INVEST IN TURKEY

TURKISH DEFENSE & AEROSPACE INDUSTRY

1 AN 2 0 1 8
Agenda

• Snapshot

• Turkish Defense Industry

• Turkish Civil Aviation
Turkish defense and aviation industry offers lucrative opportunities...

**SPENDING**
$15 BILLION
DEFENSE EXPENDITURES
(2016)

**TURNOVER**
$6 BILLION
DEFENSE & AEROSPACE INDUSTRY TURNOVER
(2016)

**EXPORTS**
$2 BILLION
DEFENSE & AEROSPACE INDUSTRY EXPORTS
(2016)

**TURNOVER**
$20 BILLION
CIVIL AVIATION TURNOVER
(2016)

**540**
AIRCRAFT
AIRLINE FLEET
(2016)

**PASSENGERS**
193 MILLION
AIRLINE PASSENGERS
(2017)

**STRONG SUPPORT**
FOR JOINT VENTURES
WITH FOREIGN FIRMS

**CLUSTERS**
DEFENSE & AEROSPACE

**AVIATION HUB**
INCREASING CONNECTIVITY WITH
286 INTERNATIONAL DESTINATIONS
(as of 2016)

Source: SIPRI, SASAD, DGCA, DHMİ, Ministry of Transport, Maritime Affairs and Communications
Agenda

- Snapshot
- **Turkish Defense Industry**
- Turkish Civil Aviation
Turkish defense industry has important advantages with a globally-competitive edge.

**Strong government support to the defense industry**

- Well-developed industrial and human resource ecosystem
- Globally-competitive national defense companies
- Cost-competitive defense products *vis-a-vis* Western-manufactured equivalents, suiting budgets of the governments with financial constraints
- Among the largest defense budgets globally
- High number of strategic agreements with international partners, facilitating defense industry collaboration and trade
- Strong government support to joint ventures, international partnerships and defense cooperation
Turkish defense industry has been undergoing a profound transformation from a sole procurement to design and manufacture.

**Transformation of the Defense Industry**

**Pre-1990**: Direct Procurement
- Cobra AH-1 W (Attack helicopter)
- AB-412 Helicopter
- MLRS (Rocket system)

**1990-2000**: Co-Production
- Armoured Combat Vehicle
- Light Transport Aircraft
- Basic Trainer Aircraft
- Cougar Helicopter

**2000-2010**: Partial Design (Main Platforms)
- Altay (Tank)
- Milgem (Warship)
- Anka (UAV-MALE Class)
- Hürkuş (Basic trainer aircraft)

**2010-2020**: Indigenous Design (Local Production)
- Indigenous Helicopter Program
- Indigenous Fighter Jet Project
- Göktürk-3 Satellite

**2020-2030**: Basic & Advanced Technologies
- Complete Localization
- Life Cycle Management
- Performance-based Logistics

Source: SSM
Turkey’s decisive policies have yielded significant results in transforming the defense industry.

Local Content in Turkey’s Defense Procurement

- 2002: 24%
- 2016: 68.5%

Source: SSM
Turkey has introduced industrial participation (IP) / offset (O) policies in order to facilitate long-term cooperation with international partners in the field of defense, aerospace and homeland security.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Threshold to Require Offset</td>
<td>$5 Million</td>
</tr>
<tr>
<td>IP/O Commitment</td>
<td>At least 70% of the Contract Price</td>
</tr>
<tr>
<td>Subcontractor / SME Portion</td>
<td>30% of the Category-A IP&amp;O 15% of SME share</td>
</tr>
<tr>
<td>Crediting Basis</td>
<td>Domestic Net Added Value (DNAV)</td>
</tr>
<tr>
<td>Type of Agreement</td>
<td>Separate IP&amp;O Agreement with the Contractor</td>
</tr>
<tr>
<td>Bank Guarantee</td>
<td>6% of IP&amp;O Commitment</td>
</tr>
<tr>
<td>Period of Performance</td>
<td>Program Duration + 2 Years</td>
</tr>
<tr>
<td>Penalty</td>
<td>6% of Unfulfilled Commitment</td>
</tr>
<tr>
<td>Temporary Crediting</td>
<td>Allowed (Conditional)</td>
</tr>
<tr>
<td>Banking of Credits</td>
<td>Allowed (Valid for 5 Years)</td>
</tr>
<tr>
<td>Transfer of Excess Credits</td>
<td>Allowed (Causality)</td>
</tr>
</tbody>
</table>

### Categories

**Category A**
- Direct Industrial Participation
- Export of products/services in the areas of defense, aerospace and homeland security

**Category B**
- Acquire technology / capability
- New investment in the areas of defense, aerospace and homeland security

**Category C**
- Export to Prior Market
- Foreign Direct Investment
- Technological Collaboration
- Enabling technology/ability that is requested particularly by SSM

### Multipliers

- Design & Engineering Works Performed by SMEs (Cat-A): 2
- All other IP Works (Cat-A): 1
- Export of Platforms: 4 - 5
- Export of Systems / Subsystems: 3
- Export of Structural Parts: 2
- SME Portion in Export: (+ 1)
- Export to Prior Market: (+ 1)
- Technological Collaboration (Cat-C): 3 - 5
- Enabling technology/ability that is requested particularly by SSM (Cat-C): 6 - 8
- Foreign Direct Investment (Cat-C): 4
- Transfer of Hardware / Software to University / Research Institute (Cat-C): 3

Source: SSM
Turkey's defense expenditures have significantly expanded over the past two decades.

