



THAILAND BOARD
OF INVESTMENT



**AEROSPACE
INDUSTRY -TAKING OFF
TO NEW HEIGHTS**



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Aerospace Industry Overview

With air travel becoming faster, more accessible, and more comfortable, the aerospace industry has witnessed a huge spike in the number of people travelling both domestically and abroad.

By 2036 it is estimated that there will be approximately

7.8
Billion

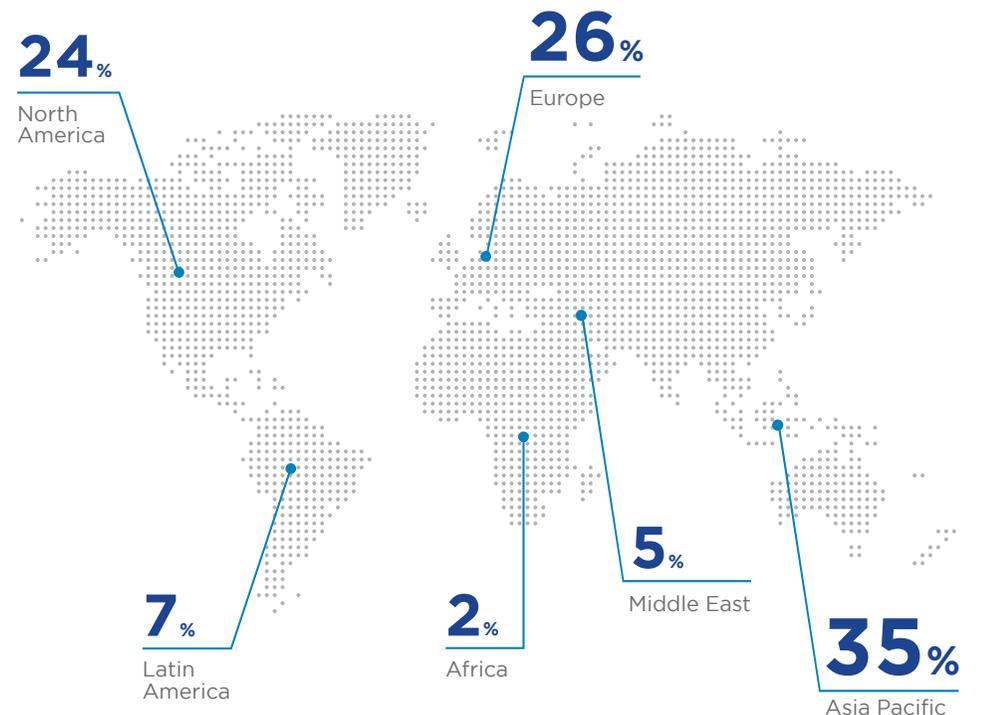
passengers per year
- almost double today's figure
of 4 billion travelers.

This huge spike in demand will result in significant economic opportunities for countries across the globe, not least those in the Asia Pacific. According to the 2017 IATA 20 Year Passenger Forecast, the Asia Pacific region will contribute more than half of new passengers between 2017 and 2036, primarily driven by booming passenger numbers from China, India and Indonesia. **This represents an average growth rate of 4.6% per year.**

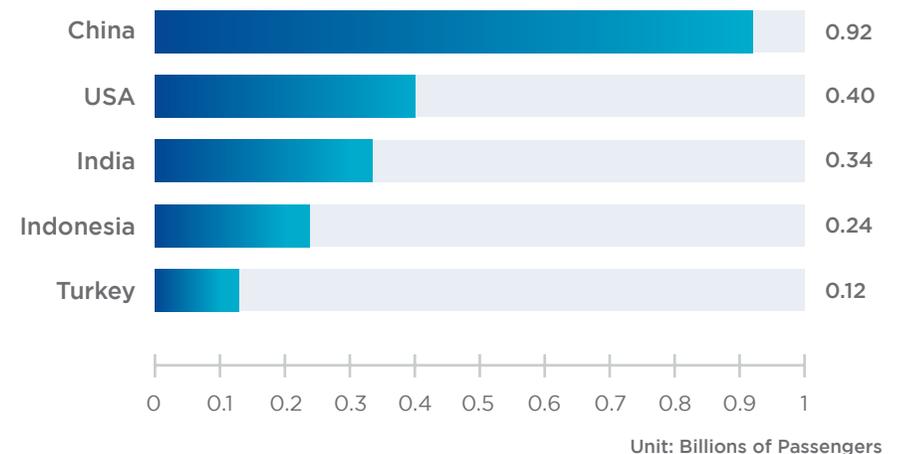
To fully capitalize on these projections, governments, aviation experts and other private sector stakeholders are continuing to forge partnerships in areas including infrastructure, trade liberalization and reduction of barriers to freedom of movement.



