MAINTENANCE REPAIR & OVERHAUL (MRO)

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EEC Infrastructure Management

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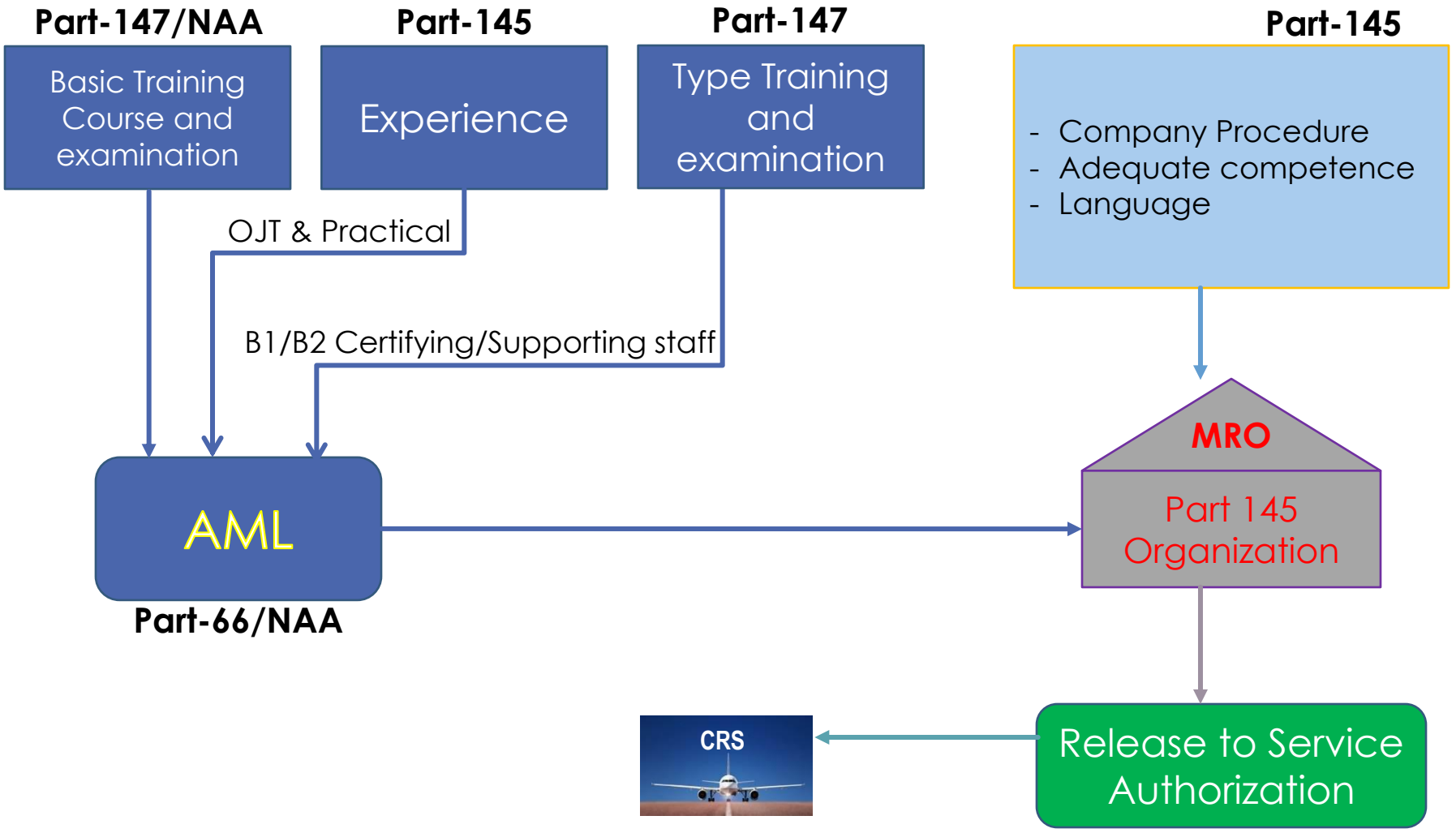
MRO

MRO is stand for Maintenance, Repair and Overhaul. MRO can be defined as" all actions which have the objective of retaining or restoring an items in or to state in which it can perform its required function. So MRO can be applied to wide range of industries, from small products to bigger ones, like the aircraft.

MRO can be Categorized into 4 groups

1. In-house MRO
2. Independent Third Party MRO
3. Airline Third Party MRO
4. OEM MRO

Part-145 MRO


Part-147/NAA
Basic Training Course and examination
Part-145
Experience
Part-147
Type Training and examination
Part-145
- Company Procedure
- Adequate competence
- Language
OJT & Practical
B1/B2 Certifying/Supporting staff
AML
Part-66/NAA
MRO
Part 145 Organization
CRS
Release to Service Authorization

Global MRO markets

- Line Maintenance
- Airframe Heavy Maintenance
- Engine Overhaul
- Component Overhaul
- Modification/Retrofit

Line Maintenance

Maintenance checks that are carried out to ensure that the aircraft is fit for flight but that do not remove the aircraft from service. Line Maintenance includes light checks plus day-to-day operational maintenance that is carried out to ensure that the aircraft remains in operational readiness, including trouble shooting, defect rectification, and component replacement.

Technicians diagnose and correct faults on the aircraft on an ad-hoc basis and carry out minor and major aircraft checks on a scheduled interval basis. Line maintenance consists of three primary activity categories: Transit checks, Daily/Weekly checks and A-checks

Airframe Heavy Maintenance

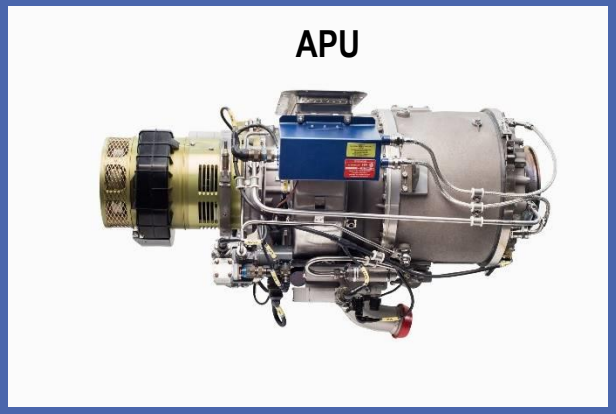
Airframe Heavy maintenance is regularly schedule inspection, maintenance, preventive maintenance and alteration that will take the aircraft out of service for a pre-determined time at specified intervals. Individual airlines, in compliance with national aviation safety regulations, establish heavy maintenance schedules.

Scheduled work scopes are typically based on calendar time or a fixed number of flight hours. Generally, there are four levels for air carrier aircraft, termed “A”, “B”, “C”, and “D” checks. “A” and “B” checks are considered line maintenance, while “C” and “D” checks are classified as “heavy maintenance.”

Engine Overhaul

Engine overhaul services involves off-wing maintenance, preventive maintenance and alteration that restores the engine to designed operational condition; by regulation the engine must be disassembled, inspected, parts repaired or replaced as necessary, reassembled and tested. For air transport operators, engine overhaul is performed on an as-needed (on condition) basis, except for the replacement of life-limited parts (LLP) which occurs at a fixed time established by the national aviation authority.

Component Overhaul

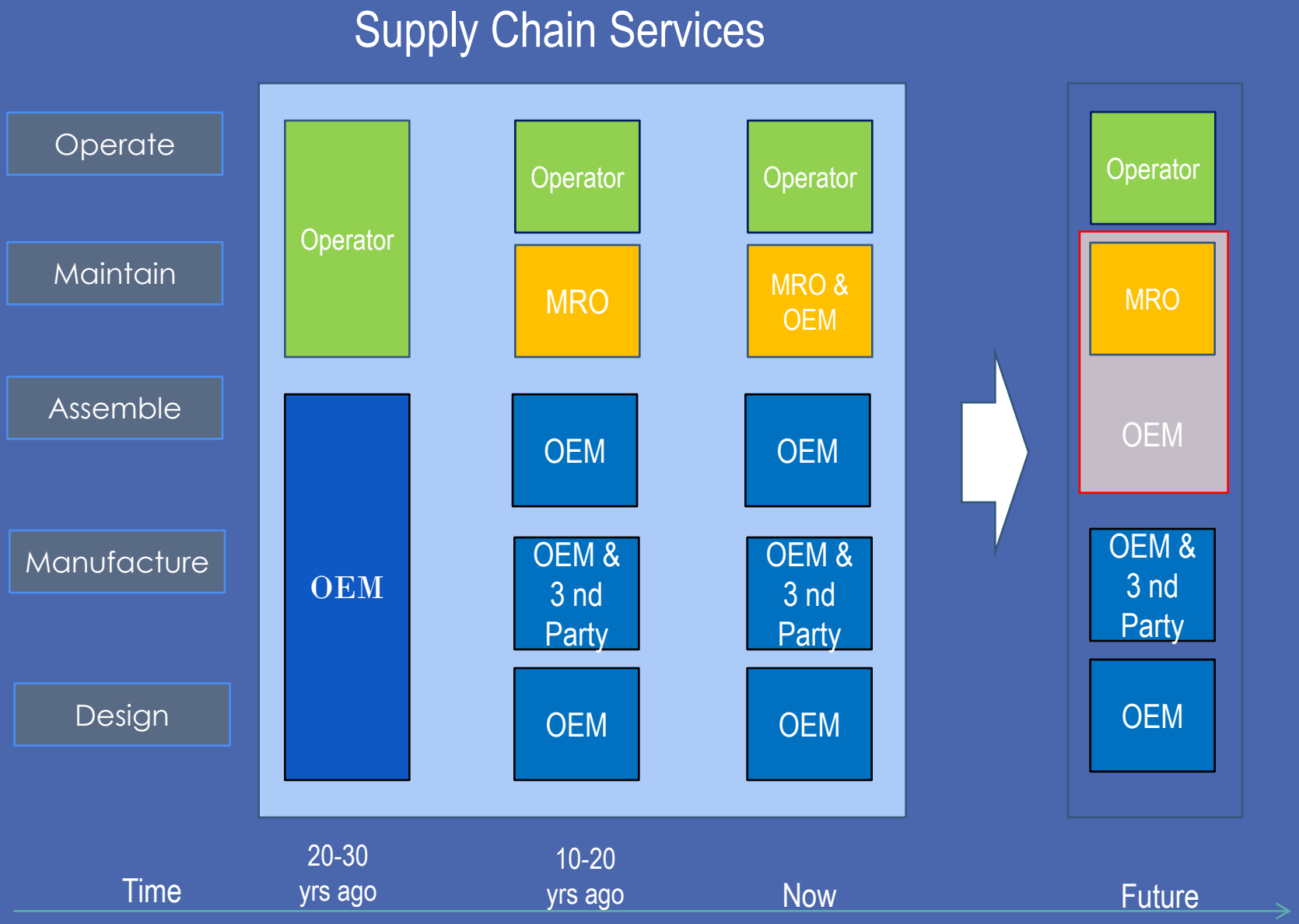


Aircraft components such as non-rotating vanes, nozzles, vane rings, ducts, seals and non-rotating assemblies, Auxiliary Power Unit(APU), Landing gear and brake unit can be overhauled and repaired.

