Philippine Council for Industry, Energy
and
Emerging Technology Research and
Development (PCIEERD)

AIAP – 2014 and BEYOND

Presented by:

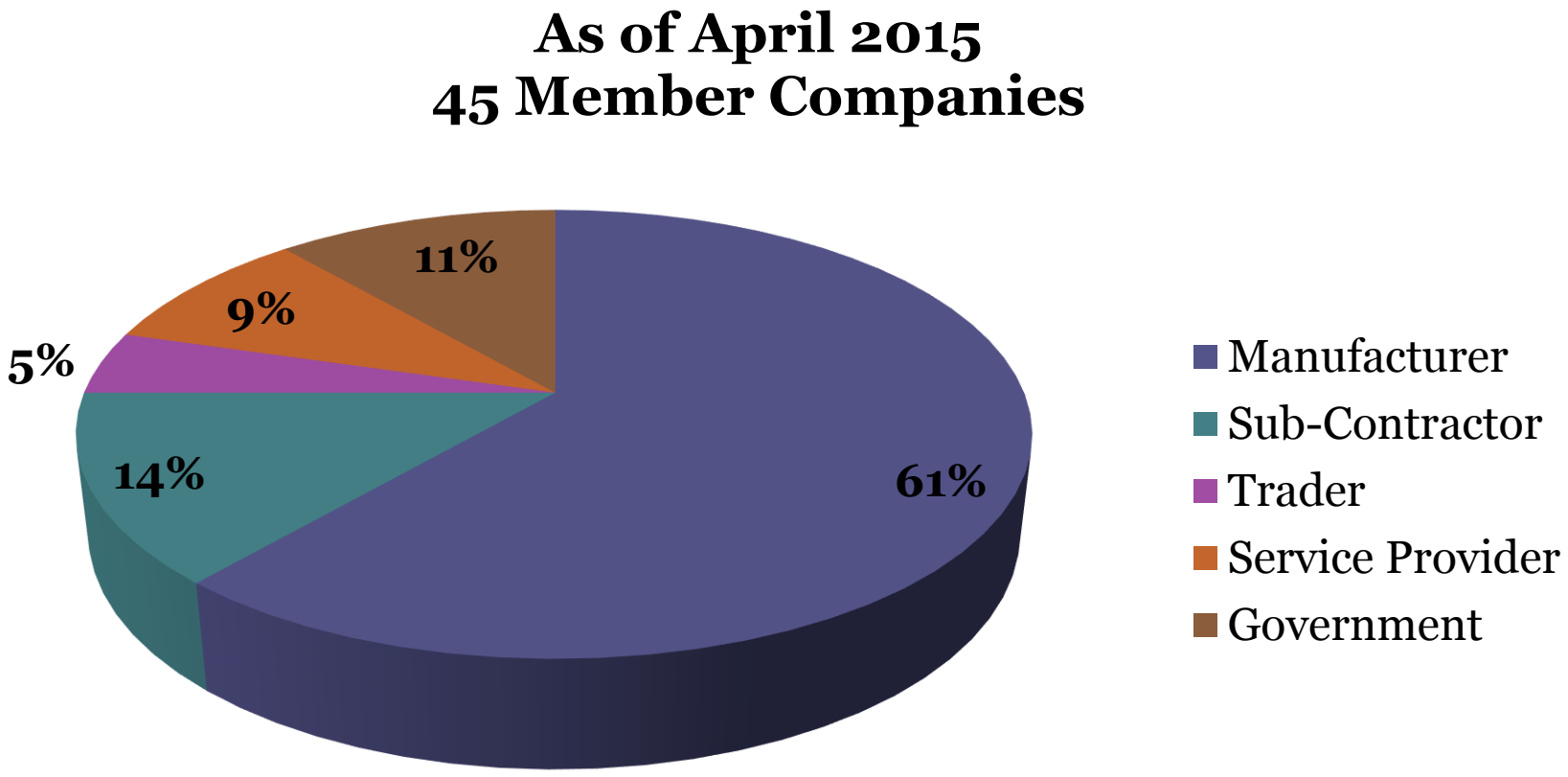
MR. JOHN T. LEE
President
Aerospace Industries Association of the Philippines (AIAP)

THE AEROSPACE INDUSTRIES ASSOCIATION OF THE PHILIPPINES (AIAP)

THE HISTORY OF THE ASSOCIATION

- **Formed last September 5, 2012**
- **Started with 5 member companies**
- **As of April 2015 – 45 Member Companies**
- **(1st / 2nd / 3rd Tier Companies to OEM of Commercial Aircraft)**

STRUCTURE OF MEMBERSHIP



MEMBERSHIP BREAKDOWN

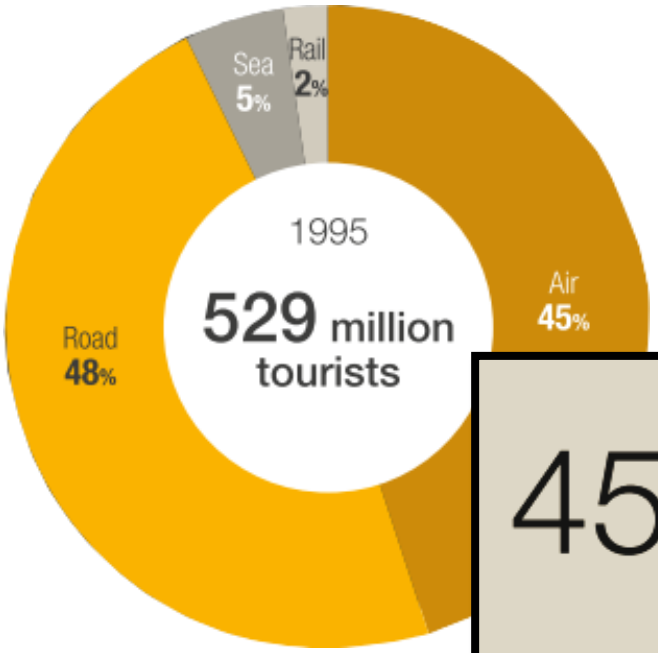
TIER 1 Companies

- **B/E Aerospace BV Philippine Branch**
  - **Manufacturer of Interiors, Galleys, Ovens, Lavatories for the Commercial Aircraft Market.**
- **MOOG Controls Corporation**
  - **Manufacturer of Primary & Secondary Flight Controls, Actuation Systems for the Commercial Aircraft Market.**
- **JAMCO Philippines**
  - **Manufacturer of Interiors, Galleys, Lavatories for the Commercial Aircraft Market.**
- **Surface Technology International**
  - **Avionics**
  - **Contract Electronics Manufacturing**