Market Share of Air Travel by Region's Carriers in 2017¹



Top 5 Growing Markets in Term of Annual Additional Passengers²



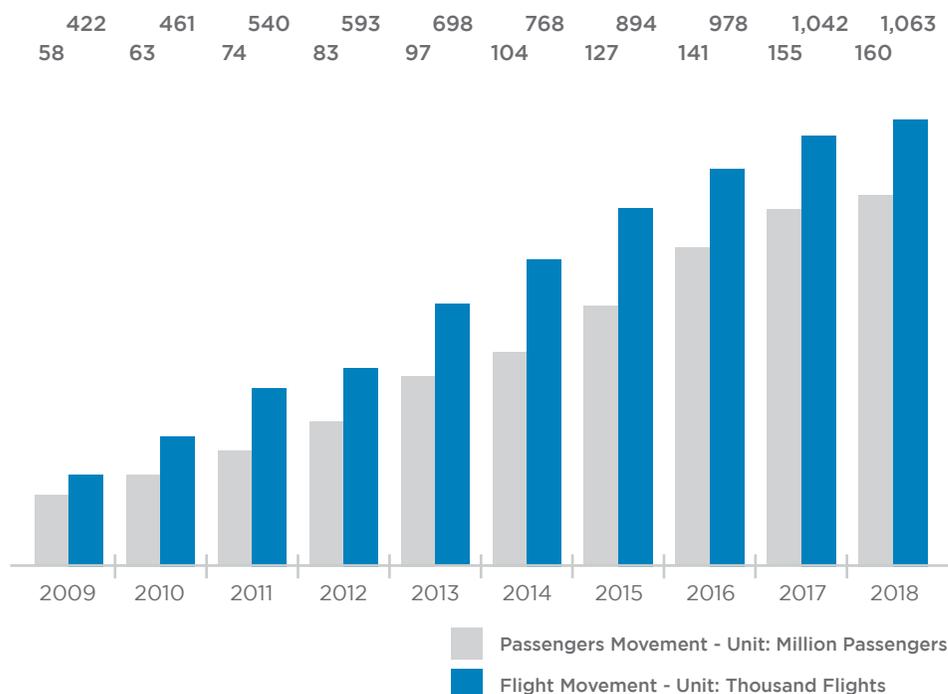
Source: ¹The International Air Transport Association

An Ideal Location for Aerospace Hub

Advantageously located in the heart of South East Asia, Thailand has long been a center of commercial aviation in the region. With a strong domestic economy and thriving tourism sector, it is no wonder that the country has seen a rise in passenger numbers over the past decade.

On average, Thailand's air traffic has increased three times faster than the global market¹. It is projected that, during 2018-2028, the number of passengers will increase at 5.6% per year, while the growth rate in the shorter term (2018-2022) is even more impressive at 7.5% per year².

Thailand's Passengers and Flight Movement³



Source: ¹The International Air Transport Association and ^{2,3}The Civil Aviation Authority of Thailand

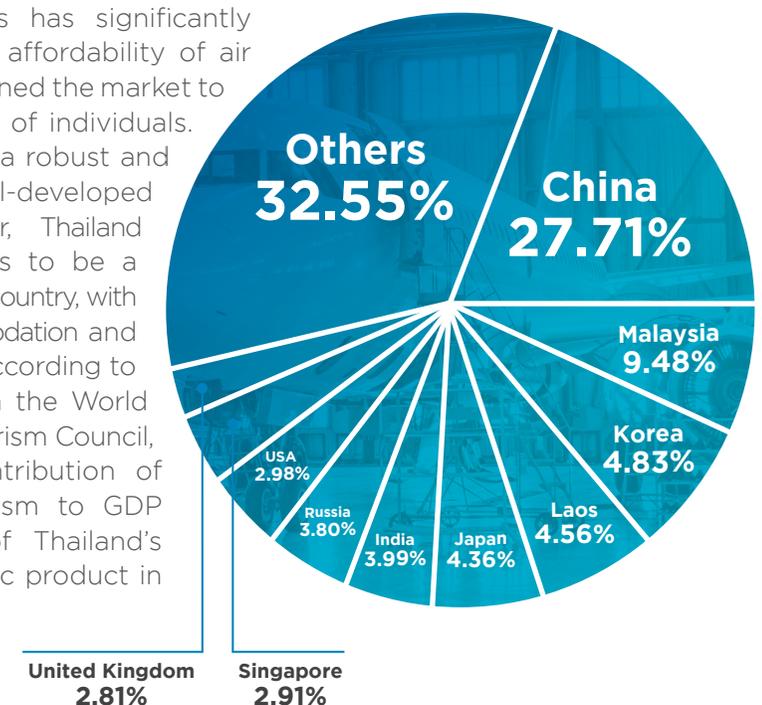
Growing Tourism Sector

In 2018, more than **35 million tourists** visited Thailand. The vast majority of Thailand's tourist arrivals originated from Asia; however, there were also a substantial number of arrivals from countries in other regions including Russia, the United States, the United Kingdom and Germany.