Modification/Retrofit

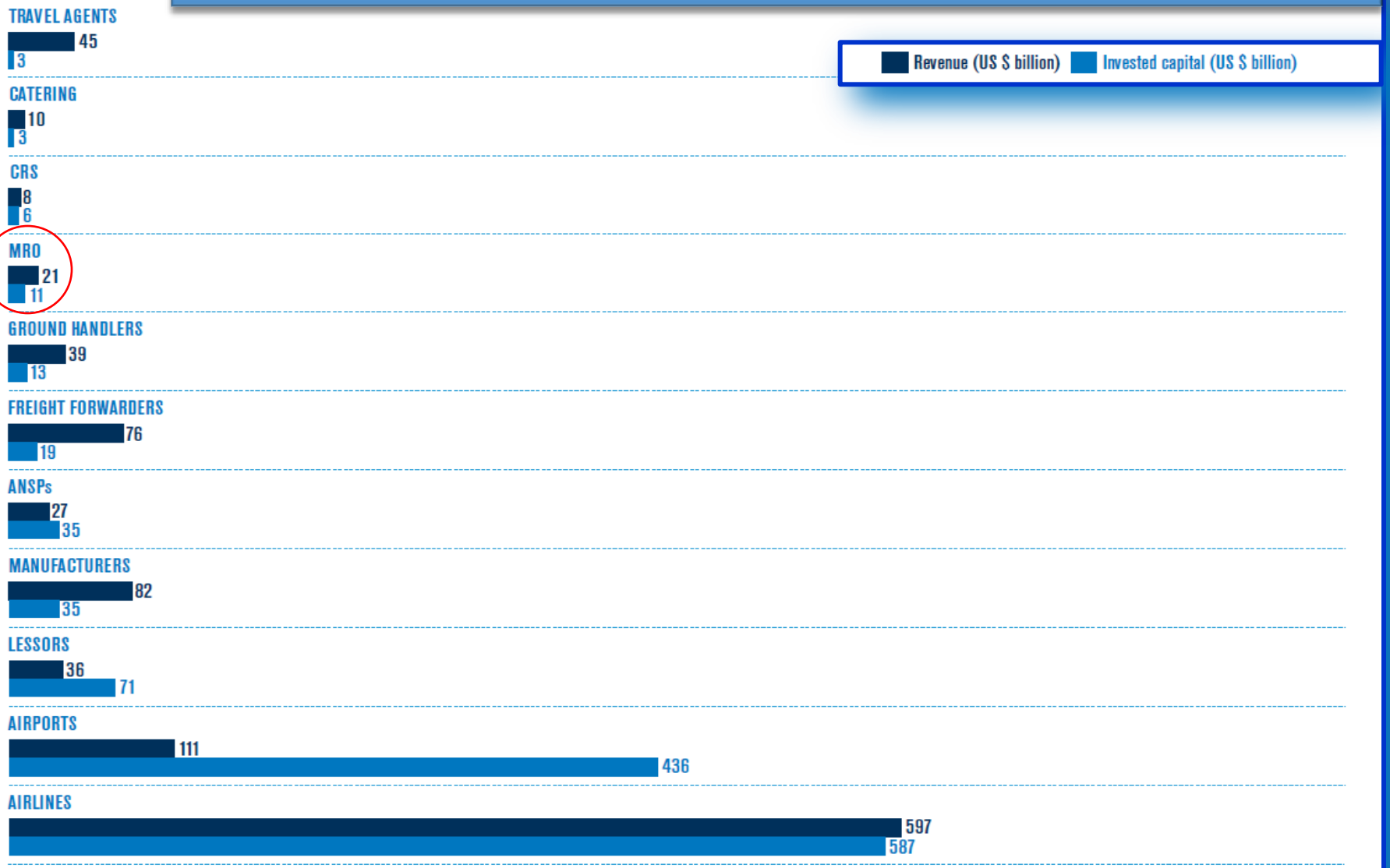
The world commercial aircraft modernization, Upgrade & Retrofit market is in a healthy state and projected to expand as airlines take on new orders. At the moment the market is being driven by a combination of factors. This includes the number of aircraft which are currently operational, the number of active aircraft due to undertake heavy maintenance checks, fuel and cost savings from introducing light weight materials, demand for air cargo, flight regulations and a need by airlines (in particular operators of wide body aircraft) for brand recognition.

2. Player Shift over services and time.



3. FUTURE OF MRO

INVESTED CAPITAL AND REVENUE IN THE VALUE CHAIN



Ref : IATA ECONOMICS BRIEFING

So…Why people still do airline business ?

Allure

State funded

Patriotism

Some Airlines success

MRO Market Segment

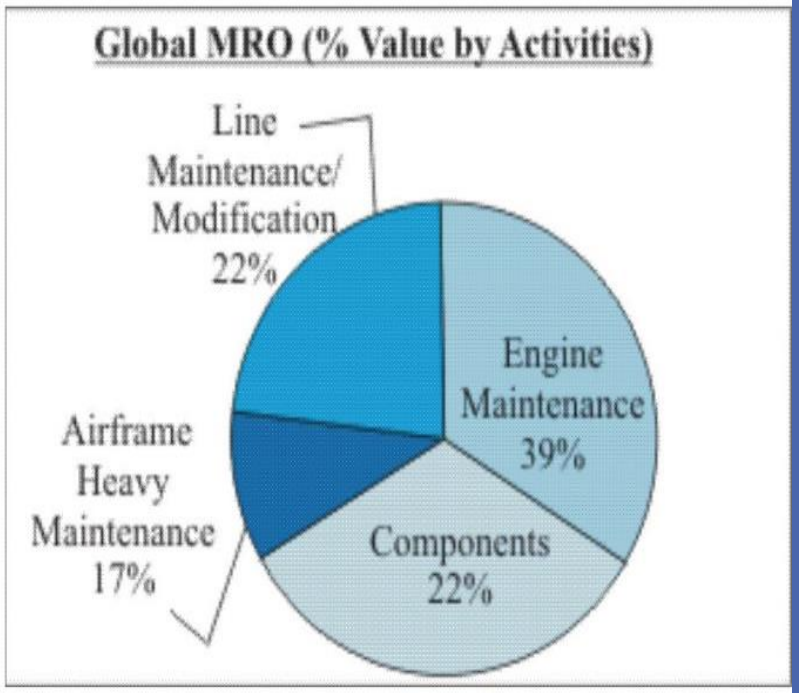
MRO Market Segment & Type of MRO Check

Line Maintenance:
*Performed approx. every 100-150 flights hrs.
*Usually done overnight

Engine Overhaul:
*Performed Approx. every 12-18 months
*After every 5000 Hours

Airframe Heavy Maintenance & Modification:
*Most comprehensive check
*Approx. every 4-5 years.

Component MRO:
*Performed approx. every 3 months
*Every 500-600 fit hours



SUPPLY CHAIN FOR AEROSPACE INDUSTRY

Total Support - One Stop Solution

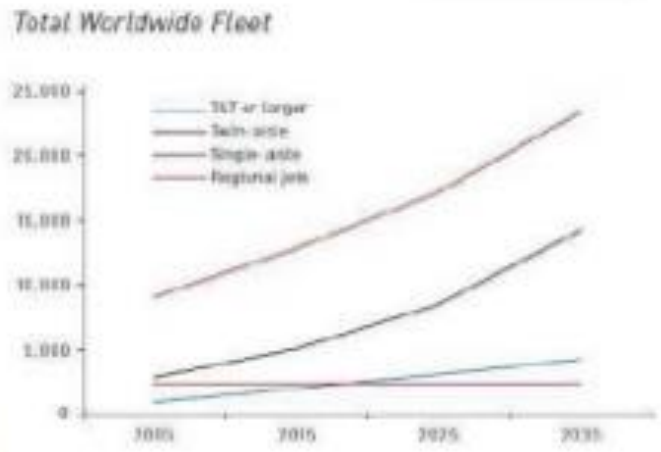
From 4 to 6 Million parts in an aircraft

More than 3 Billions parts procured per year

Spend Budget of $1,734 Billions

More than a half are narrow bed aircrafts

More than 20,000 suppliers



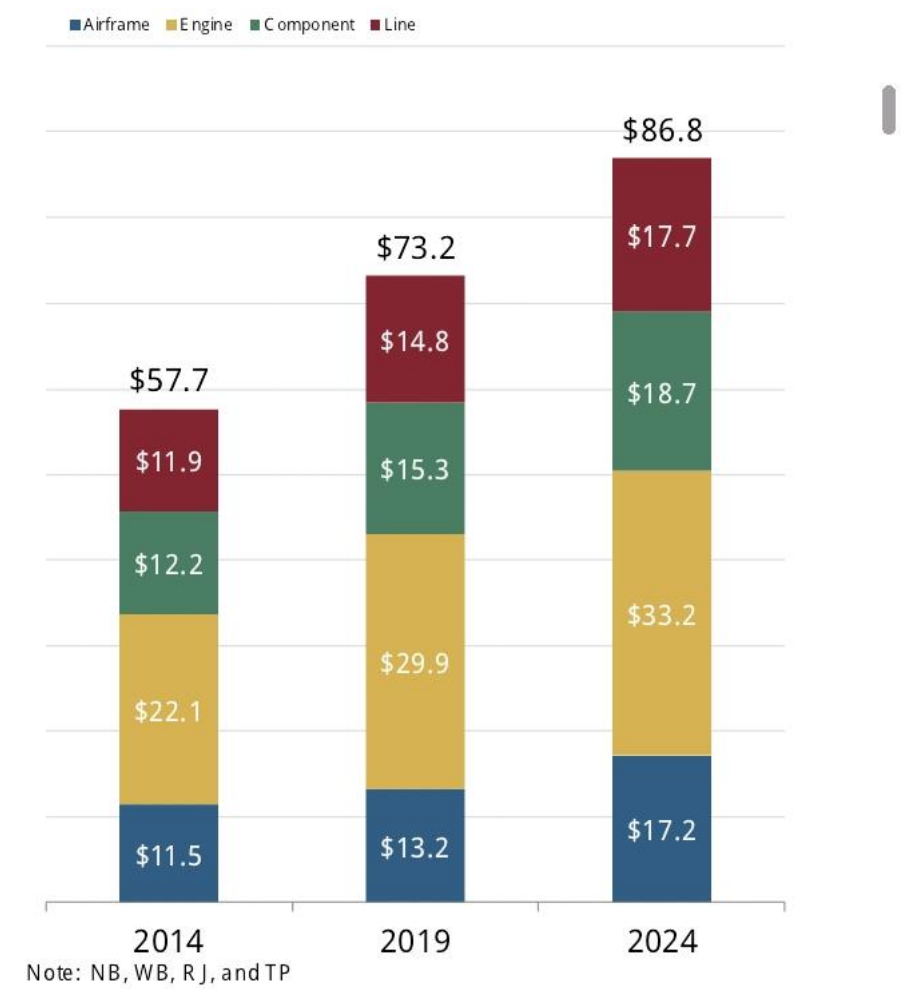
Global airline will triple for 2032

The A&D sector will need to place a much higher focus on improving supply chain integration.

Global MRO Forecast

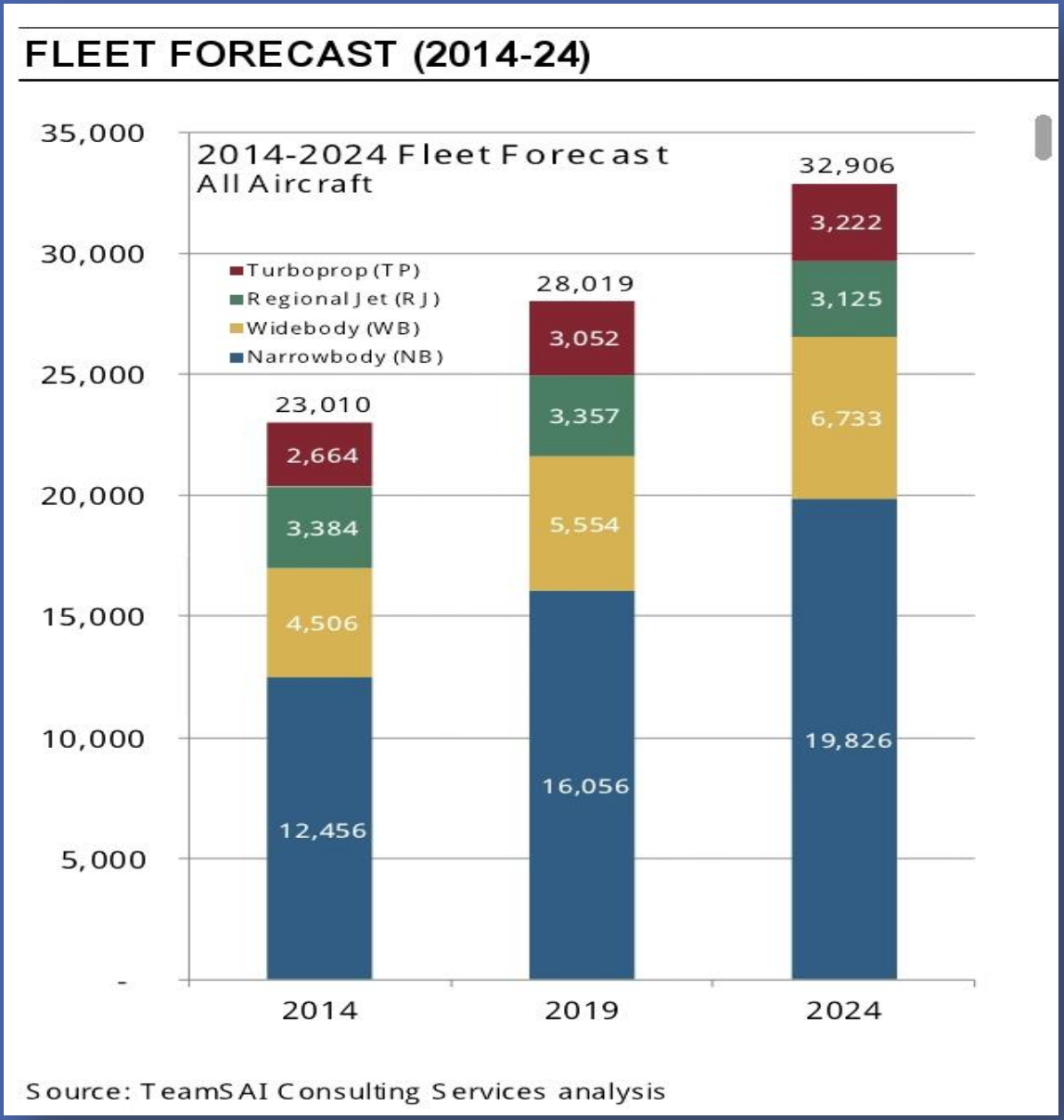
Total MRO in the air transport space for all aircraft classes is forecast to grow from $57.7B to $86.8B or 4.2% annually over the next ten years. rising to $86.8B by 2024.