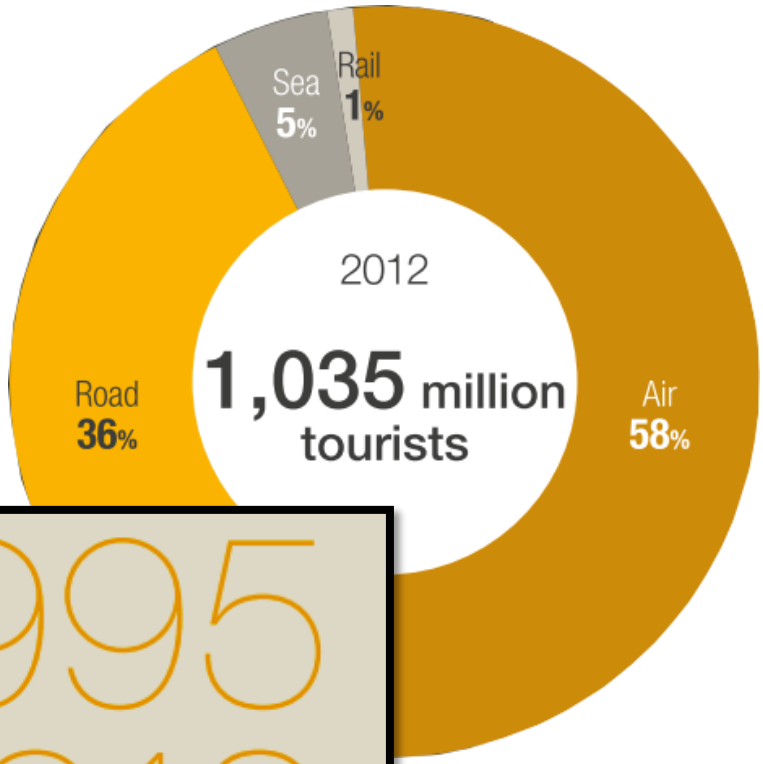
GLOBAL AEROSPACE INDUSTRIES OVERVIEW

- Air Travel – a form of travel in vehicles such as AIRPLANES, HELICOPTERS, Hot Air Balloons, Blimps, Gliders or anything else that can sustain a flight.
  - The use of air travel has greatly increased around the world in recent decades and from 1995 to year 2012 it went almost double.

Year 1995



Year 2012



45% 1995

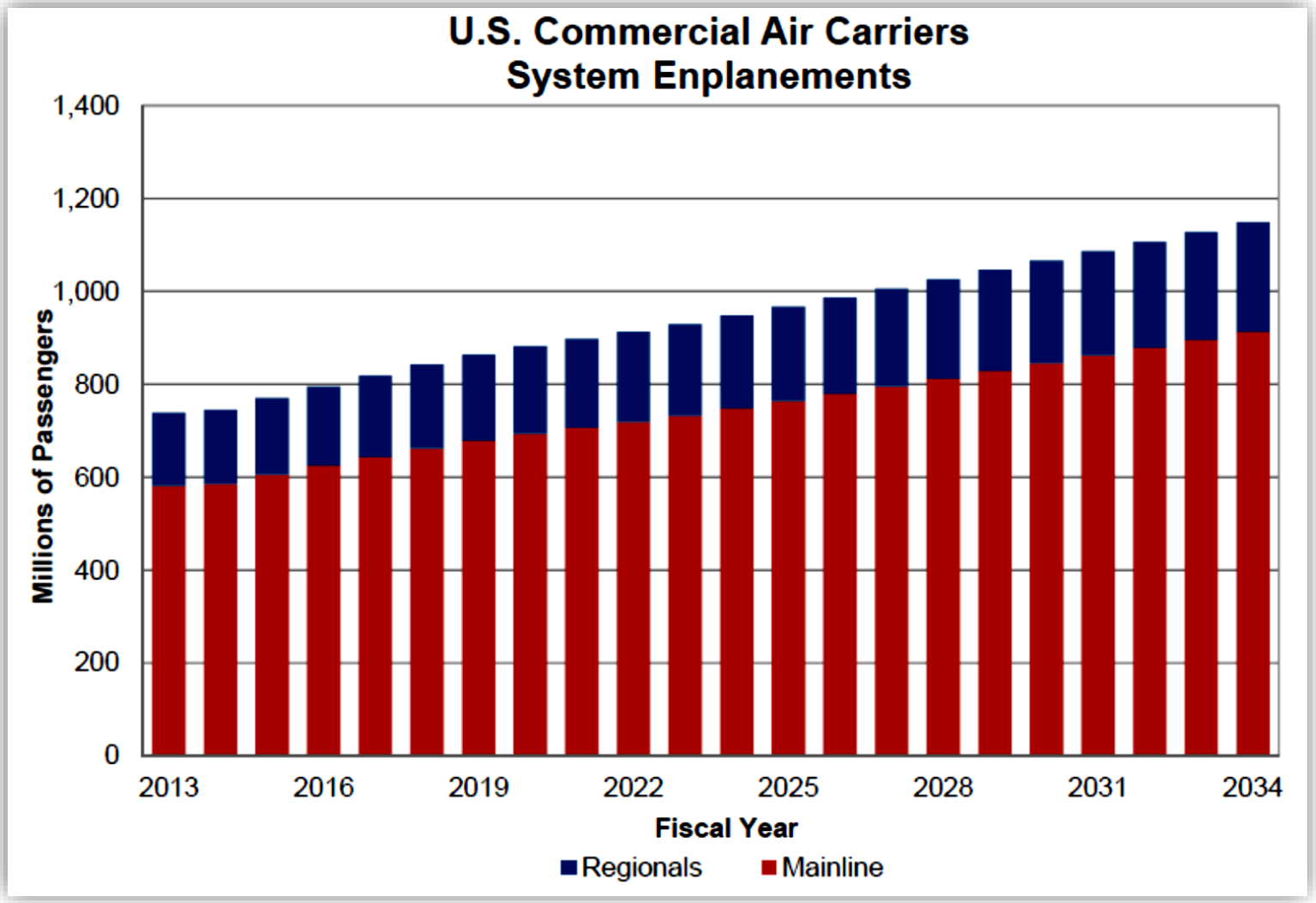
58% 2012

TOURISTS TRAVELLING BY AIR TO THEIR FINAL DESTINATION

Source: World tourist Organization

From the FAA Aerospace Forecast Fiscal Years 2014-2023 report

Commercial Aviation Forecast in US



SMALL WORLD, BIG FUTURE

Source:

100 YEARS OF COMMERCIAL FLIGHT

flying100years.com

SMALL WORLD, BIG FUTURE

Source:

100 YEARS OF COMMERCIAL FLIGHT

flying100years.com

Demand to Aircraft Assemblers

THE BOEING FAMILY

737

747

767

777

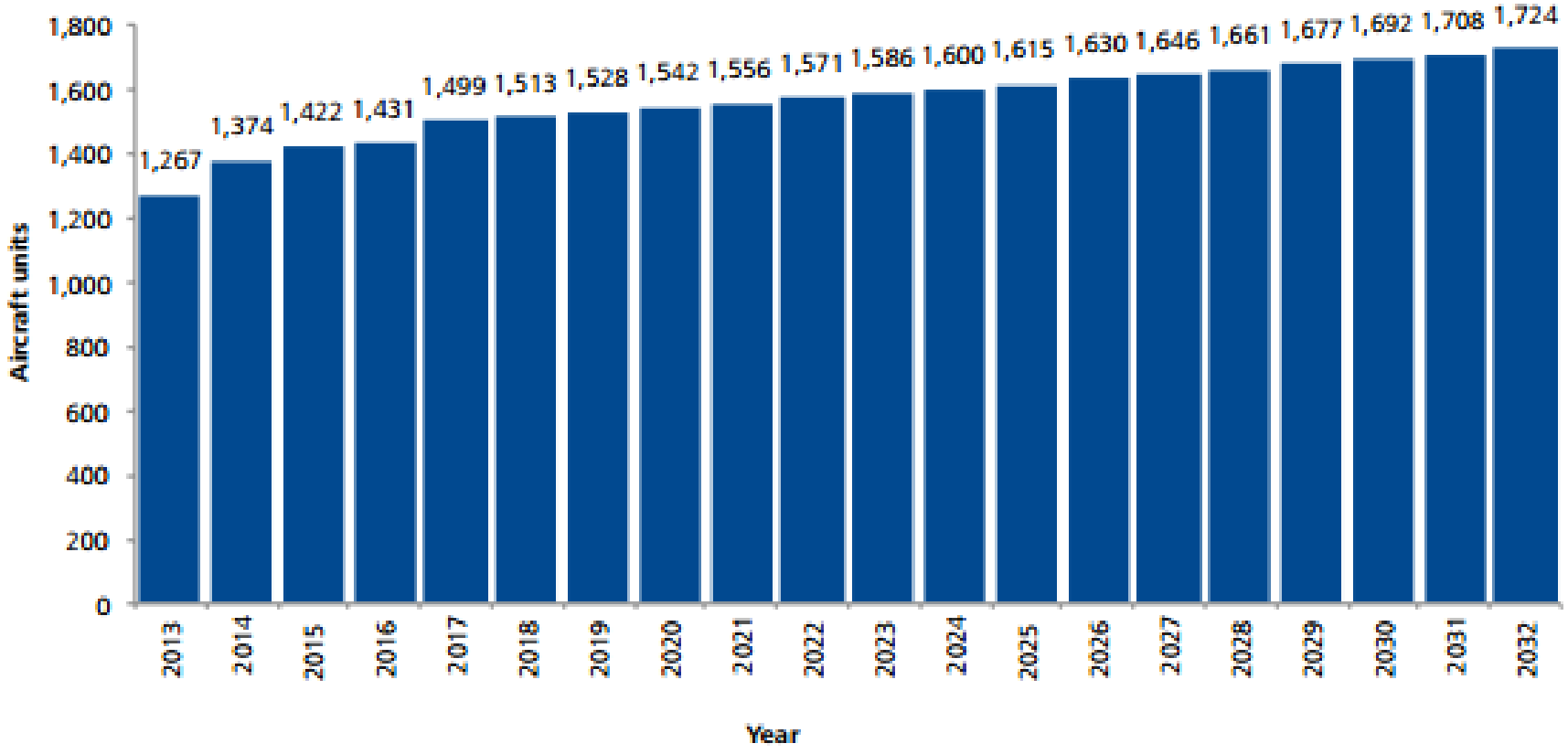
787

BOEING®

The world's largest aerospace company and leading manufacturer of commercial jetliners and defense, space and security systems. Its commercial jetliners roughly covers 48% of the world-fleet.

Aircraft Delivery Forecast

Figure 3: Aircraft delivery forecast (2013 to 2032)



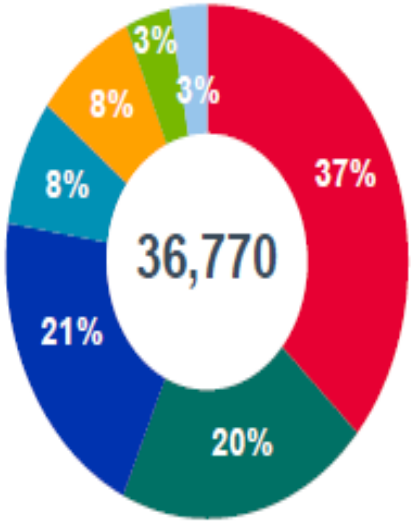
Source: DTTL Global Manufacturing Industry group analysis of data from Boeing, *Current Market Outlook* (2013–2032), September 2013, http://www.boeing.com/assets/pdf/commercial/cmo/pdf/Boeing_Current_Market_Outlook_2013.pdf and Airbus, *Global Market Forecast (2013–2032)*, September 2013, http://www.airbus.com/company/market/gmf2013/.