When assessing the drivers behind Thailand's burgeoning tourism sector, one can primarily attribute their success to two core factors. Firstly, the growth of low-cost airline carriers has significantly increased the affordability of air travel and opened the market to a wider range of individuals. Coupled with a robust and relatively well-developed tourism sector, Thailand has all it takes to be a tourist friendly country, with good accommodation and technology. According to statistics from the World Travel and Tourism Council, the total contribution of travel & tourism to GDP was 28.6% of Thailand's gross domestic product in 2018.

International Tourist Arrivals to Thailand¹



Source: ¹Ministry of Tourism & Sports

Sound Infrastructure

There are currently a total of 38 commercial airports operating across Thailand, 12 of which operate short and long haul international services. In 2017, Thailand's airports handled a total of 833,084 flights, a significant boost from previous years.

:Airports

38
Airports

have been operated under three main organizations:

- Department of Airports
- Bangkok Airways Public Company Limited
- Airport of Thailand Public Company Limited

12

international airports covering all key destinations in Thailand.

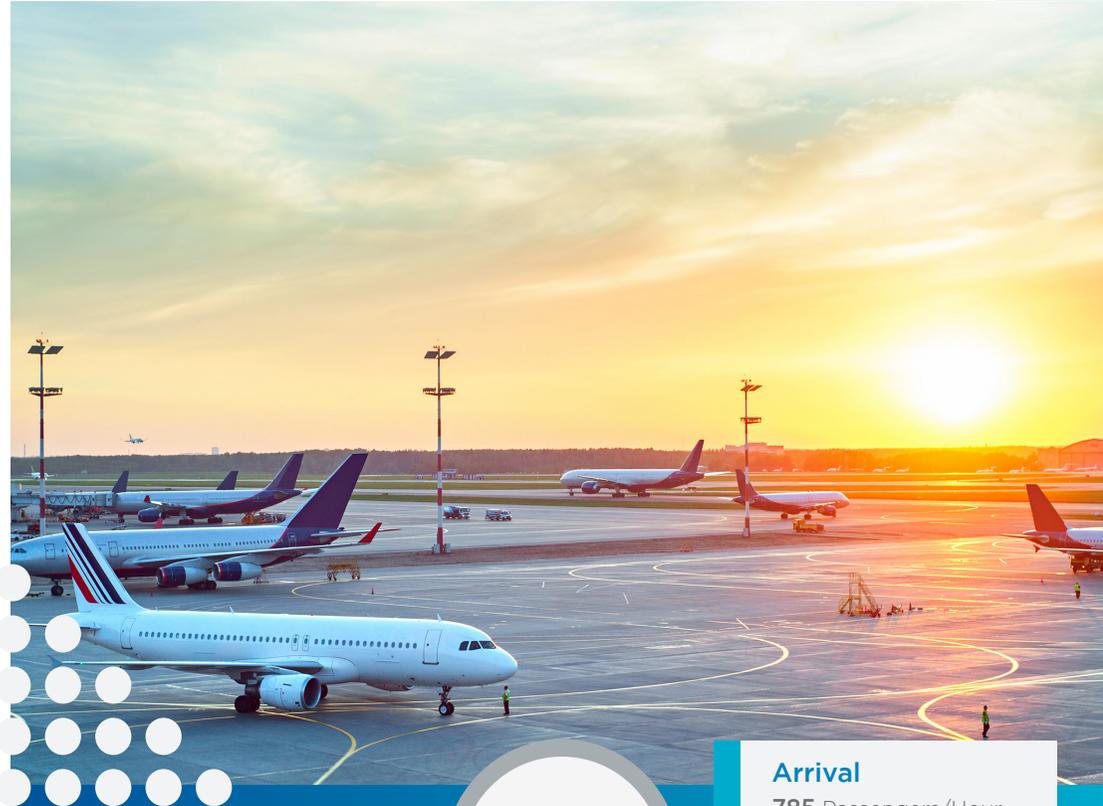


Source: The Civil Aviation Authority of Thailand

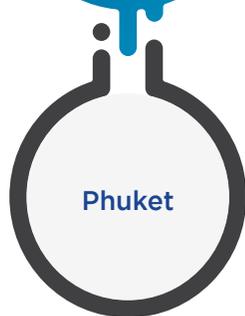
Airports in Thailand have the capacity to accommodate a huge number of passengers. Suvarnabhumi International Airport sees an average of nearly 70 flights flowing in and out per hour. Several other airports across the country accommodate more than 10 flights per hour. To support the increased capacity demands that are primarily resultant from the gradual growth of international visitors, airports across Thailand are investing significant financial and human resources into improving their operations.