### Top 20 Countries by Defense Expenditures in 2016 ($ Billion)

<table>
<thead>
<tr>
<th>Rank</th>
<th>Country</th>
<th>Expenditure ($ Billion)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>USA</td>
<td>611.2</td>
</tr>
<tr>
<td>2</td>
<td>China</td>
<td>215.2</td>
</tr>
<tr>
<td>3</td>
<td>Russia</td>
<td>69.2</td>
</tr>
<tr>
<td>4</td>
<td>Saudi Arabia</td>
<td>63.7</td>
</tr>
<tr>
<td>5</td>
<td>India</td>
<td>55.9</td>
</tr>
<tr>
<td>6</td>
<td>France</td>
<td>55.7</td>
</tr>
<tr>
<td>7</td>
<td>UK</td>
<td>48.3</td>
</tr>
<tr>
<td>8</td>
<td>Japan</td>
<td>46.1</td>
</tr>
<tr>
<td>9</td>
<td>Germany</td>
<td>41.1</td>
</tr>
<tr>
<td>10</td>
<td>South Korea</td>
<td>36.8</td>
</tr>
<tr>
<td>11</td>
<td>Italy</td>
<td>27.9</td>
</tr>
<tr>
<td>12</td>
<td>Australia</td>
<td>24.6</td>
</tr>
<tr>
<td>13</td>
<td>Brazil</td>
<td>23.7</td>
</tr>
<tr>
<td>14</td>
<td>Israel</td>
<td>18.0</td>
</tr>
<tr>
<td>15</td>
<td>Canada</td>
<td>15.2</td>
</tr>
<tr>
<td>16</td>
<td>Spain</td>
<td>14.9</td>
</tr>
<tr>
<td>17</td>
<td>Turkey</td>
<td>14.8</td>
</tr>
<tr>
<td>18</td>
<td>Iran</td>
<td>12.7</td>
</tr>
<tr>
<td>19</td>
<td>Algeria</td>
<td>10.2</td>
</tr>
<tr>
<td>20</td>
<td>Pakistan</td>
<td>10.1</td>
</tr>
</tbody>
</table>

### Turkey's 5-year Average Annual Defense Spending ($ Billion, current prices)

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Expenditure</td>
<td>2.5</td>
<td>4.0</td>
<td>6.5</td>
<td>8.7</td>
<td>11.1</td>
<td>16.8</td>
<td>17.0</td>
</tr>
</tbody>
</table>

### Distribution of defense expenditure by main category (2016)

- **Personnel** expenditure includes military and civilian expenditure and pensions.
- **Infrastructure** expenditure includes NATO common infrastructure and national military construction.
- **Other** expenditure includes operations and maintenance expenditure, other R&D expenditure and expenditure not allocated among above-mentioned categories.

Source: SIPRI, NATO
Turkish defense industry turnover has doubled over the past seven years with an annual average growth rate of 10%.

**Defense Industry Turnover ($ Billion)**
- 2009: 3.1
- 2016: 6.0

**CAGR 10%**

**Exports ($ Billion)**
- 2009: 0.8
- 2016: 2.0

**CAGR 13%**

**Orders ($ Billion)**
- 2013: 8.0
- 2014: 11
- 2015: 7.7
- 2016: 12

**Source:** Defense and Aerospace Industry Manufacturer Association of Turkey (SASAD)
Turkey's growing and diversifying exports have explored new opportunities in Middle East, Africa, Central Asia and South America.

Source: SASAD

TOTAL EXPORTS
$2 BILLION (2016)
While Turkey has considerably increased its domestic capacity in the defense industry, it continues to import a significant amount of aerospace products.

Source: SASAD, Turkish Statistical Institute

TOTAL IMPORTS ~$5 BILLION (2016)

<table>
<thead>
<tr>
<th>Category</th>
<th>Value (M)</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAVAL</td>
<td>$128M</td>
<td>USA</td>
</tr>
<tr>
<td>AIR</td>
<td>$280M</td>
<td>USA</td>
</tr>
<tr>
<td>LAND</td>
<td>$435M</td>
<td>USA</td>
</tr>
<tr>
<td>OTHER</td>
<td>$92M</td>
<td>RoW</td>
</tr>
<tr>
<td>TOTAL</td>
<td>$2,100M</td>
<td></td>
</tr>
<tr>
<td>TOTAL IMPORTS</td>
<td>$4,030M</td>
<td></td>
</tr>
<tr>
<td>CIVIL AEROSPACE</td>
<td>$1,896</td>
<td></td>
</tr>
<tr>
<td>ROW</td>
<td>($143M)</td>
<td></td>
</tr>
<tr>
<td>USA</td>
<td>($307M)</td>
<td></td>
</tr>
<tr>
<td>EUROPE</td>
<td>($485M)</td>
<td></td>
</tr>
</tbody>
</table>

Source: SASAD, Turkish Statistical Institute
Turkey is located in proximity of lucrative markets with a significant trade volume of defense and aerospace products.

### Global Imports ($Billion)

<table>
<thead>
<tr>
<th>Year</th>
<th>Arms &amp; Ammunition</th>
<th>Aircraft &amp; Spacecraft</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>7.2</td>
<td>145.2</td>
</tr>
<tr>
<td>2016</td>
<td>152.4</td>
<td>248.6</td>
</tr>
</tbody>
</table>

### Regional Imports ($Billion, 2016)

- **Europe**
  - Defense Spending (2016): $337 billion
  - Imports ($bn): 116
- **Middle East & Africa**
  - Defense Spending (2016): $173 billion
  - Imports ($bn): 26

Source: SIPRI, ITC
Orders in the defense industry have significantly increased, amounting to ~$12 billion in 2016, with 90% coming from domestic clients.

**Geographic Sources of Orders in 2016 ($ Million)**

- **Domestic** 10,611
- **USA** 3,391
- **Europe** 2,960
- **Other** 658

**Orders by Category ($ Million)**

- Land platforms/systems = $5,920 m.
- Air platforms = $3,391 m.
- Weapons & Missiles = $1,080 m.
- Naval = $640 m.
- Civil aviation = $293 m.
- Security systems = $254 m.
- MRO (Military) = $210 m.
- Other = $125 m.
- **TOTAL** = $11,913 m.