Market Outlook

New airplane deliveries by region

2014–2033

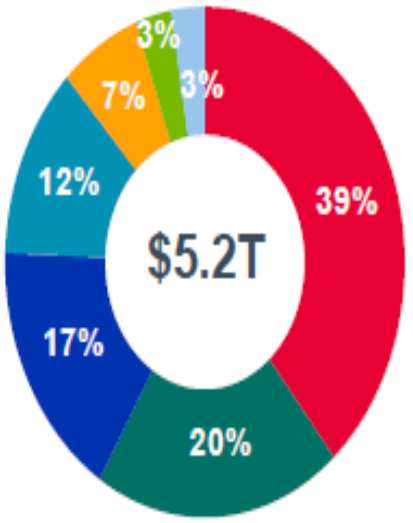
Region	Airplanes
Asia Pacific	13,460
Europe	7,450
North America	7,550
Middle East	2,950
Latin America	2,950
C.I.S.	1,330
Africa	1,080
World Total	36,770



Market value by region

2014–2033

Region	$B
Asia Pacific	2,020
Europe	1,040
North America	870
Middle East	640
Latin America	340
C.I.S.	150
Africa	140
World Total	$5,200B



Source: BOEING – Current Market Outlook – 2014-2033

THE AIRBUS FAMILY

AIRBUS

- **Airbus is the world's leading aircraft manufacturer of passenger airliners, ranging in capacity from 100 to more than 500 seats.**
- **By 2018, Airbus aims to produce 10 aircraft each month.**

AIRBUS

(Orders, Deliveries, Operators – Worldwide)May 2015

	Single Aisle	A300/ A310	A330	A340	A350	A380	TOTAL
Total Orders	11704	816	1502	377	780	317	15,496
Total Deliveries	6581	816	1189	377	3	162	9,128
Aircraft in Operation	6315	359	1171	330	3	162	8,340
Number of Operators	312	51	102	50	1	13	395
Number of Customers	284	86	102	48	40	18	380

Average price of an aircraft is 191.62(M USD)

For A350 XWB alone price is around $254 to $332 million!

Qatar has made the largest purchase to date, and will be the recipient of 80 A350 XWBs

AIRBUS

(Supply and Demand) as of January 2015

Airbus has sold over 15,000 aircraft & delivered over 8,800

A380

A350 XWB

A340

A330

A320 Family

A300/A310

Orders, deliveries & backlog

15,271	orders
8,885	deliveries
6,386	backlog
13	models
372	customers
400	operators

As at end December, 2014

A300/A310 & A340 no longer in production

Aircraft not to scale

AIRBUS

THE GULFSTREAM FAMILY

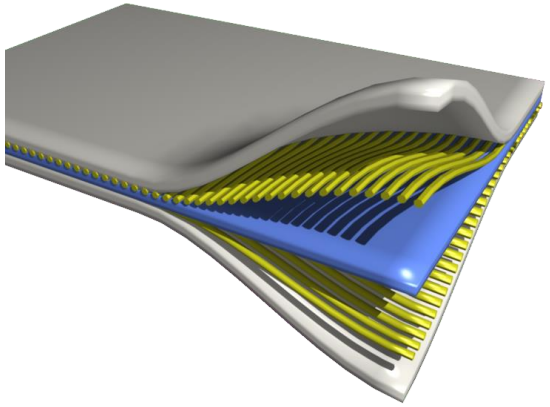
THE BOMBARDIER FAMILY

THE COMAC FAMILY

Technology

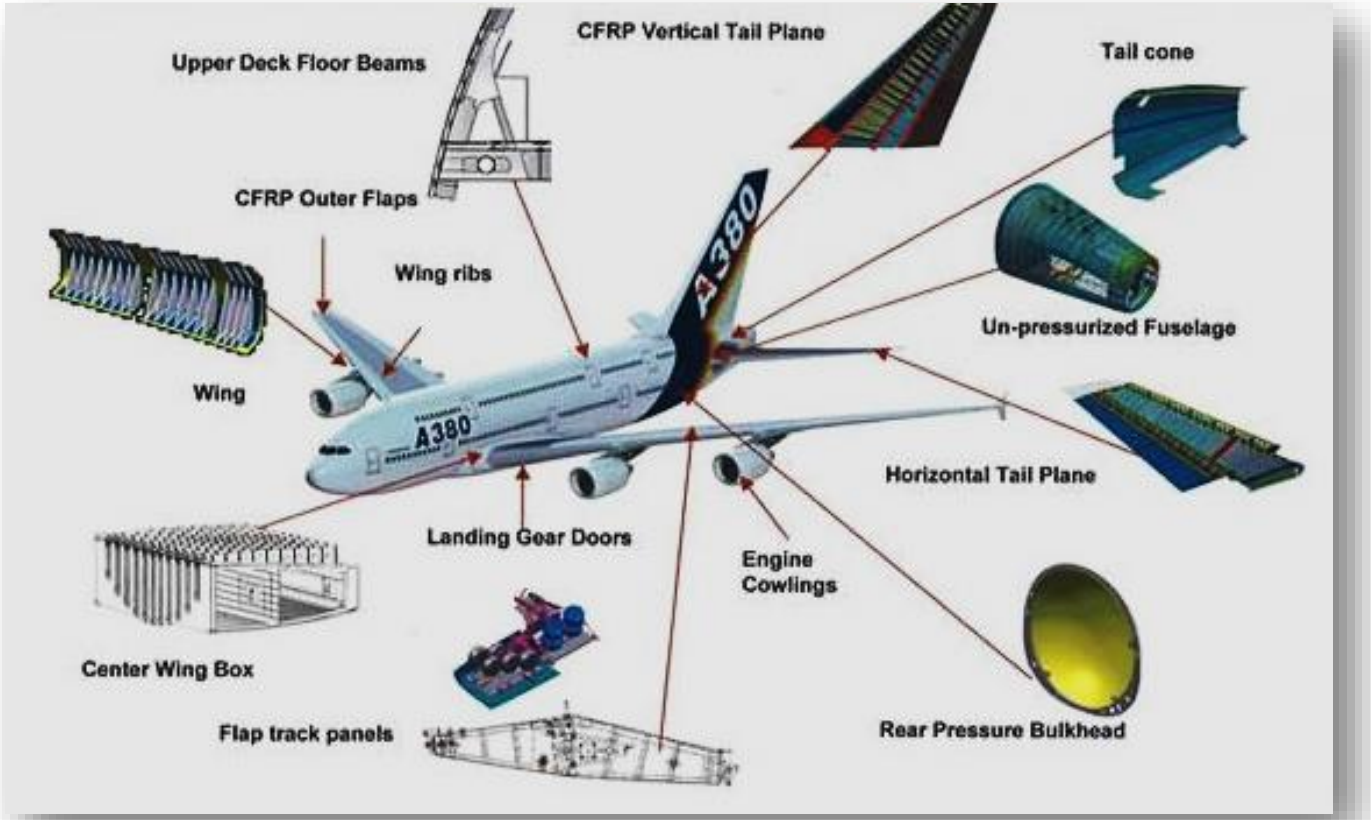
Material Technology

Composite Materials



- A **composite material** can be defined as a combination of a matrix and a reinforcement, which when combined gives properties superior to the properties of the individual components. In the case of a **composite**, the reinforcement is the fibres and is used to fortify the matrix in terms of strength and stiffness.
- **Why use composite?**
  - It is light and strong material
  - design flexibility
  - be molded into complex shapes