70
Flights

flowing in and out Suvarnabhumi International Airport per hour



Arrival
8,280 Passengers/Hour
Departure
6,660 Passengers/Hour
Aircraft Flow
68 Flights/Hour



Arrival
3,600 Passengers/Hour
Departure
3,600 Passengers/Hour
Aircraft Flow
20 Flights/Hour

Arrival
7,900 Passengers/Hour
Departure
7,190 Passengers/Hour
Aircraft Flow
46 Flights/Hour

Arrival
1,860 Passengers/Hour
Departure
2,690 Passengers/Hour
Aircraft Flow
24 Flights/Hour



Arrival
785 Passengers/Hour
Departure
1,939 Passengers/Hour
Aircraft Flow
11 Flights/Hour

Arrival
1,200 Passengers/Hour
Departure
1,000 Passengers/Hour
Aircraft Flow
12 Flights/Hour

Arrival
1,000 Passengers/Hour
Departure
1,000 Passengers/Hour
Aircraft Flow
15 Flights/Hour

Source: The Civil Aviation Authority of Thailand

: Expansion of U-Tapao and Development of Rail Links

Despite the already strong capacity of Thailand's airports, further improvements are on the way. Upgrades to Don Mueang and Suvarnabhumi International Airport are currently in progress, while U-Tapao International Airport will also increase its capacity with the addition of a second runway and the redesign of its airport space.

The Thai government has also committed 224.54 billion baht towards the construction of the High-Speed Rail Linked 3 Airport Project. Connecting Don Mueang, Suvarnabhumi and U-Tapao Airports, the completed project will cover a total distance of more than 220 kilometers. Due to be officially launched and open to the public in 2025, it is expected that the project will contribute to the progress of the Eastern Economic Corridor of Aerotropolis (EECa). Also known as the Eastern Airport City, the EECa is an airport-centered development area covering 6,000 rai in Rayong and Chonburi provinces and incorporating a re-developed U-Tapao airport as well as other facilities such as air cargo and a commercial gateway.



Human Resource Development for the Aerospace Industry

As demand within the aerospace industry increases over the next few decades, it is expected that the workforce in this industry in Thailand will also continue to grow. The Civil Aviation Authority of Thailand (CAAT) forecasts that the workforce will rise from 15.9 thousand persons in 2017 to 20.8 and 29.4 thousand persons in 2027 and 2037, respectively.

In meeting such increasing demand for skilled personnel, many universities and institutions have initiated academic programs aimed at furnishing the country's human resources with the relevant skill sets. In 2017, 33,857 engineering students graduated in Thailand, with a further 23,873 science and technology students also graduating. In the same year, 2,512 graduates were from the fields of aviation and aviation management¹.

A number of leading universities offer specific courses in aerospace maintenance

These include:



Chulalongkorn University



Thammasat University



Kasetsart University



King Mongkut's University of Technology



Rangsit University



Assumption University



Rajamangala University of Technology Krungthep

Aviation Training Centers Approved by CAAT

Other than institutions with academic programs, various types of aviation training centers approved by CAAT are also operating across the country. Currently, CAAT certifies 6 types of organizations and devices including Flying Training Organizations (FTO),

Air Traffic Control Training Organizations (ATCTO), Aviation Language Testing Service Providers (TSP), Air Traffic Control Synthetic Training Devices (STD), Aircraft Maintenance Engineer Training Organizations (AME), and Flight Synthetic Testing Devices (FSTD).