Source: SASAD, 2016
Leading players represent a significant portion of the Turkish defense & aerospace industry.

<table>
<thead>
<tr>
<th>Rank (2015)</th>
<th>Company</th>
<th>Turnover ($Million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ASELSAN</td>
<td>985</td>
</tr>
<tr>
<td>2</td>
<td>TURKISH TECHNICS</td>
<td>928</td>
</tr>
<tr>
<td>3</td>
<td>TAI</td>
<td>786</td>
</tr>
<tr>
<td>4</td>
<td>TEI</td>
<td>309</td>
</tr>
<tr>
<td>5</td>
<td>ROKETSAN</td>
<td>277</td>
</tr>
<tr>
<td>6</td>
<td>FNSS</td>
<td>188</td>
</tr>
<tr>
<td>7</td>
<td>MKEK</td>
<td>178</td>
</tr>
<tr>
<td>8</td>
<td>STM</td>
<td>170</td>
</tr>
<tr>
<td>9</td>
<td>OTOKAR</td>
<td>158</td>
</tr>
<tr>
<td>10</td>
<td>HAVELSAN</td>
<td>133</td>
</tr>
<tr>
<td>11</td>
<td>BMC</td>
<td>77</td>
</tr>
<tr>
<td>12</td>
<td>ALP AVIATION</td>
<td>62</td>
</tr>
<tr>
<td>13</td>
<td>SEDEF SHIPBUILDING</td>
<td>42</td>
</tr>
<tr>
<td>-------------</td>
<td>------------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>14</td>
<td>NUROL MAKİNA</td>
<td>40</td>
</tr>
<tr>
<td>15</td>
<td>PROBIL</td>
<td>34</td>
</tr>
<tr>
<td>16</td>
<td>DEARSAN</td>
<td>33</td>
</tr>
<tr>
<td>17</td>
<td>HST AUTOMOTIVE</td>
<td>28</td>
</tr>
<tr>
<td>18</td>
<td>ÖZTEK TEXTILE</td>
<td>23</td>
</tr>
<tr>
<td>19</td>
<td>AYDIN SOFTWARE</td>
<td>22</td>
</tr>
<tr>
<td>20</td>
<td>ISTANBUL SHIPYARD</td>
<td>21</td>
</tr>
<tr>
<td>21</td>
<td>YAKUPOĞLU TEXTILE</td>
<td>20</td>
</tr>
<tr>
<td>22</td>
<td>SAMSUN YURT SAVUNMA</td>
<td>16</td>
</tr>
<tr>
<td>23</td>
<td>ÇAN JOINT VENTURE</td>
<td>15</td>
</tr>
<tr>
<td>24</td>
<td>SAVRONİK</td>
<td>15</td>
</tr>
<tr>
<td>25</td>
<td>YONCA-ONUK</td>
<td>15</td>
</tr>
</tbody>
</table>

Source: Undersecretariat for Defense Industries, turnovers as of end-2015 and cover defense and aerospace production revenues only
Major Players

Turkish defense companies, Aselsan, TAI and Roketsan are among world’s top defense players.

Ranking of Turkish Companies Among World’s Top 100 Defense Companies

Source: DefenseNews, Annual rankings based on preceding years' financials.
Turkish defense industry has developed a strong culture of partnerships which have successfully implemented important projects.

**1988**
FNSS, a joint venture owned 51% by Nurol Holding and 49% by BAE Systems, is a leading manufacturer and supplier of tracked and wheeled armored vehicles and weapon systems for the Turkish and Allied Armed Forces.

**1985**
BMC, which is a Turkish-Qatari partnership, manufactures tactical armored vehicles for the defense industry, in addition to buses for public transportation, light and heavy weight trucks for transportation and logistics industry.

**2010**
Kale Pratt & Whitney, a joint venture owned 51% by Kale Group and 49% by Pratt & Whitney, uses state-of-the-art technologies critical to the production of the F135 engine powering the F-35 Lightning II fighter aircraft.

**2014**
Rolls-Royce and Kale Group, established a joint venture company owned 51% by Kale and 49% by Rolls-Royce 49%, to develop aircraft engines for Turkey, initially targeting the TF-X National Fighter Jet Project.

**2017**
BAE Systems and TAI signed an agreement, worth £100m, to collaborate on the first development phase of an indigenous fifth-generation fighter jet for the Turkish Air Force – TF-X.

**2017**
Qatar Armed Forces

**1988**
Kale

**1985**
BMC

**2010**
Kale Pratt & Whitney

**2014**
Qatar Armed Forces

**2017**
BAE Systems and TAI

**2017**
Rolls-Royce and Kale Group

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Global Supply Chain

Developing a domestic competitive supply chain base has also integrated Turkish companies into the global value chain.

Global Supply Chain of A400M

Airbus A400M Program
A400M is the first program that enabled TAI to gain capability and responsibility of a whole life cycled aerospace product starting from concept design studies to after sale logistics support activities. TAI’s workshare in A400M Program includes design and manufacture of structural components as Forward Center Fuselage with Emergency Exit Door, Section 17 Upper Shell with Rear Hatch Door, Paratrooper Doors, Tailcone, Ailerons and Spoilers. TAI has also manufacturing responsibility of all fuselage harnesses. TAI has first level design and procurement responsibility on lighting system (except cockpit) and water and waste system.

Source: Airbus Military
F-35 Production Industrial Participation opportunities for Turkish companies are expected to reach more than $12 billion.

**Global Supply Chain**

**TAI**

Manufacturing F-35 production airframe structure and assemblies, production landing gear components and over 100 F135 production engine parts to include titanium integrated blade rotors.

**Aselsan**

Developing manufacturing approaches for advanced optical components, which are part of the F-35 Electro Optical Targeting System. They are also working with Northrup Grumman on the F-35 CNI Avionic Interface Controller and will initiate full scale production activities in the near term.

