The Monterrey Aerocluster MRO Committee will conduct a cost/benefit analysis of the laboratory equipment required and determine the economic and financial viability of the project.
3. The committee will define the profile of the required human capital and create a development program.
4. The committee will evaluate the possibility of adapting an existing laboratory or seeking a public-private joint investment for its implementation.
5. The laboratory installation, opening, and operation will be monitored.

Strategic Project IV

- Promote the establishment of local suppliers.
- Responsibility of: Monterrey Aerocluster, A. C.
- Estimated implementation: 2020

As a civil aviation MRO hub, it is important to have local suppliers of engine and general aircraft components, such as propellers, brake assemblies, gears, ailerons, generators, and stabilizers.

An essential part of the project is creating an integrated supplier ecosystem, and allowing the supply chain to strengthen in terms of components and parts to be repaired or reused, so that suppliers and workshops in the hub can act in harmony with other elements and be competitive in cost and response time by eliminating to a large extent the logistics costs associated with supply.

The development of local component suppliers is an affordable investment, since the big companies support the development of suppliers in the region in order to improve their cost competitiveness.

The state currently has two propeller workshops in operation and one brake workshop, as well as a significant number of workshops serving other industries.
which could get the necessary certifications and focus one or more of their lines of business on the aerospace sector.

**Action Plan**

1. The Monterrey Aerocluster MRO Committee will determine the state’s current capacities and which are lacking, perform a national and international supplier analysis, and identify the best practices that can be implemented locally.

2. The Monterrey Aerocluster will design a support and certification program for companies serving other industries and which show interest in moving into the aerospace sector.

3. Partnership programs will be created with the supply chains of other local industries.

4. Finance schemes will be sought to develop regional suppliers.

5. An execution and implementation plan will be designed of the actions agreed by the supplier development committee.

6. A plan will be defined for making periodic evaluations to monitor the development of the project.

**Strategic Project V**

- Board to promote NL as an MRO hub.
- Responsibility of: Monterrey Aerocluster A. C. - MRO Committee
- Estimated implementation: 2015

The hub will have a board which is actively involved in the promotion of the region’s aerospace capacities. The promotion board will be organized independently of the Monterrey Aerocluster and its members will be appointed by the MRO Committee. It will be financed by the members of the hub and participate in fairs, congresses, and other promotion events. The aim of promoting the hub is for investors to see Nuevo León as a destination that can provide a comprehensive aircraft service.

The board will seek to increase the activity of local workshops by attracting new clients and with access to markets that had not been previously explored, such as Central America. It also aims to increase the share in the North American market, which is the most important in terms of executive fleets.

**Action Plan**

1. The Monterrey Aerocluster MRO Committee will appoint a promotion board which will develop the strategy to follow to promote the hub.

2. The Monterrey Aerocluster will coordinate with the government of Nuevo León and ProMéxico to attend national and international events in order to promote the leadership of the state’s aerospace sector.

3. The promotion board will be responsible for developing the hub’s promotion material, capacity matrix, and directories.

**Strategic Project V I**

- Regional office of the General Directorate of Civil Aviation (Dirección General de Aviación Civil, DGAC).
- Responsibility of: Monterrey Aerocluster A. C. - MRO Committee
- Estimated implementation: 2015

Once Nuevo León is consolidated as a competitive aerospace centre, the need will have to be assessed for a regional DGAC office, with the same functions as the central offices, the capacity to handle all procedures and reduce delivery times, and the power to issue authorizations. The DGAC is the highest aviation authority in the country, overseeing compliance with national aviation laws and the correct application of sector-related standards and regulations.

The main benefit of a DGAC office in Nuevo León in terms of MRO will be the support given to aerospace projects in general, through the adoption of procedures under the time frames regulated by Mexican law. Thus, the new authorized capacities and the resulting streamlined procedures will facilitate increased activity with recurrent and new customers.
**Action Plan**

Regional DGAC Office

1. The Monterrey Aerocluster MRO Committee—in conjunction with the Secretariat of Economic Development of Nuevo León (Secretaría de Desarrollo Económico de Nuevo León, SEDENL)—will establish the strategy to attract the DGAC office.
2. The Monterrey Aerocluster coordination will contact the state government office to present the project and work together on its negotiation.
3. The Monterrey Aerocluster MRO Committee together with the state government will present the project to the DGAC and the SCT.
4. The DGAC and the SCT must make internal arrangements for the implementation of a regional office that works in coordination with regional and local headquarters.
5. The Monterrey Aerocluster will monitor the installation and operation of the office and coordination with companies in the cluster.