Aerospace Application

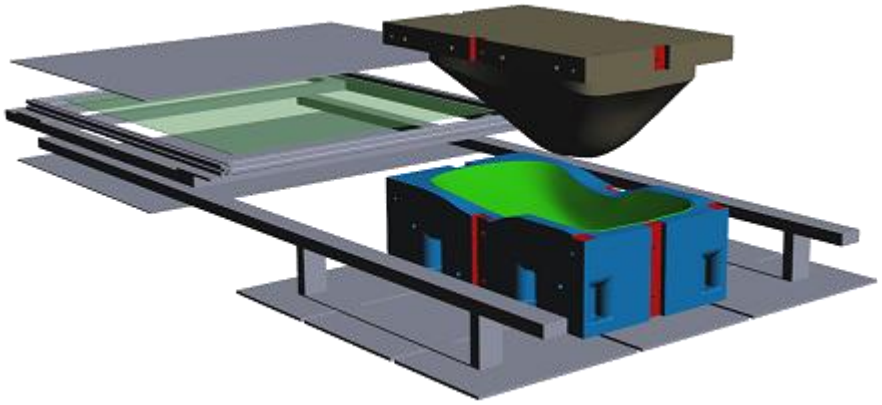


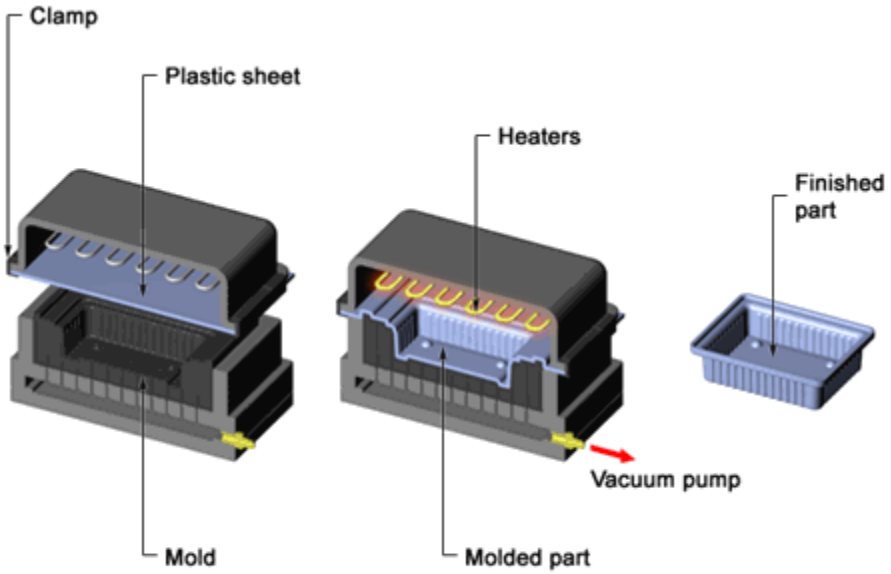
- **Application**

  Commonly used in Aircraft, boats and marine, automotive components, building materials and others. Its primary advantage is its lightweight property making it the best material in transportation, since less weight

Vacuum Thermoforming

- a simplified version of thermoforming, whereby a sheet of plastic is heated to a forming temperature, stretched onto a single-surface mold, and forced against the mold by a vacuum (suction of air).





Vacuum Thermoforming
(application in Aerospace and Aviation)

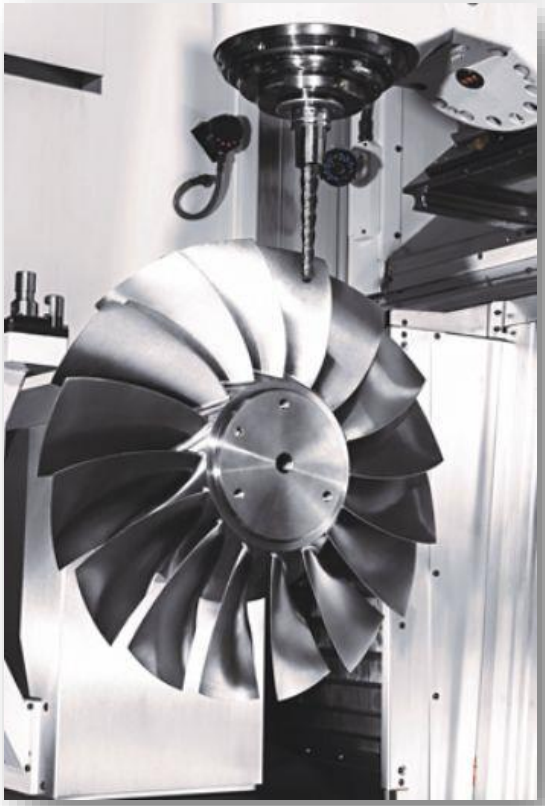
- Aircraft Interior Paneling
- Galley Components
- Overhead Luggage Bins
- Seating Parts
- Window Shades
- Light Housings
- Ducting

Adaptive Machining Technology

- **used in situations where components have an individual shape and are therefore not candidates for normal machining processes.**

Adaptive Manufacturing New weight-reduction production technologies in the aerospace industry often pose real problems when it comes to maintaining acceptable levels of component accuracy, quality and consistency. Delcam's Adaptive Manufacturing Solution builds upon the strengths of Electronic Fixturing and OMV technology to allow pre-defined, and certified, manufacturing processes to compensate for undesirable process variables. Common examples of customers using Delcam's Adaptive Manufacturing solution include:-

• Adaptive machining of inconsistent castings
• Adaptive trimming of flexible composite parts
• MRO of damaged blades, vanes and blisks



Adaptive Machining

Adaptive manufacturing helps aerospace manufacturers to repair high value components such as turbine blades for jet engines, where repair is a more economic alternative than manufacturing new components. Turbine blades operate in extreme environments and therefore become distorted by heat and worn over time, significantly reducing engine performance.