**Ayesas**

Currently is the sole source supplier for two major F-35 components – missile remote interface unit and the panoramic cockpit display.

**Fokker Elmo Turkey**

Manufacturing 40% of the F-35 Electrical Wiring & Interconnection System (EWIS) and will also deliver and support TAI with all center section wiring systems. Fokker Elmo is also developing the EWIS for the F135 engine, for which a major share is produced in Fokker Elmo Turkey in Izmir.

**Havelsan**

Havelsan has been instrumental as the Turkish lead for developing the construct of the future Turkish F-35 Integrated Pilot and Maintenance Training Center (ITC) and associated training systems in Turkey.

**Kale Aero**

In conjunction with Turkish Aerospace Industries, they manufacture and produce F-35 airframe structures and assemblies. Kale Aero also supports Heroux Devtek as the sole source supplier for all three variants landing gear up lock assemblies. Additionally, Kale Aerospace has also established a joint venture in Izmir with Pratt & Whitney and is manufacturing production hardware for the F135 engine.

**ROKETSAN and Tubitak-SAGE** are the Turkish joint leadership team who strategically manage the development, integration, and production of the advanced precision-guided Stand-off Missile (SOM-J) which will be carried internally on the 5th Generation F-35 aircraft. Additionally, Lockheed Martin Missiles and Fire Control has partnered with Roketsan, through a teaming agreement, to jointly develop, produce, market and sell the advanced, precision guided Stand Off Missile – Joint Strike Fighter (SOM-J).

Source: www.F35.com
In addition to international partnerships, Turkish companies have developed strong domestic capabilities with cutting-edge technologies. UAVs are a key area where Turkish companies excel.

**ANKA**

ANKA, advanced Medium Altitude Long Endurance class Unmanned Aerial System, performs day and night, all-weather reconnaissance, target detection / identification and intelligence missions with its EO/IR and SAR payloads, featuring autonomous flight capability including Automatic Take-off and Landing. ANKA incorporates a heavy-fuel engine and electro-expulsive Ice Protection System with an Advanced Ground Control Station and dual datalink allowing operational security and ease. The system is expandable with a Transportable Image Exploitation Station, Radio Relay, Remote Video Terminal and SATCOM.

**Technical Specifications**
- Wing Span: 17.3 m
- Length: 8 m
- Powerplant: 150 HP
- Payload Capacity: 200 kg
- Endurance: 24 hours
- Service ceiling: 30,000 ft
- Data range: 200 km
- Cruise Speed: 110 knots

**BAYRAKTAR TACTICAL UAS**

Bayraktar Tactical UAS is a Medium Altitude Long Endurance class system developed for tactical reconnaissance and surveillance missions. Prototype Development Phase started within 2007 based on competition model. Bayraktar Tactical UAS with its critical all subsystems - including Flight Control, INS-GPS, Automatic Take Off-Landing systems developed in house demonstrated fully automatic taxi, take off, cruise, landing, parking phases - was selected as the winner of the program in 2009.

**Technical Specifications**
- Wing Span: 12 m
- Length: 6.5 m
- Powerplant: 100 HP
- Payload Capacity: >55 kg
- Endurance: >24 hours
- Service ceiling: 24,000 ft
- Data range: 150 km
- Cruise Speed: 70 knots

**KARAYEL TACTICAL UAV**

KARAYEL Tactical UAV System is the first and only Tactical Unmanned Aerial Vehicle designed and produced according to NATO's STANAG-4671 for reconnaissance and surveillance purposes. With its capable Payloads on board, KARAYEL can not only detect a target but also mark it with its laser designator. KARAYEL can take off, land and fly a designated mission fully autonomously without assistance from a pilot. Payload capacity and variations are available for both civil and military applications.

**Technical Specifications**
- Wing Span: 10.5 m
- Length: 6.5 m
- Powerplant: 97 HP
- Payload Capacity: 70 kg
- Endurance: 10 hours
- Service ceiling: 22,500 ft
- Data range: 150 km
- Cruise Speed: 60-80 knots
In order to meet Turkish Air Force (TurAF) requirements beyond 2030s, Turkey has introduced an indigenous design and development program (TF-X) to replace the aging F-16 fleet of TurAF.

**TF-X Program**

Within the scope of TF-X Program, Turkey will become one of the few countries to possess the necessary technologies, engineering infrastructure and production capabilities, once the engineering activities on all the critical technologies are accomplished (e.g. increased situational awareness, sensor fusion, low observability, weapon bay, ...etc), which are needed by a 5th generation (or beyond) jet fighter aircraft.

TF-X aircraft is planned to be kept operational in the TurAF inventory until 2070s and will be interoperable with other critical assets of TurAF such as F-35As.

The TF-X indigenous design and development program prime contract between Undersecretariat for Defense Industries (SSM) and Turkish Aerospace Industries Inc. (TAI) has been signed on 5th of August 2016. The timing of this signature alone, is a key demonstrator of Turkey’s determination of running mega-projects uninterruptedly, even under extraordinary conditions.

Currently, the prime contract covers the initial four (4) years (starting after signature of major subcontracts) which will end up with completion of preliminary design phase. Within this period beyond the design and development of TF-X Aircraft, engineering capabilities, technology development activities (for key sensors like radar, electronic warfare, etc.), test infrastructures establishment and certification processes will be performed and extensive capabilities for a new generation jet fighter design, development and production will be gained by Turkish industry. TF-X aircraft will be a multi-role aircraft, it will be designed mainly for air-to-air role with a consideration to air-to-surface roles as well. Upon engineering analysis, TF-X aircraft will be a multi-role aircraft, it will be designed mainly for air-to-air role with a consideration to air-to-surface roles as well. Upon engineering analysis, preliminary calculations, based on received information of suppliers of candidate engines, TF-X aircraft is decided to be a twin engine configuration.