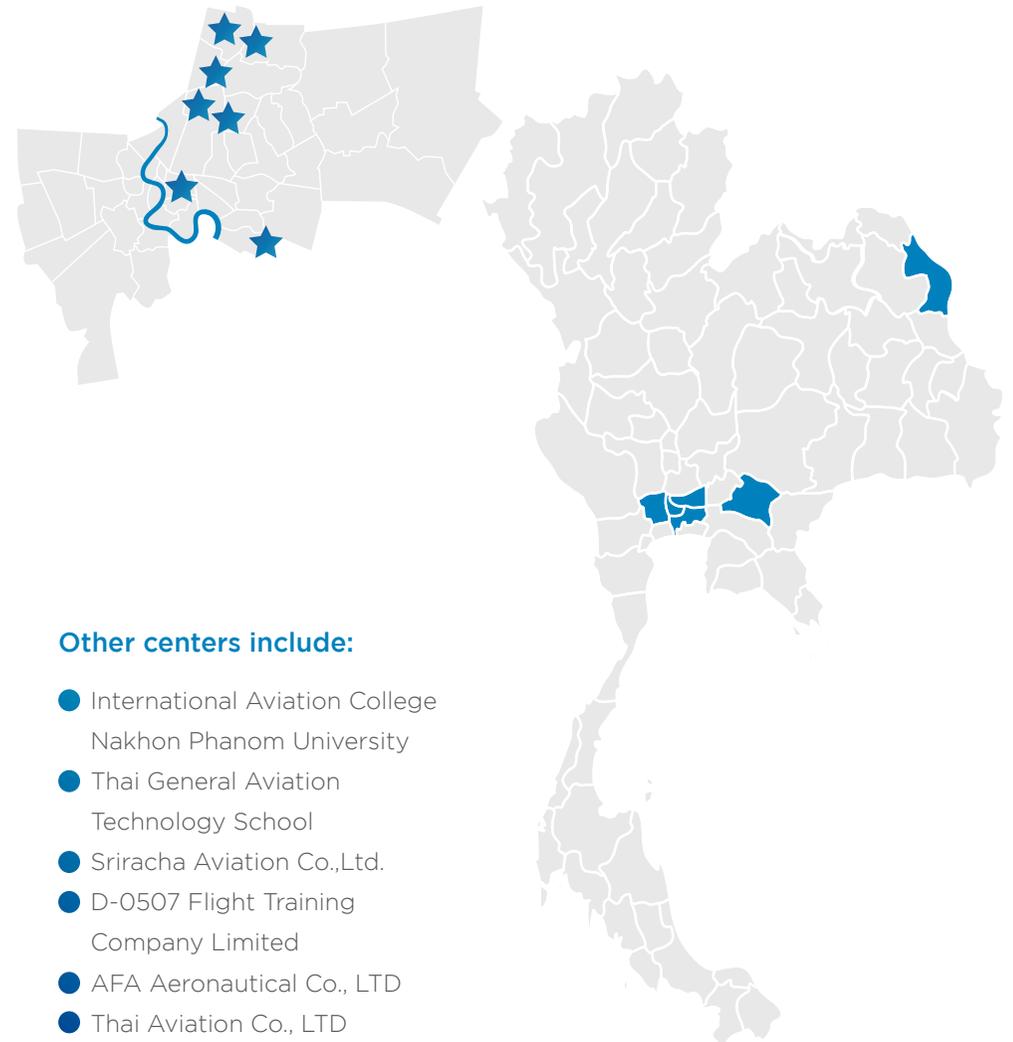


As for the FTO, there are

13
centers

for pilot training approved by CAAT. The Bangkok-based centers are

- Civil Aviation Training Center
- Bangkok Aviation Center Co., LTD
- Royal Sky Aviation Center Flying School
- Thai Flight Training Co., Ltd.
- Asia Aviation And Technology Co., Ltd.
- Thai Inter Flying Co., LTD.
- Premium Airlines Co., LTD.



Other centers include:

- International Aviation College Nakhon Phanom University
- Thai General Aviation Technology School
- Sriracha Aviation Co.,Ltd.
- D-0507 Flight Training Company Limited
- AFA Aeronautical Co., LTD
- Thai Aviation Co., LTD

Aircraft Industry



: Thailand's Significant Potential

Thailand's future in this sector is clear for all to see. With the expansion of U-Tapao International Airport as part of the EECa development; the airplane purchase orders made by low-cost carriers; and the emergence of the Maintenance, Repair, and Overhaul (MRO) sector, it can be expected the further infrastructure improvements required to accommodate the production of aircraft parts and aircraft-related products will be forthcoming. Recognizing the sector's significant potential, many key international aircraft manufacturing companies have already invested in Thailand. These include Ducommun, Leistritz, Michelin, Revima, Senior Aerospace, Triumph Structures (Thailand), and Zodiac Aerospace.



Thailand is also a hub of auto parts production, an industry whose relevant skills and technologies can be utilized to produce aircraft-related products. This provides Thailand with a wealth of expertise in Tier 3 component manufacturing and Tier 4 composite manufacturing for original parts manufacturing (OEMs).

Example of Key Players

 Ducommun Technologies

 Revima

Leistritz

ZODIAC AEROSPACE 

 **MICHELIN**

senior Aerospace

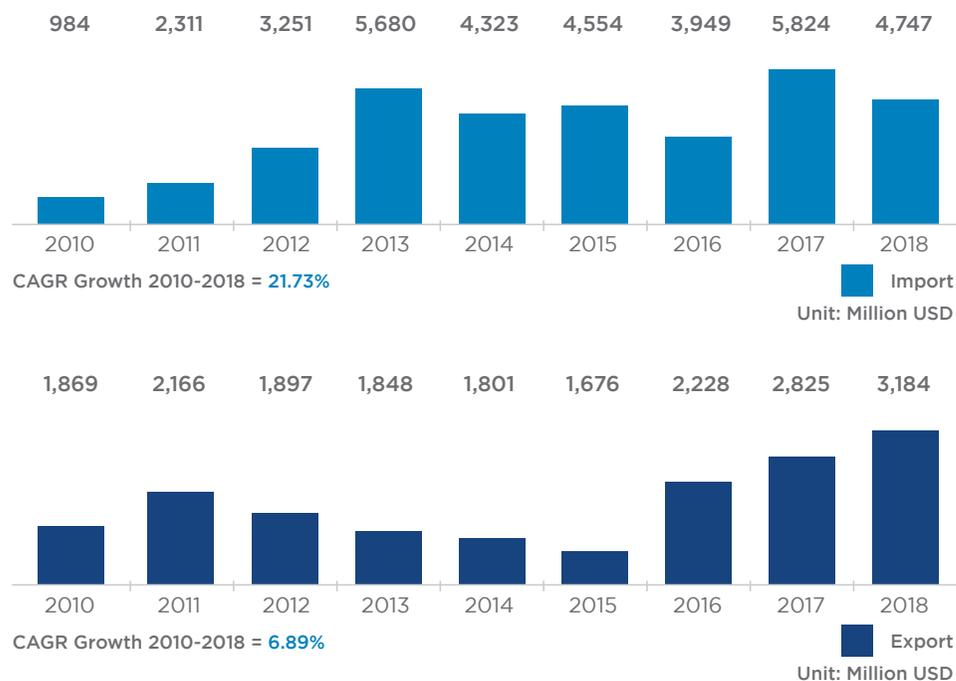
 Triumph Structures (Thailand) Ltd.
A Triumph Group Company