MRO FORECAST (2014-24)



Source: TeamSAI Consulting Services analysis

Fleet Growth



The global turbine-powered air transport fleet is about 23,000 aircraft 20 % of the fleet is in Western Europe; Eastern Europe adds another 5 %. Asia Pacific, China, and India combined have more than a quarter of the world's fleet. Emerging markets are expected to see a greater share of the market, and therefore represent areas of MRO growth.

TOP 10 FLEETS BY MRO SIZE

	2014	2024
1*	A320 CEO & NEO	A320 CEO & NEO
2*	737 NG & MAX	737 NG & MAX
3*	777	777
4*	747-400	A350
5*	A330	A330
6	767	787
7	757	A380
8	737 Classics	Embraer 170/175/190/195 & E2
9*	A340	747-400
10	CRJ-700/900/1000	A340

*denotes aircraft that are in the top ten in 2014 and 2024

Source: TeamSAI Consulting Services analysis

Boeing and Airbus aircraft drive nearly 90% of the MRO market.

The A320 (CEO & NEO) and 737 (NG & MAX) are expected to drive the largest share of the MRO market over the forecast period.

MRO TRENDS SUMMARY

Aviation Industry Summery

Fuel efficiency is therefore an area of considerable focus for manufacturers as airlines retire less efficient aircraft

- Retrofit
- 737 winglets
- A320 sharkets

- Composite airframes
- Boeing 787
- Airbus A350
- Bombardier C-Series

- Geared turbofan engines
- Bombardier C-Series
- A320 neo
- 737 MAX

A350XWB and B787 Dreamliner promise more improvements

737 MAX

A320 neo

Bombardier C-Series

Another challenge for MROs

‘‘OEMs are making big inroads into traditional third party MRO markets through their after-market support services “

OEMs (original equipment manufacturers) such as Boeing, Airbus and Rolls-Royce are making big inroads into traditional third-party MRO markets through their aftermarket Support.

Engine OEMs lead the way in successfully capturing the value of the aftermarket stream

History

Mid 1990s, engine OEMs embarked on strategy to capture the total maintenance value as part of their product life cycle

Approach

Control material prices which is significant portion of maintenance costs
Control intellectual property

Value Proposition

Provide predictable costs (PBTH)
Remove asset ownership cost of spare parts
Offer expertise that operators cannot easily maintain on their own
Provide single source for all maintenance needs
Spread the investment in exotic tooling over a larger base
Manage the complexity

Today's Reality for the3rd Party/Airline MRO

Component and airframe OEMs have adopted similar models

Component and airframe OEMs have developed less maintenance-intensive equipment which they control closely

Labor arbitrage applies pressure to 3rd party / airline MROs

Rolls-Royce

Total Care

WORLDWIDE PARTNER

OnPoint solutions are flexible long-term commitments designed to meet customers' unique engine service needs.

AIRBUS FHS - TSP

Reducing your investments, simplifying your material management

For customers considering component repair and spare parts services, a cost effective solution will be shaped through the FHS Components' module. This service is applicable to key system LRU and main elements.

COMPONENT SPARE PARTS

•Analysis and definition of critical parts list to base at customer's (MEL, Minimum Equipment List, and DR ,Dispatch Reliability, related)

•Customer based On-Site-Stock : Supply of critical parts at main base and outstation

•Pool access service

•Guaranteed lead times : 4hrs for AOG (Aircraft On Ground) / 3 days for routine items

COMPONENT REPAIR SERVICES

•Repair at OEM of all selected unserviceable components

•Optimized turnaround time

•Transportation between Customer and Repair stations

•Landing gears, nacelles, APU overhaul

We manage first rank suppliers: OEMs, overhaul providers, forwarders and warehousing agents. We integrate their competencies, leverage their performance, including warranty administration, and we deliver your tailored solution through one single interface.

We optimise spares recommendation, we mutually select what suits your operational needs and we guarantee your material repairs as well as your spare parts availability.

Two GoldCare Service Offerings

Airlines may choose from two GoldCare services to match their business models:

GoldCare: A lifecycle management solution offering guaranteed dispatch reliability levels through comprehensive fleet maintenance management and spare parts support. Boeing manages a globally recognized team of maintenance providers and component suppliers for GoldCare customers, and provides GoldCare Integrated Materials Management Service, as well.

GoldCare Integrated Materials Management Service: A comprehensive logistical and supply chain integration service for spare parts, including repair and overhaul of components, with Boeing providing guaranteed parts availability service levels.

787 DREAMLINER

“If you aren’t an OEM MRO, you need a strategy to align yourself to deliver maximum value and stable costs to the customer over the long term.”

Furthermore, like the airline market itself, the MRO business is moving east.

According to forecasts by 2021, Asia will hold the leading share, worth some $21 billion, with Europe second at around $20 billion and the Americas third at just under $20 Billion

Competitor’s

SIA: A Premium Service Provider and Cost Leader

SIA manages its two main assets planes and people
so that its service is better than rivals' and its costs are lower.
The airline invests heavily in areas of the business that touch
the customer in order to enhance SIA's premium positioning.
Everything behind the scenes is subject to rigorous cost control.

SIA spends more than its rivals in key areas:

Buying new aircraft
SIA replaces its fleet more frequently than do competitors.

Depreciating aircraft
It depreciates aircraft over 15 years compared with the industry standard of 25 years.

Training
The airline invests heavily in inducting and retraining employees.

Labor costs on flights
SIA staffs each flight with more cabin crew members than do other airlines.

Innovation
It invests in both radical and incremental innovations.

…And it spends less, partly as a consequence on:

Price per aircraft
SIA is usually a showcase customer for aircraft makers, places large orders, and often pays in cash.

Fuel, maintenance, and repair
SIA's operating costs are lower because its fleet is young and energy efficient.

Salaries
SIA keeps salaries low by offering employees bonuses of up to50% depending on SIA's profitability also, the airline's reputation attracts younger workers.

Sales and administration
Customer loyalty, a lean headquarters, and constant cost cutting keep the airline's SGA expenses low.

Back-office technologies
SIA chooses to lag behind rivals in areas that don't affect the customer experience.

Singapore Airlines follows a 4-3-3 rule of spending:

40% on training,

30% on revising processes and procedures, and

30% on creating new products and services every year

SIAEC

Singapore is now one of Asia' largest and most comprehensive MRO hubs, hosting more than 100 companies. It has seen 12%annual growth in recent years

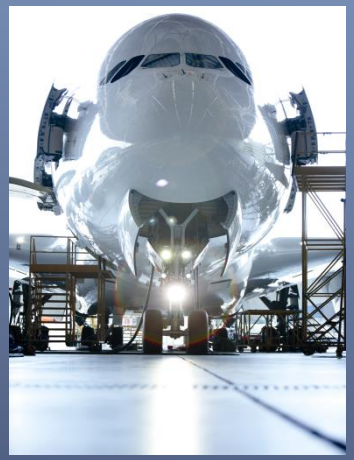
SIAEC CORPORATE BACKGROUND

- 60 years of experience in airline engineering
- Market capitalization ~ S$4.0 billion
- Staff strength of 6000 employees
- SIAEC and its JVs contribute to about half of Singapore's aerospace industry output
- Total no. of JVs - 25
- Managing FMP Services for over 170 aircraft for 14 operators
- Supporting MRO Services for SIA's fleet of 101 A380 / A330 / B777 / A320 / A345 aircraft
- Providing Line Maintenance services at over 30 airports globally
- Holds 25 national aviation authorities (including FAA, EASA, Bermuda DCA)

Financial Highlights

	FY 03/04	FY 04/05	FY 05/06	FY 06/07	FY 07/08	FY 08/09	FY 09/10	FY 10/11	FY 11/12	FY 12/13
Revenue	S$678.7M	S$807.5M	S$959.1M	S$977.4M	S$1,009.6M	S$1,045.3M	S$1,006.4M	S$1,106.9M	S$1,169.9M	S$1,146.7M
Net Profit	S$139.0M	S$170.4M	S$230.6M	S$242.1M	S$253.8M	S$260.6M	S$236.1M	S$258.5M	S$269.1M	S$270.1M