**MILESTONE 3**

Become the biggest generator of human capital for the aerospace sector in Mexico; specialized in high-precision manufacturing, materials, mechanical design, and maintenance for aviation

**Estimated implementation: 2025**

This milestone consists of the state of Nuevo León having the capacity and infrastructure to supply specialized talent to the national and regional aerospace sector. The state will generate a sufficient number of graduates across several disciplines and, through a broad knowledge of the particular needs of the industry, design specific programs to support the integration of professionals to local companies and create a barrier against talent drain.

The region’s universities which actively participate in the generation of aerospace talent are some of the most outstanding in the country. Among the main programs offered are those of the UANL, which in addition to bachelor and graduate degrees in aeronautical engineering, include those geared to the aerospace sector such as high-precision manufacturing, materials, and mechanical design. The ITESM, meanwhile, provides specialization in aeronautical design and manufacture for fifteen engineering companies. Educational institutions like CONALEP and the Álvaro Obregón Industrial School and Technical High School (UANL) offer technical degrees in engine manufacture. In the future, there will be a move to integrate programs and disciplines designed jointly by the industry and academia so that the programs are aligned with the specific demands of the local aerospace companies for specialized talent.

Keeping channels of communication open between industry and academia which allow the identification of future human capital needs will be vital for the timely reorientation of existing programs and the creation of new programs. This will provide insight into the definition of professional profiles and ensure that their design meets the requirements of each specialty and level. The programs must be flexible and skill-based, and with comprehensive training.

**Strategic Project I**

- Develop a mapping of human capital needs and tailored programs on training, specialization, and technical assistance across all levels.
- Responsibility of: Monterrey Aerocluster A. C. - Human Capital Committee
- Estimated implementation: 2025

Being the country’s highest generator of specialized talent for the aerospace industry implies training highly skilled personnel with the characteristics companies demand. It is therefore necessary to strengthen the link between academia and industry in the development of new curricula that will generate increased competitiveness and talent productivity.

The project will produce reciprocal benefits among the parties involved. On one hand, academia places its graduates quickly and prepares them on current issues recommended by the companies; on the other, organizations are supplied with enlightened talent focused on their specific needs. In addition, the develop-
ment of dual company-academia programs and programs involving the donation in-kind of equipment used in company processes reduces the learning curve of graduates as they enter the industry.

Today, initiatives are underway to implement this kind of program in the short term, increasing the level of specialization in high-precision manufacturing, materials, mechanical design, and aeronautical maintenance. It will be the responsibility of the committee leading the project to propose the development of customized curricula and give adequate follow-up to the proposal.

**Action Plan**

1. The Monterrey Aerocluster will appoint a human capital committee and give it the power to manage, implement, and make decisions on issues related to the human capital of the state’s aerospace industry.
2. The Monterrey Aerocluster human capital committee will develop a liaison board between academia and industry so that both parties are in constant dialogue and the needs of each are efficiently communicated.
3. The liaison board will develop joint programs between academia and internship companies for students in the final semesters of academic programs.
4. The board will develop an internship plan together with companies in the Monterrey Aerocluster so that students at technical or higher levels can have access to the state’s leading-edge technology installations.
5. The Monterrey Aerocluster human capital committee will provide support to academic institutions to develop teacher development and training programs.
6. The Monterrey Aerocluster human capital committee will work alongside academia on the creation of a development committee for the region’s teaching talent. This committee will liaise between educational institutions looking for teaching personnel and foreign educational institutions able to respond. It will also have the power to manage and handle resources.
7. The talent development committee will work both on leveraging current grants and creating new funds for study grants and teacher development.
8. Student and teacher exchange programs will be developed with universities specializing in aeronautics so that the new knowledge can be transmitted in the programs offered in the region. These programs will be managed by the human capital committee of the Monterrey Aerocluster in close cooperation with educational institutions.
9. Dual programs will be designed between industry and academia for the donation of equipment and materials so that students obtain first-hand experience with materials and equipment used in the industry giving them a more enriching learning experience. The human talent committee will be responsible for making the necessary arrangements with the industry to develop these programs.