In this regard a Heads of Agreement (HoA) was signed between TAI and BAE Systems on 28th of January 2017, in the presence of the Prime Ministers of Turkey and the United Kingdom. In addition, the Letter of Agreement (LOA) was signed during the IDEF 2017. The TAI-BAE Systems Collaboration Agreement was signed and entered in to effect on 25th of August 2017.

One of the key ambition and consideration of SSM and TurAF, which is shared by the Turkish industry as well, is the exportability of TF-X aircraft to key allies and friendly countries. In this regard, Turkey also welcomes any opportunities for participation of interested countries in a win-win model.
Turkish defense industry has an attractive ecosystem supported by a qualified workforce, incentives and know-how.

**Product & Technology Development Expenditures ($million)**

<table>
<thead>
<tr>
<th>Year</th>
<th>Engineering Graduates in Turkey</th>
<th>Financed by Equity</th>
<th>Financed by Incentives</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>120</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2016</td>
<td>367</td>
<td>247</td>
<td>120</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong> 35,502</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Employment in the Industry: 35,502**

- Engineer: 30%
- Technician: 30%
- University Graduates (other fields): 11%
- Other: 11%

**2016 Engineering Graduates in Turkey**

- Chemical Engineering & Processes: 16,415
- Electronics & Automation: 10,450
- Motor Vehicles, Ships & Aircraft: 2,175
- Mechanics & Metals: 1,245

**Incentive Schemes**

<table>
<thead>
<tr>
<th>Main Incentive Tools</th>
<th>General Incentives</th>
<th>Regional Incentives</th>
<th>Incentives for Priority Investments</th>
<th>Incentives for Large Scale Investments</th>
<th>Incentives for Strategic Investments</th>
<th>Project-Based Incentives</th>
<th>R&amp;D Incentives</th>
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<td>✓</td>
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<tr>
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<tr>
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<tr>
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<td>✓</td>
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<tr>
<td>Land Allocation</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Partnership (Equity Investment by Govt.)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Guarantee of Purchase by Govt.</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
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<td>✓</td>
<td>✓</td>
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<td>✓</td>
<td>✓</td>
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<tr>
<td>Financial Grant</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

Source: SASAD, Higher Education Council, Ministry of Economy, Ministry of Science, Industry and Technology
Incentives

Turkish defense and aerospace investments are eligible for a wide range of incentives offered by the government, lucrative incentives schemes boost project economics substantially...

Manufacturing investments in defense and aerospace receive incremental benefits

- Corporate Tax deductions (up to 100%)
- Tax credits (up to 90%)
- Land Allocation
- Project Financing Support
- Social Security Premium Exemptions
- VAT and Customs Duty Exemptions
- Training support

Lowering upfront costs, improving cash flow, and accelerating returns on investment

Investments in Defense and Aerospace are Priority Areas with Strategic Focus

- 100% deductible R&D expenditures
- Corporate Tax exemptions
- Income Tax exemption for R&D personnel
- VAT exemptions on final products
- Dedicated Technology Development Zones
- Early stage financing for start-ups
- Export support

Research, Development, and Design activities are backed by generous support programs

- Industry Participation / Offset
- Product based supports/loans
- Industry development programs
- Exemptions for duties

Grants, incentives, and supports are available at all stages of new product development life cycle
As the industry developed, important aerospace clusters have emerged across Turkey.
Turkey hosts important events with significant international participation...

- **Eurasia Airshow**
  - April 25-29, 2018
  - Antalya
  - www.eurasiaairshow.com

- **Istanbul Airshow**
  - September 27-30 2018
  - Ataturk Airport
  - 12th International Civil Aviation & Airports Exhibition & Aviation Industry Supply Chain Platform
  - www.istanbulairshow.com

- **IDEF’19**
  - April 30 – May 3, 2019
  - Istanbul
  - idef.com.tr
The business environment for the industry is well-organized with a strong cooperation between the public and private sector.

**UNDERSECRETARIAT FOR DEFENSE INDUSTRIES (SSM)**
SSM was established in 1985 with a mandate to develop policies establishing a modern defense industry infrastructure in Turkey and has the authority and responsibility to implement these policies. As per its mandate, SSM carries out major systems procurement, industry policymaking, localization strategy, R&D and international industry relations. SSM is responsible for reorganizing and integrating the existing national industry in line with defense industry requirements; supporting new enterprises; exploring the opportunities with foreign investment and technology contributions; supporting enterprises to partner with foreign investors.

**DEFENSE & AEROSPACE INDUSTRY MANUFACTURERS ASSOCIATION (SaSaD)**
SaSaD was established in 1990 with a mission to contribute to the development, strengthening, and competitiveness of the Turkish defense and aerospace industry. As the representative of the Turkish defense and aerospace industry, both in Turkey and international platforms, SaSaD aims to facilitate the business environment for the industry players in coordination with the procurement authorities and contractors. Having started the business with 12 founding members at the beginning, SaSaD currently has 113 full members and 75 special members in the communication network as of 2017.

**DIRECTORATE GENERAL OF CIVIL AVIATION (DGCA)**
DGCA is in charge of regulating the civil aviation industry in accordance with the national and international regulations and standards in order to ensure flight safety and security of the civil aviation. Its main duties, among others, are: to issue relevant documentation and to register aircraft; to audit licenses of flight crew; to determine the licensing terms of personnel working in the civil aviation; to regulate the terms and conditions for the permissions to be granted to real or legal persons to perform air transportation activities in or out of Turkey; to regulate and audit air navigation of commercial aircraft, as well as traffic communication services in Turkish airspace.

**GENERAL DIRECTORATE OF STATE AIRPORTS AUTHORITY (DHMI)**
DHMI is a state-owned enterprise in charge of the management of Turkish airports and controlling Turkish airspace. It main activities are: management of airports, ground services at airports and air traffic control services, establishment and operation of air navigation systems and facilities and other related facilities and systems, and to maintain them at the level of modern aeronautics.
Agenda

• Snapshot

• Turkish Defense Industry

• Turkish Civil Aviation
Civil Aviation

Turkey is a key player in global air transportation.