SIAEC - JOINT VENTURES NETWORK



Component Repair & Overhaul

Panasonic Avionics Corporation — Singapore 42.5%

FAST Fuel Accessory Service Technologies — Singapore 49.0%

Singapore Jamco — Singapore 65.0%

Messier Services (Safran Group) — Singapore 40. 0 %

ACE Services — Singapore 51.0%

Safran Electronics Asia Pte Ltd (Safran Group) — Singapore 49.0%

UTC Aerospace Systems — Singapore 40. 0 %

Engine & Engine Component Repair & Overhaul

Eagle Services Asia — Singapore 49.0%

SAESL — Singapore 50.0%

HAESL — Hong Kong 10.0%

IECO — Singapore 50.0%

TCS Singapore — Singapore 24.5%

IAT-Asia — Singapore 33.3%

AST — Singapore 29.0%

PWA — Ireland 49.0%

ACTS — Taiwan 24.5%

CAS Combustor Airmotive Services

Line Maintenance

PAPAS — Hong Kong 47.1%

JAS Engineering — Indonesia 49.0%

A+ — Philippines 51.0%

AMSA — Australia 100%

SAAM — Vietnam 49.0%

SIA Engineering (USA) — USA 100.0%

Airframe Maintenance

SIA Engineering (Philippines) — Philippines 65.0%

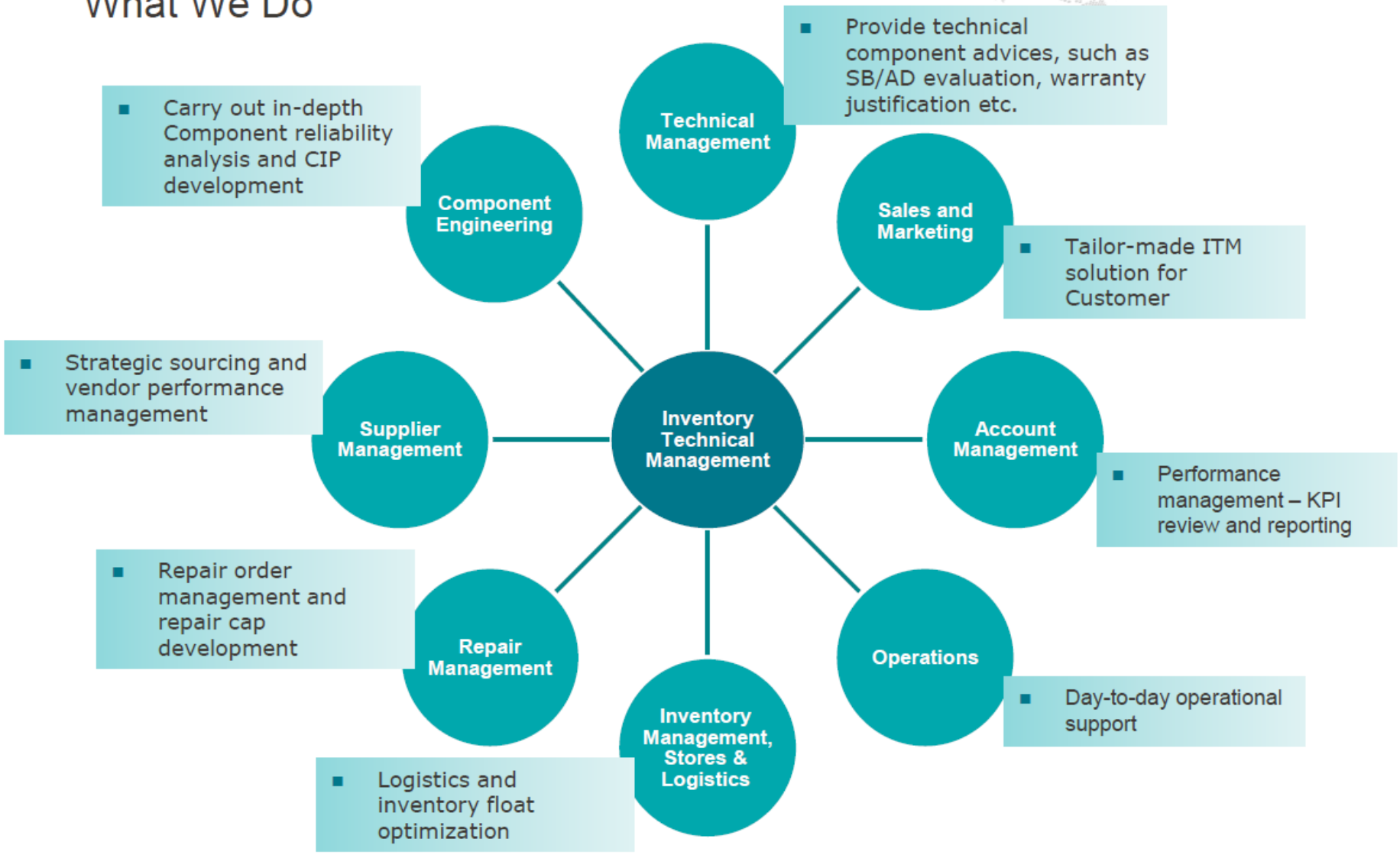
Knowledge -Based

JADE (Jamco Aero Design & Engineering) — Singapore 45.0%

SIAEC has extended its overhaul capability and introduced high value-added leading edge technologies through joint ventures with original equipment manufacturers (OEMs) like Pratt & Whitney, Rolls-Royce, Goodrich and Hamilton Sundstrand.

HAECO ITM

What We Do



HAECO Group Milestones

- Formed TAECO in Xiamen in 1993
- Formed HAESL with Rolls-Royce in 1997
- Formed STAECO in Jinan in 1999
- Relocated to new Hong Kong International Airport in 1998

- HAECO opened second and third hangars in 2006 and 2009
- TAECO opened its fifth hangar in 2007
- Formed SHAECO and TALSCO in 2007
- Formed TEXL and Taikoo Spirit in 2008

- Taikoo Sichuan opened in 2010, followed by Shanghai Taikoo in 2011
- TAECO opened sixth hangar in 2011
- HAESL opened Phase V component repair facility in 2011

- Formed HAECO ITM & HAECO Cabin Solutions in 2012
- Established HAECO Component Overhaul (Xiamen) Ltd. in 2014
- Acquired TIMCO Aviation Services, Inc. in 2014

HAECO Group Services

HAECO Group

One of the world's leading aircraft engineering and maintenance groups, offering a comprehensive range of airframe, cabin, engine and component services.

Airframe Services

Offers airframe maintenance, cabin reconfiguration, structural modification, freighter conversion fulfillment, as well as line services covering transit checks and certification, defect clearance, cabin management, ramp services and 24/7 AOG support across Asia and the U.S.

Cabin Solutions

Provides turnkey cabin integration solutions for commercial aircraft and private jets, covering design engineering, certification and vendor management. The Group is an authorised aircraft seat and cabin interior products OEM.

Engine Services

Operates world-class repair, overhaul and testing facilities for Rolls-Royce RB-211 and Trent engines in Hong Kong, a GE Aviation-authorised GE-90 facility in Xiamen, Mainland China, and a Pratt & Whitney JT8D facility in Oscoda, Michigan in the U.S.

Component Services

Provides component repair and overhaul services for hydraulic, mechanical, avionics and pneumatic systems across the Airbus and Boeing commercial aircraft fleets, and with wheels and brakes, tyres, aerostructures, landing gear and APUs through the Group's subsidiaries and associate facilities.

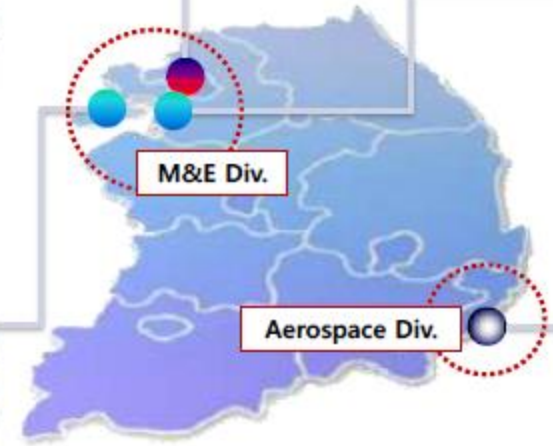
Korean Maintenance & Engineering

✈ Gimpo

· 2.5 Bay Hangar

✈ Incheon

· 2.5 Bay Hangar



✈ Bucheon

· Engine Maintence Center

✈ Gimhae

· 2 Bay Hangar

· No.7 Hangar (1 Bay)

· Paint Hangar (1 Bay)

AFI KLM E&M Components Support in Asia

Lufthansa Technik Philippines(LTP), has made its mark in the fast growing low cost carrier (LCC) maintenance sector. Now, with one hangar

ST Aerospace is to add a sixth passenger-to-cargo conversion line to cope with the success of its business

Maintenance, repair and overhaul provider ST Aerospace (Singapore Technologies Aerospace Ltd) employs more than 8,000 engineers and technical specialists worldwide. Even the recent turbulent times for the airline industry have failed to dent its growth.

Air India: setting up a joint venture MRO facility in Nagpur with Boeing

GHIAL out to woo Engine makers

GMR Hyderabad International Airport (GHIAL), a subsidiary of GMR Infrastructure, is at an advanced stage of talks with major aircraft engine manufacturers to set up an engine MRO facility at the airport.

Flydubai invests $20m in MRO centre

Dubai-based low-cost carrier (LCC), flydubai, is shaking off some of its reliance on its big state-owned neighbor, Emirates Airline, by creating its own in-house maintenance operation.

Aircraft Maintenance and Engineering Corporation (Ameco Beijing)

A joint venture between Air China Limited and Lufthansa. Ameco Beijing was established on August 1st, 1989 with Air China Limited holding 60% and Lufthansa 40% of the registered capital. The registered capital is USD 187.53 million and the joint venture agreement was signed for 40 years.

A Boeing led joint venture bringing a new standard of service into the MRO industry

Boeing Shanghai Aviation Services is a joint venture among Boeing, the Shanghai Airport Authority and China Eastern Airlines with The Boeing Company owning majority interest. Boeing Shanghai Aviation Services offers the advantages of an MRO with the skills, quality, and knowledge of the original equipment manufacturer. It leverages Boeing's best practices, including Boeing quality standards, information technologies and applications for efficient, cost effective operations. Since it's inception in 2006, the Joint Venture has benefitted from the expertise and resources of The Boeing Company and its partners.

GAMECO

GAMECO's new hangar, which is the largest truss structure hangar in China, is 400 meters long and 133 meters wide. With 96,000 square meters of space, it can accommodate four wide body aircraft (two Airbus A380 and two Boeing B747), or twelve narrow body aircraft (such as Boeing B757, 737 and Airbus A320) undergoing maintenance at the same time.

TAECO-Taikoo (Xiamen) Aircraft Engineering Company Limited

The shareholders include Hong Kong Aircraft Engineering Co. Ltd. (56.55%), Xiamen Aviation Industry Co, Ltd. (10.00%), Cathay Pacific Airways (9.09%), Japan Airlines (9.09%), Boeing Commercial Aeroplane Group (9.09%) and Beijing Kailan Aviation Technology Development and Service Co. (4.18%) and Hong Kong Kin Kuen Development Co., Ltd (2%)

Air China and CFM Finalize Engine MRO Joint Venture

Air China and CFM International agreed to establish an innovative maintenance repair, and overhaul (MRO) joint venture. In 2010, after three years negotiations, the two companies cleared the final hurdle and have received Chinese government approval for the formation of Sichuan Services Aero Engines Maintenance Company (SSAMC), a 60/40 joint venture between Air China and CFM, located in Chengdu, China.

China, India to lead MRO growth

China has emerged as the big driver behind current and future growth in the aircraft MRO business, not just regionally, but globally. By the end of this year, according to various forecasts, the country will represent 5% of the world's MRO output and a third of all Asia-Pacific activity.

India, too, is on the verge of an MRO explosion, although it is likely to be several years before MRO rivals China's MRO development. Both Airbus and Boeing are heavily involved in MRO in both India and China, as are leading engine manufacturers.

OUTSOURCING TRENDS

The potential cost savings are too attractive to ignore. Outsourcing, or contract maintenance, as some prefer to call it, has become an integral and growing part of today's cost-conscious airline industry

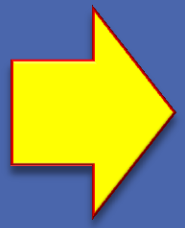
TYPE OF CHECK TO BE OUTSOURCED

D-Check	OFTEN Outsourced
C-Check	SOMETIMES Outsourced
A-Check	Rarely Outsourced
Line Maintenance	Last Bastion to be Outsourced