: Trade of Aircraft-related Products

Indicating the strong potential of its aircraft industry, Thailand has reported a positive trend in the trade of aircraft-related products over the past decade. In this respect, the country has recorded overall growth in both its import and export numbers. Imports in particular have undergone a period of strong growth, with a

CAGR of 21.73% between 2010 and 2018. Thailand's imports of aircraft-related products hit a value of 5.82 billion in 2017. While exports performed less spectacularly over the same period, with a CAGR of 6.89%, there was a strong upward trend from 2015 to 2018, indicating a promising future for this area of trade.

Import and Export of Aircraft related Products



Source: International Trade Centre

Top 5

Imported Products in 2018



Aeroplanes and other powered aircraft of an unladen weight > 15000 kg



Turbojets of a thrust > 25 kN



Aeroplanes and other powered aircraft of an unladen weight <= 2000 kg



Spark-ignition reciprocating or rotary internal combustion piston engine



Ignition wiring sets and other wiring sets for vehicles, aircraft or ships

Top 5

Exported Products in 2018



Spark-ignition reciprocating or rotary internal combustion piston engine



Ignition wiring sets and other wiring sets for vehicles, aircraft or ships



Parts of aeroplanes or helicopters, n.e.s. (excluding those for gliders)



Aeroplanes and other powered aircraft of an of an unladen weight > 15000 kg



New pneumatic tyres, of rubber, of a kind used for aircraft

Source: International Trade Centre

: Strong and Consistent Growth

Across the globe, the airline industry remains characterized by strong growth, primarily due to the continued increase in air travelers in both the domestic and international travel markets. Similarly, in 2018 the airport business in Thailand also continued to see a steady rise in the number of outbound travelers, and the continued expansion and popularity of low-cost carriers.

Example of Airlines Operating in Thailand

Domestic Routes



International Routes



Airline Business

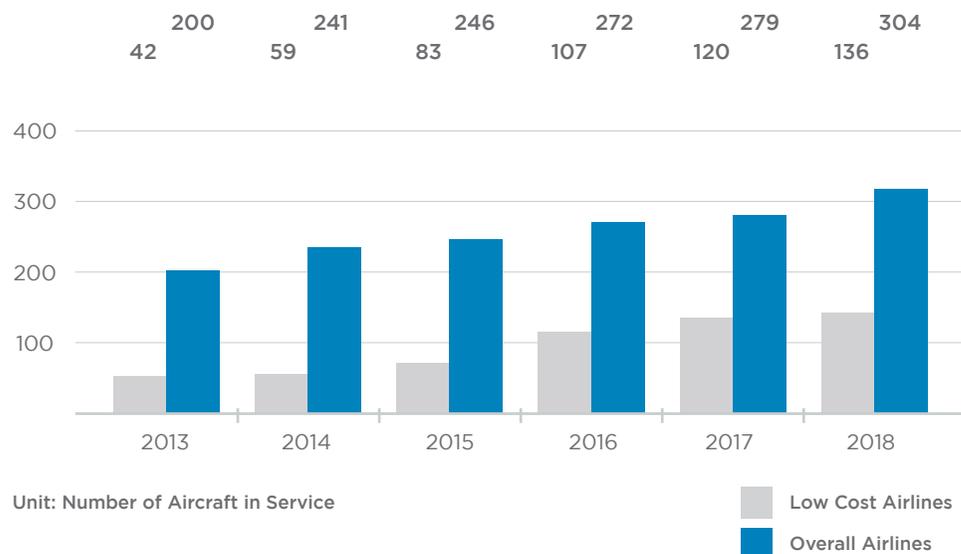


: Demand in Domestic Market



A significant amount of growth within the Thai market remains driven by the domestic demand for low cost carriers. At present, low cost airlines now account for more than 70% of the domestic market share. Interestingly, Thailand's international market has also experienced rapid growth as a result of low cost carriers. In 2017, they accounted for approximately 13.5 million international seats, an increase of more than 8 million in just over five years.