Worldwide Passenger Ranking
3rd

Worldwide RPK Ranking
10th

Worldwide RTK Ranking
10th

Worldwide FTK Ranking
14th

Worldwide Air Traffic Ranking
12th

European Passenger Ranking
3rd

European Air Traffic Ranking
5th

Source: ICAO 2016

RPK: Revenue Passenger-Kilometers
RTK: Revenue Ton-Kilometers
FTK: Freight Ton-Kilometers
Turkey’s civil aviation has been rapidly growing...

**Aircraft** (# of Aircraft)
- 2003: 626, 2016: 1,417 (126% increase)

**Airline Passengers** (million)
- 2003: 34, 2017: 193 (467% increase)

**Airline Cargo Capacity** (Ton)
- 2003: 303, 2016: 18,222 (501% increase)

**General Aviation** (# of Aircraft)
- 2003: 162, 2016: 347 (114% increase)

**Airline Fleet** (# of Aircraft)
- 2003: 162, 2016: 540 (233% increase)

**Air Taxi** (# of Aircraft)
- 2003: 131, 2016: 231 (76% increase)

**Business Jets** (# of Aircraft)
- 2003: 32, 2016: 114 (256% increase)

**Turnover** ($ Billion)
- 2003: 2.2, 2016: 20 (809% increase)

Source: Director General of Civil Aviation (DGCA), *Airline, air taxi, general aviation, business jets, aerial agriculture, balloon.*
13 airline companies are operating in Turkey as of end-2016.

<table>
<thead>
<tr>
<th>Airlines</th>
<th>Passenger Aircraft</th>
<th>Seat Capacity</th>
<th>Cargo Aircraft</th>
<th>Freight Capacity</th>
<th>Total Aircraft</th>
</tr>
</thead>
<tbody>
<tr>
<td>TURKISH AIRLINES</td>
<td>300</td>
<td>59,679</td>
<td>8</td>
<td>552,000 KG</td>
<td>308</td>
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<td>SunExpress</td>
<td>49</td>
<td>9,261</td>
<td></td>
<td></td>
<td>49</td>
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<tr>
<td>PEGASUS AIRLINES</td>
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<td>12,930</td>
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<td>OnurAir</td>
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<td></td>
<td></td>
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<td>4,944</td>
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<td>8</td>
<td>1,440</td>
<td></td>
<td></td>
<td>8</td>
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<tr>
<td>ULS</td>
<td></td>
<td></td>
<td>3</td>
<td>121,575 KG</td>
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<td>corendon</td>
<td>11</td>
<td>2,079</td>
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<td></td>
<td>11</td>
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<tr>
<td>AIR ACT</td>
<td></td>
<td></td>
<td>7</td>
<td>795,025 KG</td>
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<td>Zair</td>
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<td>1,488</td>
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<td>tailwind</td>
<td>5</td>
<td>840</td>
<td></td>
<td></td>
<td>5</td>
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<td>BORAJET AIRLINES</td>
<td>14</td>
<td>1,335</td>
<td></td>
<td></td>
<td>14</td>
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<td><strong>TOTAL</strong></td>
<td><strong>515</strong></td>
<td><strong>100,365</strong></td>
<td><strong>25</strong></td>
<td><strong>1,821,600 KG</strong></td>
<td><strong>540</strong></td>
</tr>
</tbody>
</table>

Source: DGCA
International Connectivity

Turkey’s convenient location makes it a natural hub for aviation, as such, Turkish government has significantly invested in airport infrastructure to develop Turkey into an international hub.

**2003**
- 50 countries
- 60 international destinations
- 2 domestic hubs
- 26 domestic destinations

**2016**
- 118 countries
- 286 international destinations
- 7 domestic hubs
- 55 domestic destinations

Source: DGCA
Civil Aviation

Improvement in the airport infrastructure has been a major boon to the Turkish civil aviation.

**THE BUSIEST AIRPORTS IN TURKEY**

(MILLIONS OF PASSENGERS AS OF 2017)

<table>
<thead>
<tr>
<th>AIRPORT</th>
<th>CODE</th>
<th>DOMESTIC</th>
<th>INTERNATIONAL</th>
<th>TOTAL</th>
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<td>44.3</td>
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<td>ISTANBUL</td>
<td>SAW</td>
<td>21.1</td>
<td>10.3</td>
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<tr>
<td>ANTALYA</td>
<td>AYT</td>
<td>7.5</td>
<td>18.5</td>
<td>25.9</td>
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<tr>
<td>ANKARA</td>
<td>ESB</td>
<td>13.9</td>
<td>2.0</td>
<td>15.8</td>
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<tr>
<td>IZMIR</td>
<td>ADB</td>
<td>10.5</td>
<td>2.4</td>
<td>12.8</td>
</tr>
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<td>ADANA</td>
<td>ADA</td>
<td>5.0</td>
<td>0.6</td>
<td>5.6</td>
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<td>TRABZON</td>
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<td>4.0</td>
<td>0.2</td>
<td>4.2</td>
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<td>1.4</td>
<td>2.3</td>
<td>3.7</td>
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<td>BJV</td>
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<td>GAZIANTEP</td>
<td>GZT</td>
<td>2.6</td>
<td>0.3</td>
<td>2.9</td>
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</table>