**Strategic Project II**

- Development of promotion programs for academic institutions which offer aerospace education.
- Responsibility of: Monterrey Aerocluster A. C. - Human Capital Committee
- Estimated implementation: 2020

This project consists of making middle-, high-school and higher-education students aware of the programs, development opportunities, and professional growth potential in the aerospace sector, being proactive in attracting the talent for which other industries also compete. The aim is to guide and encourage students to learn more about the industry, having a broader pool of candidates increases the likelihood of locating those with the necessary abilities to train in aerospace and high-technology areas, and thus sow in new generations the seed of interest to develop in emerging industries and advanced manufacturing.

The promotion program will be developed jointly by industry and academia and be implemented by educational institutions offering courses focused on the aerospace industry, promoting technical and professional careers in aeronautics.

**Action Plan**

1. The specific objectives and action plan for the promotion programs will be defined.
2. A list will be made of the educational programs available in the region and those to be promoted will be identified.
3. A promotion team will be created to oversee the implementation of the program. Promotional materials such as leaflets and presentations will be produced and a working agenda designed that specifies the role of visits to educational institutions and the action plan to follow on such visits.
4. An analysis will be made taking promotion models abroad as reference to determine which are applicable to the local market.
5. Enrolment into the related programs will be reviewed periodically to evaluate the impact of the promotion program.
MILESTONE 4

Nuevo León with a developed and skilled supply chain integrated into the aerospace value chain

Estimated implementation: 2020

The continued integration of the state’s supply chains is an important objective of the Nuevo León aerospace industry. The state’s main players are seeking to establish a chain that meets sector demands in terms of quality, synchronization, and certifications. The aim is to develop the supply chain in areas with highest potential and added value and to establish an integrated supply network with capacity in advanced manufacturing processes that meets the sector’s demands and standards.

Creating the conditions to attract big OEMs, Tier 1, and Tier 2 companies is a fundamental part of capacity development. Successful companies that are able to penetrate global chains, increased capacity, and level of supply to local organizations, and access to scale economies are just some of the benefits of reaching this goal.

Using the capacities that have been developed in advanced manufacturing in Nuevo León, the intention is to work on integrating companies from other sectors into the aerospace chain. The experience and the level of competitiveness achieved in other industries gives the region a base of personnel and companies which can assimilate the necessary knowledge to focus on the sector, either with an additional line of business or migrating to serve the industry exclusively. To do this, support has been provided to obtain certifications and develop aerospace capacities. Evidence of this is that twelve companies are now certified in the manufacturing process of pieces and two more are in the process of NADCAP certification—the leading certification program in the world in the aerospace industry. Furthermore, the ITESM operates the Aerospace Industry Development Centre (CEDIA) of the state of Nuevo León. The CEDIA develops high-level human capital for the aerospace industry, evaluates strategies, designs programs and administers projects, has a NADCAP office and is aligned with the Performance Review Institute, improving the quality and reducing the costs of companies, establishing technical specifications for common processes and striving towards the same goal with local industry.

Strategic Project

- Breakdown of local supply chain capacities and manufacturers’ needs analysis.
- Responsibility of: Monterrey Aerocluster A. C. - Supplier Development Committee
- Estimated implementation: 2020

This kind of breakdown will highlight the capacities and missing links in the region’s manufacturing industry. The aim of the project is to fill the gaps by inserting developing suppliers into the aerospace sector. This will create the knowledge and develop the necessary skills to design and enhance the logistics processes in the supply chain of local companies. To this end, a study is made of the operational strategies of supply chains with international flow.

The focus of the project is to optimize the supply chain through knowledge of the specific needs of manufacturers. The aim is to enhance processes, develop specialized personnel, and ensure consistent, constant chains. Knowing the specific requirements of the big companies will enable local organizations to work with common surveillance processes and develop best practices. At a later stage, they will be able to access AS9102 certifications, with which the manufacturer guarantees—through physical and chemical testing, product testing, and manufacturing methods—that the production is made in accordance with the requested specifications.

In addition, the project will clearly illustrate which of the region’s capacities should be developed to create a chain with sequential links that enables the building of complete systems or subsystems.