Thailand's Fleet Size



Source: Center of Aviation as of April 2018

Maintenance, Repair and Overhaul (MRO)



While Thailand has historically operated a relatively limited MRO sector, this is changing. In its Commercial Market Outlook 2018, Boeing predicted that aircraft fleets in the Asia-Pacific would almost triple from the 6,000 aircraft currently based in the region to approximately 17,000 by 2036. Such growth would make the Asia-Pacific the world's largest market and

lead to the center of the MRO industry shifting from North America and Europe to the Asia-Pacific region. With the region leading the way in the aerospace industry's seemingly insatiable global growth and the significant opportunity this presents for regional MRO services, Thailand is in a strong position to build on its existing importance as an aviation hub and establish itself as regional center for MRO services.

: Growth Opportunities

Example of MRO Companies Operating in Thailand



Airbus is an international pioneer in the aerospace industry. This company is a leader in designing, manufacturing and delivering aerospace products, services and solutions to customers on a global scale.



Chromalloy is an integrated solutions provider — for original equipment manufacturers, commercial airlines, militaries, oil and gas companies, and power companies — that delivers innovative solutions designed to reduce manufacturing and operating expenses and extend the life of gas turbine engines.



Triumph Aviation Services Asia, Ltd. provides repairs and overhauls complex aircraft operational components in Thailand and acts as a Single-Source Service Center for all commercial aviation across the region. The company was founded in 2005 and is based in Chonburi.



TurbineAero is an independent aerospace component maintenance, repair, and overhaul service provider focused on APUs and related products. It provides military, commercial, and regional airline customers with a comprehensive maintenance solution for legacy and new APU engine models.

: Development in U-Tapao Airport

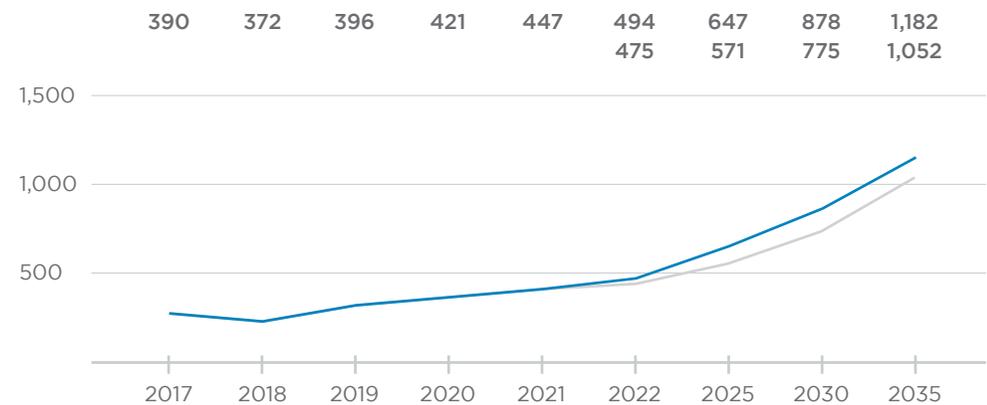
An important factor contributing to the prospects of the MRO sector in Thailand is the development plan of the Eastern Economic Corridor of Aerotropolis (EECa) which features the expansion of U-Tapao International Airport. This will provide excellent opportunities for a range of related companies.

Important components of the development plan include:

- Passenger Terminal 3 and Commercial Gateway
- Air Cargo Facilities
- Maintenance, Repair and Overhaul (MRO) Facilities
- Aviation Training Facilities
- Free Trade Zone

A new passenger terminal and runway will boost passenger numbers at U-Tapao to 15 million per year within the next five years.

Expected MRO Value in the Future



Unit: Million USD

- Thailand Insourced MRO as usual
- Thailand Insourced MRO with U-Tapao Project

In June 2018, Thai Airways International and Airbus signed an MOU to establish an MRO facility at U-Tapao International Airport. It is expected this facility will be one

of the most modern and extensive service centers in the Asia-Pacific region, offering heavy maintenance and line services for all wide-body aircraft types.

Thai Airways-Airbus Coordination

- MRO Center Establishment
- Technician Training School
- Aircraft Composite Repair Shop
- Technology Support for Smart Hangar
- Parts Store and Logistic Center
- Design for Building and Construction
- Equipment Maintenance Office

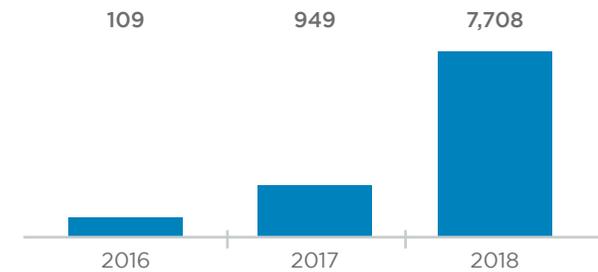
Expected Finished Period in 2021

Unmanned Aerial Vehicle (UAV)

Unmanned Aerial Vehicles (UAV), commonly known as drones, have undergone a significant growth in popularity worldwide over the past few years. Thailand is no exception. The drone market in Thailand has grown enormously,

as can be observed from the increase in the number of registered drones in the country. The figure surged from 109 units in 2016 to 949 units in 2017, before skyrocketing to and 7,708 in 2018.