Accurately and efficiently repairing turbine blades depends on knowing the position of the work piece, the shape of the stock at the start of the operation and the shape that is to be produced at the end of the operation. Adaptive machining allows accurate and efficient machining when at least one of these factors is unknown. CAM programs assist in this process by enabling operators to adapt toolpaths to the position of the stock, a much easier solution that moving stock into the correct location.

Aerospace manufacturers benefit through reduced set-up times as it is easier to realign toolpaths instead of parts. Furthermore, adaptive manufacturing eliminates errors from an incorrect set-up, whilst time and money is saved through a reduced need for highly accurate fixtures.

Application:

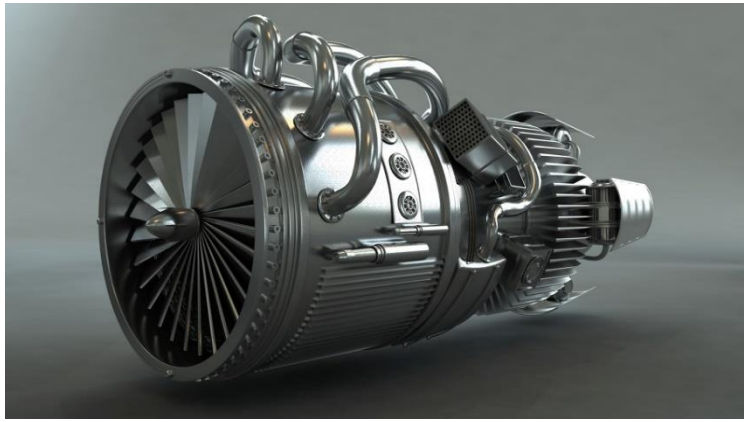
Turbo Machining

Repair

Casting and Forging

Grinding and Machining

Surface Treatment



- **Chemical corrosion protection processes fro Ferrous and Non-Ferrous materials/parts typically employed in aerospace components manufacturing in accordance with MIL C.5541, AMS 2404, ASTM A967 and MIL A 9625**

COMPONENTS THAT ARE BEING / WILL BE MANUFACTURED LOCALLY FOR THE INDUSTRY

THE PRODUCTS

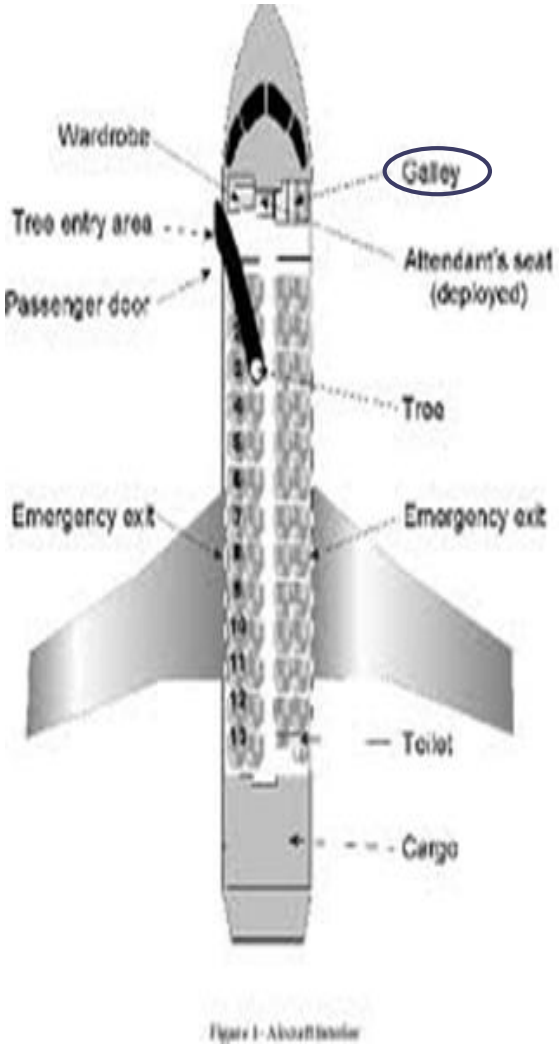
BOEING 787 Primary & Secondary Flight Controls