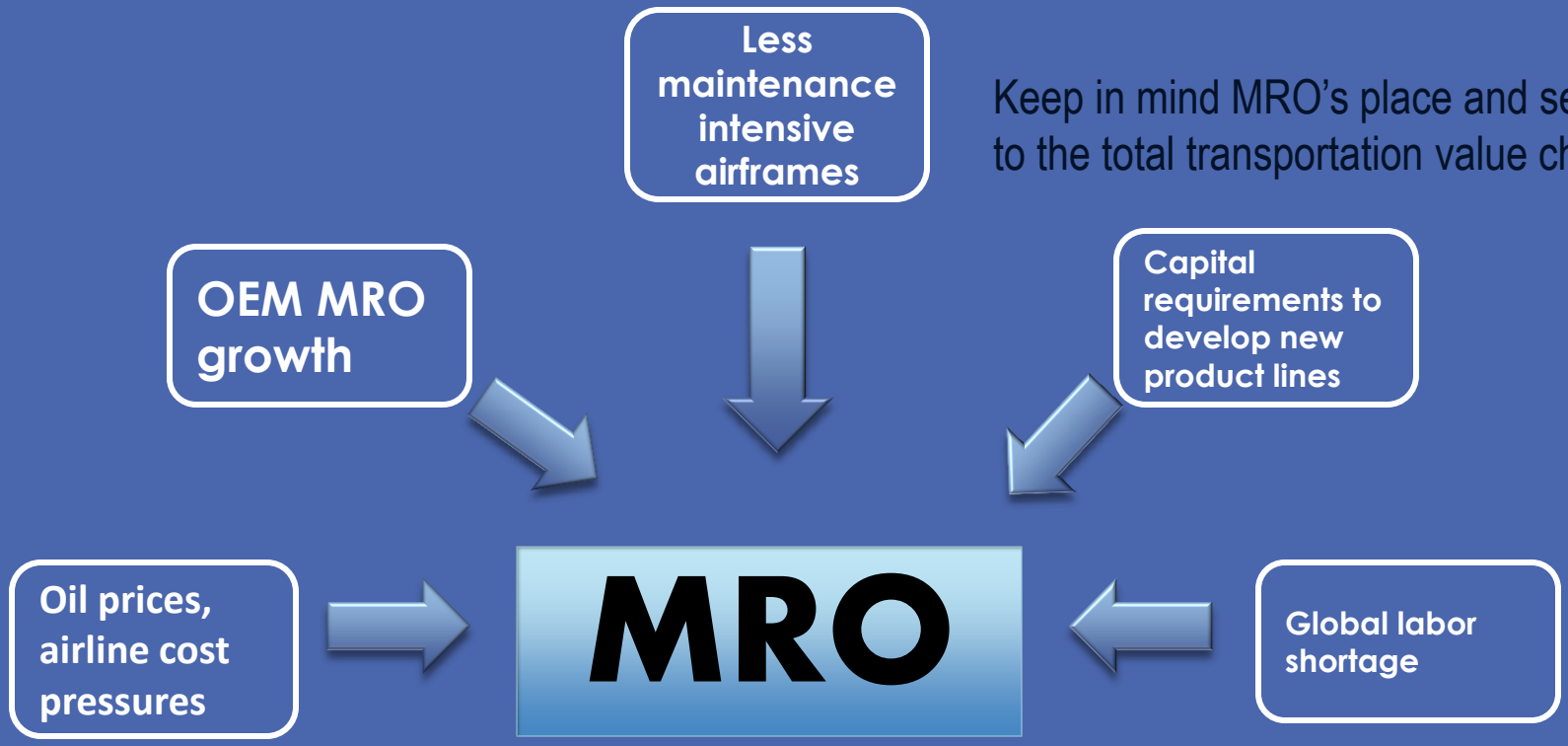
IN SUMMARY……..

Business expectations are changing rapidly

Relationship Based	Performance Based
Inventory Tolerant	Inventory Intolerant
Asset Utilization Not a Focus	Turn-Around Time Prioritized
Little Accountability	Accountability for Results
Limited Competitive Threat	Global Competition
Metal & Mechanical	Composites & Electronic
Western Focused	Eastern Focused



MRO growth strategies



Keep in mind MRO's place and sensitivity to the total transportation value chain

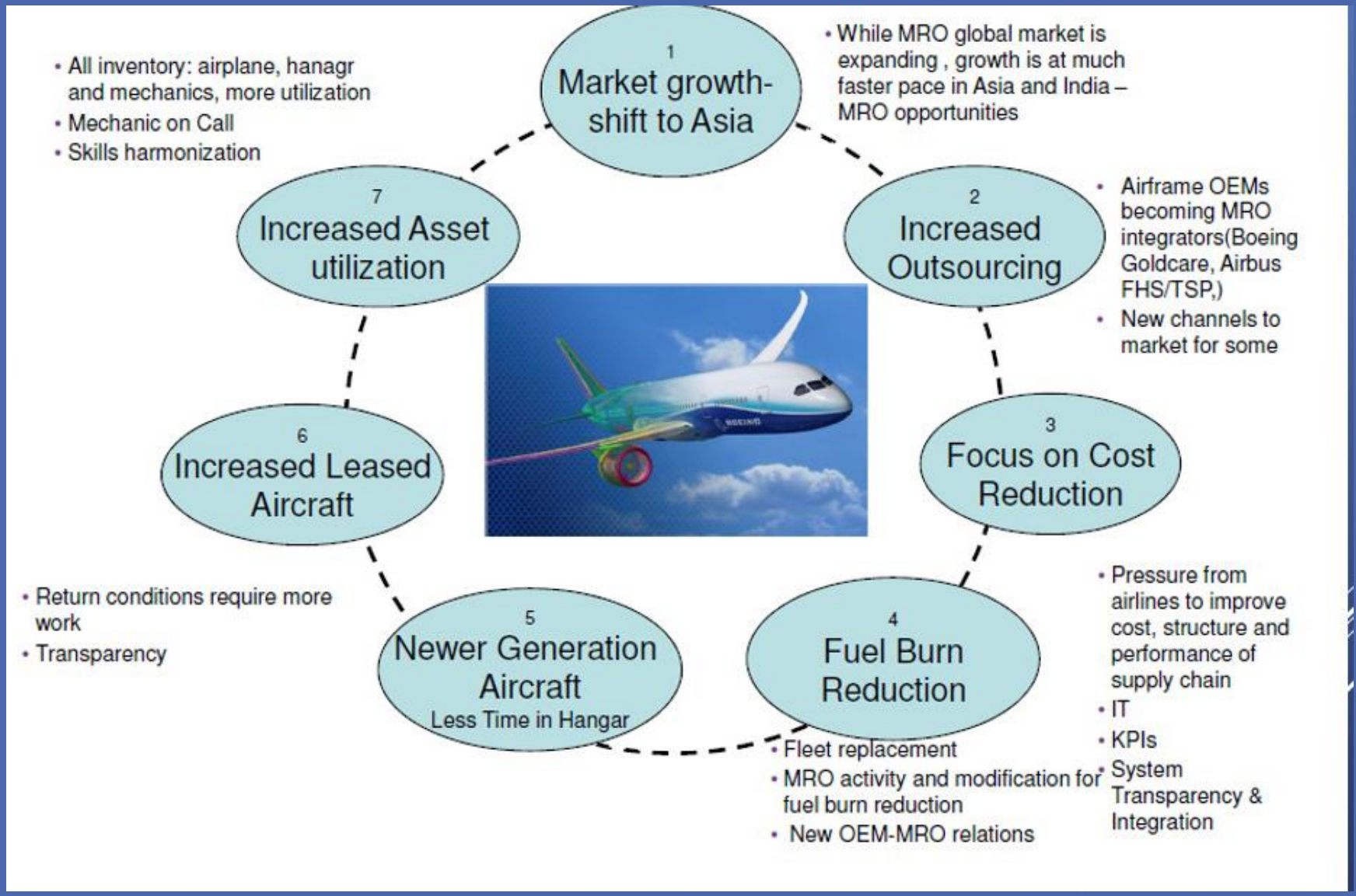
Four strategies for MRO growth: especially pertinent to non-OEM MROs

- Labor
- Value Creation
- M&A
- Diversification

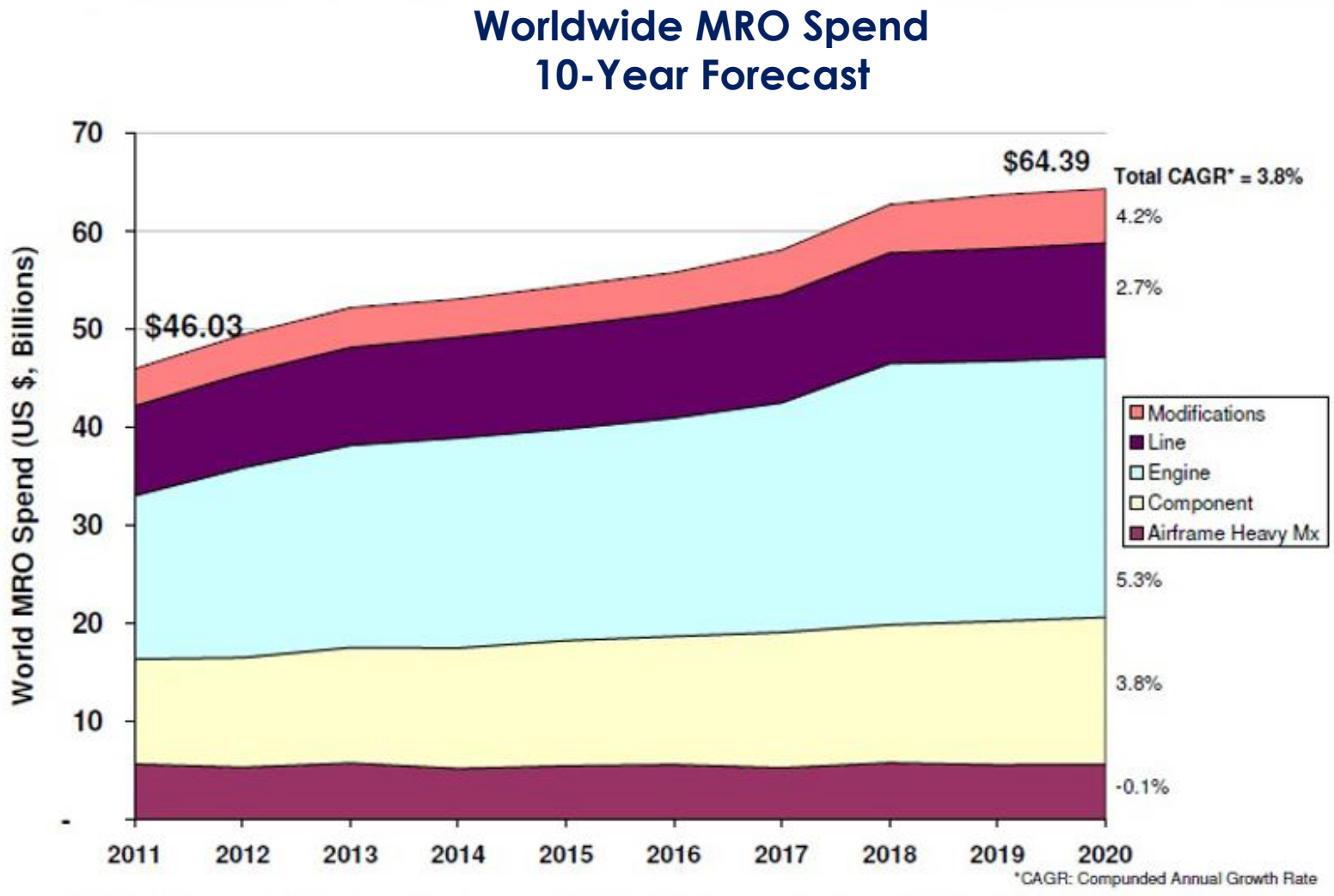
Four basic strategies for MRO growth

	AIRLINE MRO	INDEPENDENT MRO
Labor	Outsource non-core activity Develop expertise in core activity areas	Capitalize on outsourcing needs of airlines Develop expertise in core activity areas
Value creation	Implement cost reductions and new efficiencies Adopt supply chain innovations Embrace new, smart aircraft systems	Implement cost reductions and new efficiencies Adopt supply chain innovations Focus on reliability and dependability
Diversification		Expand market offerings Expand geographical reach Pursue full-service capabilities
M&A	JVs and large scale parts pooling with other airlines Leverage alliances	Target small, bolt-on acquisitions Identify value-oriented innovations that contribute to airline customer's cost focus

Seven Trends are Shaping the Long Term Structure of the Air Transport MRO industry