Action Plan

1. Monterrey Aerocluster will appoint a supplier development committee and give it the power to manage, implement, and make decisions on issues related to the development of suppliers to the state’s aerospace industry.
2. The Monterrey Aerocluster supplier development committee will define the specific objectives and scope of the project and perform an analysis of national and international competition in order to develop a sustainable competitive advantage, and will define the existing gaps between current capacities and needs to generate a development plan for those with most potential.
3. Using the breakdown of information, the supplier development committee will identify which companies have the necessary capacities to participate in a supplier development program.
4. The Monterrey Aerocluster will contact the company and present the different programs and how to enter them to those interested in participating.
5. A strategy will be defined to measure scope and control implementation.

**Strategic Project II**

- Link companies in the Monterrey Aerocluster to the Business Liaison Centre of the Secretariat of Economic Development of Nuevo León.
- Responsibility of: Monterrey Aerocluster A. C. - Supplier Development Committee
- Estimated implementation: 2016

As part of the development of an integrated supply chain, companies in the Aerocluster will be linked to the Business Liaison Centre (Centro de vinculación empresarial, CVE) system. The aim of the centre—created in 2003—is to link supply companies established in Mexico and integrate them into the value chains of anchor companies in the country and abroad. The CVE handles industrial projects across all sectors, seeking, registering and validating suppliers, supporting buyer-supplier communication, making technical visits, and providing training and assessment to companies’ supplier projects.

The integration of Monterrey Aerocluster companies to the system will serve as a web-based promotion tool for local companies. The aim is to provide access to knowledge on supply and demand between national and international players and, based on their capacities and interests, establish strategic relationships to complete the value chains. The benefit of the project is that it will raise competitiveness, strengthen chains, and attract more programs for local aerospace companies.

**Action Plan**

1. The Monterrey Aerocluster supplier development committee will arrange with the Secretariat of Economic Development to start the procedures to link companies to the CVE. The committee will be the liaison between the Monterrey Aerocluster companies and the system.
2. An analysis will be made of the members of the Monterrey Aerocluster to select, in the first stage, the companies which meet the requirements to join the platform. Subsequently, periodical evaluations will be made to gradually integrate all the Monterrey Aerocluster companies to the CVE.
3. A plan will be produced for the introduction, training, management, technical support, and general information of the CVE platform. The plan will be administered by the supplier development committee and backed by the Monterrey Aerocluster.

**Strategic Project III**

- Aerospace Industry Assistance and Support Centre (Centro de Asistencia y Soporte para la Industria Aeroespacial, CASIA) of Nuevo León.
- Responsibility of: Monterrey Aerocluster A. C. - Supplier Development Committee
- Estimated implementation: 2017

With the aim of providing training sessions to obtain certifications and to strengthen the local supply chain, a centre will be established in the state that provides various consulting services. It is proposed that the centre has a wide variety of equipment available at the same site, for example, for non-destructive tests, secondary processes, and Cad Catia software licenses.

A centre with these features will strengthen scientific capacities and increase the competitiveness of Nuevo León’s production sectors. In addition, the centre will enable the development of innovation and design activities and respond to the needs of the local aerospace industry. Having the centre will optimize time frames, processes, and costs associated with certifying aerospace companies and increase commercial activity and their capacity to serve other clients. This activity will grow as the hub evolves and offers more high-value services.

**Action Plan**

1. The Monterrey Aerocluster supplier development committee will define the specific objectives, business plan, and scope of the centre.
2. The supplier development committee will define the expected capacities of the CASIA and the financing scheme with which it intends to be self-sustainable.
3. The centre’s requirement for human resources will be defined and talent development programs created based on specific needs.
4. A marketing and promotion plan will be designed for the centre.
7. CONCLUSION

Nuevo León is on the right track to reach its full potential and become one of the most competitive aerospace regions in Mexico with a vision for the medium and long term.

The state has been key in the industrial growth and development of Mexico, having capacities in advanced manufacturing, engineering, design, and R&D, which have been important in the consolidation of mature sectors like metal-working, electrical-electronics, and automotive, all critical to the national economy. This will serve as a platform and enable the region to position as a pole of competitiveness specializing in aerospace.

This road map captures the strategy defined by academia, industry, and government to position Nuevo León as the most important R&D pole in Mexico for advanced manufacturing and design, the primary civil aviation hub in Latin America and the area with the highest generation of aeronautical human capital in the country.

Furthermore, this regional strategy is in line with the National Flight Plan, the country’s strategy to trigger poles of competitiveness that maintain the growth of the Mexican aerospace sector, promote strategic investment and high-value projects, and contribute the technology development and innovation in Mexico.