THE PRODUCTS

Airbus A350XWB Primary & Secondary Flight Controls

THE PRODUCTS

Galley Equipment

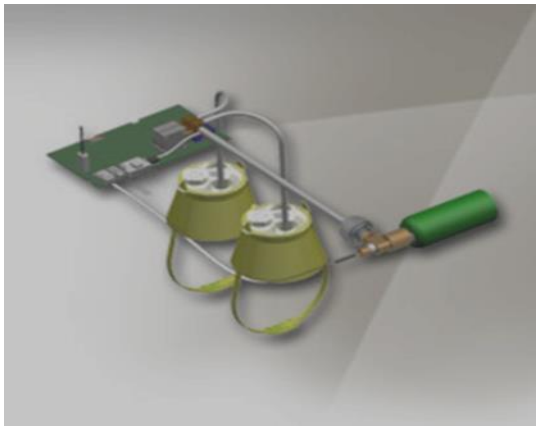


THE PRODUCTS

Other Potential Products

Seats

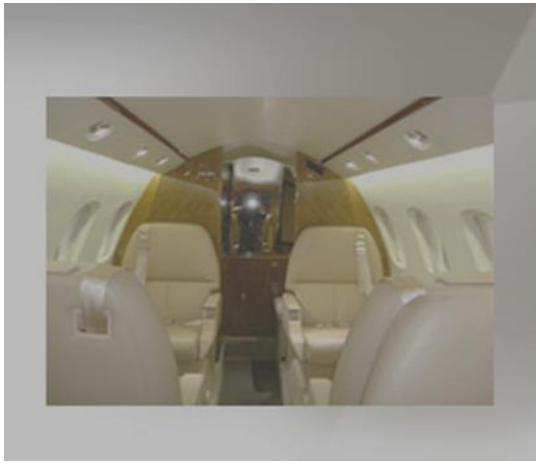
Wiring Harness



Oxygen Systems

Potable Water and Vacuum Waste System

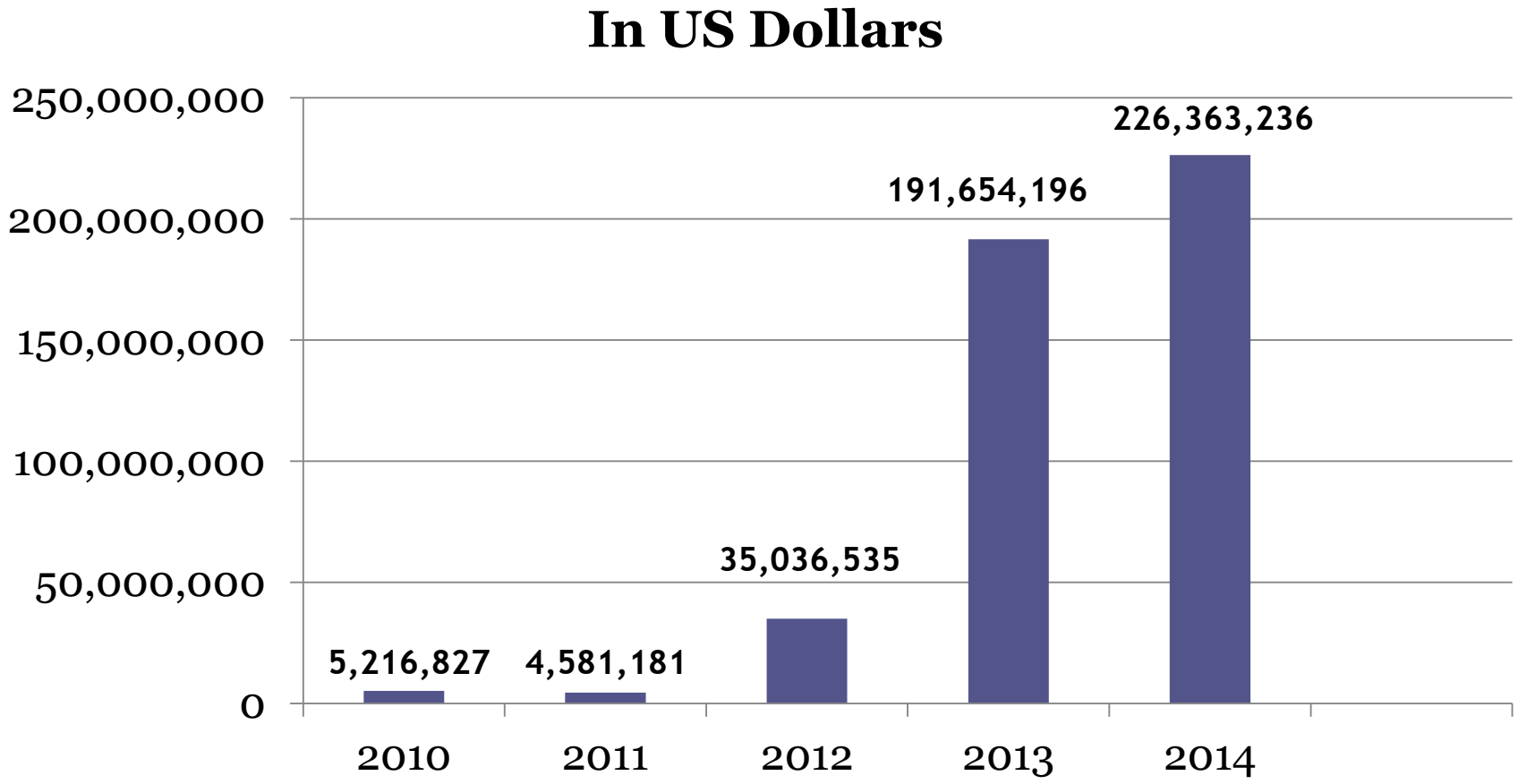
Thermal and Power Management



Lighting Systems

FACTS AND FIGURES: STRENGTH IN NUMBERS

TOTAL PHILIPPINE EXPORTS OF AEROSPACE PARTS & COMPONENTS



Source: Philippine Statistics Authority and the DTI- Export Management Bureau

Airbus Projection for A350 XWB

Airbus projection is USD 300M for their total annual buy in the Philippines for their A350 once it goes into full production.

Required Technology from current Philippine Manufacturers

Sheet Metal

- Water Jet
- Laser
- Turret Punch
- Power Press
- Press Brake
- Hydroform

Plastic

- Extrusion
- Injection
- Vacuum Thermo form

CNC Machining

- 5 axis
- 4 axis
- Large machines for aerostructures
- Hard machining
- Exotic material machining
- Pinch Milling
- Ultrasonic Machining
- Composite machining
- Turn Mill 5 axis
- Adapting Machine technology

Surface Treatment

- Anodizing
- Priming
- Electroplating
- Electrocoating
- Zinc Nickel

Composite

- Autoclave
- Lay up
- Repair
- Heat treatment

Gear manufacturing

- Hobbing
- Shaving
- Grinding
- Milling
- Shaping

Investing In Aerospace July 31, 2015

- AIAP and MIRDC
- To be held in MIRDC, 8 am to 6 pm.
- Tier 1 to present their supplier requirements and technology needed to support their build.
- Preparation for “Aerospace Summit in Manila 2015” Dec. 1 to 3. Featuring some of the biggest OEM aero engine manufacturers and other global buyers.
- Supplier Application will be available July 31, 2015

LOCAL INTERVENTION FOR PHILIPPINE AEROSPACE DEVELOPMENT (LIPAD)

A Proposal for the Philippine Council for Industry, Energy and Emerging Technology Research & Development (PCIEERD)

MIRDC SUMMARY OF GENERAL REQUIREMENTS FOR THE AEROSPACE INDUSTRY

METALS INDUSTRY RESEARCH AND DEVELOPMENT CENTER
General Santos Avenue, Bicutan, Taguig City