Total Number of Registered Drones



The increase in the popularity of drones is mainly attributed to the sharp fall in prices. As is the case with other technologies, it is likely that high-quality drones will become more affordable in the years to come, and this indicates a continued growth for the foreseeable future.



According to SZ DJI Technology, a Chinese drone maker, Thailand is among the top-five markets in term of consumer enthusiasm for drone technology. With tech-savvy consumers who love to take pictures and a large number of small farmers who can utilize drones to spray fertilizers or pesticides, Thailand offers a large potential market for drone makers and distributors.

Supporting Policy and Organizations

In an effort to support the development and growth of Thailand's aerospace industry over the short and medium term, the relevant government agencies embark on a series of policy reforms. Some broad policy initiatives include increased assistance to domestic companies; undertaking comprehensive research & technology development; developing new industry talents; and fully implementing aerospace standards and certification programs.

Supporting Organizations



Ministry of Transport

has overall responsibility for transportation, traffic planning, and transport infrastructure development.



Department of Airports (DOA)

operating under the Ministry of Transport, the DOA is in charge of the operation of airports belonging to the government.



Civil Aviation Authority of Thailand (CAAT)

the CAAT is mandated with the enforcement of laws on air navigation, the negotiation of air service agreements with international civil aviation organizations, and the promotion of Thailand's aviation industry.



Airports of Thailand Public Co., Ltd. (AOT)

manages Thailand's six international airports.

BOI Incentives

BOI offers a wide range of tax and non-tax incentives for eligible activities.

Group	Activities	Tax Incentives	Exemption of Import Duty *
A1	Manufacture of aircraft or aircraft parts such as airframe, critical parts (e.g. engine and parts, propeller), appliance (e.g. flight recorder, radar), equipment and other components	8 years CIT exemption (no cap)	✓
	Manufacture of aerospace devices and equipment such as devices or equipment related to rockets/spacecraft/space vehicles/propulsion units and auxiliary equipment, etc.		
	Aerospace operating systems such as search, detection, navigation, guidance, aeronautical, nautical systems and instruments, etc.		
A2	Repair of aircraft or aircraft parts	8 years CIT exemption	✓
A3	Manufacture of onboard devices and equipment (except disposable and reusable aircraft utilities and supplies) such as seats, life vests, trolley, galley, etc.	5 years CIT exemption	✓
	Aircraft or Aerospace Industrial Zone or Industrial Estate		
A4	Repair of onboard devices and equipment (except disposable and reusable aircraft utilities and supplies)	3 years CIT exemption	✓

Notes : *Exemption of import duty on machinery and raw materials used in production of export products

Incentives for Investment in the Eastern Economic Corridor (EEC)

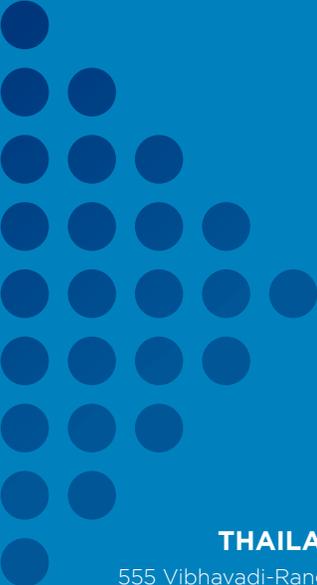
The BOI also recognizes the importance of investment in relevant activities in targeted locations. It has therefore been providing additional incentives for investment in the EEC. The promoted zone for specific industries related to aerospace is the Economic Corridor of

Aerotropolis (EECa). Eligible activities located in one of the 21 promoted zones for targeted industries or other industrial estates / industrial parks in the EEC may also receive additional incentives, on top of the basic package granted by the BOI.

Incentives for Investment in the EECa

Eligible Activities	Additional Incentives
<p>Manufacture of aircraft or aircraft parts such as airframe, critical parts, appliance, equipment and other components</p> <p>Repair of aircraft or aircraft parts</p> <p>Manufacture of aerospace devices and equipment such as devices or equipment related to rockets/ spacecraft/ space vehicles/propulsion units and auxiliary equipment, etc.</p> <p>Aerospace operating systems such as search, detection, navigation, guidance, aeronautical, nautical systems and instruments, etc.</p>	<p>4 years of CIT exemption</p>
<p>Manufacture of onboard devices and equipment (except disposable and reusable aircraft utilities and supplies) such as seats, life vests, trolley, galley, etc.</p>	<p>2 years of CIT exemption and a 5-year 50% CIT reduction</p>

Applications for incentives under the EEC scheme must be submitted by 30 December 2019. In addition, investment projects under the scheme must establish a collaboration with education or research institutions in forms such as Co-operative Education (CoE), Dual Vocational Training (DVI), Work Integrated Learning (WiL), or a similar cooperation, under the condition that the number of students participating in the collaborative program is at least 10% of the project employees or 50 people, whichever is lower.



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