The implementation of the strategy and of the milestones depends on the commitment of those responsible and on all those who join the resulting projects.
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Texas 125, Parque Industrial Nacional, Ciéncaga de Flores, Nuevo León, 65550
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**I. Produce**
- Aeroengines: Propelers, Rotors, Power Plant
- Fuselage: Nacelles / Pylons, Stabilizers
- Aircraft Construction Assembly
- Avionics
- Landing Gear
- Wings
- Computer System Softwares / Information Systems
- Electrical power/Airborne Auxiliary Power
- Electrical Cable Accessories / Harnesses
- Aircraft Interior Equipment Furnishing
- Autoflight Systems and Equipment
- Communication Systems and equipment
- Control Systems & Equipment / Flight Controls
- Fuel & Fuel Systems
- Hydraulic Systems & Hydraulic Power
- Indicating / Recording Systems
- Safety & Survival Equipment
- Air Conditioning
- Fire Protection / Ice & Rain Protection
- Lights
- Oxygen
- Pneumatic
- Vacuum
- Water, Waste, Ballast
- Windows
- Central Maintenance System
- Inert Gas System
- Cargo and Accessory Systems
- Fasteners
- Space Systems & Equipment
- Armaments and Related Equipment: Missile Related Products
- Technical Textiles
- OTHERS

**II. Processes**
- Machinery Manufacture - CNC and Precision Engineering
- Rough: Turning
- Rough: Milling
- Finish: Turning
- Finish: Honing
- Computer System Softwares
- MBD: CATIA V5
- MBD: CAD / CAM / CAE
- Forging & Aerostructure fabrication forming
- Forging
- Labor Work
- Deburring Shot Peen
- Grit Blasting Treatment Processes
- Heat Treat: Quench & Temper
- Heat Treat: Stress Relieving
- Heat Treat: Solution + Age
- Surface Treatments: Chrome Plate
- Surface Treatments: HVOF Spray
- Surface Treatments: Cad Plating
- Surface Treatments: MCAC
- Surface Treatments: Sulfuric Anodise
- Surface Treatments: Chromic Anodise
- Surface Treatments: Prime & Paint
- Testing & Certifications
- NDT: MPI
- NDT: LPI
- NDT: Acid Etch
- MCL: Chemical
- MCL: Mechanical
- Tooling
- Tooling Transformation Processes
- Castings: Investment
- Castings: Die
- Castings: Sand
- Joint Processes: Soledring & welding
- Joint Processes: Adhesives
- OTHERS

**III. materials**
- RAW (Materials Range)
- Stainless Steel
- Steel
- 300M or Equivalent
- Aluminium
- Titanium
- Delran Composites
- Surface Treatments: Sulfuric Anodise
- Surface Treatments: Chromic Anodise
- Surface Treatments: Prime & Paint
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<td>Liquid chromatograph (HPLC)</td>
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<td>Equipment to determine continuous quality components (from a few milliliters up to four gallons) and carbon for semimicas samples (IPC)</td>
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<td>Universal tension, compression, and flexural machines</td>
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<td>Falling dart equipment for measuring impact resistance</td>
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<td>Friction coefficient measuring equipment</td>
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<td>Ultramicrotome for microscopy sample preparation</td>
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<td>Coating equipment for metals (gold and platinum), and carbon for SEM and TEM samples</td>
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<td>Stereoscopic microscope</td>
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<td>Optical microscope with image analyzer</td>
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<td>Transmission electron microscope (TEM)</td>
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<td>Dual-beam electron microscope</td>
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<td>Equipment for measuring magnetic and electrical properties</td>
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<td>Equipment for measuring fire resistance properties</td>
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<td>Equipment for sample preparation by injection, extrusion, coextrusion, compression, thermoforming, rotational molding, and machining</td>
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<td>3D modeling equipment</td>
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<td>Design software for polymeric pieces</td>
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<td>Design software and continuous quality components (from a few milliliters up to four gallons) and carbon for semimicas samples</td>
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<td>Equipment for measuring properties by X-ray diffraction (WAXS and SAXS)</td>
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<td>Batch and continuous polymerization reactors (capacity from a few milliliters up to four gallons)</td>
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<td>Oscillating capillary rheometers with settings for low, medium, and high viscosity liquids, and flow rate meters</td>
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**Labour Base**

With special thanks to:

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**Gratefulness**

For their valuable participation in the preparation of this document.