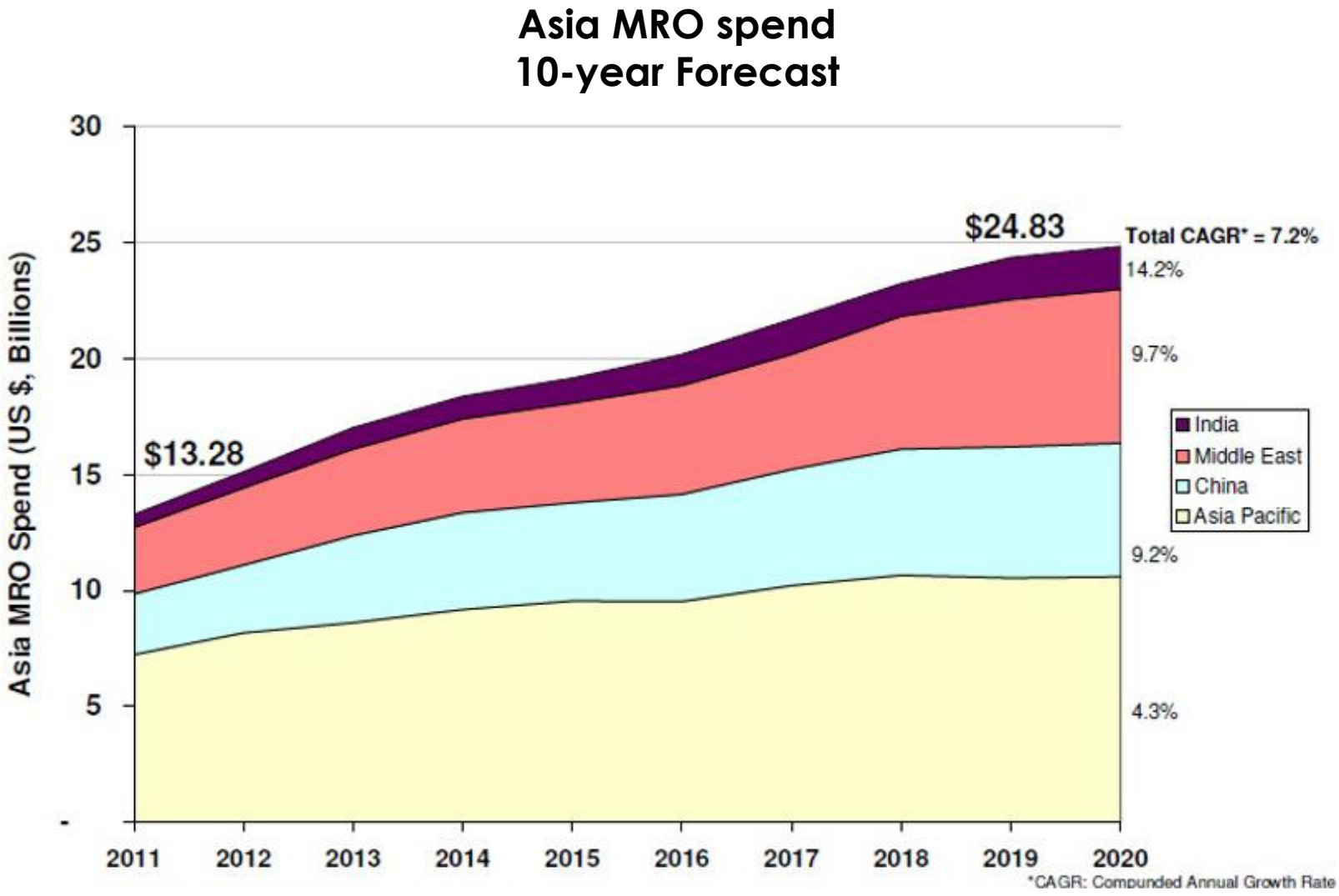


Worldwide MRO market size growing 3.8%



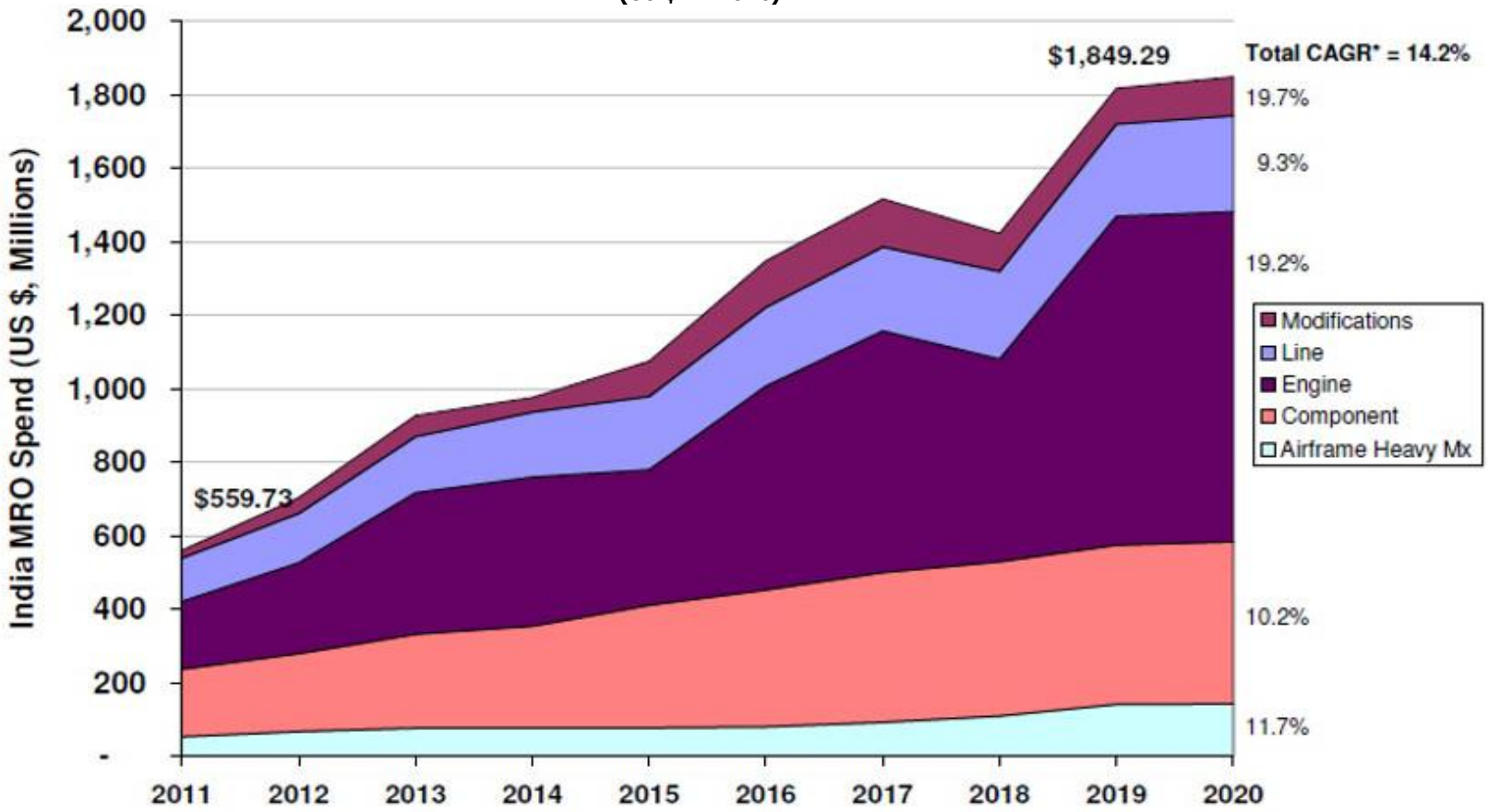
MRO Market size is increasing worldwide, but growth in Asia is double.

Asia MRO market increasing at double the world rate



Asia MRO size increasing 7.2 annually, but growth in India is double.

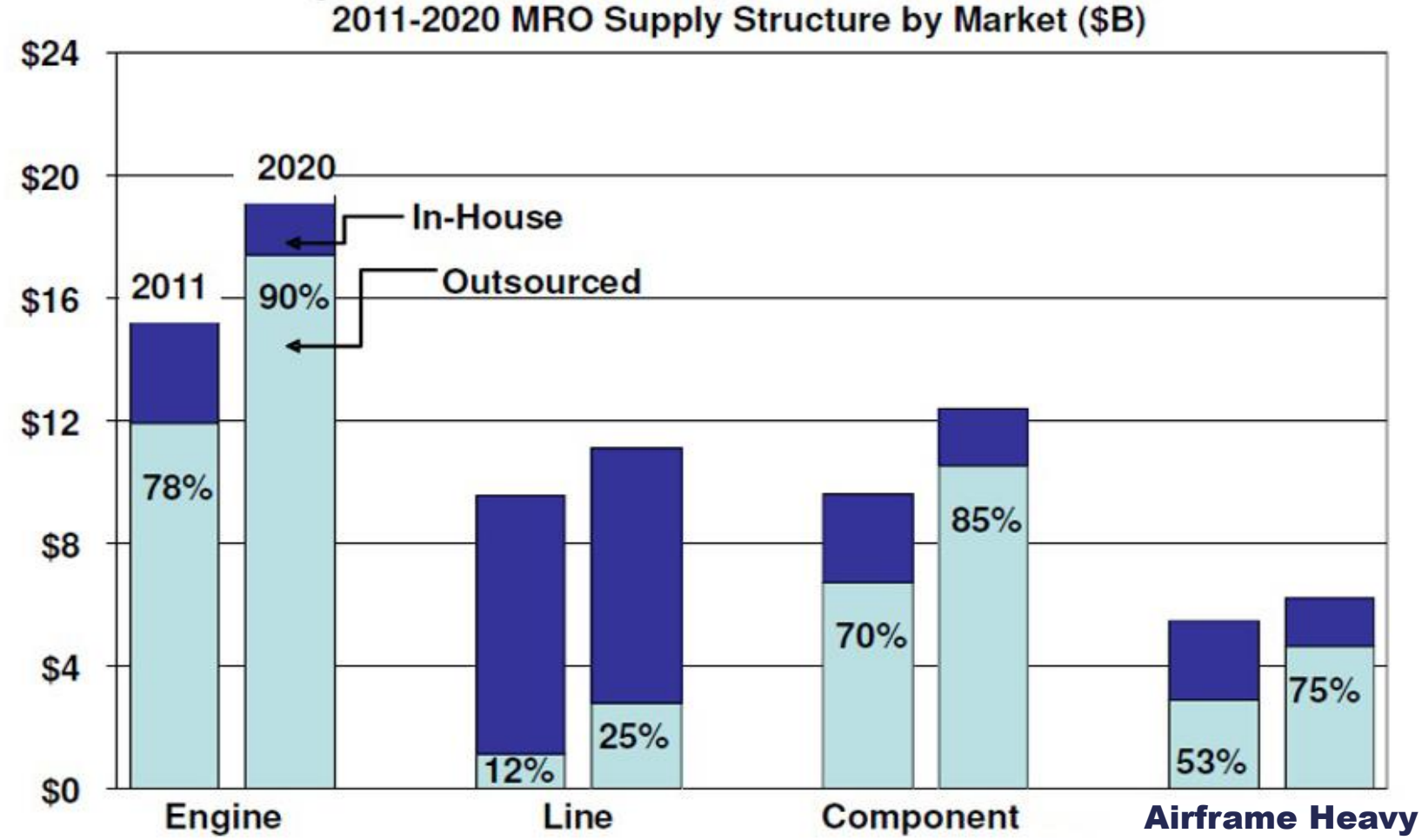
India MRO market will triple in the next 10 years from $560 millions to $1.8 billions



India MRO market growth expected to be 14.2% per annum, double that of Asia

2.Outsourcing will increase Over the Decade

The available market grows to about $65b by 2020 at 3.8% CAGR



MRO Market is shifting towards Asia

- Rapid growth of fleets in Asia and India
- Increasing Outsourcing - Increasing focus on cost controls in aviation. Efficient MRO and integrated services providers
- Lower Labor Cost
- India MRO market growth is at 14.2% annually (CAGR) and expected to triple to $1.9 billion per year by 2020
- Outsourced work from ME, Europe and Americas will clearly outpace organic growth

Outsourcing Trends: Key things to observe

- Line Maintenance outsourcing is limited – strategic decision, to control delays and airline image
- Engine and Component repair and overhaul will be largely outsourced – 80-90%
- Heavy and Base Maintenance work will move to efficient and low labor cost areas – Asia is one
- MRO market size is expected double in Asia if outsourced work potential from ME, Europe and Americas is tapped

3. Operating Economics – increasing focus

- Airlines are focusing on future
- Reducing Costs in all areas
- What does it cost to deliver a safe airplane and on-time