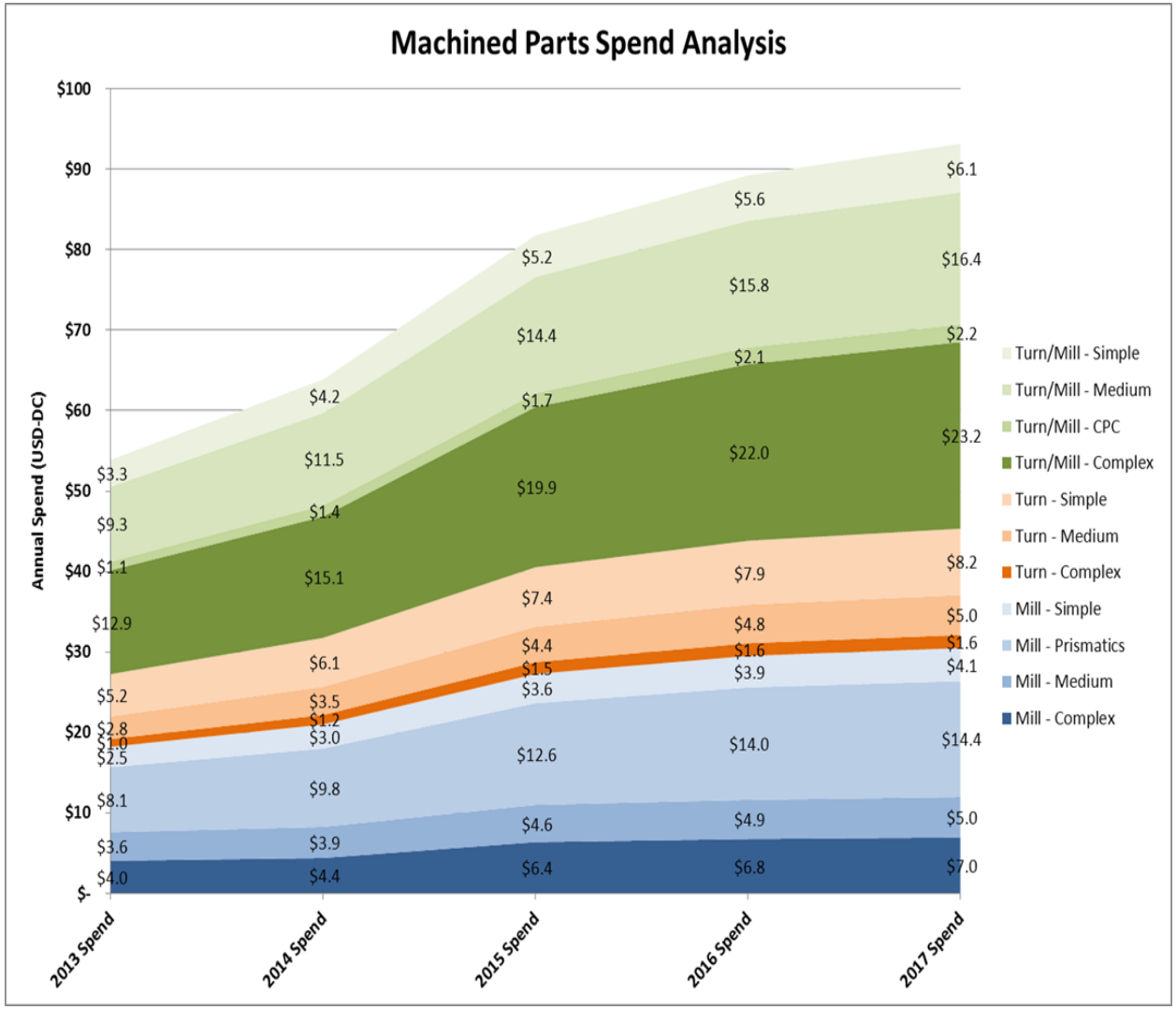
SUMMARY OF GENERAL REQUIREMENTS FOR AEROSPACE INDUSTRY

	Total Requirements (Php) (less estimated cost if acquired equipment by MIRDC met the Industry Requirements)
I. Equipment/Facility Requirements	
(under ATD)	
1. Metrology Upgrade	18,800,000.00
2. Chemical Laboratory Upgrade	2,600,000.00
3. NDT Upgrade	37,900,000.00
Subtotal under ATD	***59,300,000.00***
(under MPRD)	
4. Surface Engineering Upgrade	143,307,500.00
5. Metallurgical Laboratory Upgrade	2,720,000.00
Subtotal under MPRD	***146,027,500.00***
(under PD)	
6. Gear Manufacturing Upgrade	115,000,000.00
7. Finishing Equipment Upgrade	20,000,000.00
8. Machining Equipment Upgrade	27,000,000.00
9. Computer Software For 3D Modelling	-
Subtotal under PD	***162,000,000.00***
TOTAL MIRDC Equipment/Facility Requirements	367,327,500.00
(under other DOST agencies)	
10. Flammability Testing	5,000,000.00
12. Thermoforming	10,000,000.00
13. Composites Manufacturing	10,000,000.00
14. Reference for Calibration: Gauge block, pin gauges, thread gauges (English and metric)	No estimates yet
Subtotal under DOST agencies	***25,000,000.00***

TOTAL MIRDC and Other DOST Agencies Equipment/Facility Requirements	392,327,500.00
II. Training and Certification	
1. GD&T (Geometric tolerancing)	1,000,000.00
2. AS 9100 Consultancy /Training	3,000,000.00
3. NADCAP Consultancy/Training	4,500,000.00
4. Post Processing/Automated CNC	2,000,000.00
5. Basic Gear Machining and Nomenclature	4,000,000.00
6. Surface Treatment Technology	3,000,000.00
7. Heat Treatment Technology	3,000,000.00
8. Waste Treatment Technology	3,000,000.00
9. Machine Maintenance	1,000,000.00
10. Thermoforming	2,000,000.00
11. Composites Manufacturing	2,000,000.00
TOTAL Training and Certification Requirements	28,500,000.00
GRANDTOTAL Equipment and Training Certification	420,827,500.00

Aircraft Group - External Production Spend

- **Increased spend due to:**
  - **Shift to 80% buy**
  - **New business**
  - **Acquisitions**



FIRST PARTIAL PROJECT LIST & JUSTIFICATIONS

- **NON-DESTRUCTIVE INSPECTION**
- **VACUUM HEAT TREAT**
- **SURFACE TREATMENT**
- **COMPOSITES MANUFACTURING**
- **GEAR MANUFACTURING**

CONTACT US

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- **Phone: +63-2-839-1721**
- **Fax: +63-2-839-1721**
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- **Email: secretariat@aiaphilippines.org**

THANK YOU!