<table>
<thead>
<tr>
<th>AIRPORT</th>
<th>CODE</th>
<th>DOMESTIC</th>
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<th>TOTAL</th>
</tr>
</thead>
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<tr>
<td>DUBAI</td>
<td>DXB</td>
<td>0.5</td>
<td>83.1</td>
<td>83.7</td>
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<td>LONDON</td>
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<td>4.7</td>
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<td>5.5</td>
<td>60.4</td>
<td>65.9</td>
</tr>
<tr>
<td>AMSTERDAM</td>
<td>AMS</td>
<td>0.1</td>
<td>63.5</td>
<td>63.6</td>
</tr>
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<td>FRANKFURT</td>
<td>FRA</td>
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<td>53.7</td>
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<tr>
<td>BARCELONA</td>
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<td>44.1</td>
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<td>MUNICH</td>
<td>MUC</td>
<td>9.7</td>
<td>22.6</td>
<td>32.3</td>
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</table>

**THE BUSIEST AIRPORTS IN EMEA REGION**

(MILLIONS OF PASSENGERS AS OF 2016)

<table>
<thead>
<tr>
<th>AIRPORT</th>
<th>CODE</th>
<th>DOMESTIC</th>
<th>INTERNATIONAL</th>
<th>TOTAL</th>
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<tr>
<td>DUBAI</td>
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<tr>
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<td>LHR</td>
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<tr>
<td>PARIS</td>
<td>CDG</td>
<td>5.5</td>
<td>60.4</td>
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<tr>
<td>AMSTERDAM</td>
<td>AMS</td>
<td>0.1</td>
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<td>63.6</td>
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<tr>
<td>FRANKFURT</td>
<td>FRA</td>
<td>7.1</td>
<td>53.7</td>
<td>60.8</td>
</tr>
<tr>
<td>ISTANBUL</td>
<td>IST</td>
<td>19.0</td>
<td>41.3</td>
<td>60.2</td>
</tr>
<tr>
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<td>MAD</td>
<td>14.3</td>
<td>36.1</td>
<td>50.4</td>
</tr>
<tr>
<td>BARCELONA</td>
<td>BCN</td>
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<td>32.3</td>
<td>44.1</td>
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<tr>
<td>LONDON</td>
<td>LGW</td>
<td>3.9</td>
<td>29.3</td>
<td>33.2</td>
</tr>
<tr>
<td>MUNICH</td>
<td>MUC</td>
<td>9.7</td>
<td>22.6</td>
<td>32.3</td>
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Source: DHMI, Airports Council International (ACI)
Over the past decade, Istanbul Atatürk Airport has rapidly developed into an international hub.

**HUB CONNECTIVITY: 15 FASTEST GROWING AIRPORTS IN EUROPE**

<table>
<thead>
<tr>
<th>Rank</th>
<th>Airport</th>
<th>2007</th>
<th>2017</th>
<th>Growth</th>
</tr>
</thead>
<tbody>
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<td>01.</td>
<td>FRA</td>
<td>61657</td>
<td>69930</td>
<td>13%</td>
</tr>
<tr>
<td>02.</td>
<td>CDG</td>
<td>47528</td>
<td>56535</td>
<td>70%</td>
</tr>
<tr>
<td>03.</td>
<td>AMS</td>
<td>33280</td>
<td>47217</td>
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</tr>
<tr>
<td>04.</td>
<td>IST</td>
<td>28734</td>
<td>33908</td>
<td>591%</td>
</tr>
<tr>
<td>05.</td>
<td>LHR</td>
<td>23747</td>
<td>32407</td>
<td>13%</td>
</tr>
<tr>
<td>06.</td>
<td>MUC</td>
<td>17911</td>
<td>28599</td>
<td>20%</td>
</tr>
<tr>
<td>07.</td>
<td>VIE</td>
<td>13918</td>
<td>17990</td>
<td>291%</td>
</tr>
<tr>
<td>08.</td>
<td>ZRH</td>
<td>12411</td>
<td>17979</td>
<td>0%</td>
</tr>
<tr>
<td>09.</td>
<td>FCO</td>
<td>7855</td>
<td>15157</td>
<td>22%</td>
</tr>
<tr>
<td>10.</td>
<td>CPH</td>
<td>7759</td>
<td>13803</td>
<td>-1%</td>
</tr>
<tr>
<td>11.</td>
<td>MXP</td>
<td>7459</td>
<td>12427</td>
<td>59%</td>
</tr>
<tr>
<td>12.</td>
<td>HEL</td>
<td>5084</td>
<td>9982</td>
<td>96%</td>
</tr>
<tr>
<td>13.</td>
<td>IST</td>
<td>4907</td>
<td>6665</td>
<td>141%</td>
</tr>
<tr>
<td>14.</td>
<td>SVO</td>
<td>4600</td>
<td>5805</td>
<td>176%</td>
</tr>
<tr>
<td>15.</td>
<td>CPH</td>
<td>3718</td>
<td>5404</td>
<td>-30%</td>
</tr>
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</table>

Source: ACI Europe Airport Industry Connectivity Report 2017 *Connectivity is a composite measure of the number of destinations, the frequency of services and the quality of the connections (in the case of hubbing or indirect services).
Turkey is building world’s largest airport in Istanbul...

- 200 million passenger capacity
- 350 Destinations
- 500 Airplane Parking Capacity
- 2,000 daily landing & departures
- 6 Runways

 Operational in 2018
Global Aviation

With more than 4 billion new passengers, global aviation market will grow to 7.8 billion passengers by 2036, around one-third of the growth will come from countries around Turkey.

Turkey is set to be 9th largest aviation market in the world over the next 20 years..