Airlines are focusing on the future

Cost & networks

- *Enter new markets*
- *Mergers, acquisitions & partnerships*

Differentiated value proposition

Revenue

- *Direct flight*
- *Passenger experience*
- *Ancillary revenues*

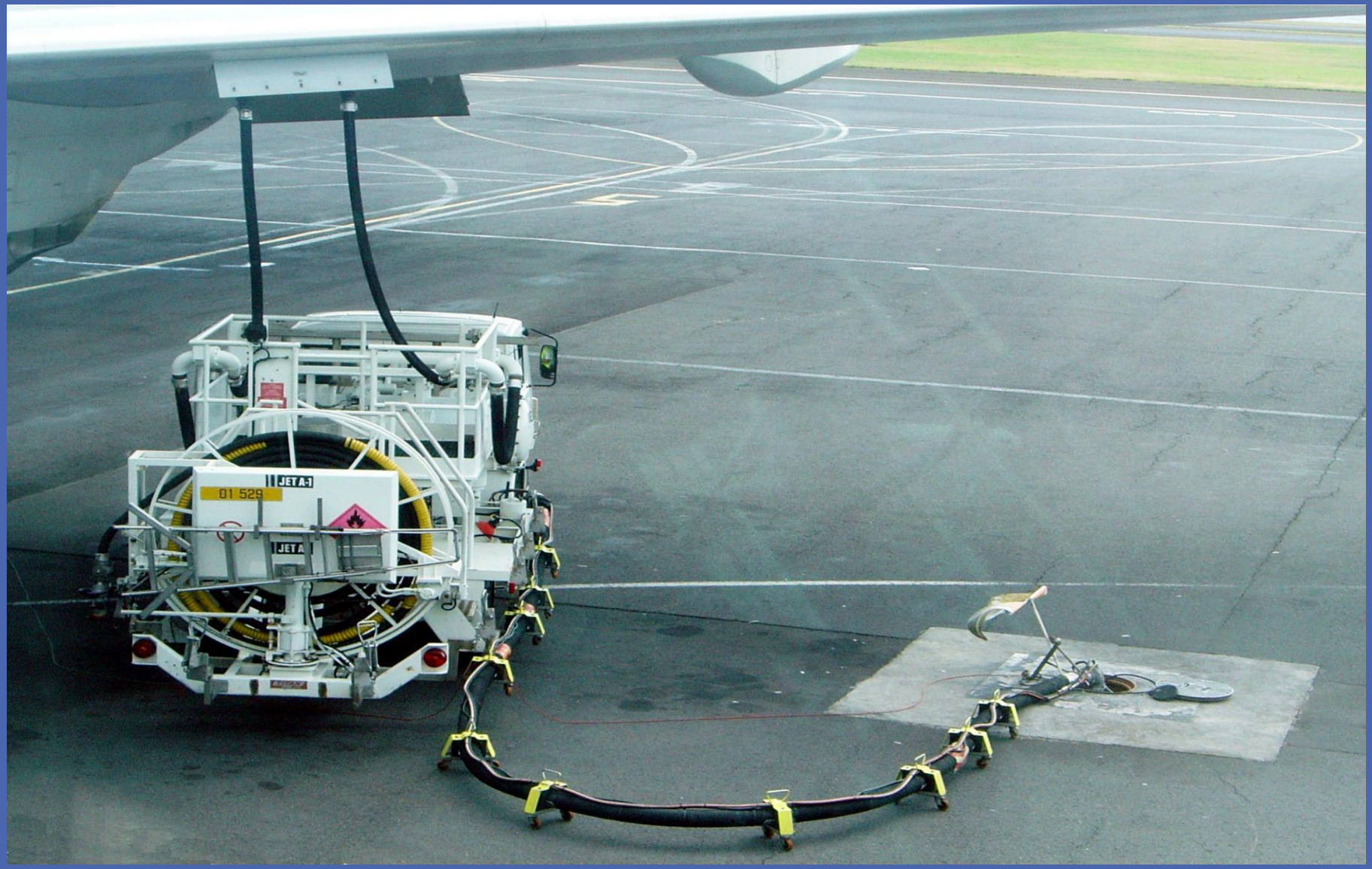
Cost

- *Fuel, maintenance*
- *Training*
- *Technology & automation*

Fleet

- *Older airplanes retired*
- *Fleets simplified*
- *Standardization*

4. Increasing Fuel Prices



Maintenance for Fuel Consumption Reduction

- Engine washes – Big MRO Opportunity
- Aerodynamic cleanliness
- Weight reduction
- Winglets & Modifications
- Limited APU use

- Operating at slower speeds – Use Cost Index
- Fuel tankering
- Air traffic management
- Single Engine taxi
- Aging Fleet replacement

3-4% Fuel cost savings are possible

MRO work in fuel conservation will grow

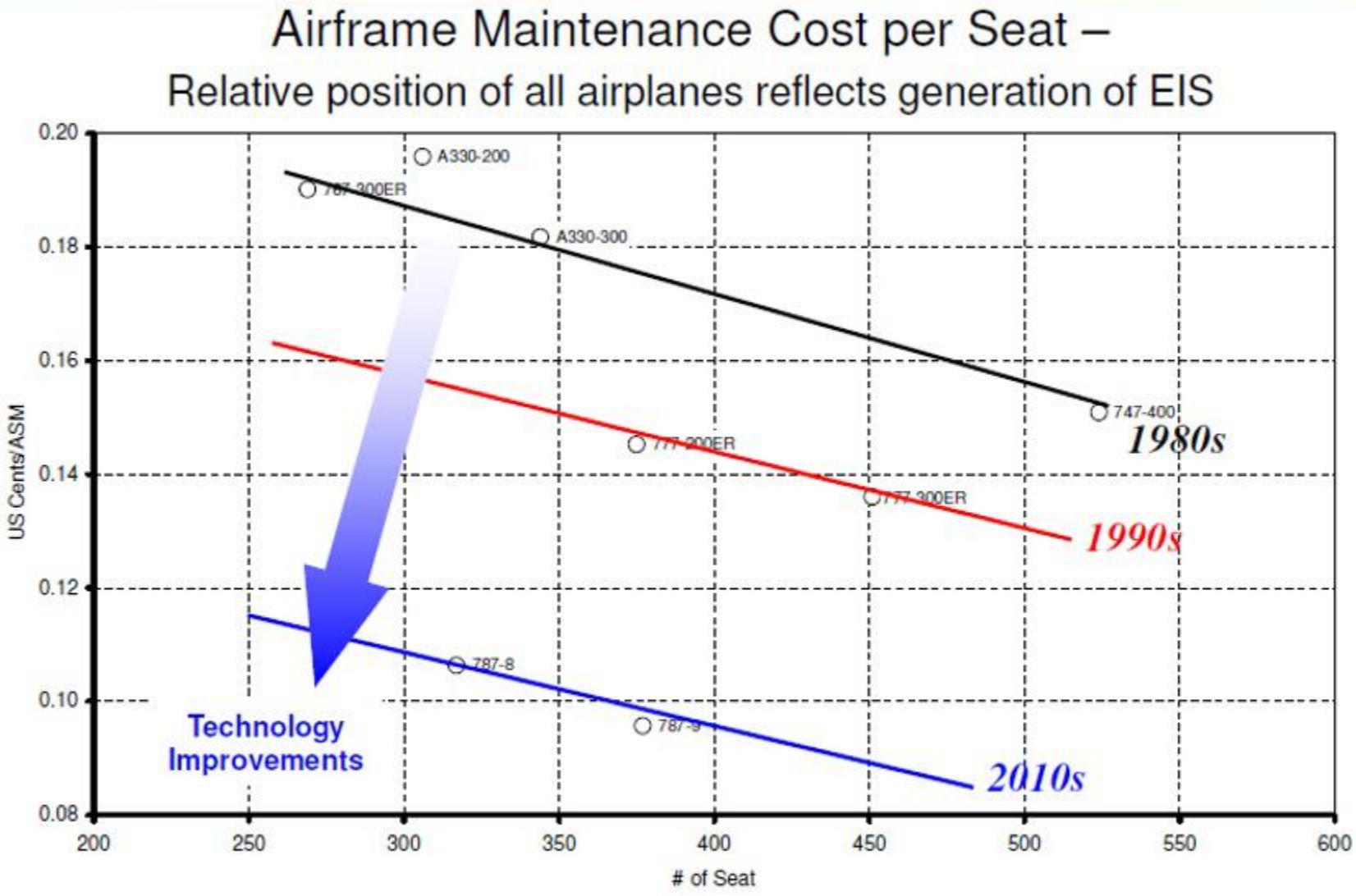
5. Less time on the ground more time in revenue service

- Longer intervals between routine checks
- Fewer tasks to accomplish within those checks
- Less unscheduled maintenance

	787	777	767/A330 /A340
Line	1,000 FH	1000 FH	750 FH
Base	12,000FH 36 mo	37 mo	6,000 FH 18 mo
Heavy	12 yr	8 yr	6 yr
Landing Gear	12 yr	10yr	10yr

More pressure for MRO Efficiency

Newer generation airplanes less to maintain



787 Designed for Lower Operation Cost-and 30% lower airframe Maintenance cost

Low Fuel Burn

Low Fees

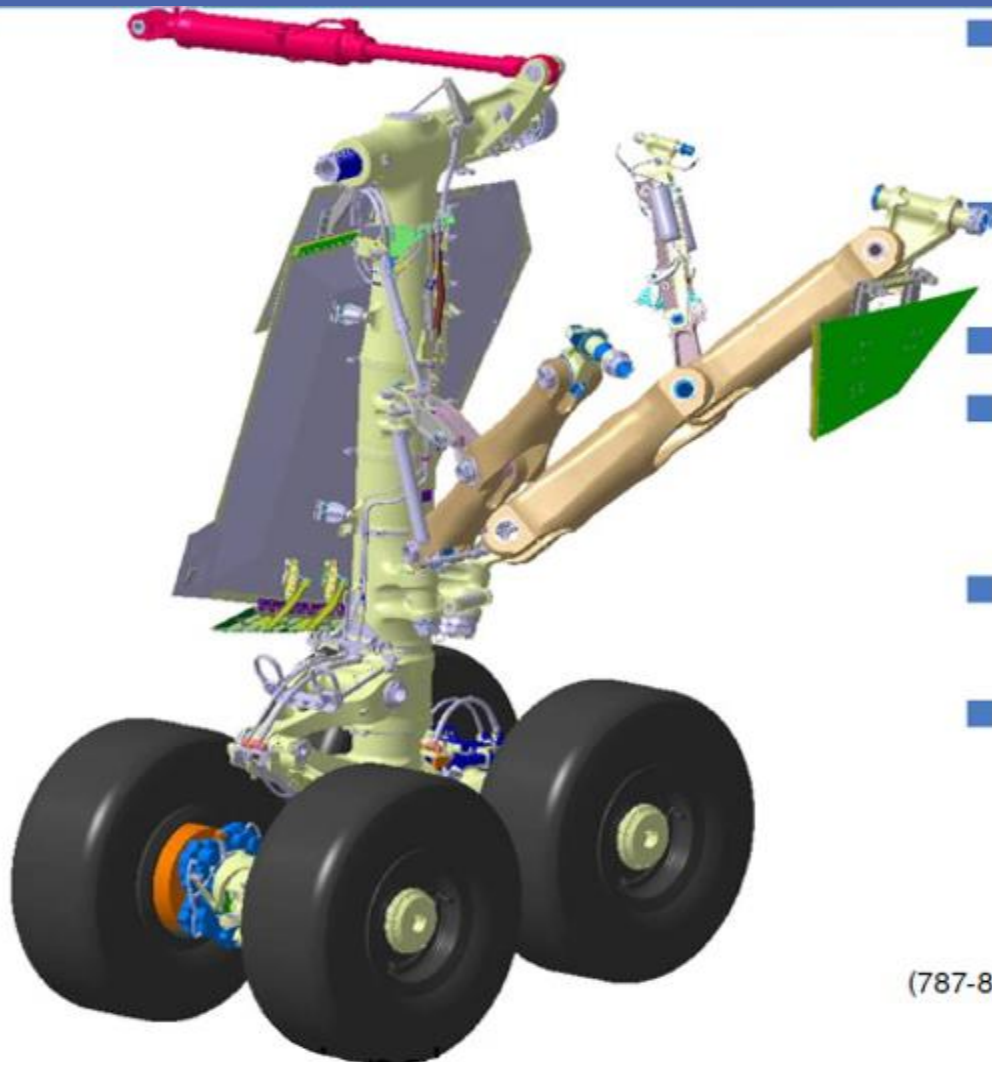
Low Maintenance Cost

Mixed Fleet Flying

Standard Airplane

Services Plan

What does new technology mean for airlines and MRO



- Composites repair facilities and composites expertise at base maintenance
- Move away from skill based training to common trade
- Effective IT Systems
- Growth in IFE, installation, refurbish and maintenance MRO work
- Stronger Maintenance Control Centers
- Less airplane in hangar – faster hangar turn times