The Largest 10 Passenger Markets
(Ranked by passenger numbers to, from and within each country)

<table>
<thead>
<tr>
<th>Ranking</th>
<th>2016</th>
<th>2036</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>USA</td>
<td>CHINA</td>
</tr>
<tr>
<td>2</td>
<td>CHINA</td>
<td>USA</td>
</tr>
<tr>
<td>3</td>
<td>UK</td>
<td>INDIA</td>
</tr>
<tr>
<td>4</td>
<td>JAPAN</td>
<td>INDONESIA</td>
</tr>
<tr>
<td>5</td>
<td>SPAIN</td>
<td>UK</td>
</tr>
<tr>
<td>6</td>
<td>GERMANY</td>
<td>JAPAN</td>
</tr>
<tr>
<td>7</td>
<td>INDIA</td>
<td>SPAIN</td>
</tr>
<tr>
<td>8</td>
<td>ITALY</td>
<td>GERMANY</td>
</tr>
<tr>
<td>9</td>
<td>FRANCE</td>
<td>TURKEY</td>
</tr>
<tr>
<td>10</td>
<td>INDONESIA</td>
<td>THAILAND</td>
</tr>
</tbody>
</table>

5 Fastest Growing Markets
(In terms of annual additional passengers in 2036 compared to 2016)

<table>
<thead>
<tr>
<th>Country</th>
<th>Additional Passengers (million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHINA</td>
<td>921</td>
</tr>
<tr>
<td>USA</td>
<td>401</td>
</tr>
<tr>
<td>INDIA</td>
<td>337</td>
</tr>
<tr>
<td>INDONESIA</td>
<td>235</td>
</tr>
<tr>
<td>TURKEY</td>
<td>119</td>
</tr>
</tbody>
</table>

Source: IATA
Turkey is also well-positioned to benefit from Maintenance, Repair, and Overhaul (MRO) business in the region that hosts 34% of World in-service fleet and accounts for 40% of global MRO market.

Source: Oliver Wyman
## Partnerships

Competition and cooperation go hand in hand in the Turkish aerospace industry.

### 2009

**Turkish Engine Center (TEC)**

The Turkish Engineering Center is a joint venture with Turkish Technic specializing in CFM56 and V2500 engine overhaul and repair. The Turkish Engine Center unites the long histories of engineering and maintenance excellence of its parent companies. Established in 2009, the facility is located at Istanbul’s Sabiha Gökçen Airport and has performed more than 400 engine overhauls.

---

### 1989

**SunExpress**

SunExpress was founded as a subsidiary of Turkish Airlines and Lufthansa. Today, SunExpress has a fleet of 70 aircrafts with 13,950 seats capacity, flying to more than 100 destinations. It carried around eight million passengers in 2016. With its 26 years of experience and thus the long-term commitment in the traffic between the home markets of Turkey and Germany, the airline has acquired the reputation of the holiday specialist even beyond Turkey.

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### 2009

**Turkish Technic (TURKISH TECHNIC)**

Established in 2008, acquired by HNA in 2010, myTECHNIC is the World’s first lean greenfield MRO with a total closed area of 48,400 m² and one of its kind in the region with a 15,788 m² hangar area, 12,115 m² office area and 20,500 m² warehouse and shop area under one roof. Located in Sabiha Gökçen Airport, myTECHNIC has established business with 130+ customers in 10 regions.

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### 2010

**Goodrich Turkish Technic (GOODRICH TURKISH TECHNIC)**

A joint venture owned 60% by Goodrich Aerostructures and 40% by Turkish Technic, Goodrich Turkish Technic provides services for nacelles, thrust reversers, related parts and rotatable support.

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### 2011

**TSI Aviation Seats (TSI AVIATION SEATS)**

TSI Aviation Seats was established as a joint venture owned 50% by Turkish Airlines and 50% by Assan Hanil, with the target of designing, producing, repairing and marketing all types of aircraft seats and supplying their spare parts.

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**Turkish Technic (TURKISH TECHNIC)**

A joint venture owned 51% by Turkish Technic and 49% by TAI, the company manufactures galleys and their inserts (like trolleys, std. containers etc.), crew rests, cabin dividers, wind screens, miscellaneous stowage, coatrooms, video control compartments, aircraft textile, leather and most of other cabin interior parts except for the aircraft seats.
Turkish Airlines has shown incredible growth over the past decade, taking competition to a higher level.

<table>
<thead>
<tr>
<th></th>
<th>2007</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Millions of Passengers</td>
<td>19.6</td>
<td>68.6</td>
</tr>
<tr>
<td>Int’l Transit Passengers (million)</td>
<td>1.1</td>
<td>21.7</td>
</tr>
<tr>
<td>Fleet</td>
<td>102</td>
<td>329</td>
</tr>
<tr>
<td>Countries Served</td>
<td>69</td>
<td>120</td>
</tr>
<tr>
<td>International Destinations (Number of Cities)</td>
<td>138</td>
<td>250</td>
</tr>
<tr>
<td>Revenue* ($Billion)</td>
<td>3.7</td>
<td>10.4</td>
</tr>
</tbody>
</table>

Source: Turkish Airlines *2017 annualized as of September 2017
The visionary leadership of Turkish Airlines is committed to expanding..

“We will increase our fleet to 500 aircrafts and revenues to 30 billion dollars by 2023”

Mr. İlker AYCI
Chairman
Turkish Airlines
Turkey’s macro fundamentals have been a key driver of civil aviation...

**Growth Drivers of Civil Aviation**

- **Average Annual Real GDP Growth**
  - 5.6% over the past 14 years

- **Income per Capita**
  - As of 2016, up from $3,581 in 2002

- **Foreign Trade Volume**
  - As of 2017, up from $88 billion in 2002

- **Average Annual Number of Tourists**
  - Visiting Turkey over the past 10 years
  - 30+ million

**Proximity to Major Markets**

- 1.5 billion people, $24T GDP and 45% global trade at a 4-hour flight distance

**Source:** Turkstat, IMF and World Bank
What can ISPAT do for you?

ISPAT will assist you before, during and after your entry to Turkey

A governmental body attached to the Prime Ministry

Private sector approach with public sector capabilities

Acting as your solution partner

General & customized business information & sectoral analysis & reports

Site selection support to find appropriate location/land for your investment

Arrangements of meetings with governmental bodies and other stakeholders

Facilitating your investment at all stages

Matchmaking with local partners & establishing business linkages

Project launch & Press release Services

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THANK YOU

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