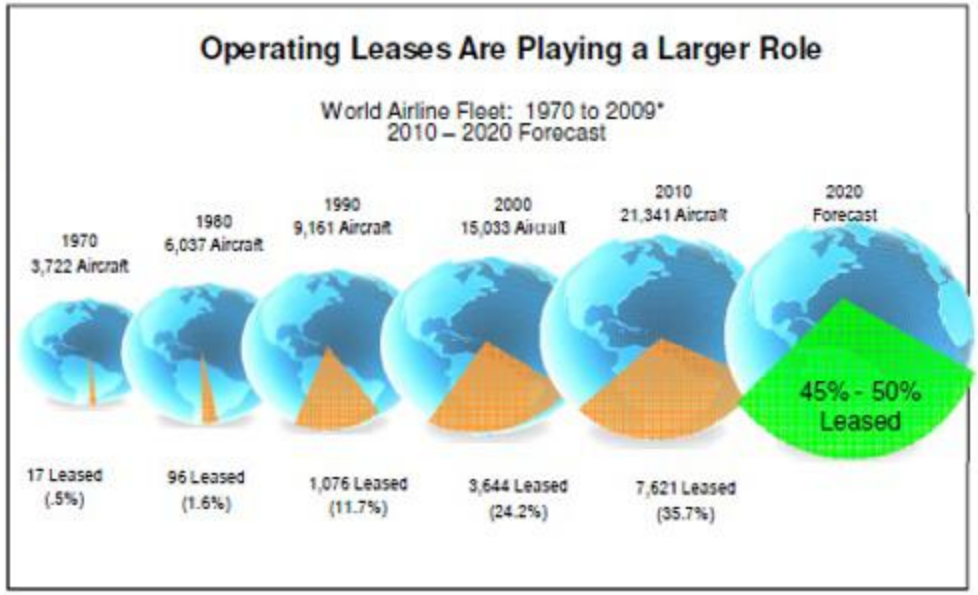
(787-8)

Additional Day in services in service means $65,000 profit opportunity

6. The leasing Market Continue to grow…

- **Lease demand is expected to grow from 36% today, to 50% by 2020 driven by increasing demand from airlines**
- **Leasing continue to evolve**
  - Realigning ownership and capitalization strategies (raised over $16B in 2010)
  - More fragmentation / niche players
  - Emerging new entrants

- Increased quantity of airplanes coming off-lease and will require to fulfill lease return conditions (C-Checks, paintings and reconfiguration etc). Cross border movement of leases adds registration, records and administrative costs

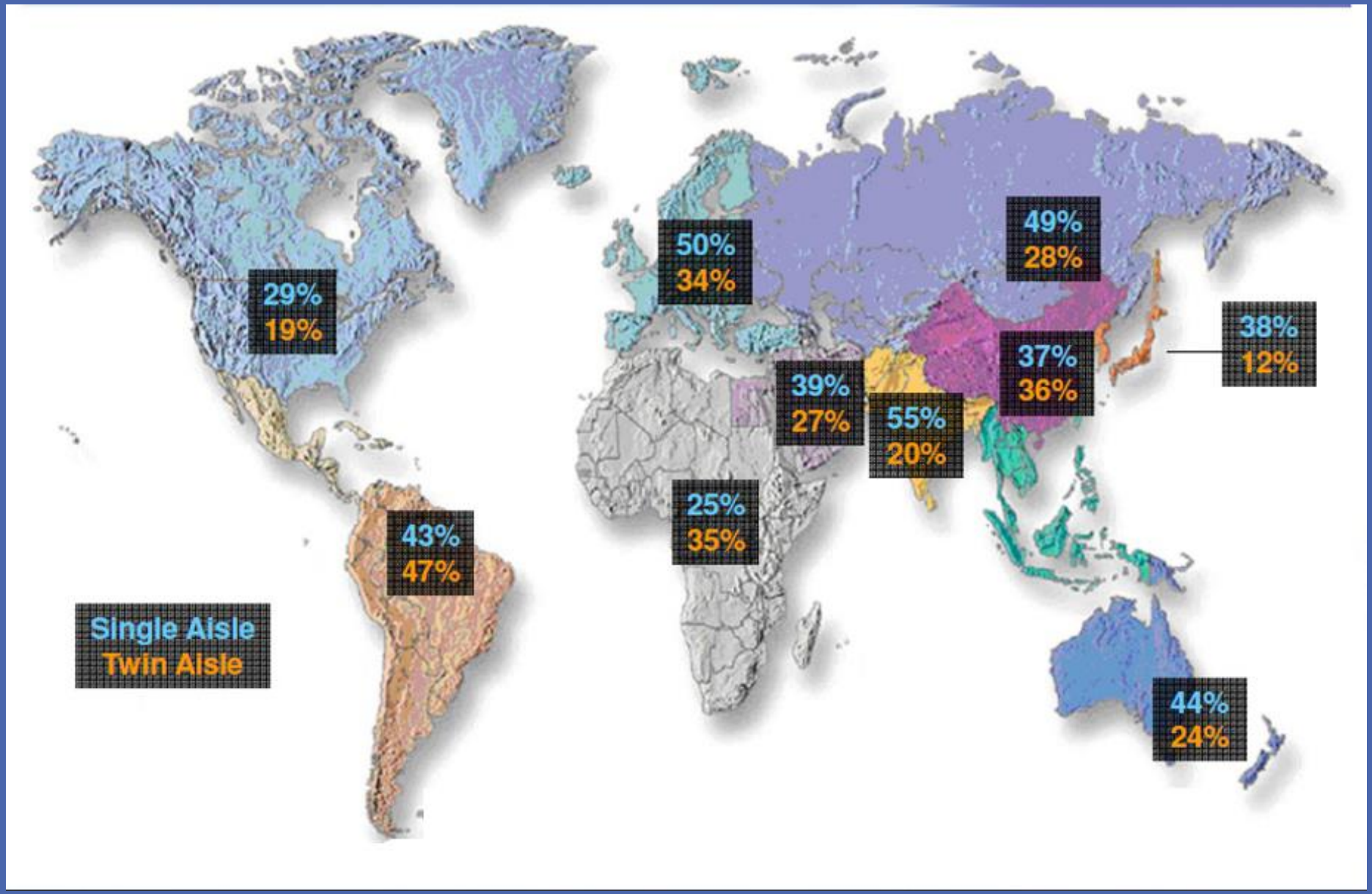


By 2020 Lessors will control 50% of the worlds fleet

Increasing Leased Airplanes –

Increased industry cost for compliance with return conditions and regulatory process

Global Share of Lease Market



Lease return conditions will require more maintenance and more records validation

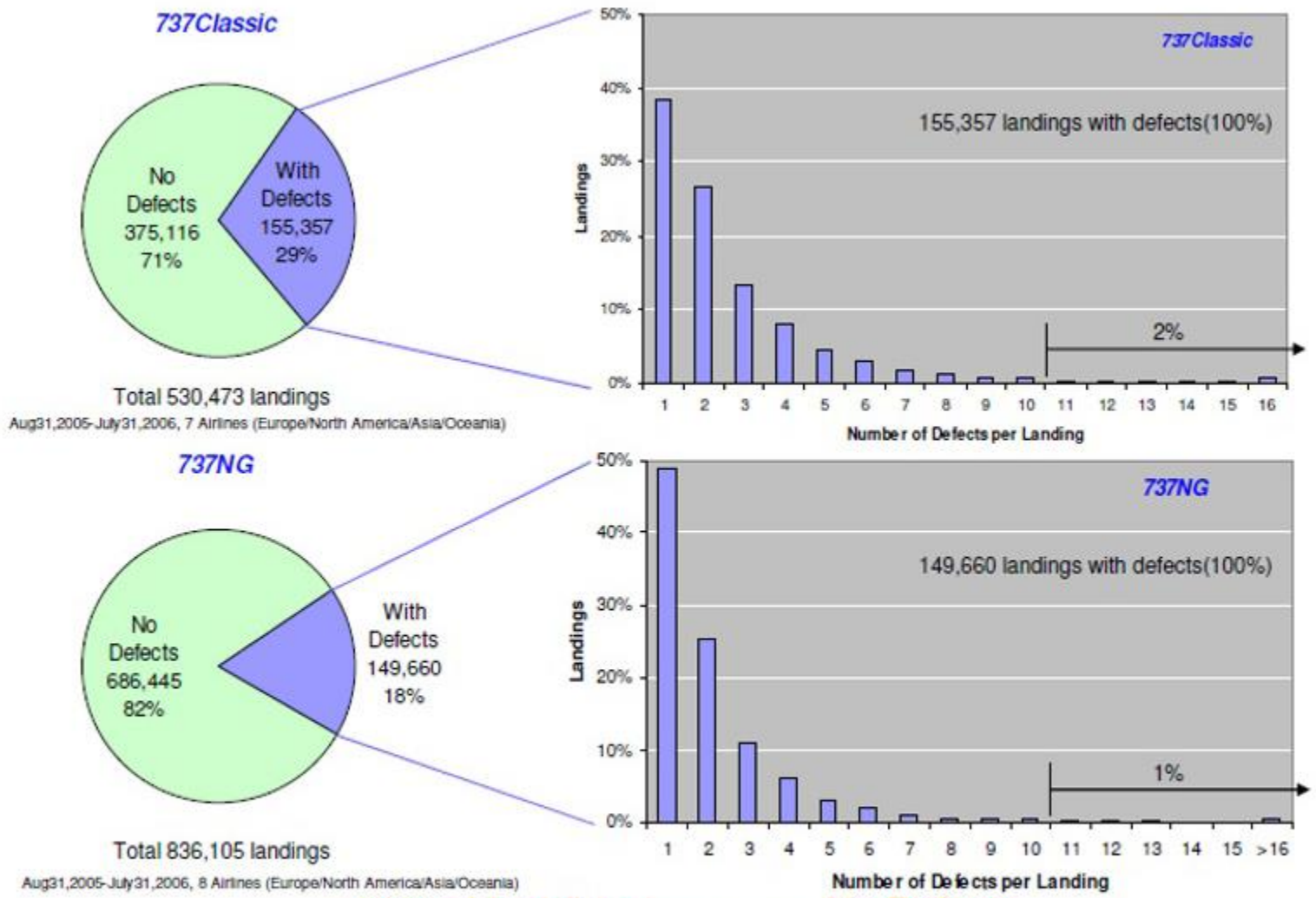
- Premature inspection (usually C-Check as a return condition)
- Duplication of inspections
- Duplication of registrations
- Individual certificates:
  - Maintenance checks
  - Recertification of components
  - Inspection of aircraft
- Export/import process
- Test flight requirements

Impact: Increasing MRO work - $263,000 per transfer

7. Mechanic on-call –increasing trend on single aisle airplanes

- 80% of Flights (Single Aisle) have no reported defects
- Airlines increasingly implementing a system of "mechanic-on-call"
- Almost fully in practice in USA and Western Europe
- Being adapted slowly in other countries
- 30% Line labor saving estimated

Number of landings with no defects – Single Aisle



Summery – Aviation MRO Opportunities

- Fast growth in MRO size in Asia and India –7.2% and 14.2% growth
- Outsourced work from Europe, America and Middle East has big potential for being sourced to Asia – infrastructure and marketing is lacking
- Fuel Burn reduction is potential MRO growth area
- IFE installation, refurbishment and maintenance – huge opportunity
- Mechanics Licensing System needs to harmonized with international (EASA and FAA etc) systems for efficiency and transnational work movement
- Mechanics training systems and courses need to be harmonized - Training
- Enterprise MRO IT systems need to be deployed for effective control of costs production control and records and to use next generation airplane health monitoring systems

Q & A


Thank You
THAI